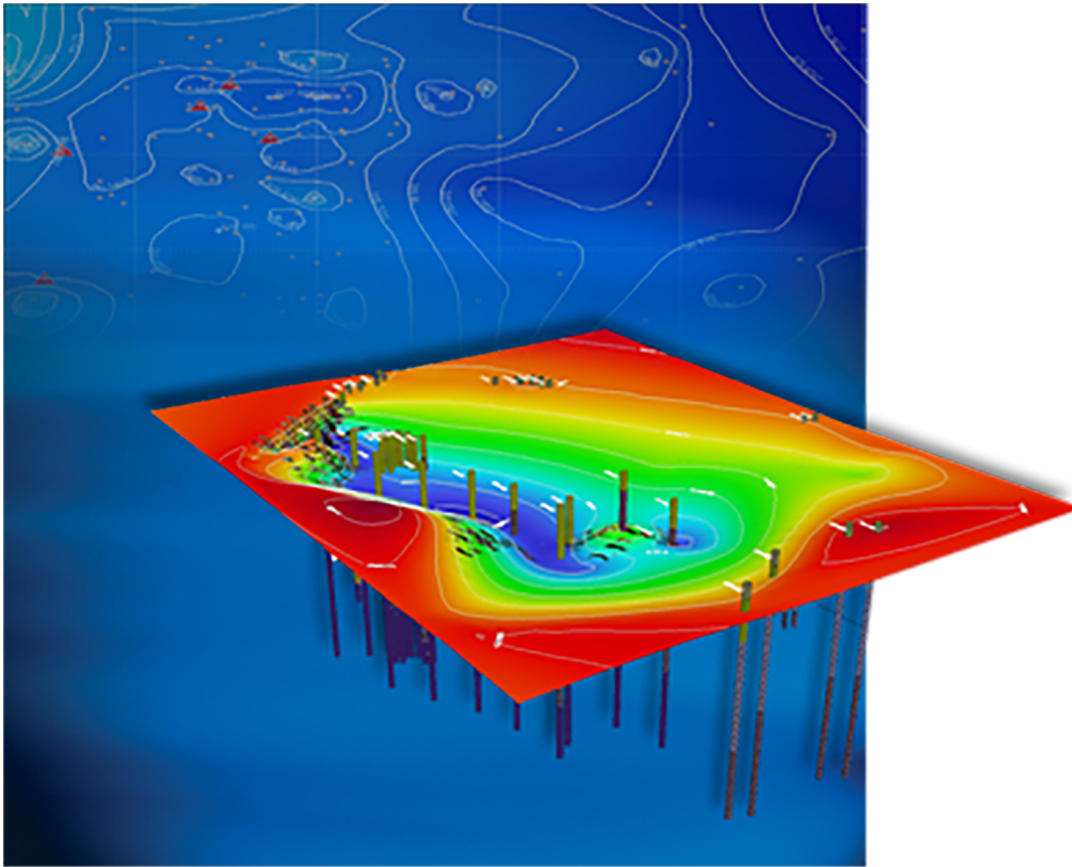


# User's Manual



# Hydro GeoAnalyst 8.0

From Data Discovery to Delivery

© 2018 by Waterloo Hydrogeologic

**Waterloo**  
HYDROGEOLOGIC

**NX** NOVA  
METRIX

Waterloo Hydrogeologic, Inc.  
630 Riverbend Drive, Suite 100  
Kitchener, ON N2K 3S2  
CANADA

[www.waterloohydrogeologic.com](http://www.waterloohydrogeologic.com)  
© 2018 by Waterloo Hydrogeologic . All rights reserved.

Published: September 2018 in Waterloo, Canada

All rights reserved. No parts of this work may be reproduced in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems - without the written permission of the publisher. While the information presented herein is believed to be accurate, it is provided "as-is" without express or implied warranty.

Specifications are current at the time of printing.  
Errors and omissions excepted



# Table of Contents

Foreword	0
<b>Part 1 Introduction to Hydro GeoAnalyst</b>	<b>1</b>
1 Installation and Licensing .....	2
2 Updating Old Projects .....	2
<b>Part 2 Demo Project Tutorial</b>	<b>4</b>
1 Navigating the Interface .....	5
2 Entering Data .....	9
3 Querying .....	10
4 Review Lithology Data .....	13
5 Review Well Construction Data.....	17
6 Review Monitoring Event Data.....	21
7 Maps .....	45
8 Cross-Sections .....	52
9 3D Visualizations .....	57
10 Online Sharing .....	64
<b>Part 3 Fundamental Concepts</b>	<b>80</b>
1 Start Page Tab .....	81
2 About the Interface .....	82
3 Toolbars .....	85
4 Station Table .....	87
5 Station Groups .....	88
6 Data Categories .....	90
7 Adjustable Windows .....	92
8 Project Tree & Station Picker Tab.....	94
9 Station List Tab .....	97
10 Station Data Tab .....	99
11 Non Station Data Tab .....	101
12 Data Query Tab .....	103
13 Data Filter Tab .....	112
14 Data Entry .....	113
15 EDD Workflow .....	114
EDD Template Designer .....	114
HGA Quick Checker .....	117
EDD Import .....	122
Mobile EDD .....	125

16	Spatial Geo_Point .....	134
<b>Part 4 Menu Bar</b>		<b>138</b>
1	Project .....	138
	HGA Settings .....	146
2	View .....	153
3	Modules .....	154
	Online Sharing .....	156
	Template Manager .....	156
	User Manager .....	157
	Quick Checker .....	157
	Import .....	158
	EDD Template Designer .....	158
	Query Builder .....	161
	Quality Control .....	161
	Material Specifications Editor .....	161
	List Editor .....	164
	Event Planning .....	166
	Time Series Plotting .....	166
	3D Interpolation .....	166
	Well Profile .....	172
	Map Manager .....	173
	Cross Section Editor .....	173
	Scene Viewer .....	173
	AquiferTest .....	174
	AquaChem .....	179
	Parameter List Editor .....	181
4	Database .....	181
	Manage Databases .....	181
	BackUp Database .....	183
5	Help .....	184
	Contents .....	184
	About .....	184
	Release Notes .....	184
	View Log File .....	184
	Email Log File .....	184
	Problem Steps Recorder .....	184
	License... .....	185
<b>Part 5 Creating New Projects</b>		<b>186</b>
1	Select Data Source .....	186
2	Select Template .....	188
3	Provide Project Details .....	189
<b>Part 6 Template Manager</b>		<b>193</b>
1	Interface .....	193
2	How to add Tables and Fields .....	195
3	How to set a Field to use a List .....	197

4	How to Adjust Table Relationships.....	198
5	Managing Database Templates.....	202
<b>Part 7 User Manager</b>		<b>204</b>
<b>Part 8 Import Data</b>		<b>208</b>
1	General .....	209
2	EDD .....	214
3	Mobile EDD .....	216
4	Chemical .....	219
5	Diver .....	225
6	LAS .....	231
<b>Part 9 Query Builder</b>		<b>237</b>
1	Query Types .....	237
2	About the Interface .....	238
3	Standard Select Query - Example.....	240
4	Dynamic Station Group Query - Example.....	246
5	Using SQL Commands - Example.....	250
6	Aggregate Functions .....	254
<b>Part 10 Event Planning</b>		<b>256</b>
1	About the Interface .....	256
2	Schedule Stations .....	257
3	Event Plan Wizard .....	260
4	Event Plan Closure .....	272
5	Manage Event Plans .....	274
<b>Part 11 Lab Quality Control</b>		<b>276</b>
1	Preparing Your Data for QC Analysis.....	276
2	Define A New Lab Quality Template.....	279
	Check Duplicates Settings.....	280
	Check Spiked Settings.....	281
	Check Blanks Settings.....	282
	Check Dilution Factor Settings.....	283
	Check Method Detection Limit Settings.....	284
	Check Holding Time Settings.....	286
3	Perform Lab Quality Assessment.....	288
<b>Part 12 Time Series Plotting</b>		<b>293</b>
1	About the Interface .....	293
2	Adding Plots .....	297
	Add Plot .....	298

	Field Mappings.....	298
<b>3</b>	<b>Plot Settings</b> .....	<b>304</b>
	Style and Display Settings .....	306
	Data Series Settings .....	309
<b>4</b>	<b>Adding Lines to a Plot</b> .....	<b>312</b>
<b>5</b>	<b>Saving, Exporting, and Printing</b> .....	<b>314</b>
<b>6</b>	<b>Managing Plot Templates</b> .....	<b>316</b>
<b>Part 13</b>	<b>Well Profile</b>	<b>318</b>
<b>1</b>	<b>Well Profile Interface</b> .....	<b>318</b>
<b>2</b>	<b>Scale Column</b> .....	<b>321</b>
<b>3</b>	<b>Lithology Column</b> .....	<b>323</b>
<b>4</b>	<b>Interval Column</b> .....	<b>325</b>
<b>5</b>	<b>Depth Column</b> .....	<b>327</b>
<b>6</b>	<b>Well Construction</b> .....	<b>329</b>
<b>7</b>	<b>Plot Column</b> .....	<b>331</b>
<b>8</b>	<b>Display on Cross Section</b> .....	<b>335</b>
<b>Part 14</b>	<b>Map Manager</b>	<b>337</b>
<b>1</b>	<b>About the Interface</b> .....	<b>337</b>
	Grouping Layers .....	339
	Description of Toolbar Items.....	340
<b>2</b>	<b>Description of Menu Items</b> .....	<b>342</b>
	Project .....	342
	Layer .....	346
	New .....	346
	Open .....	347
	Load HGA Data.....	350
	Import .....	352
	Save .....	359
	Delete .....	359
	Create Intersection.....	359
	Properties .....	360
	Statistics .....	360
	Renderer.....	361
	Create Thematic Map.....	368
	Modify Thematic Map.....	370
	Create Contours .....	370
	Create Gridded Data.....	375
	Display Data.....	375
	Edit .....	384
	Tools .....	385
	View .....	389
	Select .....	391
	Settings .....	393
	Help .....	397
<b>3</b>	<b>Defining a Cross Section Line</b> .....	<b>397</b>

<b>Part 15 Cross Section Editor</b>	<b>401</b>
1 About the Interface .....	401
2 Description of Menu Items .....	404
Project .....	404
Edit .....	407
View .....	412
Tools .....	415
Help .....	423
3 Cross Section Interpretations.....	423
Loading Surface Layers.....	424
Geology Layer Interpretations .....	425
Hydrogeologic Layer Interpretations .....	428
Model Layer Interpretations .....	429
Defining Model Layers .....	429
Drawing Model Interpretation Layers.....	430
Snapping Vertices to Other Model Layer Lines .....	432
Editing Model Layers.....	433
Remove Stations from Cross Sections .....	434
4 Querying Cross Section Interpretations.....	435
5 Adding Annotations to the Cross Section.....	436
6 Limitations .....	438
<b>Part 16 Scene Viewer</b>	<b>440</b>
1 Scene Viewer Interface .....	441
2 Adding Data to a Scene .....	443
Station Groups .....	445
Cross Sections .....	446
Plumes .....	448
DXF files .....	456
Image files .....	458
Shape Files .....	459
Surfaces .....	460
3 Saving and Recalling Scenes .....	462
<b>Part 17 Online Sharing</b>	<b>464</b>
<b>Part 18 Report Editor</b>	<b>474</b>
1 About the Interface .....	474
2 Report Designer Window .....	475
Report Designer Toolbars .....	475
Toolbox options for General Tools .....	479
Label .....	479
Field .....	479
Check Mark.....	480
Image .....	480
Line .....	481
Shape .....	481
Rich Text .....	481

Frame .....	481
Sub Report.....	481
Page Break.....	481
OLE .....	481
Barcode .....	481
ActiveReport.....	482
Using the Report Designer .....	482
<b>3 Report Viewer Window .....</b>	<b>487</b>
Report Viewer Toolbars.....	488
Using the Report Viewer .....	489
<b>4 Report Settings .....</b>	<b>489</b>
<b>5 Creating Reports .....</b>	<b>493</b>
Creating Reports in HGA-Main Window .....	493
Creating a Report Containing a Map Project .....	496
Creating a Report Containing a Cross Section .....	496
<b>6 Managing Reports .....</b>	<b>497</b>
<b>7 Creating and Managing Report Templates.....</b>	<b>498</b>
<b>8 Import Reports from MS Access.....</b>	<b>499</b>
<b>Part 19 Appendices .....</b>	<b>503</b>
<b>1 Appendix A: Project Files and Directory Structure.....</b>	<b>503</b>
<b>2 Appendix B: Advanced Interpolation Settings.....</b>	<b>505</b>
<b>3 Appendix C: Map Manager: ISO Codes.....</b>	<b>510</b>
<b>4 Appendix D: Online GIS Data Resources.....</b>	<b>511</b>
<b>5 Appendix E: Frequently Asked Questions (FAQ's).....</b>	<b>516</b>
<b>6 Appendix F: Configuring Geotransformation Settings.....</b>	<b>516</b>
<b>Part 20 Troubleshooting .....</b>	<b>519</b>
<b>1 Connection Problems .....</b>	<b>519</b>
<b>Index .....</b>	<b>521</b>

# 1 Introduction to Hydro GeoAnalyst

Hydro GeoAnalyst (HGA) is the most comprehensive, and yet easy-to-use, environmental data management system, providing data validation, analysis, and visualization. The HGA package integrates a list of flexible and customizable database structures used around the world, complimented by state-of-the-art tools for data interpretation, statistical analysis, Geographical Information System (GIS) mapping, data charting, and two- and three-dimensional visualizations.

For most environment-related projects, whether they are contaminated sites or municipal water supply projects, there is often an abundance of data that has been collected over the years. How many times have you had to sift through several paper reports for that one piece of information when compiling monthly summaries on a project? Can you be sure that you have not misplaced a report or failed to mention an important piece of data?

The HGA package addresses these and many other needs in the industry. The system enables you to create a project specific database, or enhance and build upon your existing database. It can collect all of your previous data and reports and consolidate them into a powerful relational database system that can be queried and referenced with ease.

HGA operates as a desktop application based on Microsoft SQL Server technology.

Some typical applications for HGA include:

- Regional water well management
- Contaminant site inventory
- Regulatory compliance
- Geologic cross sections
- Public access to information
- Environmental site assessment
- Monitored natural attenuation
- Regional aquifer characterization and management
- Cross-boundary data sharing
- Aquifer vulnerability mapping

HGA is implemented through a number of modules, each performing a specific task. This approach allows HGA to be memory efficient, flexible, and expandable.

The following modules are for the purposes of Data Management:

- User
- Template Manager
- Data Transfer System
- EDD Workflow
- Event Planning
- Query Builder
- Lab QA/QC
- List Editor
- Material Specification

Interpretation of geologic and hydrogeologic data is made easy with the visualization modules that are provided in HGA. Using these tools, raw data can be transformed into meaningful spatial data sets. HGA offers a collection of standard and custom modules for interpreting vast amounts of spatial data. Some of these modules are briefly described in the following sections. The following modules are for the purposes of Analysis and Visualization:

- Time Series Plot
- Well Profile
- Map Manager
- Cross Section Editor
- Scene Viewer
- Online Sharing

Additionally, HGA has several options for generating reports from the various modules.

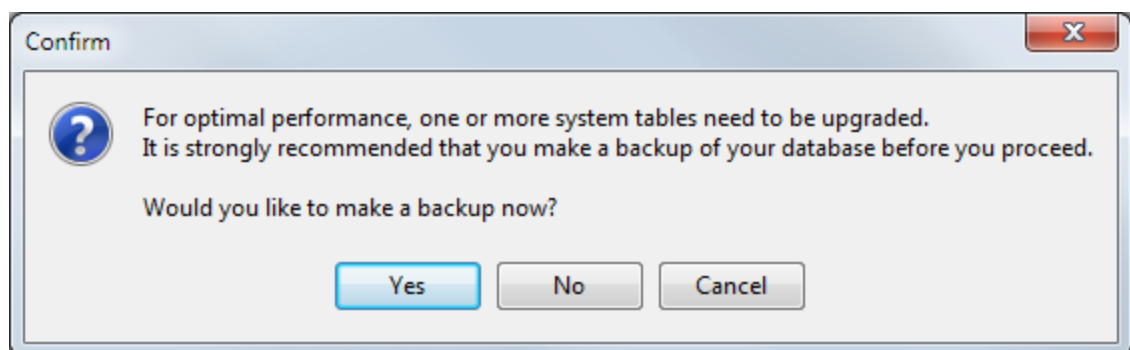
## 1.1 Installation and Licensing

For information regarding the Installation and Licensing of HGA please refer to the [HGA Getting Started](#) page.

If you have any problems with your particular system configuration, please make sure that you followed the installation instructions precisely. If the problem is still unresolved, contact your hardware experts. Finally, if you are still having trouble, you may consider contacting our Support team [support@waterloohydrogeologic.com](mailto:support@waterloohydrogeologic.com).

## 1.2 Updating Old Projects

HGA is fully compatible with projects created in earlier versions of HGA. The first time you open a project from a previous version you may be prompted to convert your database to the new format. A dialog similar to the one shown below will display.





At this time, you will have the option to create a back up copy of your database, which is highly recommended.

Click the **Yes** button to create a back up copy of your database. Otherwise, click No to continue with the database upgrade without creating a backup (Not Recommended). Selecting the Cancel button will cancel opening the project.

In addition, it is recommended that you create a backup of the "Projects" directory before you open projects in the new version of HGA. This can be done using the options in "My Computer", or "Windows Explorer".



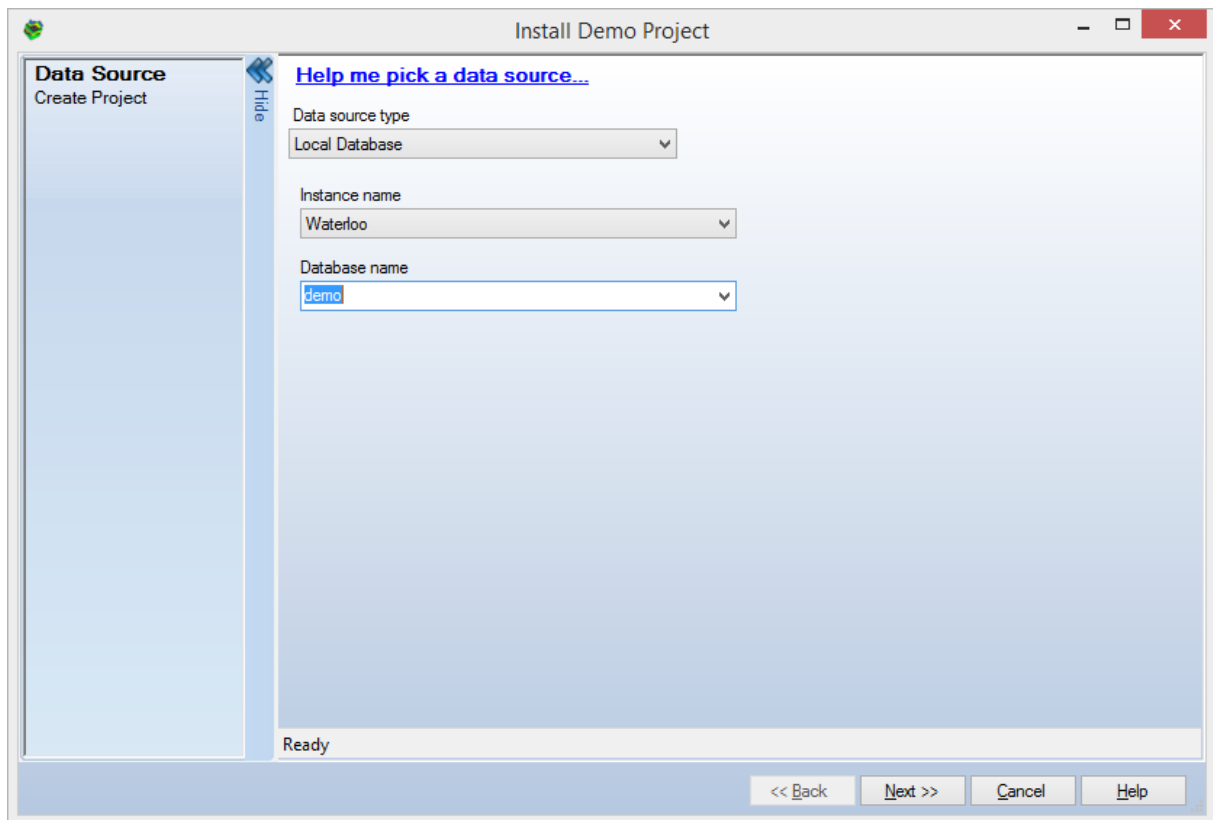
**Please Note:** Waterloo Hydrogeologic is not responsible for any direct or indirect damages, however caused, if project data has not been securely and independently backed up. You are strongly encouraged to frequently back-up your HGA project folder and the SQL Server database.

## 2 Demo Project Tutorial

The Demo Project is loaded with data and saved outputs like queries, maps, cross sections and more! This tutorial will show you how to install the Demo Project and then guide you through it so you can become familiar with HGA and what you can accomplish with the program!

You can install the Demo Project from within the program by selecting Project / Install the Demo Project (there is also an option to do this from the Start Page).

Select the Data source type - the simplest option is the Local Database which is installed on your machine when you install HGA. Simply select Waterloo as the instance and provide a Database name (e.g. demo) and then select Finish to Install the Demo Project.



If you prefer you can install the Demo Project to other SQL Servers running on your machine or network - but you must ensure you have appropriate permissions.

- The Demo Project files will be installed to the location designated under Project / HGA Settings (the Project tab).
- The default location is under Documents / Hydro GeoAnalyst.

Once the Demo Project is finished installing it will automatically open and you can see it is populated with data.

The screenshot displays the Hydro GeoAnalyst 2016.1 [Demo 2016.1] application window. The interface includes a menu bar (Project, View, Modules, Database, Help), a toolbar, and a Project Tree on the left. The main area shows a 'Station List' table with columns for ID, Station Name, X(m), Y(m), Elevation(m), TOC(m), and Station Type. The 'Station Picker' window is open below the Project Tree, showing a list of all stations with 'MW-1' selected.

ID	Station Name	X(m)	Y(m)	Elevation(m)	TOC(m)	Station Type
1	MW-1	535,250.19	4,814,315.00	332.10	331.80	Observation Well
2	MW-3	536,668.13	4,814,036.00	334.80	332.10	Observation Well
3	OW-2	535,535.50	4,814,905.00	333.90	330.90	Observation Well
4	OW-4	536,720.69	4,814,826.00	335.40	331.60	Observation Well
5	W-05	535,548.40	4,814,637.30	331.00	332.00	Observation Well
6	W-06	535,459.40	4,814,704.90	330.80	331.80	Observation Well
7	W-07	535,476.10	4,814,781.10	330.90	331.90	Observation Well
8	W-08	535,469.50	4,814,652.70	330.60	331.60	Observation Well
9	W-09	535,484.70	4,814,546.50	329.90	330.90	Observation Well
10	W-10	535,626.80	4,814,652.90	329.50	330.50	Observation Well
11	W-11	535,545.90	4,814,553.50	332.10	333.10	Observation Well
12	W-12	535,637.70	4,814,582.90	330.20	331.20	Observation Well
13	W-13	535,800.00	4,814,637.50	329.90	330.90	Observation Well
14	W-14	535,674.60	4,814,800.00	330.40	331.40	Observation Well
15	W-15	535,687.40	4,814,665.30	330.50	331.50	Observation Well
16	W-16	535,390.00	4,814,741.90	329.90	330.90	Observation Well
17	W-17	535,577.40	4,814,477.10	329.30	330.30	Observation Well
18	W-18	535,677.10	4,814,416.20	330.50	331.50	Observation Well
19	W-19	535,584.50	4,814,300.00	329.90	330.90	Observation Well
20	W-20	535,599.70	4,814,371.80	330.20	331.20	Observation Well
21	W-21	535,492.90	4,814,477.20	331.10	332.10	Observation Well
22	W-22	535,635.20	4,814,503.80	330.80	331.80	Observation Well
23	W-23	535,588.40	4,814,667.30	331.10	332.15	Observation Well
24	GB-01	536,212.69	4,814,030.00	323.50	324.50	Borehole
25	GB-02	536,156.69	4,814,050.00	326.00	327.00	Borehole
26	GB-03	536,079.69	4,814,070.00	326.00	327.00	Borehole
27	GB-04	535,953.69	4,814,020.00	322.00	323.00	Borehole
28	GB-05	535,848.69	4,814,060.00	324.00	325.00	Borehole
29	GB-06	535,743.69	4,814,070.00	330.50	331.90	Borehole
30	GB-07	535,652.69	4,814,030.00	333.00	334.00	Borehole
31	GB-08	535,498.69	4,814,040.00	329.50	330.50	Borehole
32	GB-09	535,386.69	4,814,060.00	329.50	330.50	Borehole
33	GB-10	535,295.69	4,814,030.00	338.00	339.00	Borehole
34	GB-11	535,232.69	4,814,000.00	339.50	340.50	Borehole
35	GB-12	536,225.92	4,814,281.80	325.93	326.93	Borehole

Station Group: All Stations Rows: 151 Selected: 0

## 2.1 Navigating the Interface

The HGA interface includes a menu and toolbar on the top as well as a project tree to the left and the data tabs on the right. Additionally several of the modules will launch as a tab. Within HGA the concept of Stations is used throughout - these are simply a location - often including an x and y coordinate. The Station Picker can be found below the Project Tree.

The screenshot shows the Hydro GeoAnalyst 2016.1 [Demo 2016.1] interface. The main window is titled "Hydro GeoAnalyst 2016.1 [Demo 2016.1]". The interface is divided into several sections:

- Menu and Toolbar:** Located at the top, containing icons for Project, View, Modules, Database, and Help.
- Project Tree:** Located on the left side, showing a hierarchical view of the project data. The tree includes nodes for Station Groups (All Stations, Boreholes, Boreholes\_with\_plot\_dat), Monitoring\_Wells, QC\_Monitoring\_Wells, Soil\_Borings, WQ\_Stations, Clay\_thicker\_than\_2m, Soil\_Borings\_with\_TCE, Queries, Time Series Plots, Well Profile Templates, Map Projects, Cross-Sections, and Scenes.
- Station Picker:** Located below the Project Tree, showing a list of station names. The selected station is MW-1.
- Data tabs:** Located on the right side, displaying a table of station data. The active tab is "Station List". The table has columns for ID, Station Name, X(m), Y(m), Elevation(m), TOC(m), and Station Type. The table contains 35 rows of data.

The status bar at the bottom indicates "Station Group: All Stations Rows: 151 Selected: 0".

When first opening HGA the default window displays will appear. There are two tab groups one with the Project Tree and Station Picker (on the left) and one with 4 tabs; Station List, Station Data, Data Query, and Data Filter (on the right). The tabs provide you with different ways of viewing the data in the database.

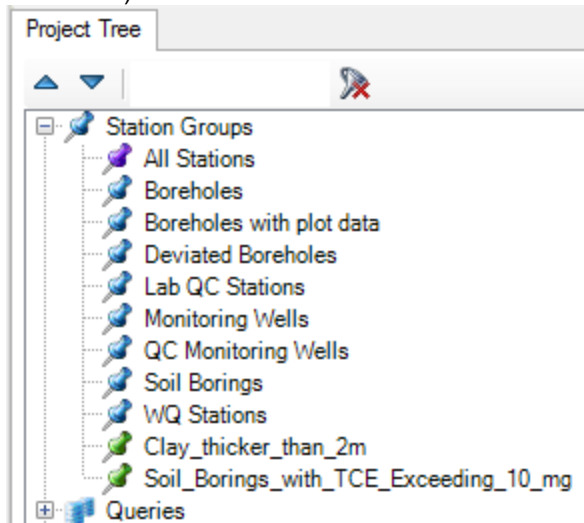
However, the HGA interface is adjustable - you can change the layout to suit your needs. You can find more information [About the Interface](#) and about the [Adjustable Windows](#) in the Fundamental Concepts section of the help.

All spatial data in the Demo Project is projected according to the NAD1983 UTM Zone 17N coordinate system. This information is defined during project creation and can be viewed by selecting Project / Properties, from the menu.


The Project Tree can be easily expanded to see all the nodes and entities of the Demo project. Take a moment to inspect the items under each node in the Project Tree.


In HGA, stations can be sorted into groups allowing for efficient management and quick retrieval of data stored in the database. All station groups created for a project are listed in the Project Tree under the Station Groups node. Double clicking on any of the branches corresponding to a station group will load the Station List tab, and display the appropriate stations belonging to that group.


In the Demo Project, there are several station groups (for example; All Stations, Boreholes, Monitoring Wells etc.).



There are three kinds of Station Groups in HGA:

 **All Stations:** This station group is in all projects and all stations that are entered (imported or manually) into the project will be found in this station group. You can not delete or rename this station group.

 **Static:** Select one or more stations directly in the Station List tab, right-mouse click, and select the Add to Station Group option from the pop up menu.

 **Dynamic:** Using the query builder, define a more advanced search criteria, and build a station group with those stations that satisfy the query criteria.

Once the stations in a group are displayed, a number of operations can be applied based on the selection.

To find out more about Station Groups please refer to [Station Groups](#).

Using the sorting and filtering options, you can also select different views for the data. For example, it may be helpful to view just the stations at specific elevation.

To do this:

- Double click the All Stations from the Station Groups branch of the tree
- Select the Elevation column in the Station List

This will sort the values in the elevation column from lowest to highest (arrow is displayed in the column header) and you can see station GB-34 has the lowest elevation at 321.09m. If you select the Elevation column again it will sort the values from highest to lowest. And now you will see that the highest elevation is 340.49m and this occurs at station GB-33.

Station List							
Station Data							
Data Query							
Data Filter							
Page 1 of 1							
ID	Station Name	X(m)	Y(m)	Elevation(m) ▾	TOC(m)	Station Type	
56	GB-33	535,233.32	4,814,527.90	340.49	341.49	Borehole	
34	GB-11	535,232.69	4,814,000.00	339.50	340.50	Borehole	
67	GB-44	535,243.05	4,814,756.20	338.22	339.22	Borehole	
33	GB-10	535,295.69	4,814,030.00	338.00	339.00	Borehole	
45	GB-22	535,200.00	4,814,293.30	337.59	338.59	Borehole	
66	GB-43	535,272.80	4,814,962.60	337.57	338.57	Borehole	
55	GB-32	535,278.96	4,814,624.00	336.52	337.52	Borehole	
44	GB-21	535,288.76	4,814,296.10	335.95	336.95	Borehole	

Additionally you will find the first row in the data grids is a filter row. You may want to find all the stations in your project that begin with GB. To do this enter GB in the filter row of the Station Name column.

Station List							
Station Data							
Data Query							
Data Filter							
Page 1 of 1							
Filter is applied to your data.							
ID	Station Name	X(m)	Y(m)	Elevation(m) ▾	TOC(m)	Station Type	
	GB						
56	GB-33	535,233.32	4,814,527.90	340.49	341.49	Borehole	
34	GB-11	535,232.69	4,814,000.00	339.50	340.50	Borehole	
67	GB-44	535,243.05	4,814,756.20	338.22	339.22	Borehole	
33	GB-10	535,295.69	4,814,030.00	338.00	339.00	Borehole	

You will see that only the stations which name begin with GB are in the station list.

To clear the filter, simple select the  button in the Station name column. To get the stations back into the original order you can sort on the ID field.

For some fields - like Station Type - you will find there is a drop down menu you can select from. This list is generated by the List Editor.

Station List							
Station Data							
Data Filter							
Data Query							
Page 1 of 1							
ID	Station Name	X(m)	Y(m)	Elevation(m)	TOC(m)	Station Type	
24	GB-01	536,212.69	4,814,030.00	323.50	324.50	Borehole	
25	GB-02	536,156.69	4,814,050.00	326.00	327.00		
26	GB-03	536,079.69	4,814,070.00	326.00	327.00	Borehole	
27	GB-04	535,953.69	4,814,020.00	322.00	323.00	Effluent	
28	GB-05	535,848.69	4,814,060.00	324.00	325.00	Observation Well	
						Open hole	
						Pumping Well	
						Surface Water	
						Test Pit	

The List Editor provides the ability to create and customize lists for just about any field - allowing for efficient and effective data entry. A list in HGA may be considered as a lookup table. To find out more about how to use the List Editor to create and edit lists please refer to [List Editor](#).


If you are wondering about the different fields (columns) you are finding in the Station List and Station Data tab and thinking you would like to be able to add new field - or make adjustments to the existing fields (or tables) in your database - you can! This is done in the Template Manager and you can find more information about this module here: [Template Manager](#).

Please be aware that the Template Manager is a very powerful tool and making changes to the database structure can have impacts on your existing data and your ability to enter or import new data. It is advisable that you have database management understanding to make large scale changes to the database structure. However - for the purpose of this tutorial you can play around within the Template Manager as much as you like to see the effects - as you can always go back to the beginning of the tutorial and re-install the Demo Project which will restore the project and all the data in it!

## 2.2 Entering Data

You can enter data into a project either manually one record (row) at a time or by importing multiple records at a time.

### Manual Data Entry

You can manually enter/edited data in the Station List, Station Data, or Non Station Data tabs. To add a new record (or row) use the  button found at the top of the tabs. You can edit existing data right within the data grids found in the tabs.

You will notice that as soon as you move your cursor out of a newly created record or edited record that the entire row is highlighted yellow. This means that there are edits that need to be saved (use the save button at the top of the tab).

If you need to delete a record you must highlight the entire row and then select the  button.

### Data Transfer System (DTS)

---

It may be more efficient to import the data using the Data Transfer System (DTS).

The DTS give you several options for importing your data:

- General
- EDD
- Mobile EDD
- Chemical
- Diver
- LAS
- Images

For more details on how to import data using the DTS, please refer to [Importing Data](#).

### EDD Workflow

---

If you have several spreadsheets of data you need to import the EDD (Electronic Data Deliverable) workflow would be your best choice. The EDD workflow provides an efficient way of getting validated data into HGA. The workflow includes the following three steps:

1. EDD Template Designer
2. HGA QuickChecker
3. EDD Import

Additionally, we also have an option to make your EDD mobile so you can use it on mobile devices like tablets and smart phones.

For more details on the EDD Workflow please refer to [EDD Workflow](#).

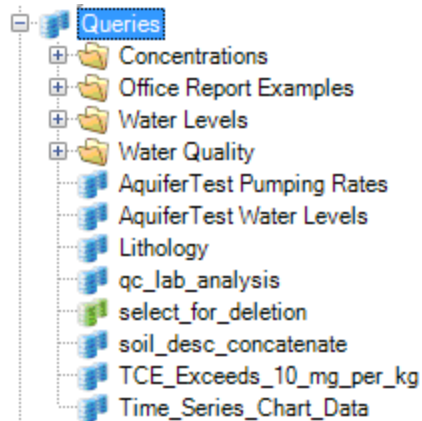
## 2.3 Querying

HGA goes beyond simply storing your data. HGA also provides practical search/query tools to help you access and interact with your data, using the industry-standard 'Structured Query Language' (SQL). Retrieving your data has never been easier!



## Query Builder

Several queries have been created for you in the Demo Project - they are saved in the Project Tree. You will notice that you can group your queries into folders to make it easier to find the query you are looking for.



To run a query and see the results simply double click on the query. For example, double click on the Lithology query and you will see the results displayed on the Data Query tab.

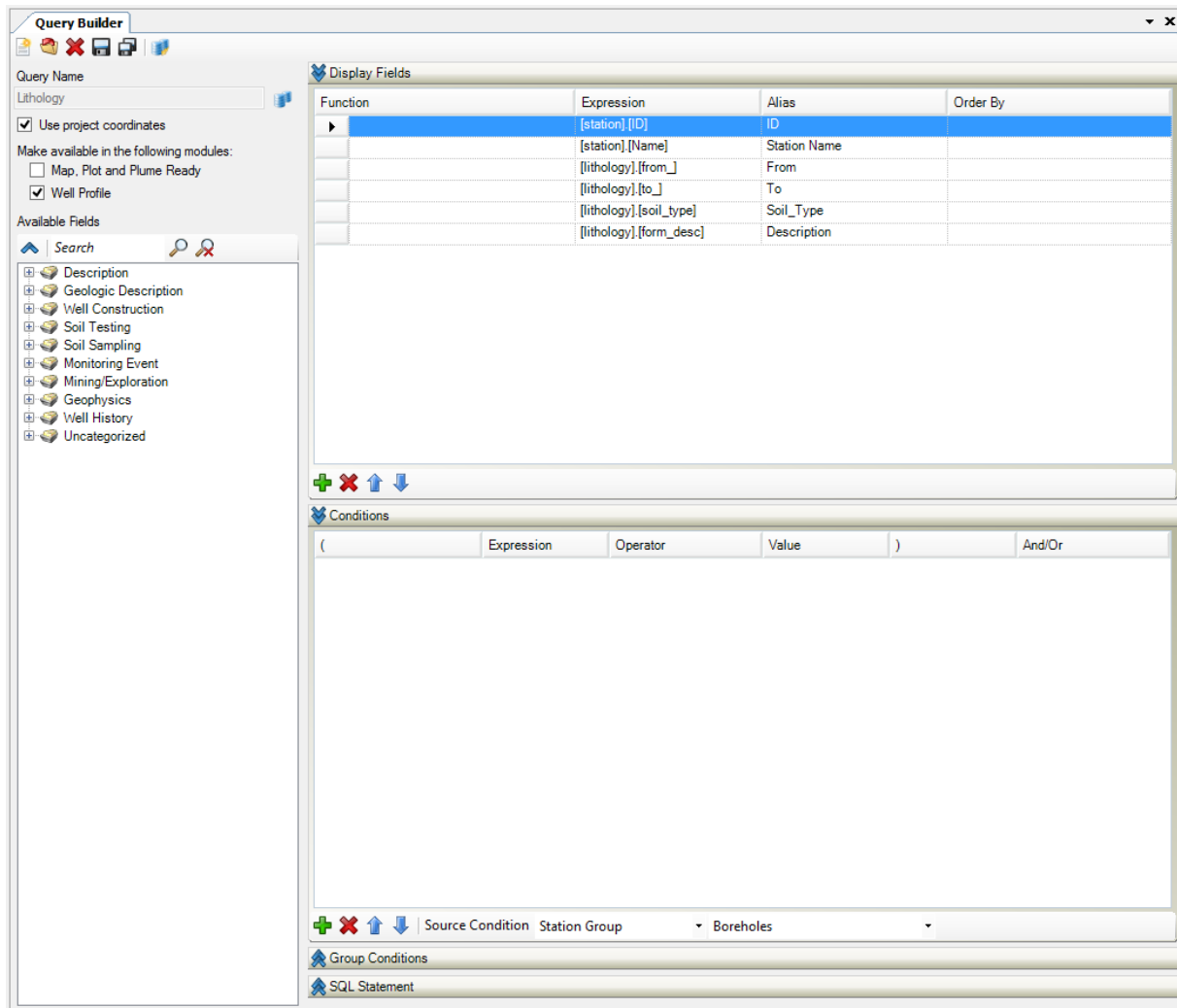
RowId	ID	Station Name	From	To	Soil_Type	Description
1	24	GB-01	.00	6.50	Coarse Gravel	Coarse Gravel
2	24	GB-01	6.50	26.00	Medium Sand	Fine to med sand
3	24	GB-01	26.00	52.00	Gravel	Gravel
4	24	GB-01	52.00	69.00	Fine Sand	Fine sand
5	24	GB-01	69.00	100.00	Silt	Silty clay with traces of gravel an
6	25	GB-02	.00	4.00	Coarse Gravel	Coarse Gravel
7	25	GB-02	4.00	17.00	Medium Sand	Fine to med sand
8	25	GB-02	17.00	48.00	Gravel	Gravel
9	25	GB-02	48.00	66.00	Fine Sand	Fine sand
10	25	GB-02	66.00	94.00	Silt	Silty clay
11	25	GB-02	94.00	100.00	Sand	Silty to Fine Sand
12	26	GB-03	.00	4.00	Coarse Gravel	Coarse Gravel
13	26	GB-03	4.00	8.00	Medium Sand	Fine to med sand
14	26	GB-03	8.00	29.00	Gravel	Gravel
15	26	GB-03	29.00	39.50	Clay	Silty clay
16	26	GB-03	39.50	62.00	Fine Sand	Fine sand
17	26	GB-03	62.00	87.50	Silt	Silty clay
18	26	GB-03	87.50	100.00	Sand	Silty to Fine Sand
19	27	GB-04	.00	8.00	Coarse Gravel	Coarse Gravel
20	27	GB-04	8.00	24.00	Sand	Fine Sand
21	27	GB-04	24.00	33.00	Clay	Silty clay
22	27	GB-04	33.00	54.00	Fine Sand	Fine sand
23	27	GB-04	54.00	80.00	Silt	Silty clay
24	27	GB-04	80.00	100.00	Sand	Silty to Fine Sand
25	28	GB-05	.00	6.00	Coarse Gravel	Coarse Gravel
26	28	GB-05	6.00	26.00	Fine Sand	Fine sand with gravel
27	28	GB-05	26.00	45.00	Clay	Silty clay
28	28	GB-05	45.00	73.50	Silt	Silty clay
29	28	GB-05	73.50	100.00	Sand	Silty to Fine Sand
30	29	GB-06	.00	3.50	Coarse Gravel	Coarse Gravel
31	29	GB-06	3.50	26.00	Fine Sand	Fine sand
32	29	GB-06	26.00	44.00	Clay	Silty clay
33	29	GB-06	44.00	67.00	Silt	Silty clay
34	29	GB-06	67.00	100.00	Sand	Silty to Fine Sand
35	30	GB-07	.00	3.00	Coarse Gravel	Coarse Gravel
36	30	GB-07	3.00	25.70	Fine Sand	Fine sand
37	30	GB-07	25.70	44.00	Clay	Silty clay

Query: Lithology Rows: 224 Selected: 0

The results of a query can be used in other modules - like [Quality Control](#), [3D Interpolation](#), [Well Profile](#), [Map Manager](#) etc. or can be used to push to Excel or PowerPoint to create tables, pivot tables, time series charts, or presentations for reporting purposes.

Review the option on the menu bar of the Data Query tab to discover all the options available to you.

To understand how a query was designed, right-click on the desired query in the Project Tree and select Edit Query. The [Query Builder](#) will open showing you the query design. Here for example is the Lithology query:



The fields you wish to see are in the Display Fields section and the conditions in the Conditions section. For this query there is only a Source Condition - indicating that it should only be run against the data associated with stations that are in the Boreholes station group.

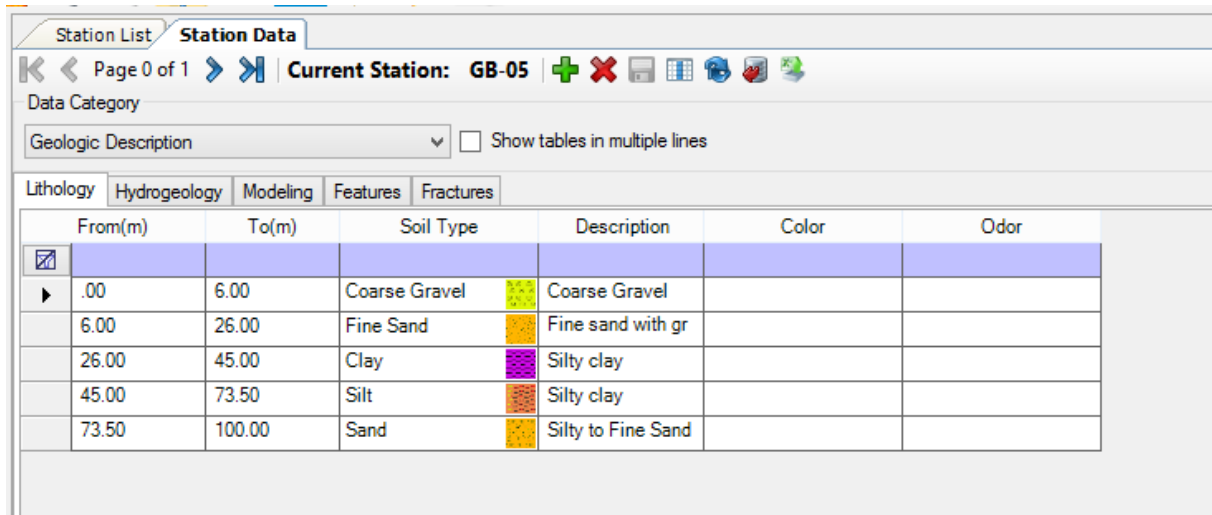
Feel free to review the design of other queries to see what options are available to you. The names and organization of the queries should give you an idea of their purpose.

For more details on the Query Builder please refer to [Query Builder](#) section.

## 2.4 Review Lithology Data

Lithology data (intervals of soil/material found during the drilling process) is stored within the Lithology table (Geologic Description category) within HGA. The different soil/material encountered during drilling is associated with specific images when displaying this data within modules (for example the Well Profile, Cross Section Editor and Scene Viewer). You may

have noticed the images when you ran the Lithology query in the previous section. You can also review each individual station's lithology data by selecting the Station Data tab and then selecting the Geologic Description category. By default the Lithology table is displayed and the data for the currently selected station is shown. You can change the station by selecting another station name from within the Station Picker. Here for example is the lithology data from station GB-05:



	From(m)	To(m)	Soil Type	Description	Color	Odor
<input checked="" type="checkbox"/>						
▶	.00	6.00	Coarse Gravel	Coarse Gravel		
	6.00	26.00	Fine Sand	Fine sand with gr		
	26.00	45.00	Clay	Silty clay		
	45.00	73.50	Silt	Silty clay		
	73.50	100.00	Sand	Silty to Fine Sand		

If you are having difficulties finding stations with lithology data try doubling clicking on the Boreholes station group in the Project tree. This will activate the Station List tab and update it with only the stations in the Boreholes station group. You will also see that the list of stations in the Station Picker has been updated with these stations. Now go back to the Station Data tab and go through the stations to review the lithology data.


The lithology data is stored as an interval with from and to depths along with the soil type and other potential descriptions (color, odor etc).

The Demo Project within HGA is using the DIN 4023 specification for associating images to the material stored in the soil type field of the lithology table. HGA comes with several different specifications including:

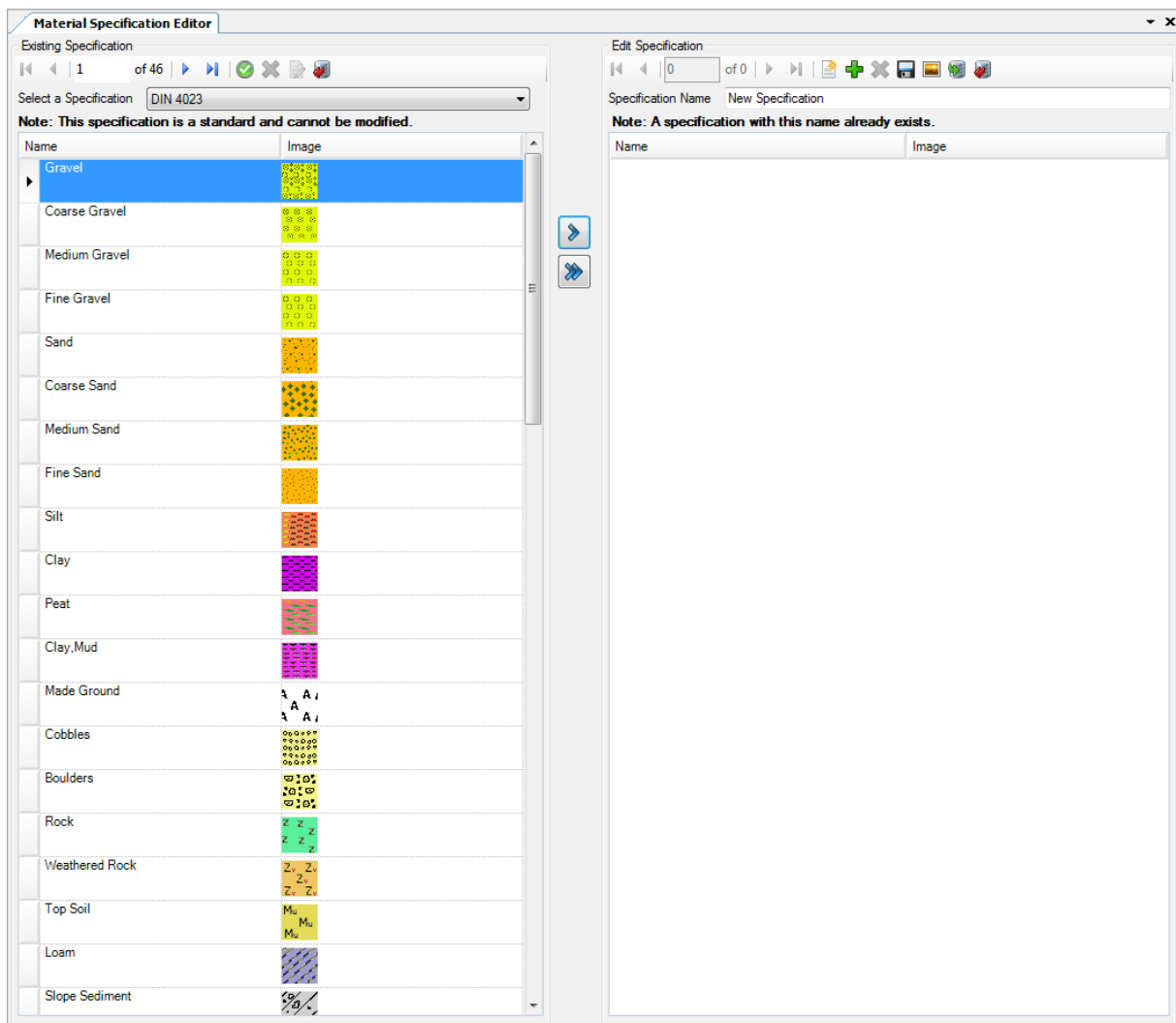
- USCS
- USDA
- DIN 4023
- IAH
- Compton
- Dunham Carbonate Classification
- Shell Standard

However, you may find you want to create your own specifications that indicates the valid soils/material and associated images for your project. You can do this within the Material Specification module.

## Material Specification

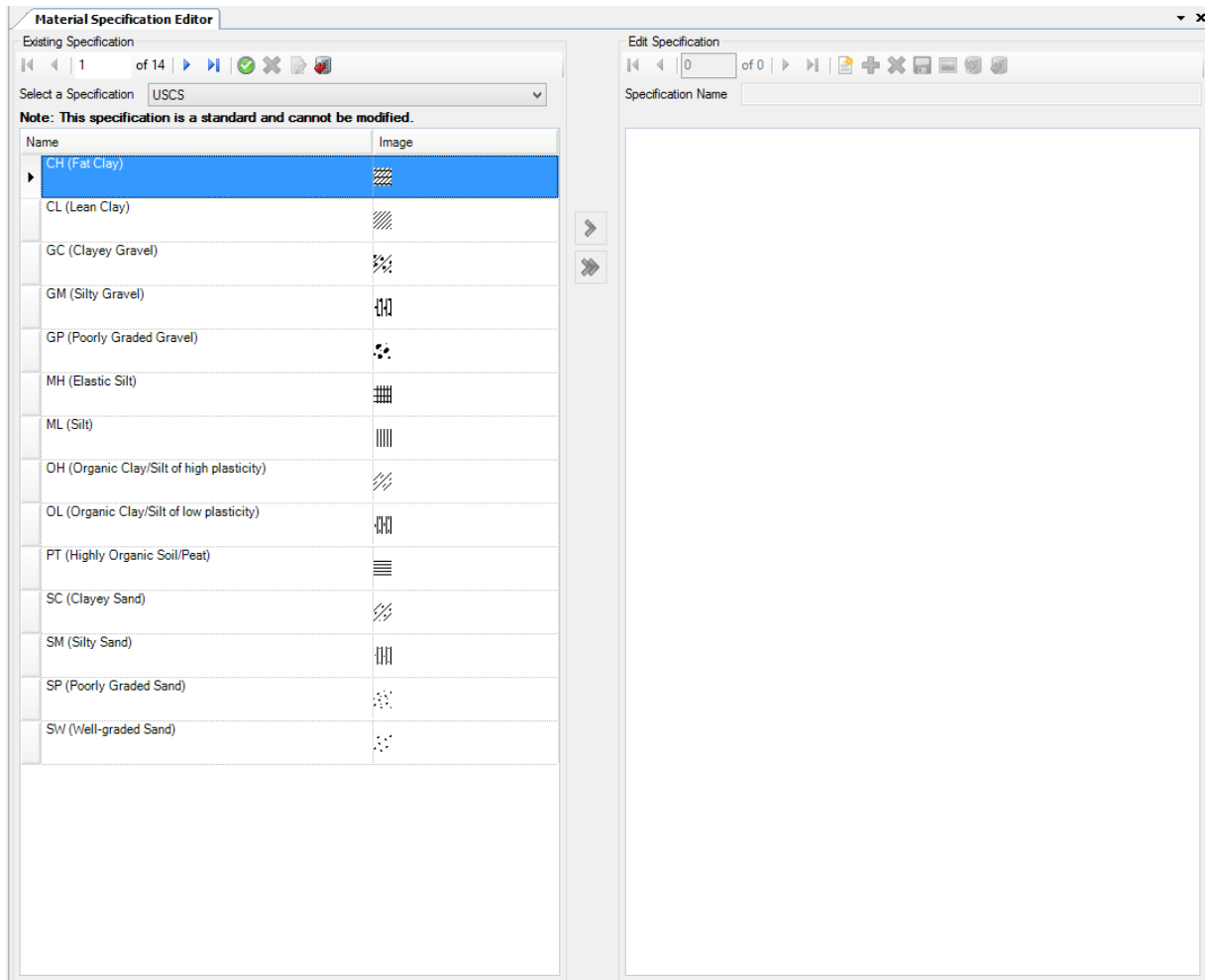
Select the Material Specifications option from the Modules menu, or click on the  button in the main toolbar.

The Material Specifications Editor will appear as a tab as shown below.



Here you can see the DIN 4023 specification used for the Demo Project including all the valid soil/material names and the associated images.

You can review other specifications that are provided within HGA by selecting them from Select a Specification drop down. For instance below is the USCS specification which uses black and white images.



The right side of the tab provides the options for creating a new specification as well as editing an existing custom specification. When creating new specifications you can use names and images from any existing specification by selecting them from the left side and selecting the blue right arrow to copy them to your new custom specification. Or you can create new names and use your own images.



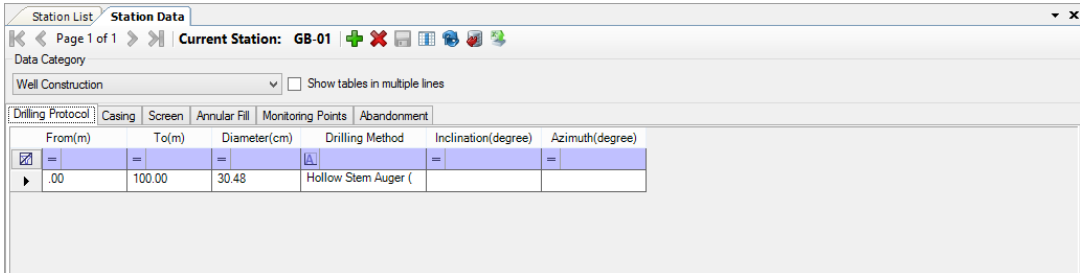
**Please Note:** You are not able to edit the specifications that come with HGA - you can only edit a custom made specification.

For more details on the Material Specification Editor please refer to [Material Specifications Editor](#).

## 2.5 Review Well Construction Data

Well Construction data is stored within several tables in HGA found under the Well Construction category. If you haven't already done so - double click on the Boreholes station group in the Project Tree. This will activate the Station List tab and update it with only the stations in the Boreholes station group. You will also see that the list of stations in the Station Picker has been updated with these stations. Now select the Station Data tab and then select the Well Construction category from the the drop down. You will see there are several tables in this Data Category including:

- Drilling Protocol
- Casing
- Screen
- Annular Fill
- Monitoring Points
- Abandonment



The screenshot shows a software interface with a window titled "Station List" and a sub-tab "Station Data". The "Current Station" is "GB-01". Under "Data Category", "Well Construction" is selected. Below this, there are tabs for "Drilling Protocol", "Casing", "Screen", "Annular Fill", "Monitoring Points", and "Abandonment". The "Drilling Protocol" tab is active, displaying a table with the following columns: From(m), To(m), Diameter(cm), Drilling Method, Inclination(degree), and Azimuth(degree). The table contains one row of data:

From(m)	To(m)	Diameter(cm)	Drilling Method	Inclination(degree)	Azimuth(degree)
.00	100.00	30.48	Hollow Stem Auger (		

For this Demo Project tutorial we will focus on the first four tables.

**Drilling Protocol** - this table stores the information regarding the drilling of a station or well. The from and to values are entered as depths and the diameter of the auger used for drilling is entered. The method used to drill the hole can also be entered. A typical vertical well will likely just have one record in this table. However, if you have an angled or deviated hole you can have one or more records in this table. For example select station GB-09 from the station picker and review the Drilling Protocol data for this station.

From(m)	To(m)	Diameter(cm)	Drilling Method	Inclination(degree)	Azimuth(degree)
0.00	50.00	30.48	Air Percussion	30.00	25.00
50.00	100.00	30.48	Air Percussion	40.00	25.00

Here you will see there are two records showing the hole was drilling with an inclination of 30 degrees (and an azimuth of 25) for the first 50 m and then at an inclination of 40 degrees for the second 50 m.

**Casing** - this table stores the information regarding the casing installed for your well. The from and from values are entered as depths. The diameter and material of the casing can also be entered. Some simple wells will only have a single record in this table - however, if you have a cluster well (also known as a nested well) you can find multiple records in this table. For example select station GB-01 from the station picker and review the Casing data for this station.

Casing ID	From(m)	To(m)	Diameter(cm)	Material
1	0.00	60.00	15.24	Steel
1	60.00	100.00	15.24	PVC
2	0.00	40.00	5.08	Piezometer

Here you will see there are three records. The first two records have the same Casing ID - they belong to the same installation. That installation has a steel casing for the first 60 m and then a PVC casing for the last 40 m. The third record has a different Casing ID - so this is a separate installation. It is using Piezometer material, has a smaller diameter and only goes to 40 m.

**Screen** - this table stores the information regarding the screen installed for your well. The from and from values are entered as depths. You can see that station GB-01 has two screens. One from 10 - 20m and a second one from 20 - 30m. These relate to the two different casings mentioned above.



Station List **Station Data**

Page 1 of 1 | Current Station: GB-01

Data Category: Well Construction

Drilling Protocol | Casing | **Screen** | Annular Fill | Monitoring Points | Abandonment

screen_id	from(m)	to(m)	Diameter(cm)	screen_type	Slot Number	description
1	10.00	20.00	15.24	Plastic	10	
2	20.00	30.00	5.08	Steel	10	

**Annular Fill** - this table stores the information regarding the annular fill (or backfill) for your well. The from and to values are entered as depths. The Filling Type field is a list that is maintained by the List Editor that includes not only the name of the filling type but also images associated with the filling type.

Station List **Station Data**


Page 1 of 1 | Current Station: GB-01

Data Category: Well Construction


Drilling Protocol | Casing | Screen | **Annular Fill** | Monitoring Points | Abandonment

From(m)	To(m)	Filling Type	Filling Volume(m <sup>3</sup> )	Description
.00	1.00	Annular seal: Concrete		
1.00	5.00	Annular seal: Bentonite		
5.00	10.00	Backfill: Cuttings		
10.00	20.00	Filter pack: Pea Stone		
20.00	25.00	Annular seal: Bentonite		
25.00	60.00	Backfill: Cuttings		
60.00	65.00	Annular seal: Clay		
65.00	75.00	Filter pack: Sand		
75.00	100.00	Backfill: Cuttings		

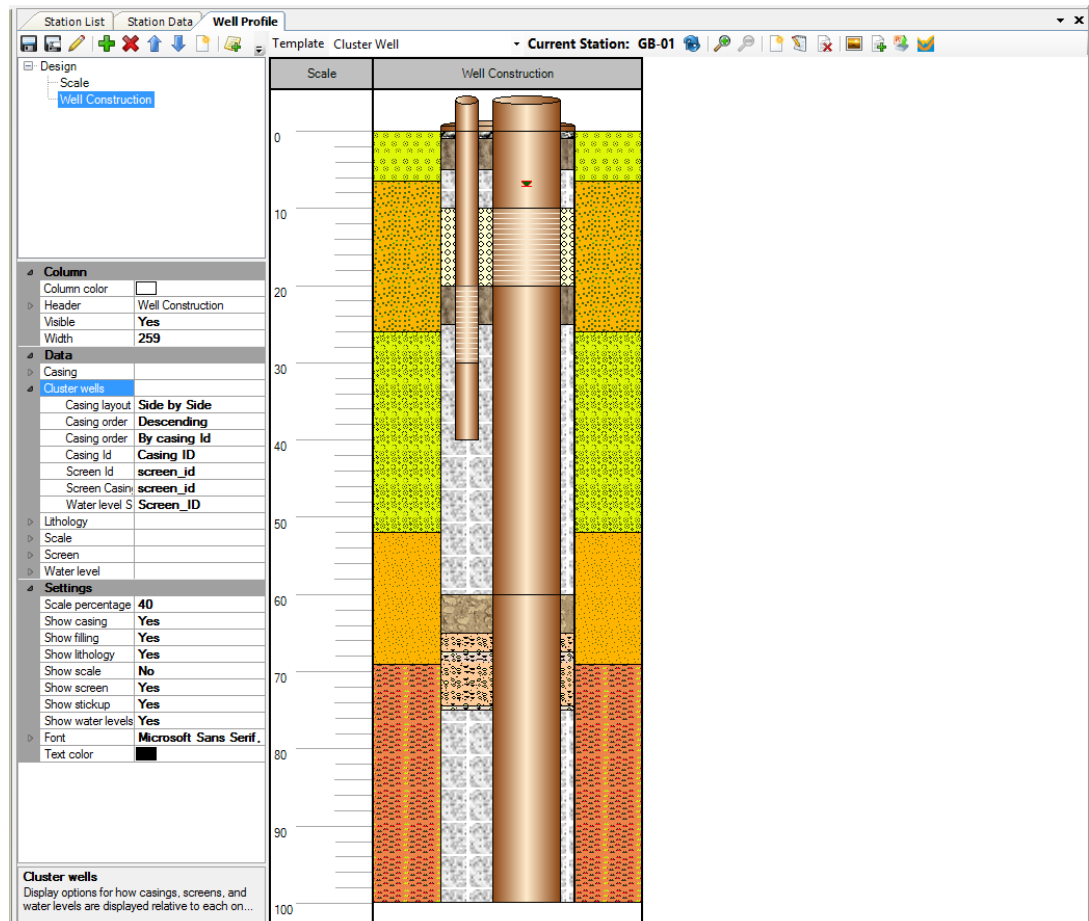
Feel free to review the different tables for the different stations to get familiar with the data. However, it might be helpful to use the Well Profile module to visualize all this data. In fact many people find it helpful to view the Well Profile while entering this data (if they need to enter the data manually from old reports) as they can visualize the data as they enter it and are more likely to notice typos and errors.

The Well Profile can be launched by selecting the  icon from the main toolbar or by selecting Modules/Well Profile or by simply double clicking on an existing Well Profile template found in the Project tree. It will be loaded with the last template that was used.

The Well Profile module can also be used as a data entry assistant in HGA, by displaying for example the well construction details we just reviewed within the Station Data tab.

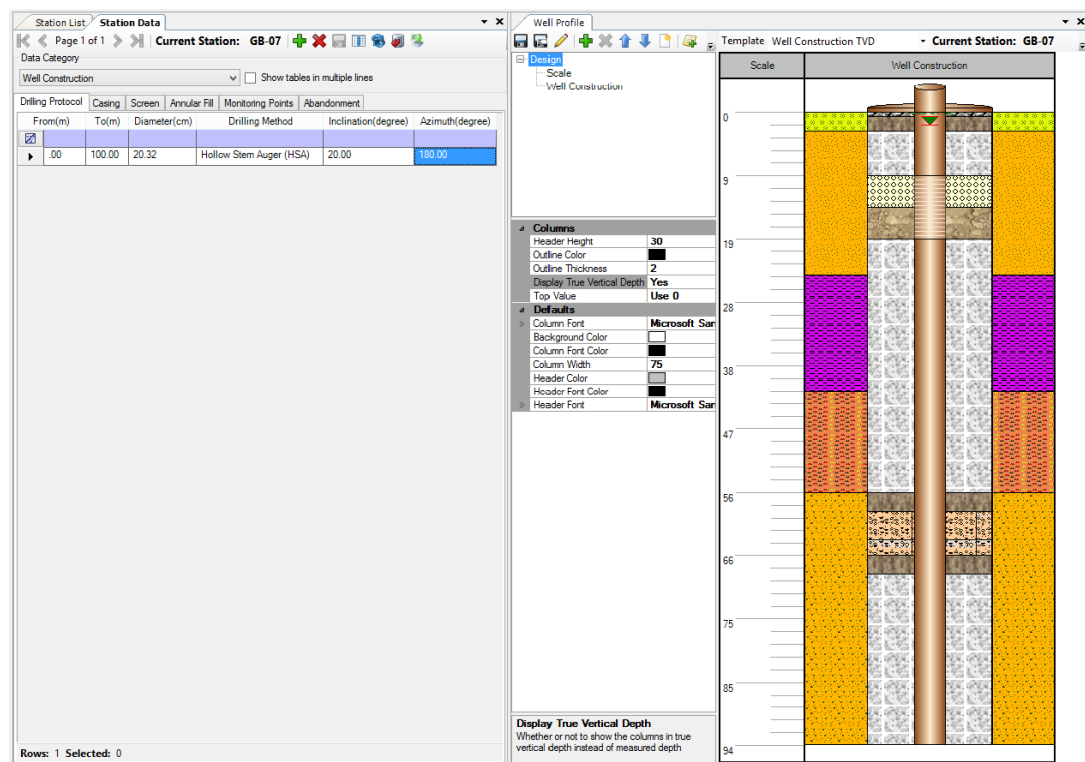
Select the  icon from the main toolbar now so that the Well Profile tab launches and then select the Cluster Well Template from the dropdown. This is a simple template with only a scale and a well construction column. It displays the data reviewed above for station GB-01 including the two different casing and two different screens.

Now select the edit button so the designer portion of the Well Profile is revealed. The designer portion allows you to see and edit the settings for the columns within the template.



Select the Well Construction branch of the Design Tree and all the setting for this column can be found below. Select the Cluster wells option under the Data section to see how the casing and screen settings allow for displaying this kind of data.

Let's take a look at another template - select the Well Construction TVD template from the dropdown and then select GB-07 from the Station Picker. You will notice under the Columns section the option for Display True Vertical Depth has been set to Yes for this template. This will automatically calculate the True (actual) Vertical Depth based on the inclination values entered in the Drilling protocol table. As mentioned above - it can be helpful to view the Well Profile at the same time as the data. You can do this by right clicking on the Well Profile tab at the top and selecting New Vertical Tab Group. Now you should be able to see both the Station Data tab and the Well Profile tab beside one another.



Take some time to review other templates and stations and the data associated with the stations to see how they are displayed on the Well Profile.

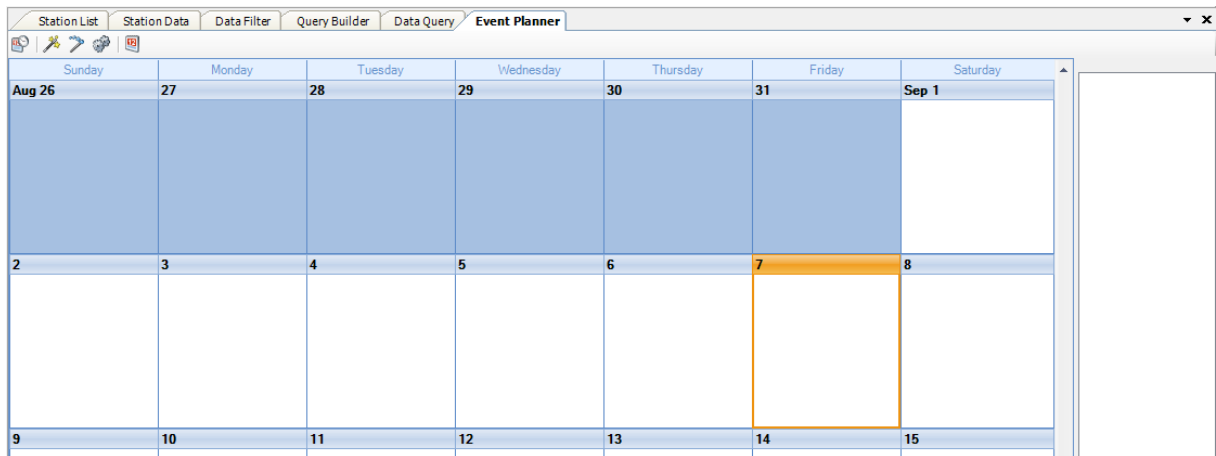
For more details on the Well Profile please refer to [Well Profile](#).

## 2.6 Review Monitoring Event Data

Hydro GeoAnalyst includes a great tool for helping project managers and staff to plan for future events (i.e. sampling events, reporting deadlines, etc.) and to ensure that field activities are always completed correctly and on time. This module is called the Event Planner. It allows

you to easily create multiple schedules for various stations and create event plans to outline the detailed of the field activities. These event plans can be automatically converted to printable reports and Electronic Data Deliverable templates (EDD) which can be provided to field personnel.

To launch the Event Planning module click the Event Planning icon on the toolbar, or access this module from the main menu. A new tab will open containing a calendar, as shown below:



At the top left of the Event Planning module you should see a toolbar with several options:



These toolbar options include the following (from left to right):

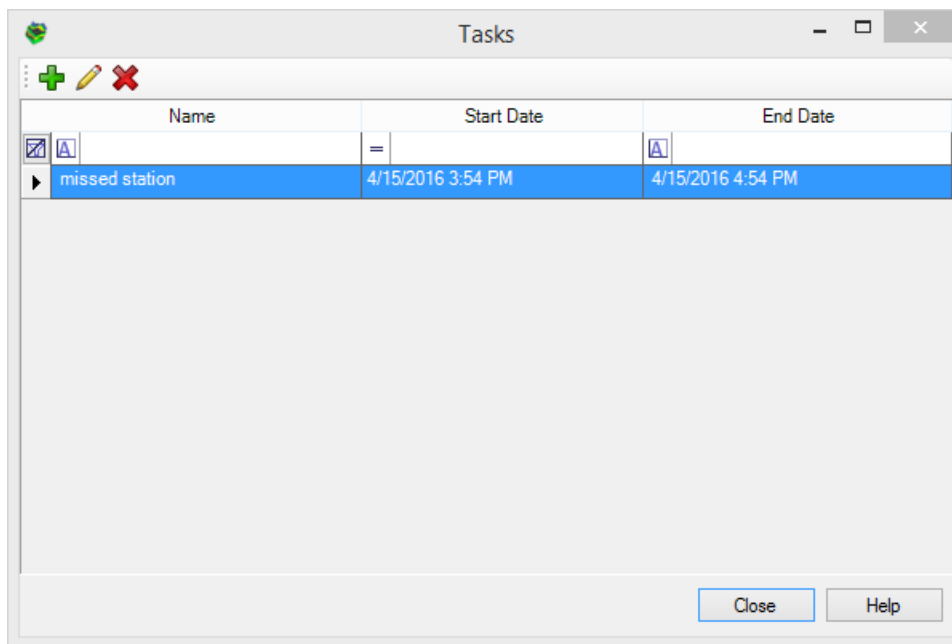
- **Tasks:** allows you to schedule stations for regular sampling
- **Event Plan Wizard:** allows you to create an Event Plan
- **Plan Close Wizard:** allows you to close existing Event Plans
- **Manage Event Plans:** allows you to manage Event Plans
- **Go To Today:** the calendar will go directly to the current date

The Event Planning module allows you to schedule both 'Tasks' and 'Event Plans'. A Task is a somewhat simpler version of a full Event Plan. Scheduling a Task allows you to specify a location and date, along with a selection of stations that require attention, and a Task description specifying what kind of work the Task entails. Event Plans provide a more robust way of scheduling project work. Event Plans allow you to incorporate specific stations to be sampled, which type of data needs to be collected, whether any QA/QC samples must be

collected and to write a checklist for additional information. A number of individual Tasks can then be scheduled in relation to a specific Event Plan. Event Plans can also be converted to reports and mobile EDDs which can be provided to field personnel.

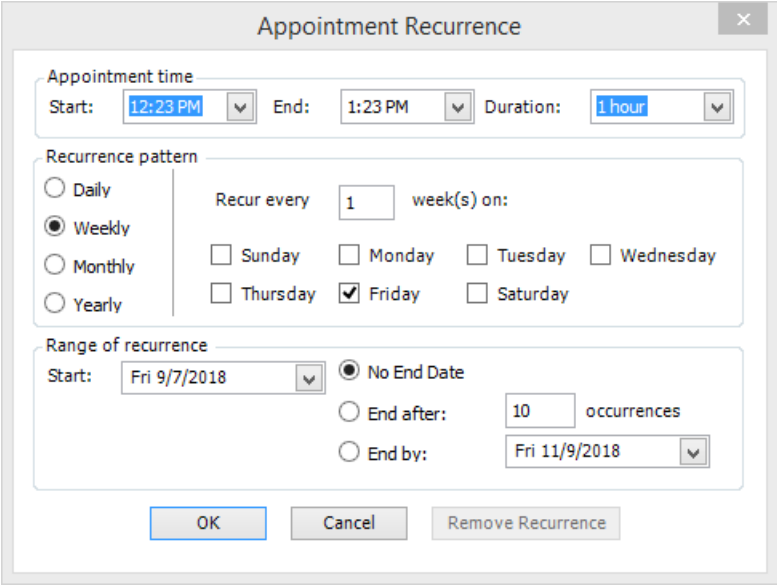
Let's explore both of these options by scheduling a new Task and Event Plan.

Click on the Tasks button in the toolbar and the 'Tasks' window will open, as shown below:



As you can see there is already one Tasks scheduled in the Demo project (i.e. 'missed stations'). Double-clicking this task will open a window which describes the details of that individual task. Let's create a new task by clicking the green '+' button. This will open the 'New Task' window:

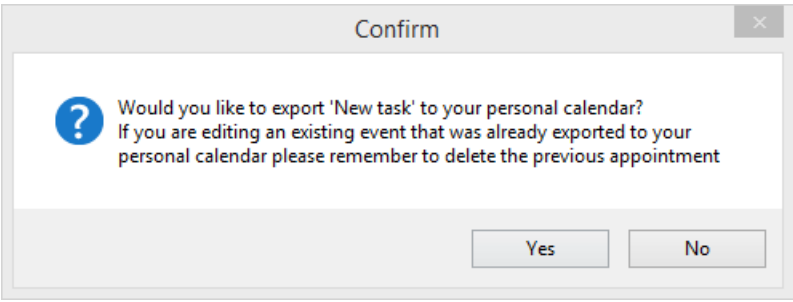
At this stage you can specify a name, location, start/end time for the task, and specify which stations are involved. You can also provide a description for the Task, to specify what work is entailed. Use the Station Group table on the right and the blue arrow buttons to select a few stations and move them into the 'Selected Stations' table (it doesn't matter which ones). Switch to the description tab and write something. Finally, you can click the 'Recurrence' button in the upper toolbar to specify a recurrence interval for this task. If you click the 'Recurrence' button you should see the following 'Appointment Recurrence' window:



The 'Appointment Recurrence' dialog box is used to configure recurring tasks. It features three main sections: 'Appointment time', 'Recurrence pattern', and 'Range of recurrence'. The 'Appointment time' section includes fields for 'Start' (12:23 PM), 'End' (1:23 PM), and 'Duration' (1 hour). The 'Recurrence pattern' section offers four options: Daily, Weekly (selected), Monthly, and Yearly. The Weekly option is further configured with 'Recur every 1 week(s) on:' and checkboxes for days of the week, with Friday selected. The 'Range of recurrence' section has a 'Start' date of Fri 9/7/2018 and three options: 'No End Date' (selected), 'End after: 10 occurrences', and 'End by: Fri 11/9/2018'. At the bottom are 'OK', 'Cancel', and 'Remove Recurrence' buttons.

The Appointment Recurrence window allows you to specify daily, weekly, monthly or yearly recurrence intervals for the Task. Utilizing Task recurrence can help you to manage recurring project work, such as monthly/quarterly sampling or reporting events.

When you have finished exploring the Recurrence and New task windows click 'Save and Close' from the toolbar in the 'New Task' window.

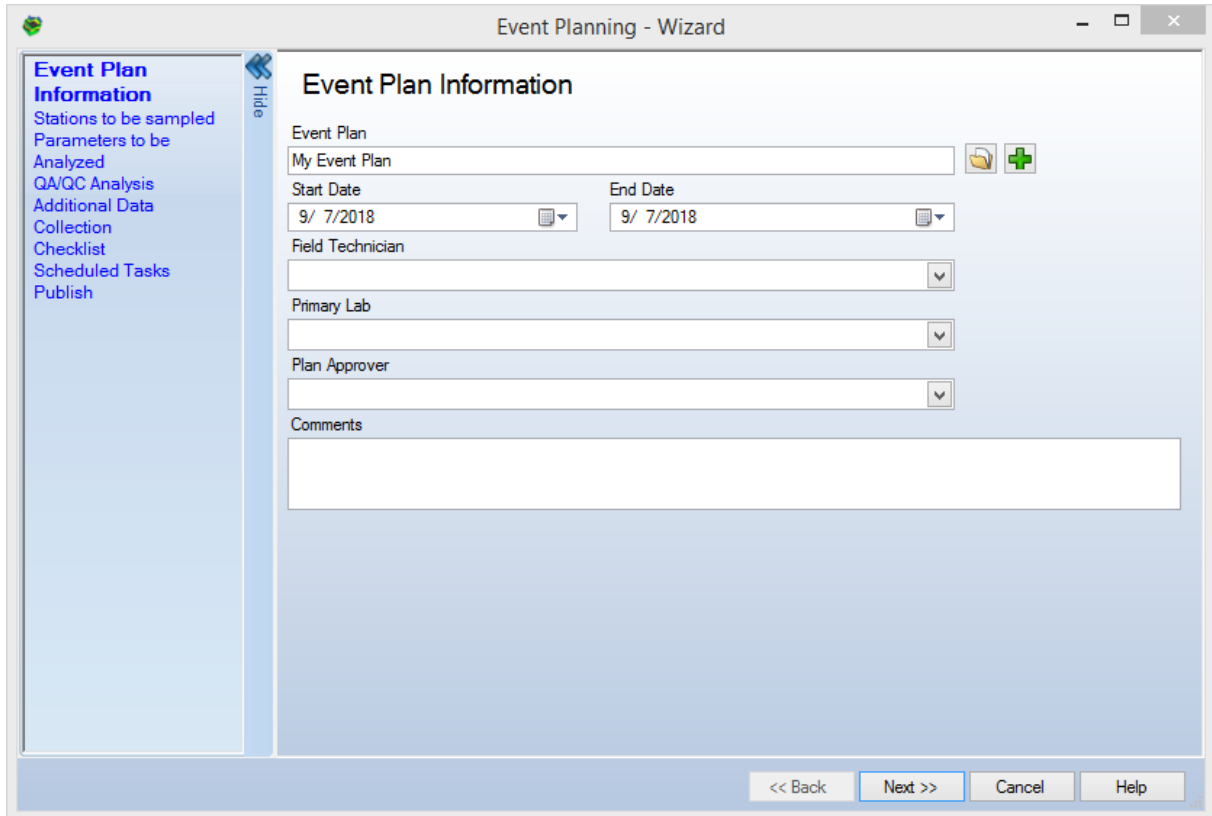


The 'Confirm' dialog box asks: 'Would you like to export 'New task' to your personal calendar? If you are editing an existing event that was already exported to your personal calendar please remember to delete the previous appointment'. It has 'Yes' and 'No' buttons at the bottom.

Clicking 'Yes' in the window above will export the scheduled task to your personal calendar (e.g. Outlook).

When you're finished scheduling your task you should see it appear in the 'Tasks' window, and also in the actual event calendar. You can then double click the task from the calendar to reopen the task window, which will contain all the previously specified information.

Now let's create a new Event Plan. We will create an Event Plan which will include several scheduled tasks. From the main Event Planning module click the 'Event Plan Wizard' button from the toolbar. The 'Event Planning - Wizard' window will open:



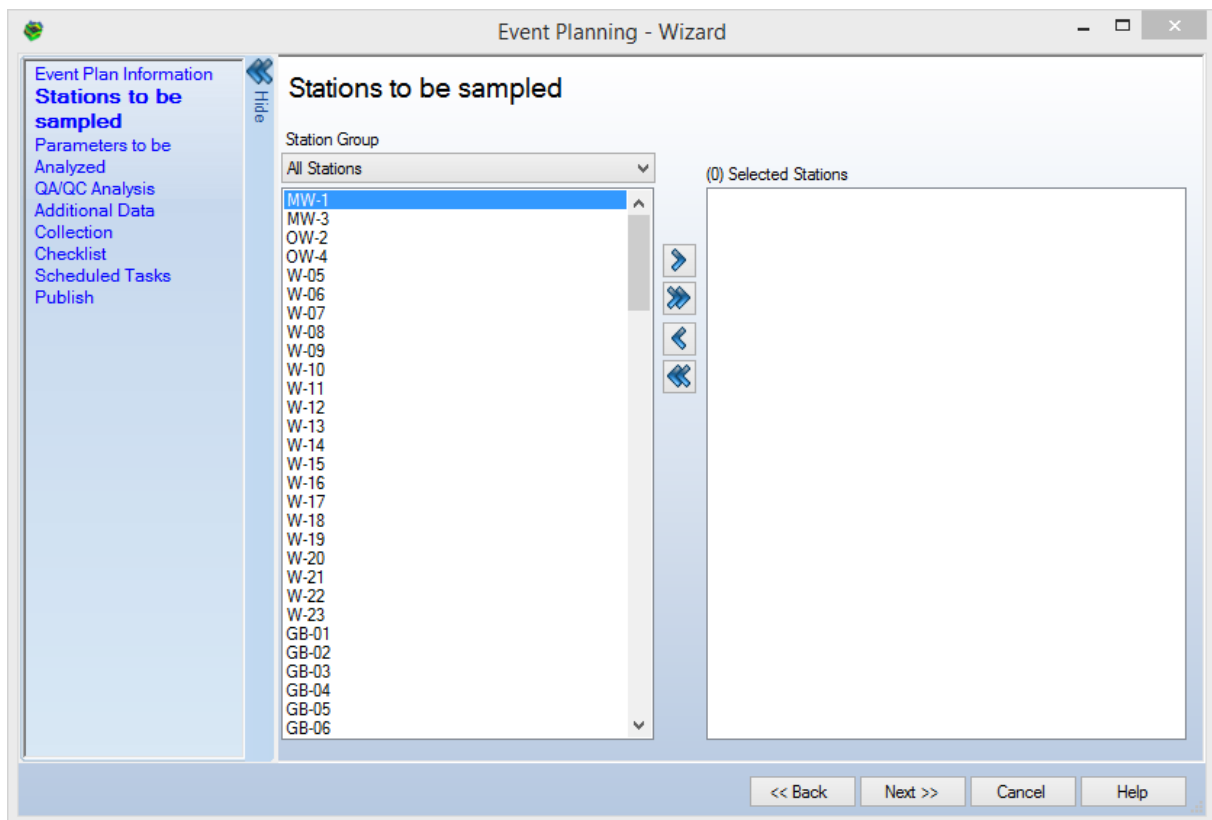
The screenshot shows the 'Event Planning - Wizard' window. On the left is a navigation pane with the following items: 'Event Plan Information' (selected), 'Stations to be sampled', 'Parameters to be Analyzed', 'QA/QC Analysis', 'Additional Data', 'Collection', 'Checklist', 'Scheduled Tasks', and 'Publish'. The main area is titled 'Event Plan Information' and contains the following fields:

- Event Plan:** A text box containing 'My Event Plan' with a folder icon and a plus sign icon to its right.
- Start Date:** A date picker showing '9/ 7/2018'.
- End Date:** A date picker showing '9/ 7/2018'.
- Field Technician:** A dropdown menu.
- Primary Lab:** A dropdown menu.
- Plan Approver:** A dropdown menu.
- Comments:** A large text area.

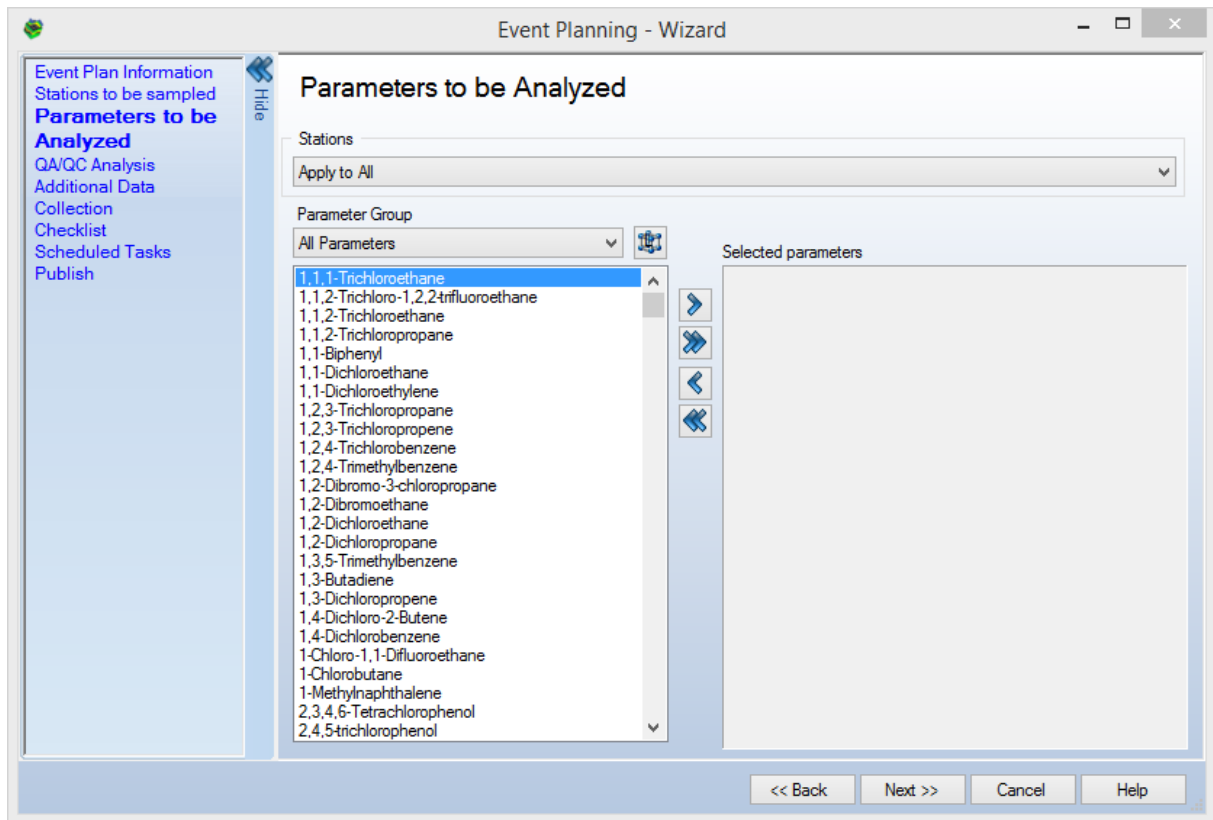
At the bottom of the window are four buttons: '<< Back', 'Next >>', 'Cancel', and 'Help'.

The first step in creating a new Event Plan is to provide a name (e.g. Example Event), a start and end date for the plan (e.g. today's date). The Event Plan name and dates are mandatory. If your database contains a list of field personnel or laboratories you may also specify these types of information on the first stage. Once you have provided a name and date simply click 'Next >>' to proceed to the next step:

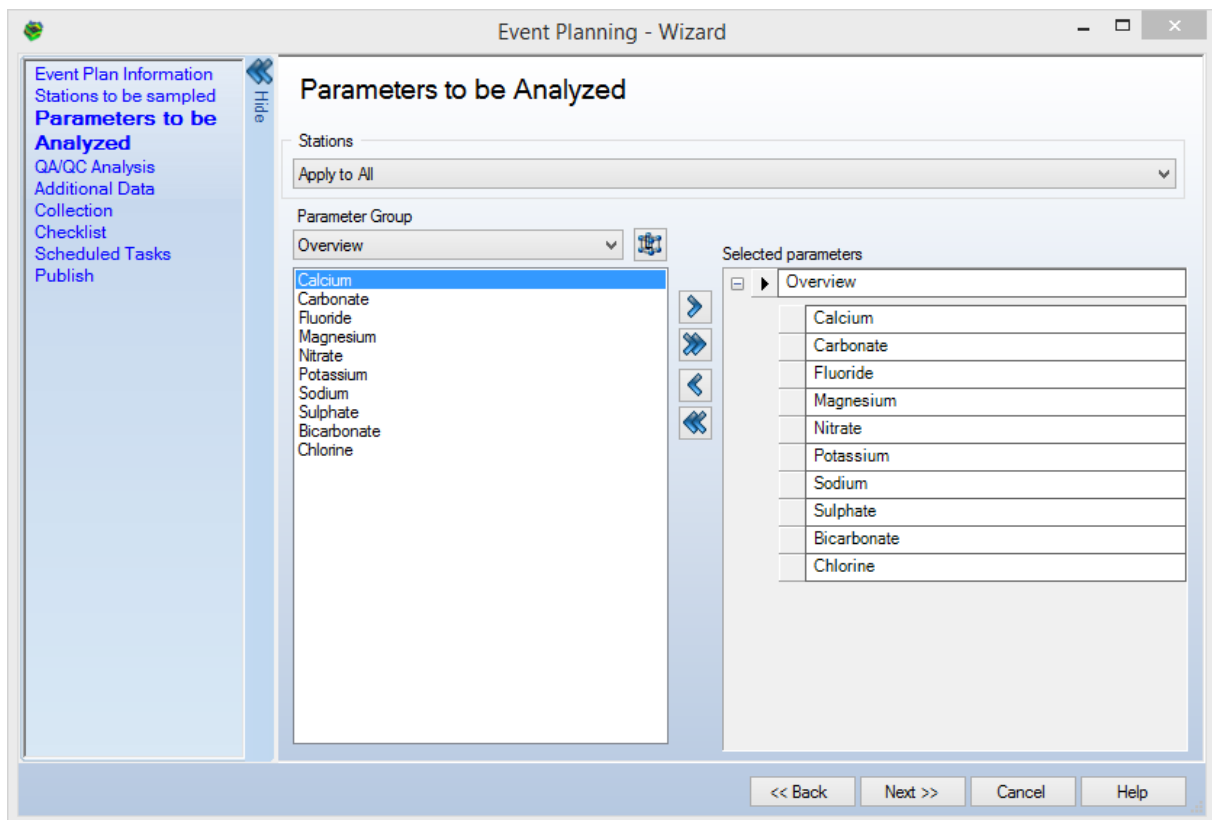




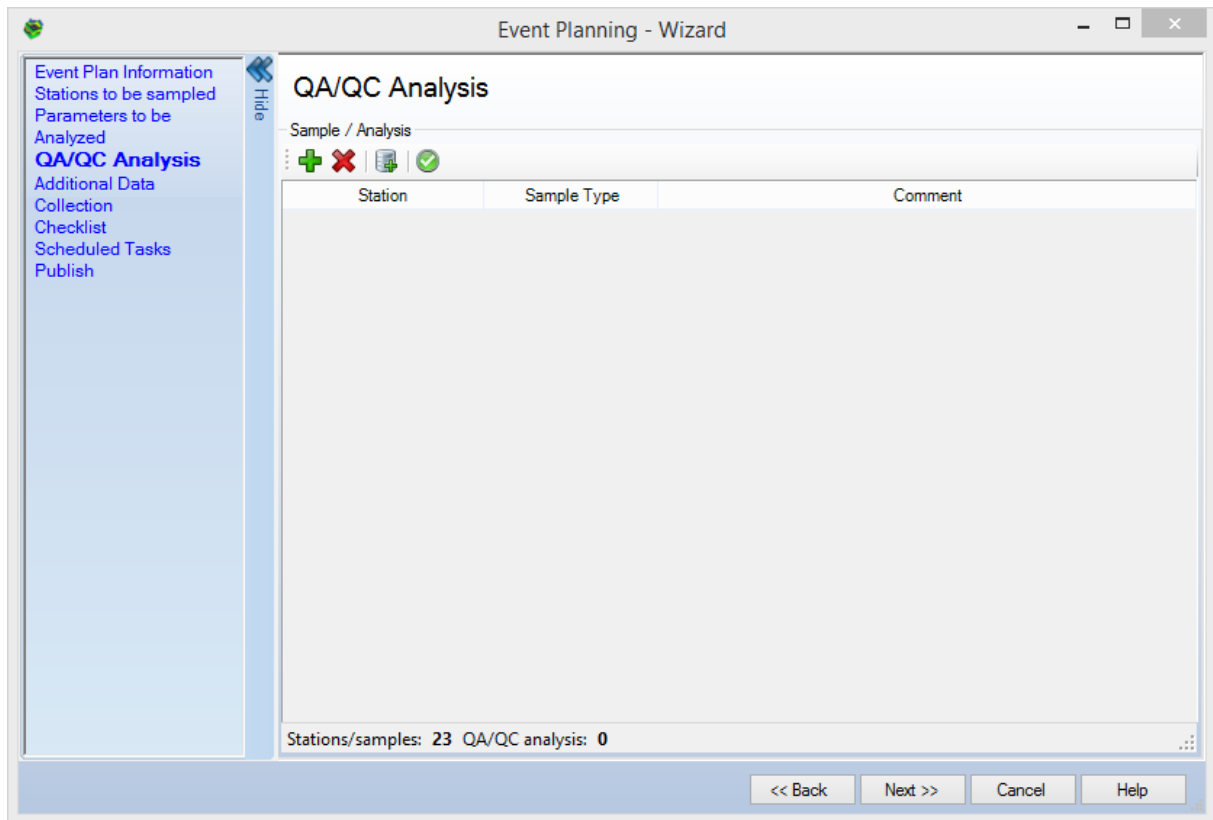
At this stage you can select which stations will be involved in your Event Plan. A dropdown menu is available to select from available Station Groups. For this demonstration change the station group to 'Monitoring Wells' and select all available wells (i.e. W-01 to W-23). Once the stations have been selected we can proceed to the next step, which is to specify which parameters will be analyzed:



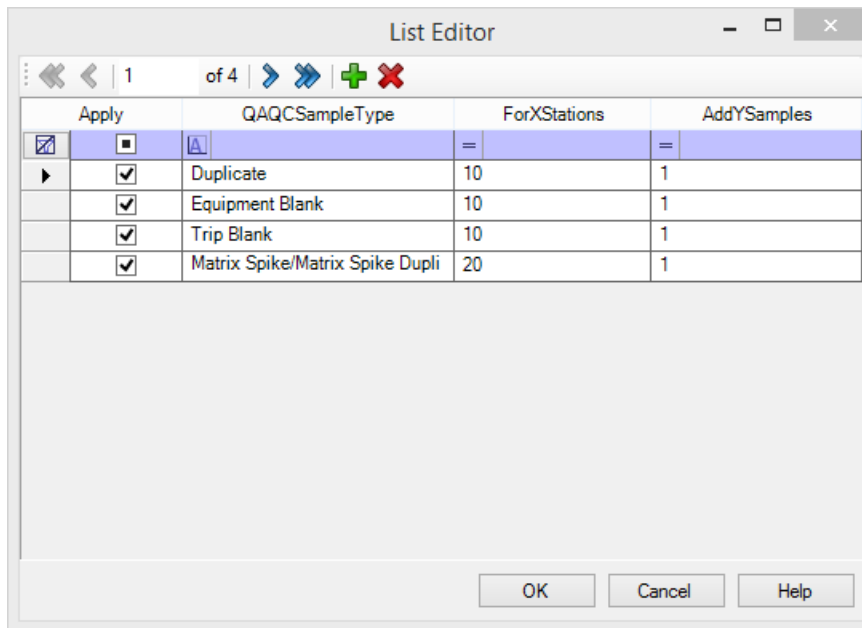
This window includes dropdown menus at the top which allow you to select which stations the selected parameters will be associated with. By default the parameters selected will be applied to all stations currently selected in this Event Plan. A 2nd menu is available allowing you to select from Parameter Groups, which may make it easier for you to select the parameters to be analyzed. From this 2nd menu select the 'Overview' parameter group, and select all parameters within to be analyzed. The Event Plan Wizard should look like the image below:



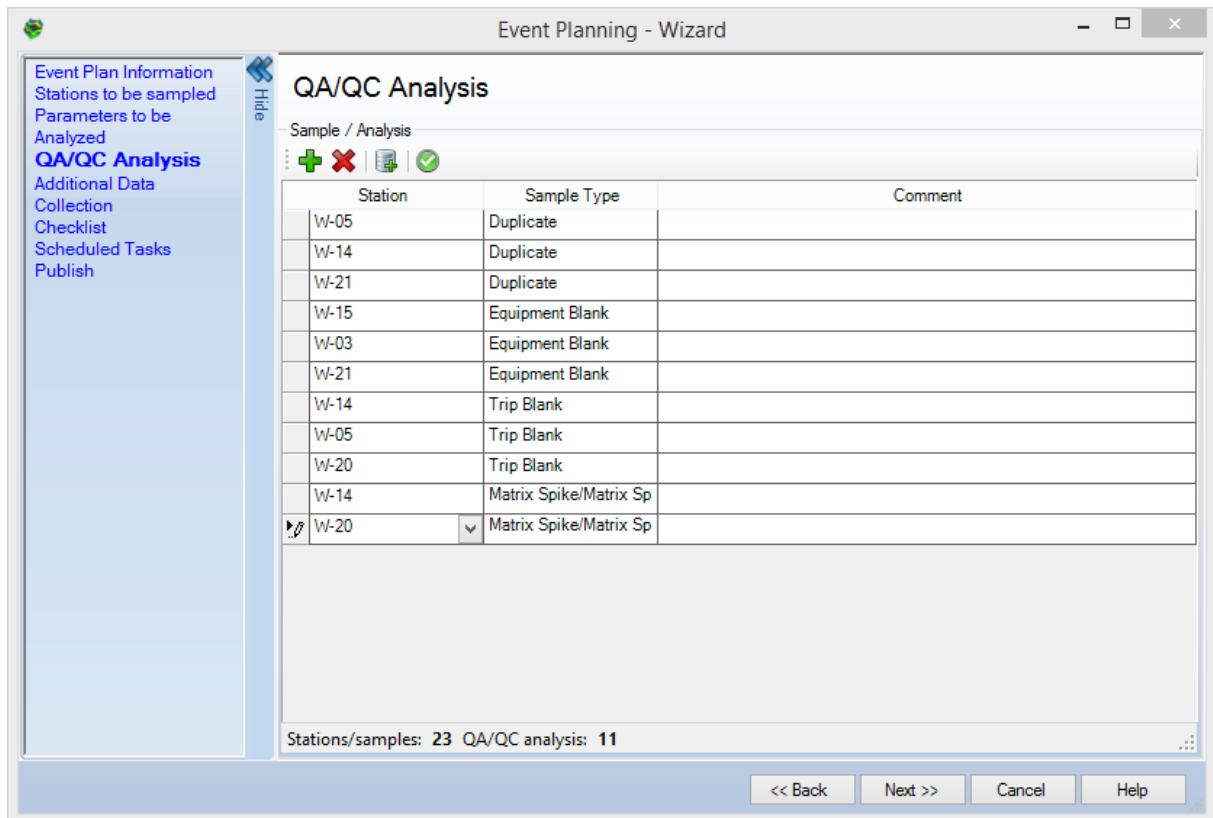
Proceed to the next step, which is to determine which QA/QC samples (if any) must be collected:



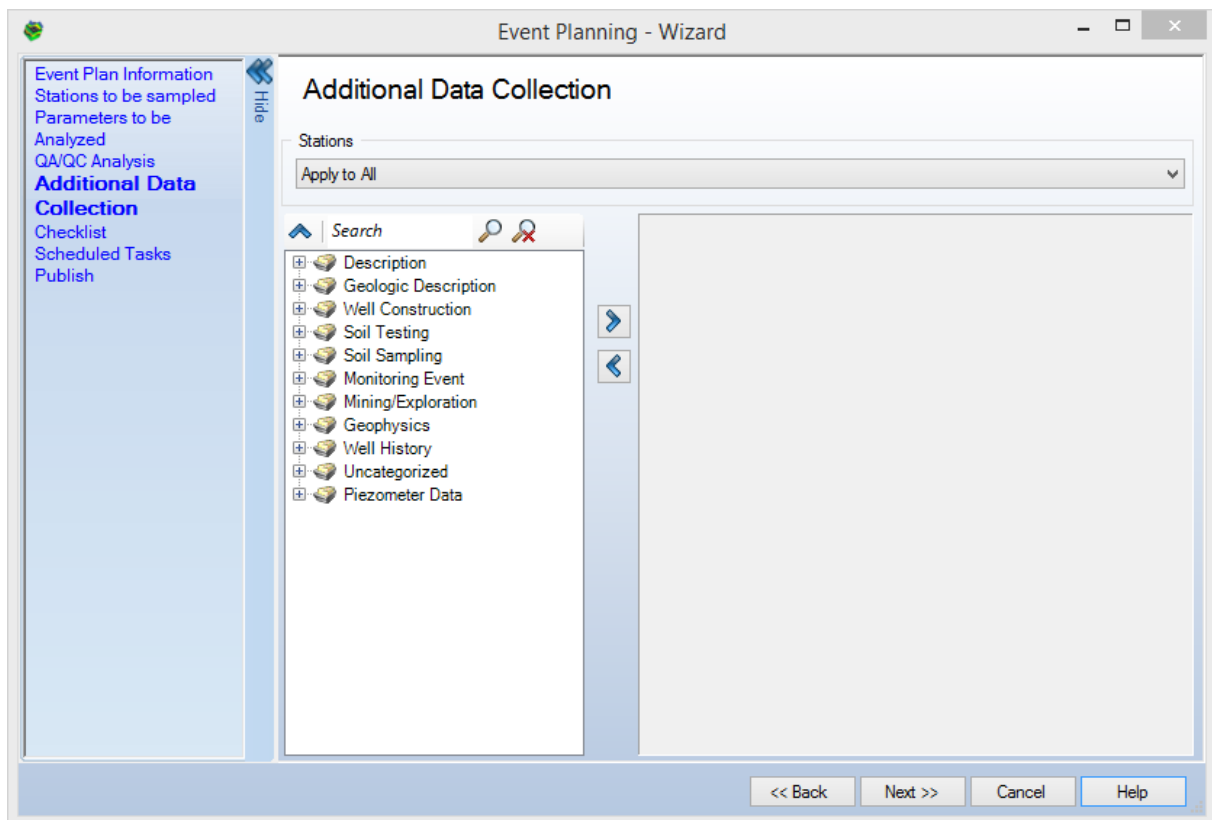
Click the green '+' button to add a row to the table. Once a row has been added you can use the dropdown menus under the 'Station' and 'Sample Type' columns to select which station and sample type (i.e. duplicate, equipment blank, trip blank or matrix spike) is required. Clicking the 'Manage QAQC Sample Type' button in the toolbar will open the following window:



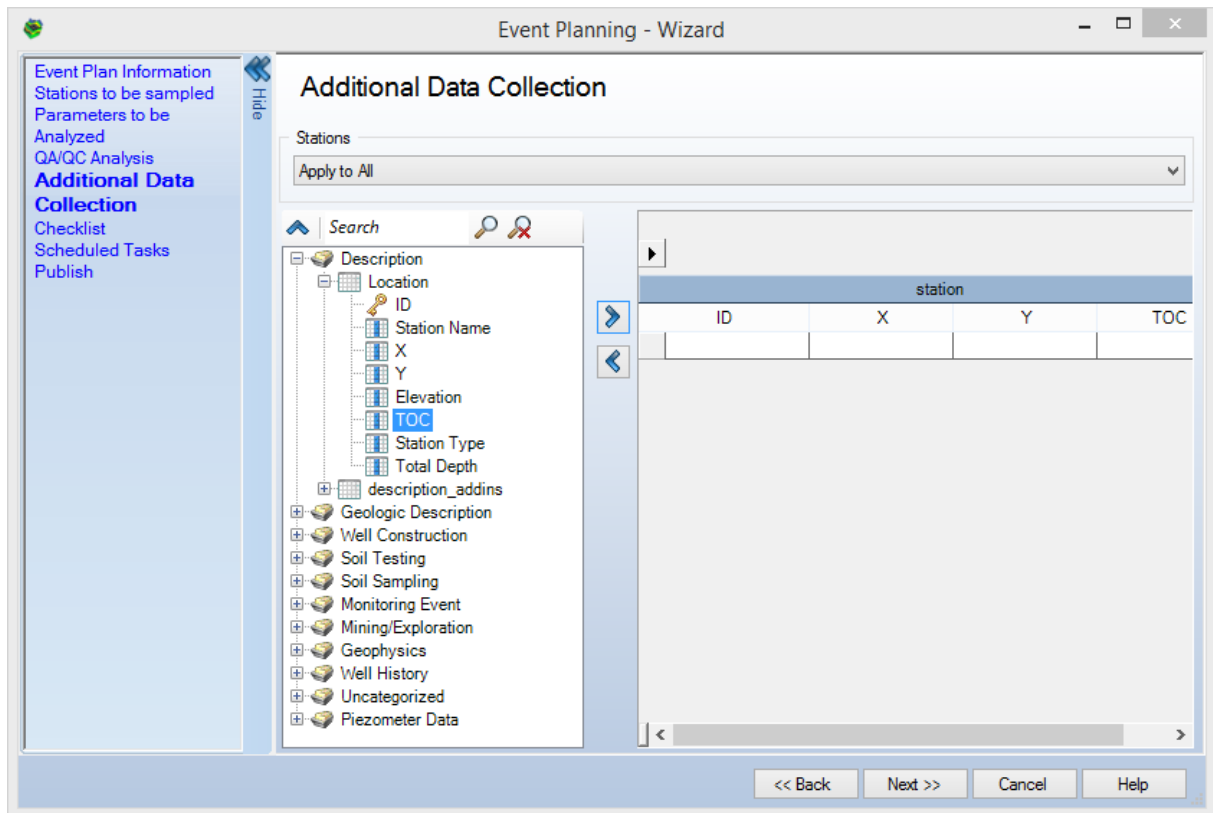
This window lists the available QA/QC sample types. The 'ForXStations' and 'AddYSamples' columns allow you to manage QA/QC sample frequency requirements. To demonstrate, close the window and click the green checkmark button in the QA/QC Analysis toolbar (i.e. the 'Apply QAQC samples according specified ratios' button). This will automatically add three duplicates, three equipment blanks, three trip blanks and two matrix spike samples. Considering that 23 stations have been selected the total number of QA/QC samples is correct, based on the specified ratios in the image above. At this stage you must select the stations that these specific QA/QC samples will be applied to. For each row specify a station under the 'Station' column. The window should look something like this:



You can now proceed to the next window, for 'Additional Data Collection':



This stage of the Event Plan allows you to specify whether any additional station data should be collected. You can specify any number of fields. Some examples of additional data which may be collected include water level measurements, TOC measurements, collecting location/GPS data, etc. To demonstrate, expand the 'Description' category, expand the 'Location' table, then select the X, Y and TOC fields and click the blue arrow button to select this additional data for collection. The window should look like this:



Proceed to the next step, which is the 'Checklist' step. At this stage you can simply write any additional notes that are required, perhaps providing a checklist of equipment required for this Event Plan. For example, you could write 'Bring GPS Unit':



Event Planning - Wizard

Hide

Event Plan Information  
Stations to be sampled  
Parameters to be Analyzed  
QA/QC Analysis  
Additional Data  
Collection  
**Checklist**  
Scheduled Tasks  
Publish

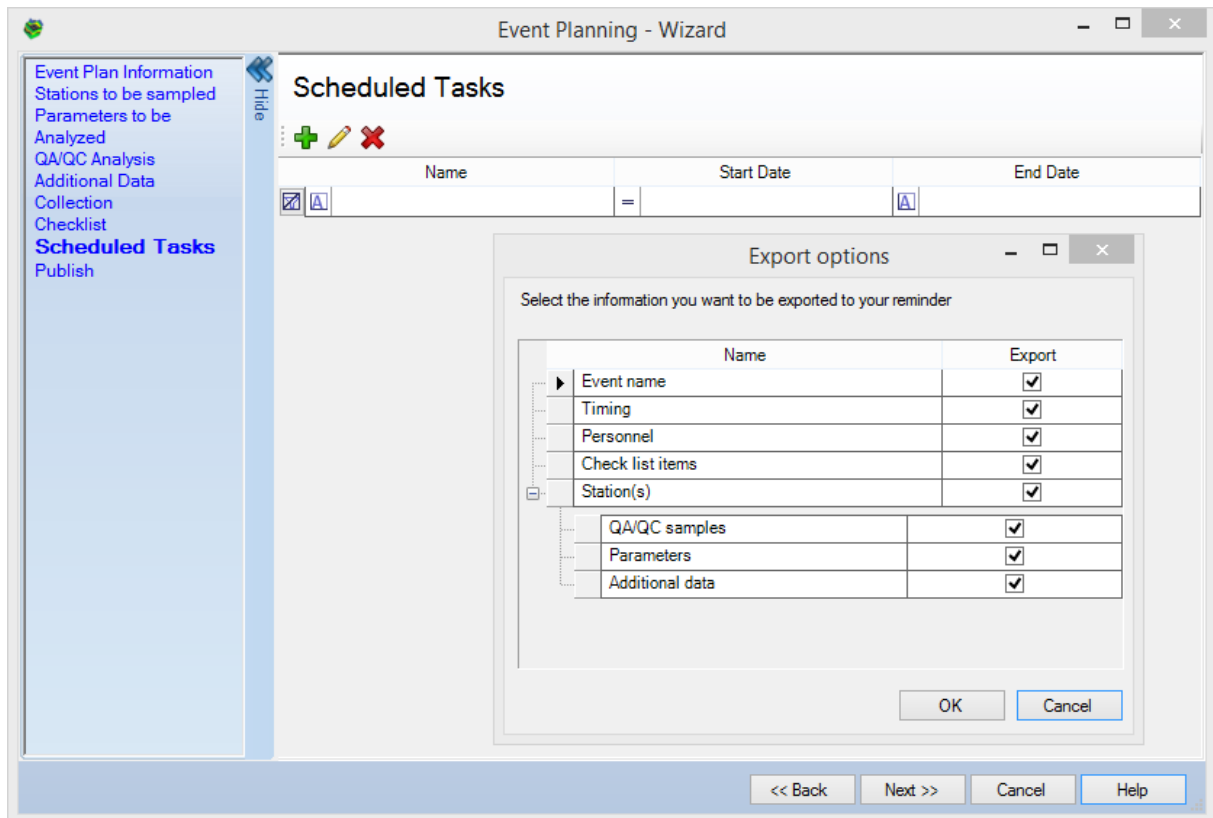
Checklist

Enter one checklist items per line

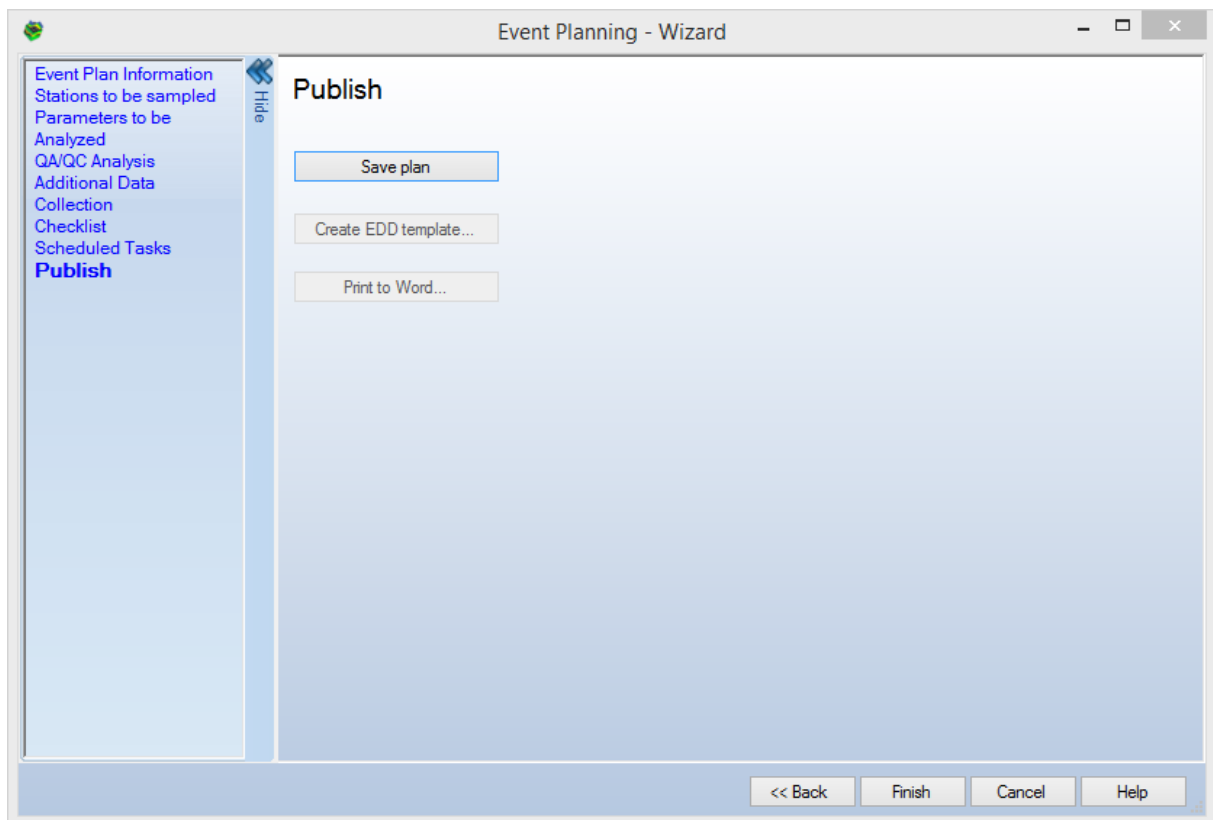
Bring GPS Unit

<< Back   Next >>   Cancel   Help

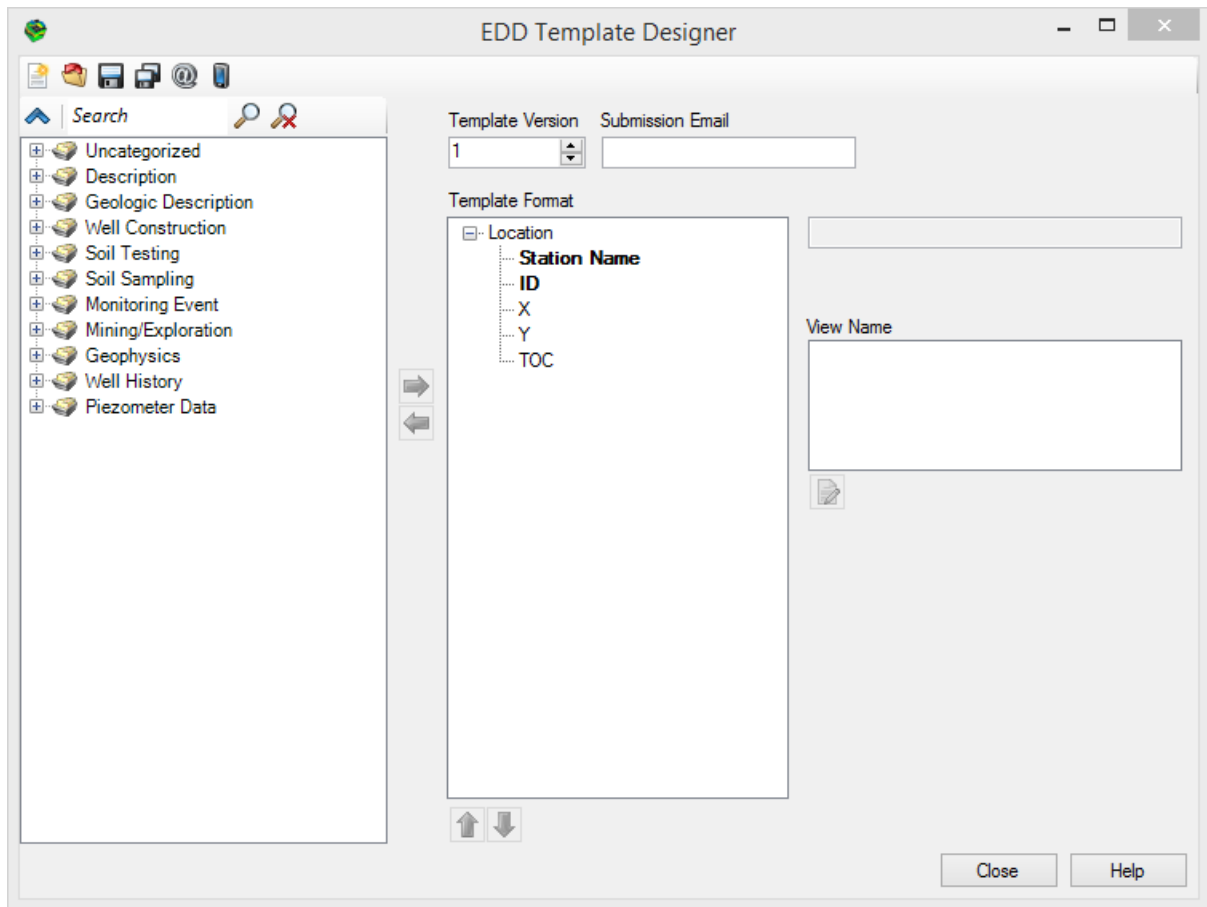
Proceed to the next step, which is the 'Scheduled Tasks' step. At this stage you can schedule tasks associated with this event plan. For example, if you were performing water sampling you might schedule three distinct tasks: a preparation day (i.e. bottle prep, equipment calibration, etc.), a sampling day (i.e. to actually visit the site and collect data) and a results day (i.e. when you expect to receive lab results). Without scheduling any tasks the Event Plan itself will not actually appear on the event calendar. By clicking the green '+' button a window will open asking you to select which information (from the Event Plan) should be included in the scheduled Task which will appear on the event calendar:



For our event let's include all the available information. Click OK in the 'Export options' window, and the familiar 'New Task' window will open. This allows you to schedule your task in the same way explained above. As you can see, the task has automatically been populated with all the information that has been described in the Event Plan. Let's leave the scheduled task as is, and proceed to the final step in the Event Plan wizard, which is to 'Publish' the Event Plan. From the Task window click 'Save and Close' and then click 'Next >>' in the Event Planning wizard (you can decide whether to export to your personal calendar or not). You should arrive at the following window:



At the 'Publish' step in the Event Planning wizard you can save your plan (committing all previous information and actually creating an Event Plan). Once the Plan has been saved you have the optional ability to publish the Event Plan to a word document and/or an EDD template. Clicking the 'Save plan' button will activate the 'Create EDD Template' and 'Print to word...' buttons. If you click the 'Create EDD Template' button the following window will open:



You can expand the Template Format in the middle table to see that all database tables/fields which were selected in the Event Plan have already been added to the EDD template. As you can see, using the Event Planning Wizard to plan for field activities is a very fast and easy way to generate EDD templates for your team. This EDD Template Designer window works just like the regular EDD Template Designer. You can also generate mobile EDD templates from this window, which can be provided to field personnel to help with data collection. For more information on the EDD process please refer to the EDD Template Designer section.

Close the EDD Template Designer and click the 'Print to word...' button in the Event Planning Wizard. This should automatically open Microsoft Word, and an Event Plan document should appear. The first page in the Event Plan document will display a summary of stations to be sampled:

Example Event	Start Date Sep 7 2018	End Date Sep 7 2018	<b>Waterloo</b> HYDROGEOLOGIC
Field technician		Plan Approved By	
Primary Lab		Comments	

**Event Plan Summary**

**Stations to be sampled**

**W-05 (-80.560403, 43.483811)**

**W-06 (-80.5615, 43.484424)**

**W-07 (-80.561288, 43.485109)**

**W-08 (-80.561378, 43.483953)**

**W-09 (-80.561197, 43.482996)**

**W-10 (-80.559433, 43.483948)**

**W-11 (-80.56044, 43.483056)**

**W-12 (-80.559303, 43.483317)**

**W-13 (-80.557292, 43.483801)**

Subsequent pages in the report are dedicated to individual stations which have been included in the Event Plan:

Example Event	Start Date Sep 7 2018	End Date Sep 7 2018	<b>Waterloo</b> HYDROGEOLOGIC
Field technician		Plan Approved By	
Primary Lab		Comments	

**W-03 (-80.560936, 43.48483)**

**W-04 (-80.561344, 43.484421)**

**Check List**

**To Bring      Returned**

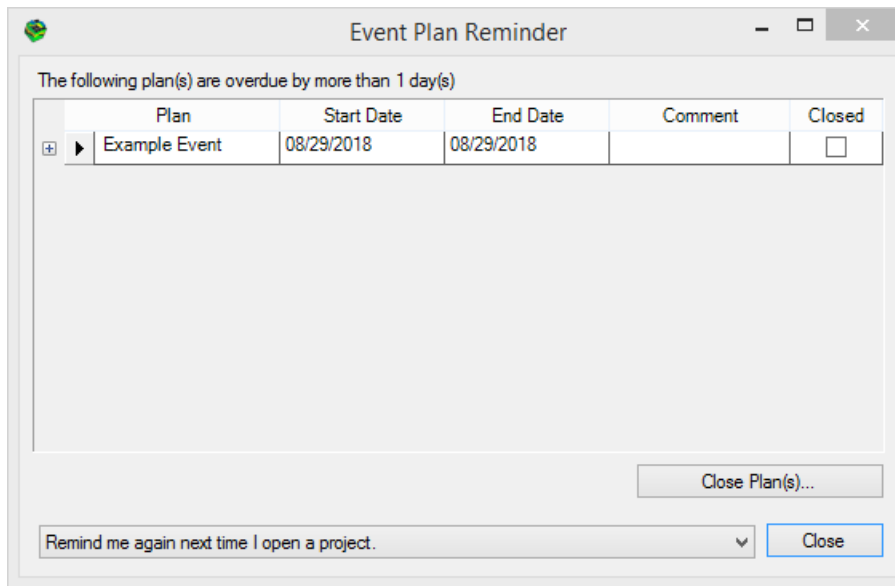
           Bring GPS Unit

These documents can be provided to your field personnel to ensure that all of the correct data is being collected at each station. Let's close the word document and return to the Event Planning module. You can also click 'Finish' in the Event Planning Wizard. You should see your event plan within the event calendar at this stage (dates may vary):

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Aug 26	27	28	29	30	31	Sep 1
2	3	4	5	6	7 Task 1 - Example Ev 12:23pm New task	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

Double clicking the new task (i.e. Task 1 - Example Event) will once again open the 'Task' window, allowing you to reschedule this task if required.

Now that an Event Plan has been scheduled, Hydro GeoAnalyst will prompt you with reminders regarding that event as the scheduled dates approach. Furthermore, the Event Planning module will remind you to 'close' and Event Plan 7 days after the plan was scheduled to be completed. If you open Hydro GeoAnalyst within that 7-day period you will see the following message (or similar):



Within the Event Planning module you can click the 'Plan Closure Wizard' (from the toolbar) and the following window will open:

Plan Closure - Wizard

**Plan Closure**

Event Plan

Start Date  End Date

Field Technician

Primary Lab

Plan Approver

Comments

<< Back © 2018 by Waterloo Hydrogeologic

The Plan Closure wizard provides you with a tool to positively confirm that the data required by the Event Plan has actually been collected. The first thing to do in the Plan Closure Wizard is to open an existing Plan using the little folder button next to the 'Event Plan' field. Once an existing Plan has been opened you can proceed to the 'Collections' step in the Plan Closure Wizard (click 'Next >>'). The following window will appear:

Plan Closure - Wizard

Plan Closure  
Collections  
Confirmation

Hide

Collections

Have you collected at the following stations?  Select All

Station	Collected	Comment
W-05	<input type="checkbox"/>	
Table	Collected	Comment
station	<input type="checkbox"/>	
QA/QC Sample	Collected	Comment
Duplicate	<input type="checkbox"/>	
Trip Blank	<input type="checkbox"/>	
W-06	<input type="checkbox"/>	
Table	Collected	Comment
station	<input type="checkbox"/>	
W-07	<input type="checkbox"/>	
Table	Collected	Comment
station	<input type="checkbox"/>	
W-08	<input type="checkbox"/>	
Table	Collected	Comment
station	<input type="checkbox"/>	

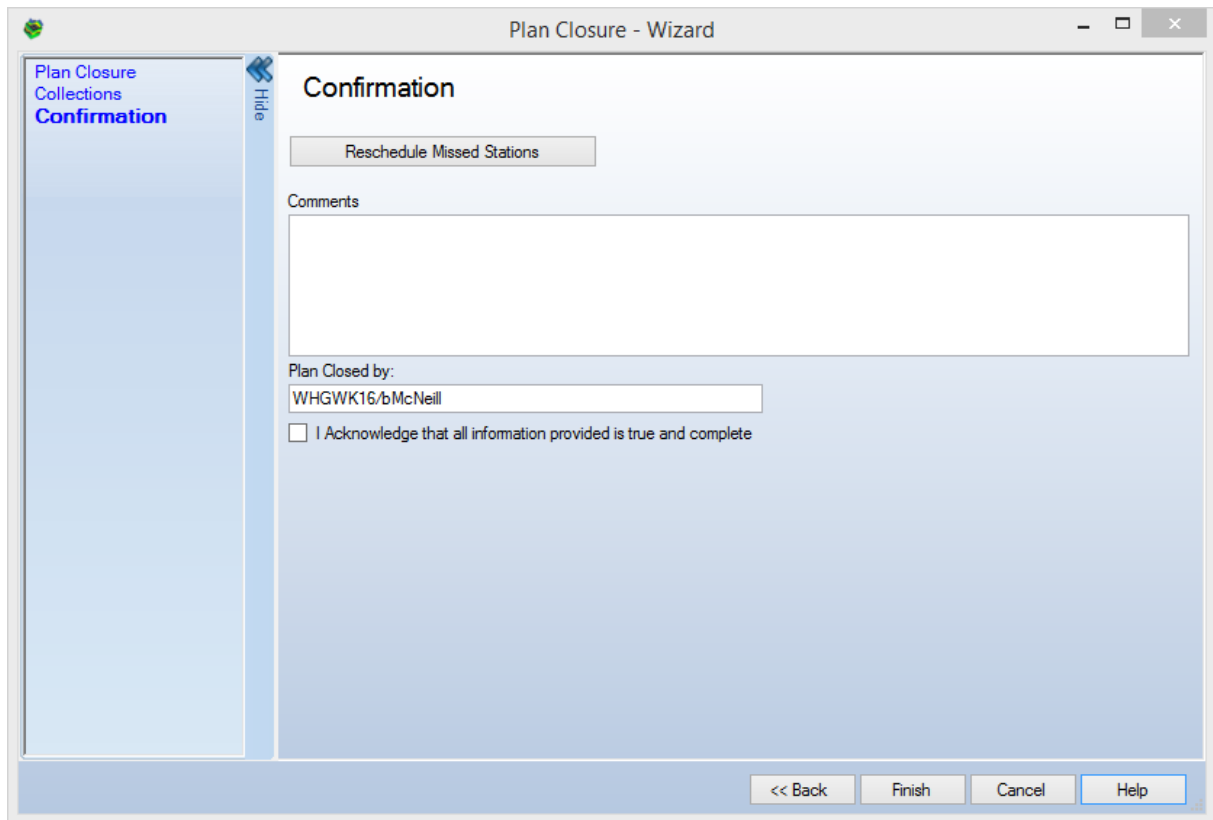
<< Back    Next >>    Cancel    Help

At this stage you can specify exactly which of the required samples/data were collected. Ideally every piece of data will be collected, but oftentimes it's impossible or difficult to reach a particular station, or perhaps an important piece of equipment was left behind. Whenever a piece of data was not collected you must provide a comment. For demonstration purposes we will use the 'Select All' button to 'check' all the completed boxes, but then 'uncheck' one and provide a comment. The window should look something like this:



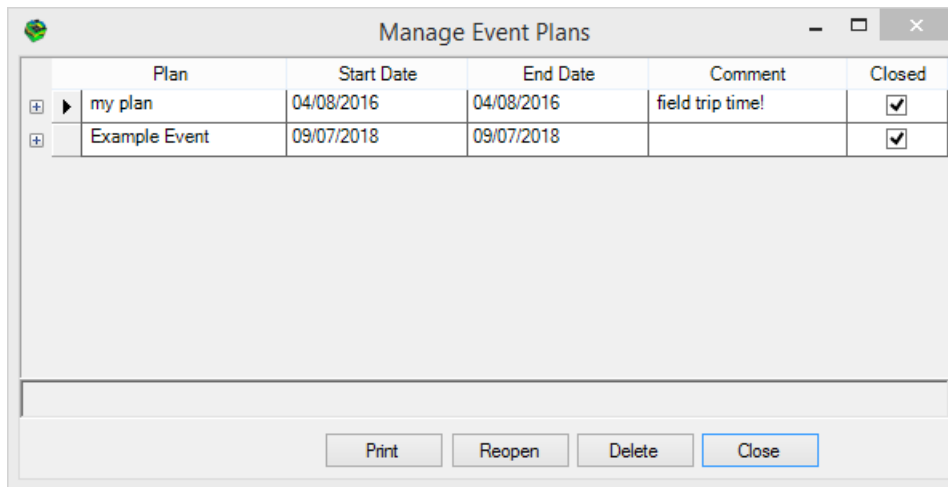
Station	Collected	Comment
W-05	<input type="checkbox"/>	Could not reach station
Table	Collected	Comment
station	<input type="checkbox"/>	Could not reach station
QA/QC Sample	Collected	Comment
Duplicate	<input type="checkbox"/>	Could not reach station
Trip Blank	<input type="checkbox"/>	Could not reach station
W-06	<input checked="" type="checkbox"/>	
Table	Collected	Comment
station	<input checked="" type="checkbox"/>	
W-07	<input checked="" type="checkbox"/>	
Table	Collected	Comment
station	<input checked="" type="checkbox"/>	
W-08	<input checked="" type="checkbox"/>	
Table	Collected	Comment
station	<input checked="" type="checkbox"/>	

Once a comment is included in each of the not-collected data points you can proceed to the next step, which is the 'Confirmation' step:



The 'Confirmation' step allows you to easily reschedule missed stations/data by clicking the 'Reschedule Missed Stations' button. This will immediately begin the process of scheduling a new task, as seen above. If all data was collected, or if the missed data does not require a rescheduling then you can finalize the process and actually 'Close' the Event Plan by clicking the 'Acknowledgment' button (under 'Plan Closed by:') and then clicking 'Finish'.

You can now open the 'Manage Event Plans' window by clicking the 'Manage Event Plans' button in the toolbar. You should see a list of available Event Plans, with a status box indicating whether or not the Plans have been closed:



The Event Planning module provides a powerful tool for project managers to keep track of the different events required by their project, and to ensure that all the required data is being collected as expected.

## 2.7 Maps

The Map Manager is packed with an abundance of mapping features that seamlessly connects your project maps with the HGA database. However, the Map Manager goes far beyond simple mapping, it also acts as a fundamental source for producing cross-sections and developing contour maps (elevations, concentrations, water table, etc.). The Map Manager is an integral part of HGA and is ideally suited for analyzing and presenting your environmental project data.

We are going to create a new map and load some data onto it and then contour that data.

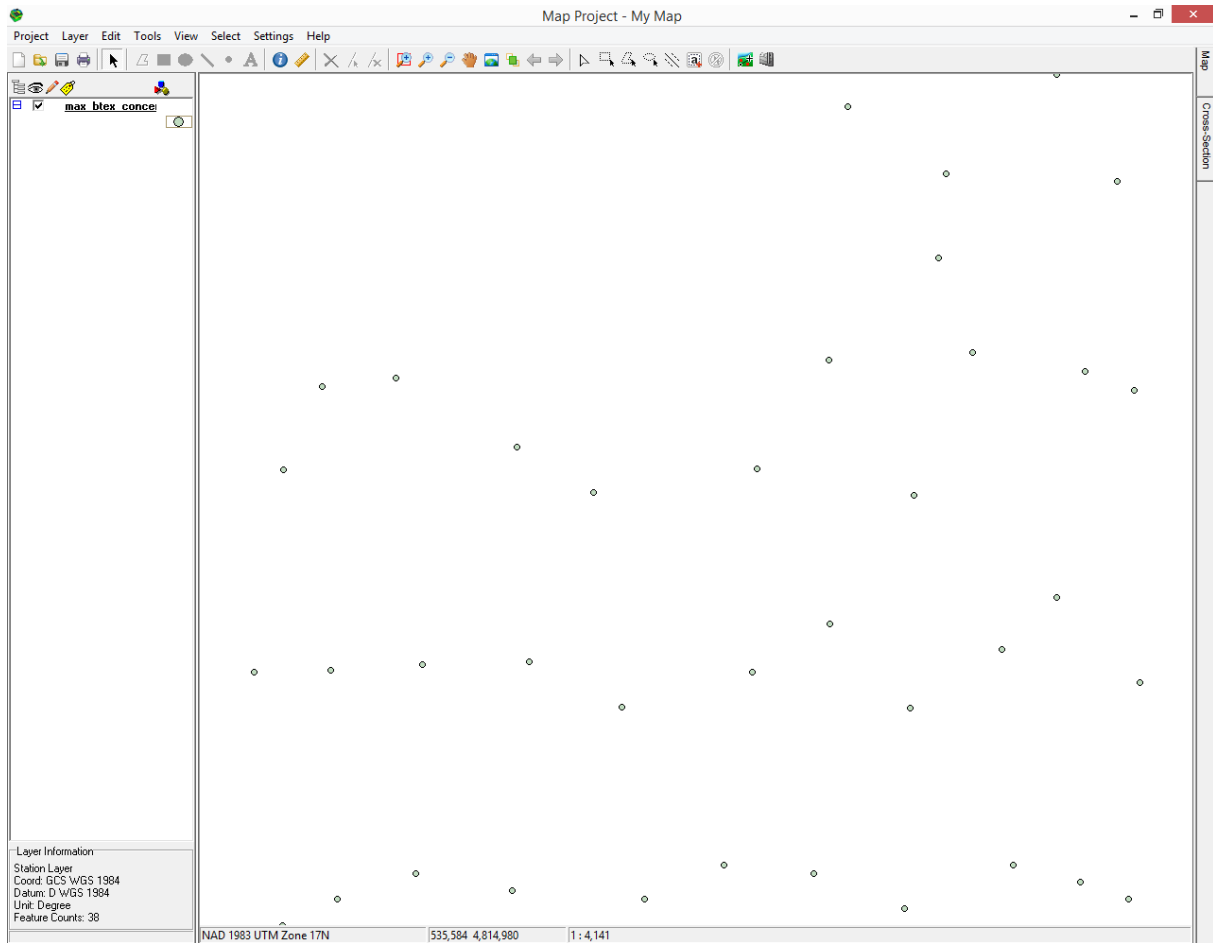


Select the Map Manager icon from the main toolbar and in the dialog that appears enter the name My Map for the new map you will be creating and then select OK.

An empty map will appear in its own window so you are able to go back and forth between the main HGA interface and the Map Manager.

Now select Layer / Load HGA data and then select the Data Query option and select the Concentrations\max\_btex\_concentration.

HGA allows you to set the precision of the field - for this you can leave the default and simply select OK.

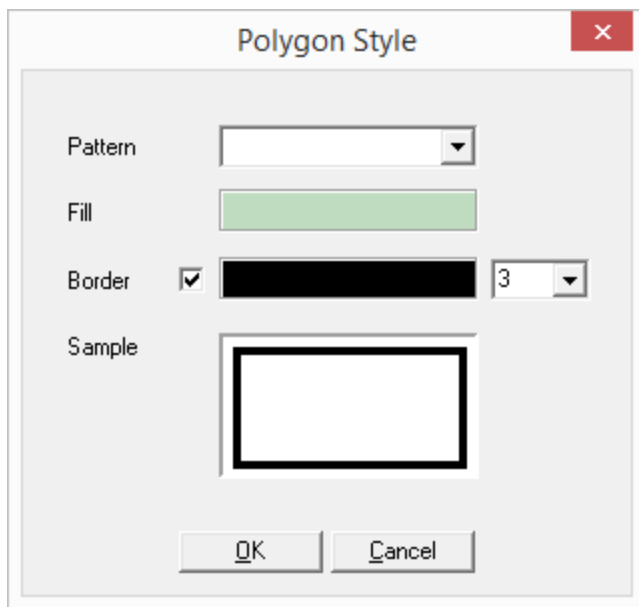


The query loads as a set of points on the map and becomes a layer in the layer manager (on the left side of the map).

The data associated with this query (the maximum BTEX values recorded at those points) is now available for you to use for further analysis.

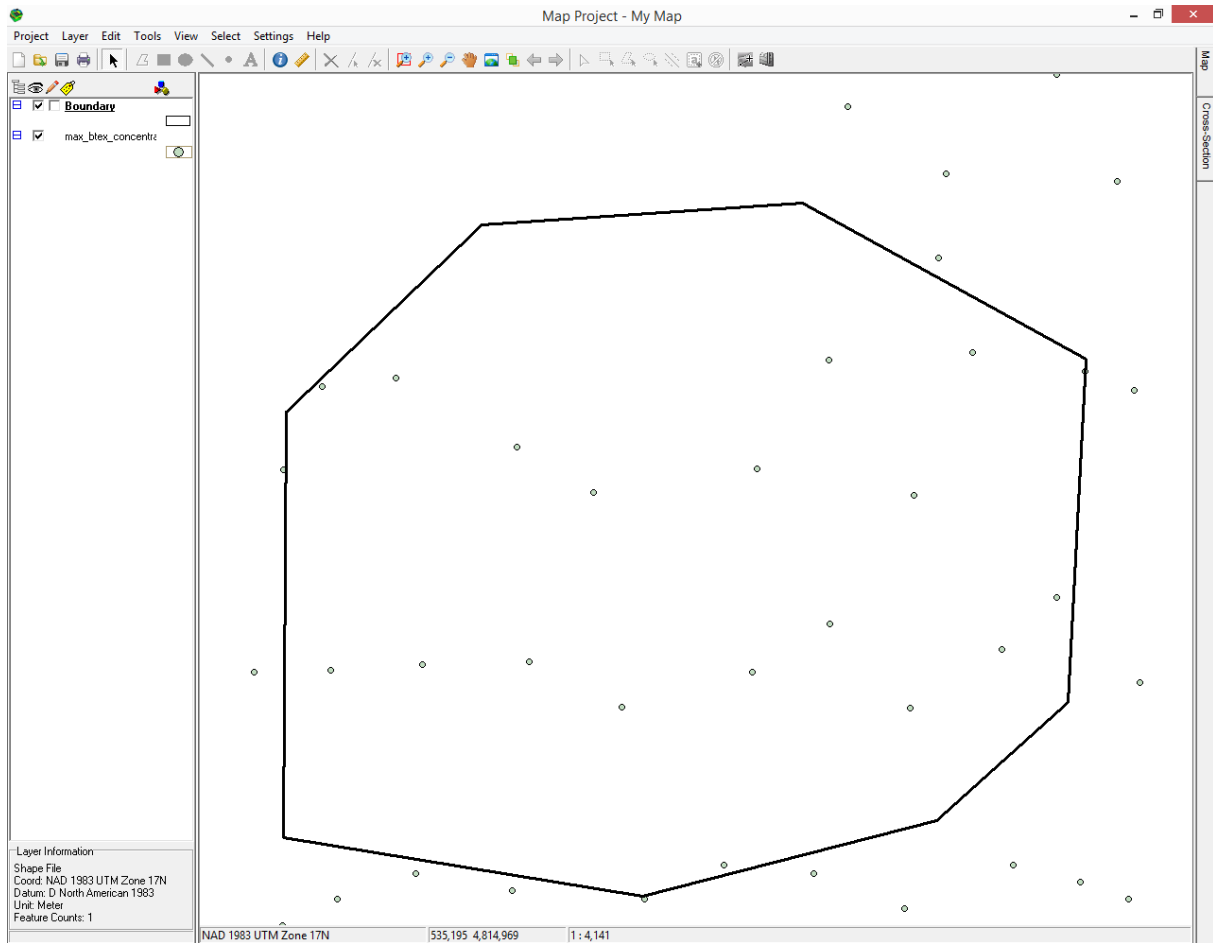
We are going to create contours and a color shade of the data. But first we are going to load a shape file of the boundary of our area of interest.

Select Layer / Open / Shapefile and browse to the Map sub folder of this Demo Project. You will find a Boundary.shp file there select it and then select open. The boundary is loaded and displayed on the map (over the points) and becomes a layer in the layer manager. If you select the polygon beside the Boundary layer (in the layer manager you can access the settings to set the style for this polygon).



Select the no pattern option from the drop down (second option) and then make the Border black and thicker by entering 3 (as shown above).

When you select OK the boundary is updated in the map.



This would be a good time to save our work - select Project / Save.

Now we will create the Contours and Color Shade. First ensure you have selected the **max\_btex\_concentration** layer in the Layer Manager - you know it has been selected when it becomes bold. Then select Layer / Create Contours and then select with HGA. The Contours dialog box appears.

The screenshot shows the 'Contours' dialog box with the following settings:

- Data to be Contoured:**
  - Choose Field: MAX\_conc
  - Min Value: 0 (Data Min=0)
  - Max Value: 40000 (Data Max=40000)
- Interpolator Settings:**
  - Interpolation Method: Natural Neighbours
  - Advanced Settings button
- Contour Type:**
  - Contour Line: Name My\_Contours, Settings button
  - Color Shade: Name My\_Color\_Shade, Settings button
  - Zebra: Name, Settings button
- Options:**
  - Use Only Selected Stations
  - Restrain within Domain
  - Choose Domain button
- Buttons:** Create, Cancel, Help

We want to have both contour lines and color shade of this data so make sure to select both options.

You need to provide a name for each of the layers that will be generated and displayed in the layer manager. For example enter My\_Contours and My\_Color\_Shade.

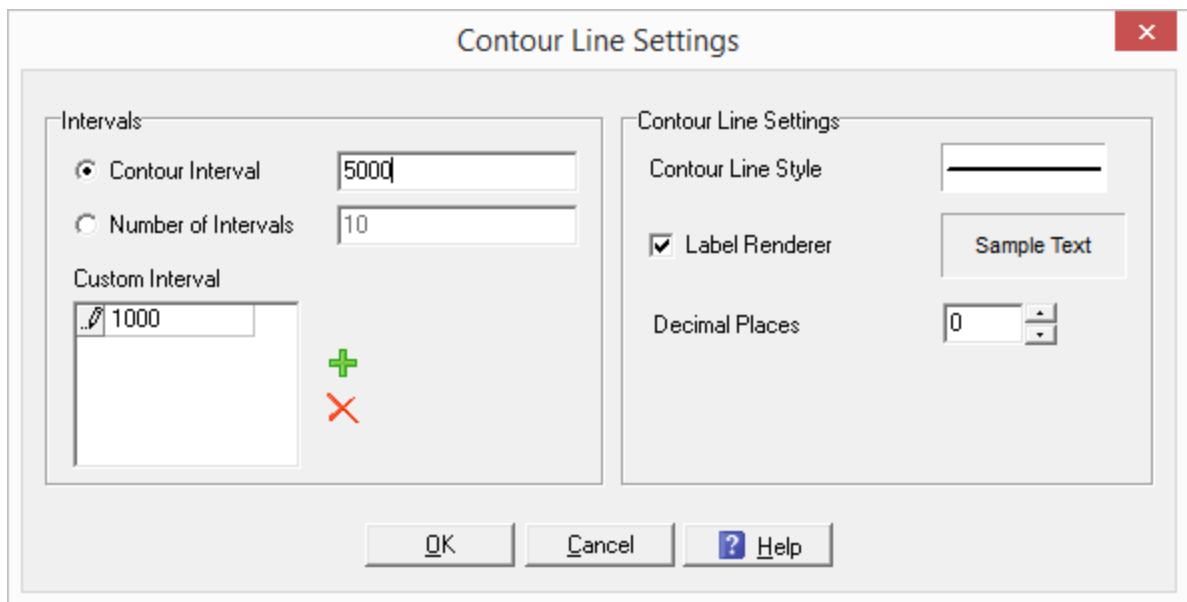
You have options to adjust the Interpolation method the following are available:

- Inverse Distance
- Natural Neighbours
- Krigging

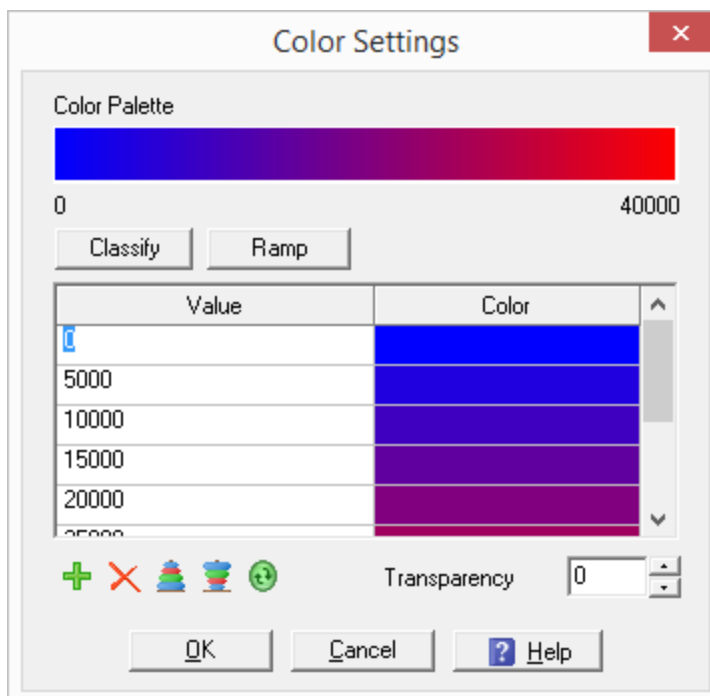
as well as Advanced Settings for each of the methods. For this tutorial we will leave Natural Neighbours and the defaults advanced settings for this interpolation method. However, you can take some time to become familiar with what options are available to you.

Now select the Settings button beside the Contour Line to access these settings. Under the Intervals section select the Contour Interval option and enter 5000 for the value. We also want a contour line at 1000 - so select the green plus button and enter 1000 in the Custom Interval option.

Under the Contour Line Settings section adjust the Contour Line Style to use Black and check on the Label Renderer option (so the contour lines will have value labels. And finally change the decimal places to 0. Your dialog box should look something like:



Select OK and you are brought back to the Contours dialog. Now select the Settings button beside the Color Shade to access these settings. This shows the color palette that will be used for the Color Shade.



We are going to use the default settings for this so you can simply select OK to return to the Contours dialog. However you can take some time to review the options available here to become familiar with them for your own project purposes.

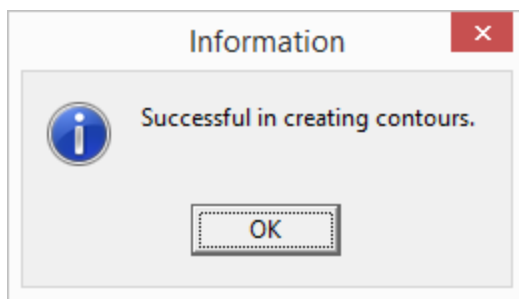


And finally we are going to restrict the contours and color shade to within the Boundary that we loaded. So select the Restrain within Domain checkbox and then select the Choose Domain button. In the dialog that appears select Boundary.

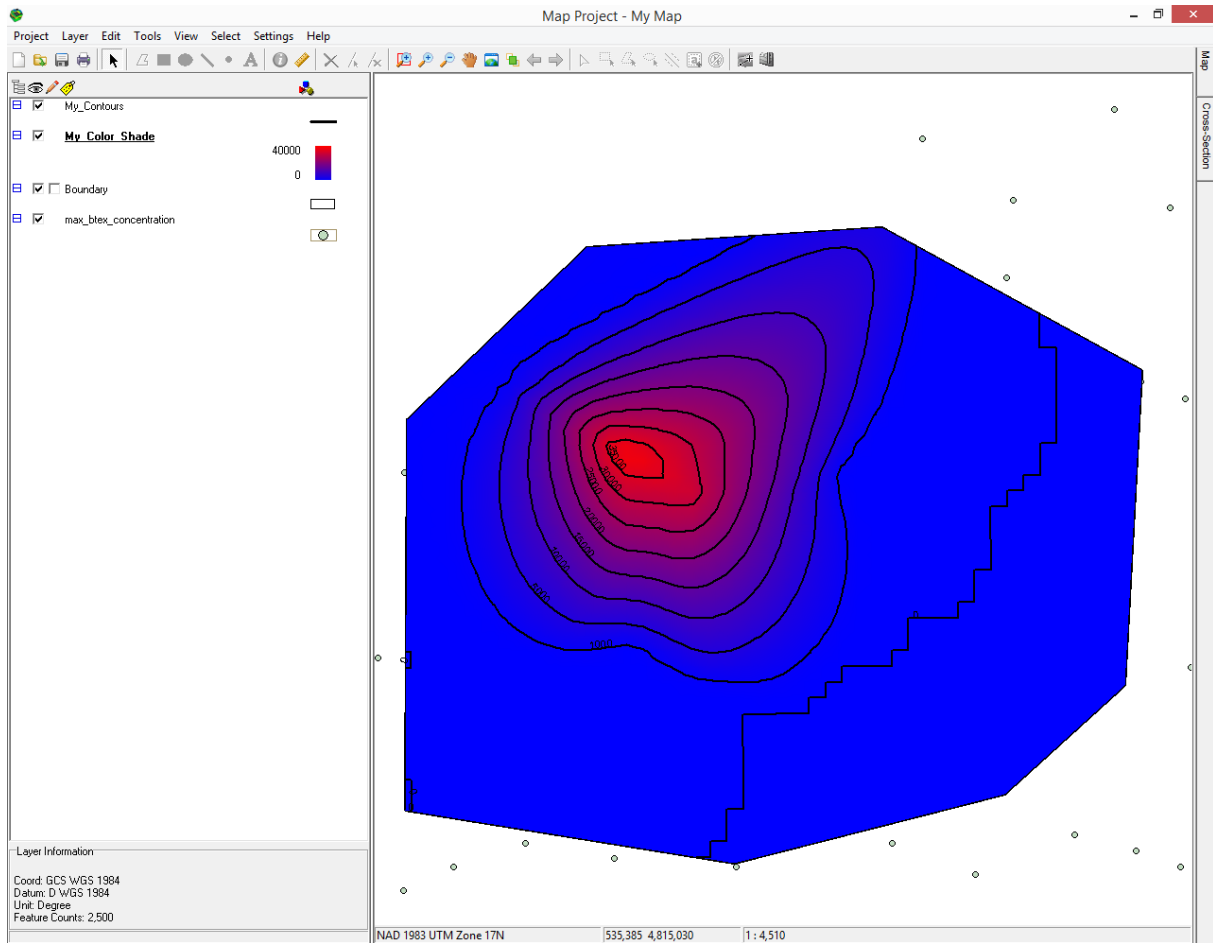
Now select the Create button to create the contours and color shade.

(You may receive a confirmation message indicating items with null values will not be included - simply select Yes).

You will then receive an Information dialog indicating that the contours were successfully created.



Select OK and then the contours and color shade will appear on the map.



If you select the Color Shade icon in the Layer Manager you can adjust the settings - perhaps try changing the transparency. You can also drag and drop the points layer (max\_btex\_concentration) on top of the My Color Shade layer - this will make the points appear on top of the color shade as items are displayed in the order they appear in the layer manager.

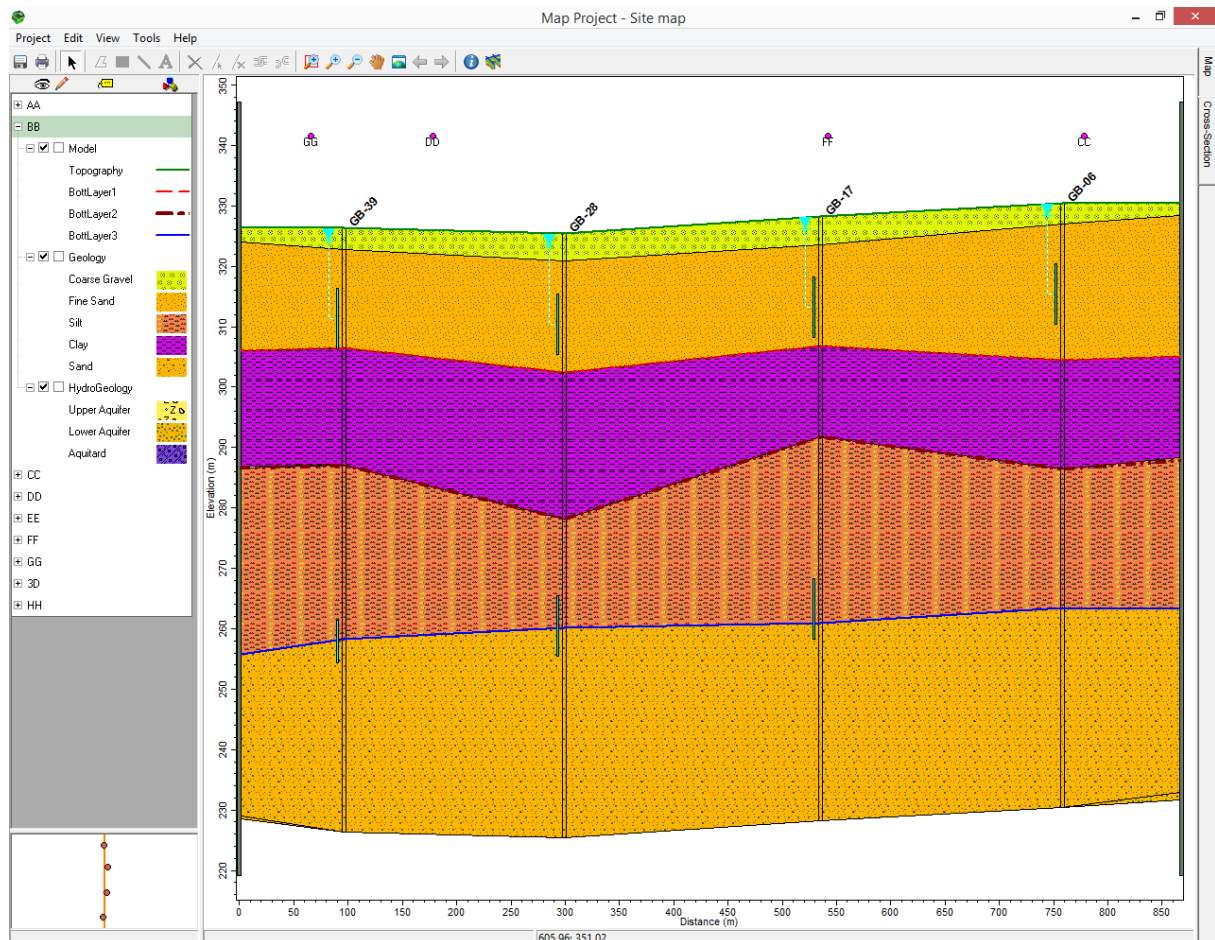
Don't forget to save your work by selecting Project / Save before you close your map. We have gone through only a small number of features of the Map Manager. For more details on the Map Manager please refer to [Map Manager](#).

## 2.8 Cross-Sections

Groundwater and environmental site investigations typically entail detailed analysis of lithologic data acquired from boreholes. Interpreting and visualizing the borehole data is a crucial step in understanding the subsurface regime. HGA comes complete with a fully-integrated cross-section tool that is designed with all the features you need to create geologic and/or hydrogeologic cross-section interpretations.

The Cross-Section Editor is designed with easy-to-use tools for interpreting geological and hydrogeological data, as well as interpreting data for groundwater flow models. Generating model layers for use as modeling layer elevations in groundwater modeling packages such as Visual MODFLOW Flex has never been easier!

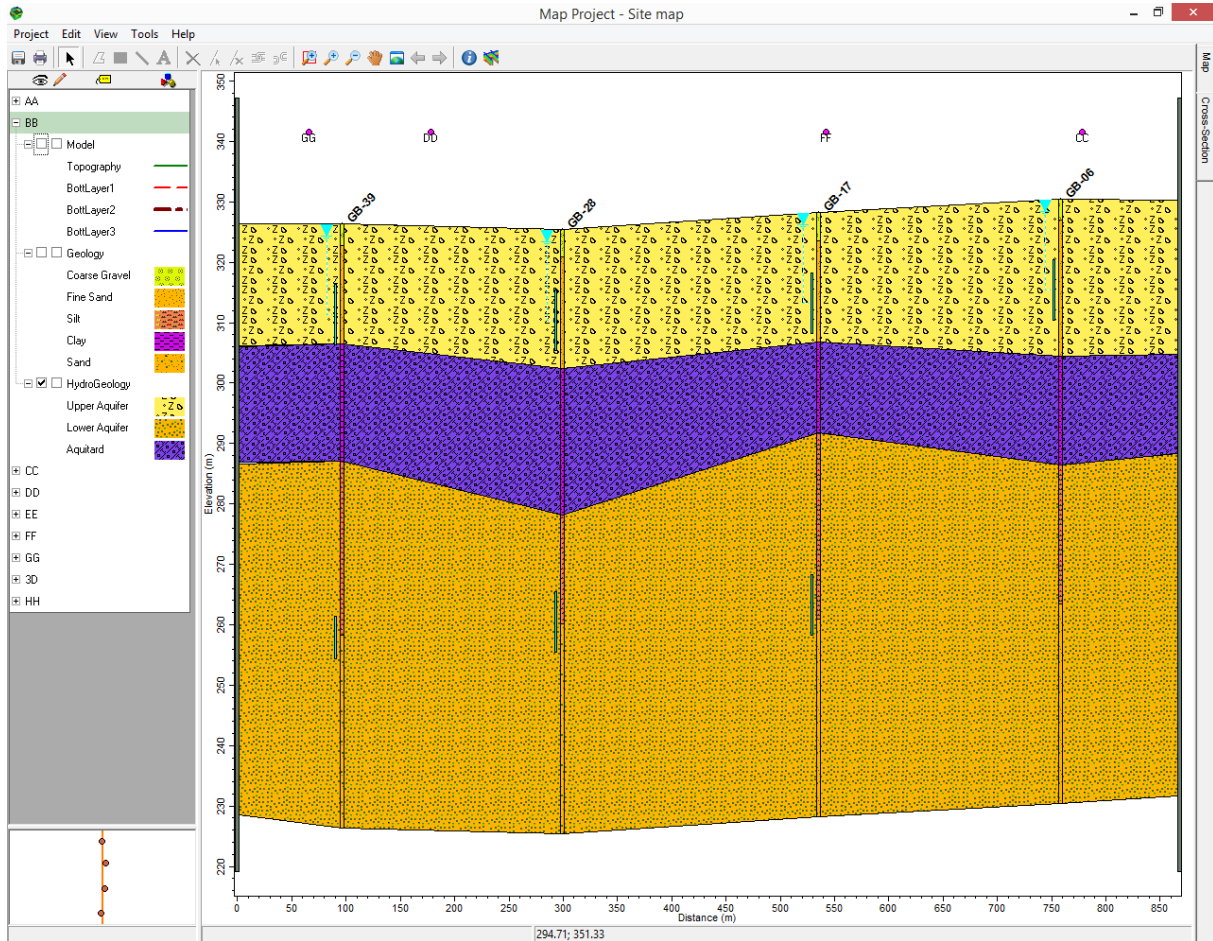
The Cross Section Editor can be accessed from the Map Manager - so first you will need to open the Site map project within the Demo Project by double clicking on Site Map under Map Projects in the Project Tree. Once the Map Manager loads select the Cross-Section tab on the right hand side to access the Cross Section Editor. The Demo Project has several Cross Sections interpreted for you already - we are going to start by opening BB by selecting the + beside BB in the Layer Control (on the left hand side).



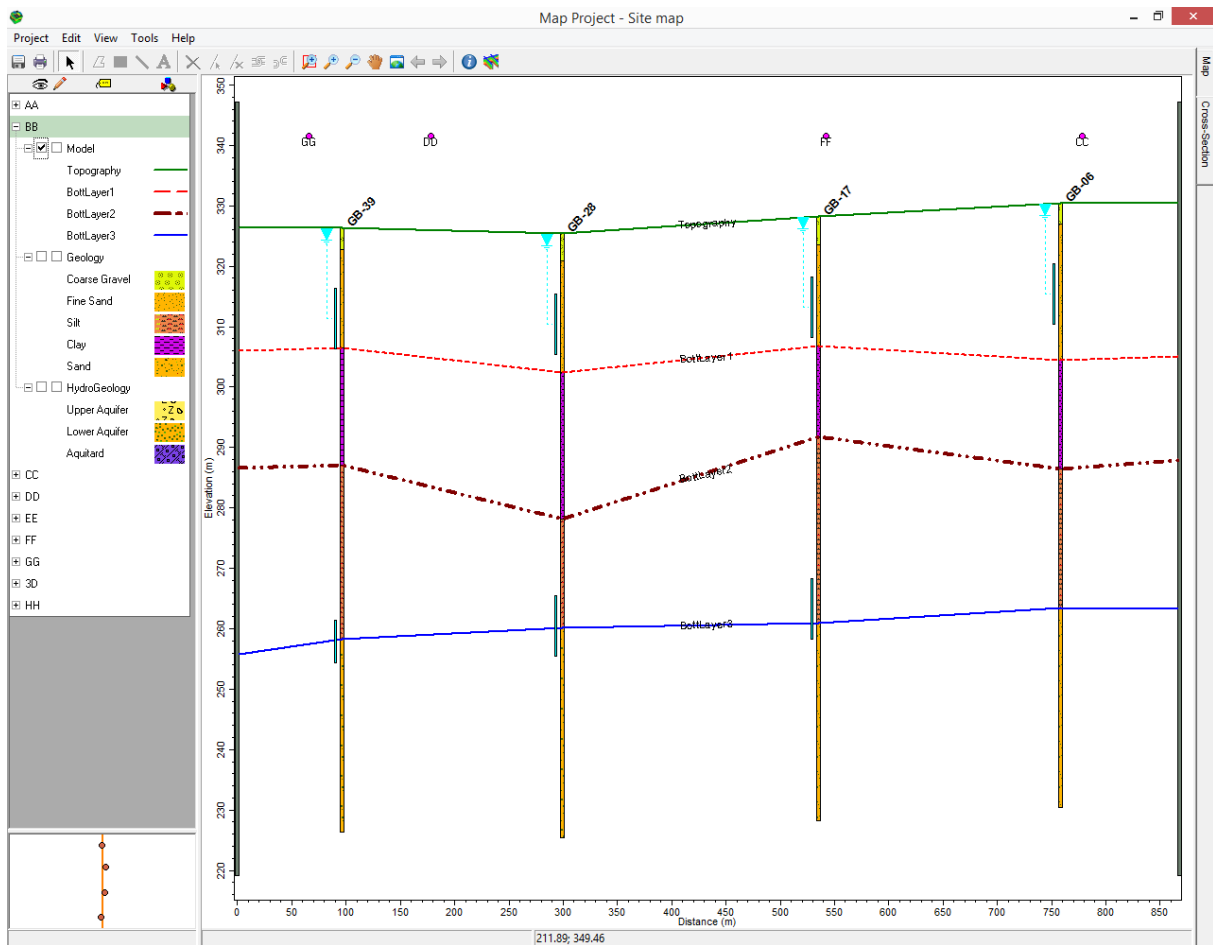
You can see that this cross section has been interpreted on three layers:

- Model** - line interpretations of where the model layers occur if you are planning on generating a groundwater model
- Geology** - polygon interpretations of the soil types from the known points (at the stations) across the entire cross section
- Hydrogeology** - polygon interpretations of multiple soil types that would comprise a hydrogeologic layer

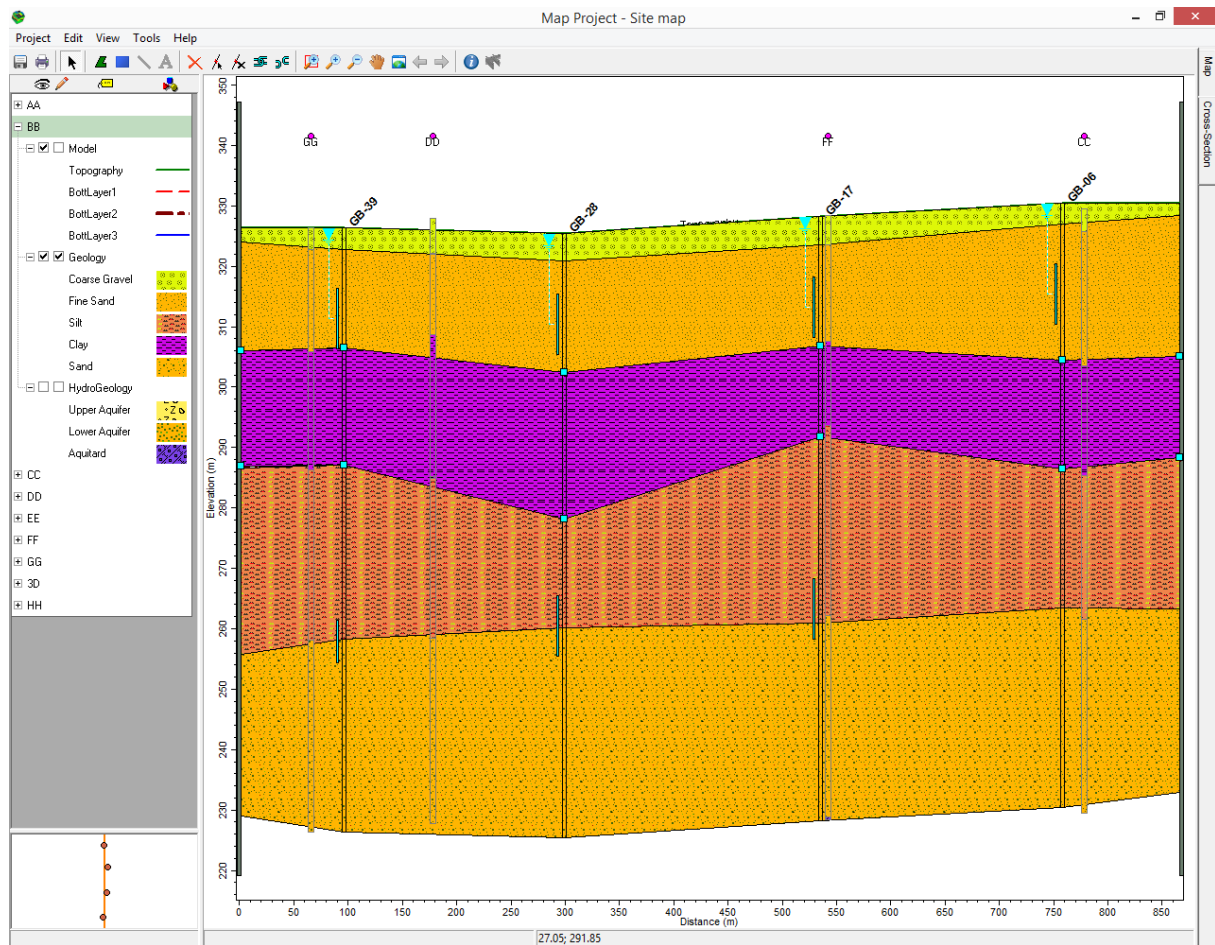
You can show/hide each interpretation type by selecting/removing the first checkbox beside each interpretation layer. For instance if you remove the first check box beside both Model and Geology you will see the Hydrogeology interpretations for this cross section.




And if you remove the check box from Hydrogeology and select the checkbox beside Model you will see the model layer interpretations.

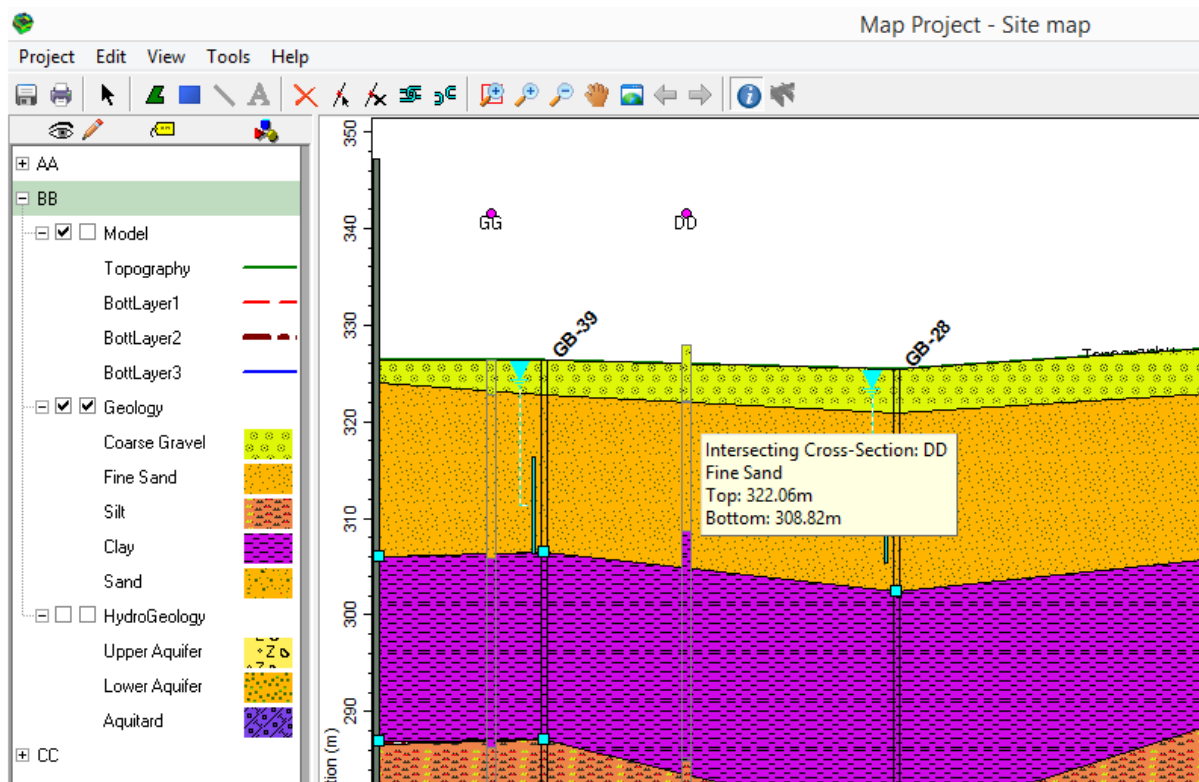



Turn the Geology interpretation back on by selecting the first check box beside the Geology layer. Now select the second checkbox - this puts the Geology layer into edit mode. You will notice the Polygon and Rectangle drawing tools become available in the toolbar. If you select a polygon - for instance the Clay polygon you will notice the vertices - light blue squares - become available and you can adjust them to edit the interpretation.



You will also notice that when you put the Geology layer into edit mode "ghost wells" appear - these are the interpretations of an intersecting cross section. So you can see that the interpretation of cross section DD is slightly different for the Clay layer. This allows you to adjust and ensure that interpretations are consistent at intersecting cross sections.

To confirm information on the cross section selection the information button  on the toolbar and your cursor will now have an i symbol on it. Hover over items on the cross section to get further information.




To return your cursor to the regular select the pointer button  and then you can spend some time attempting to edit the various polygons within the cross section. When you are done remove the second checkbox beside the Geology layer and you will be prompted to save your changes - select Yes.

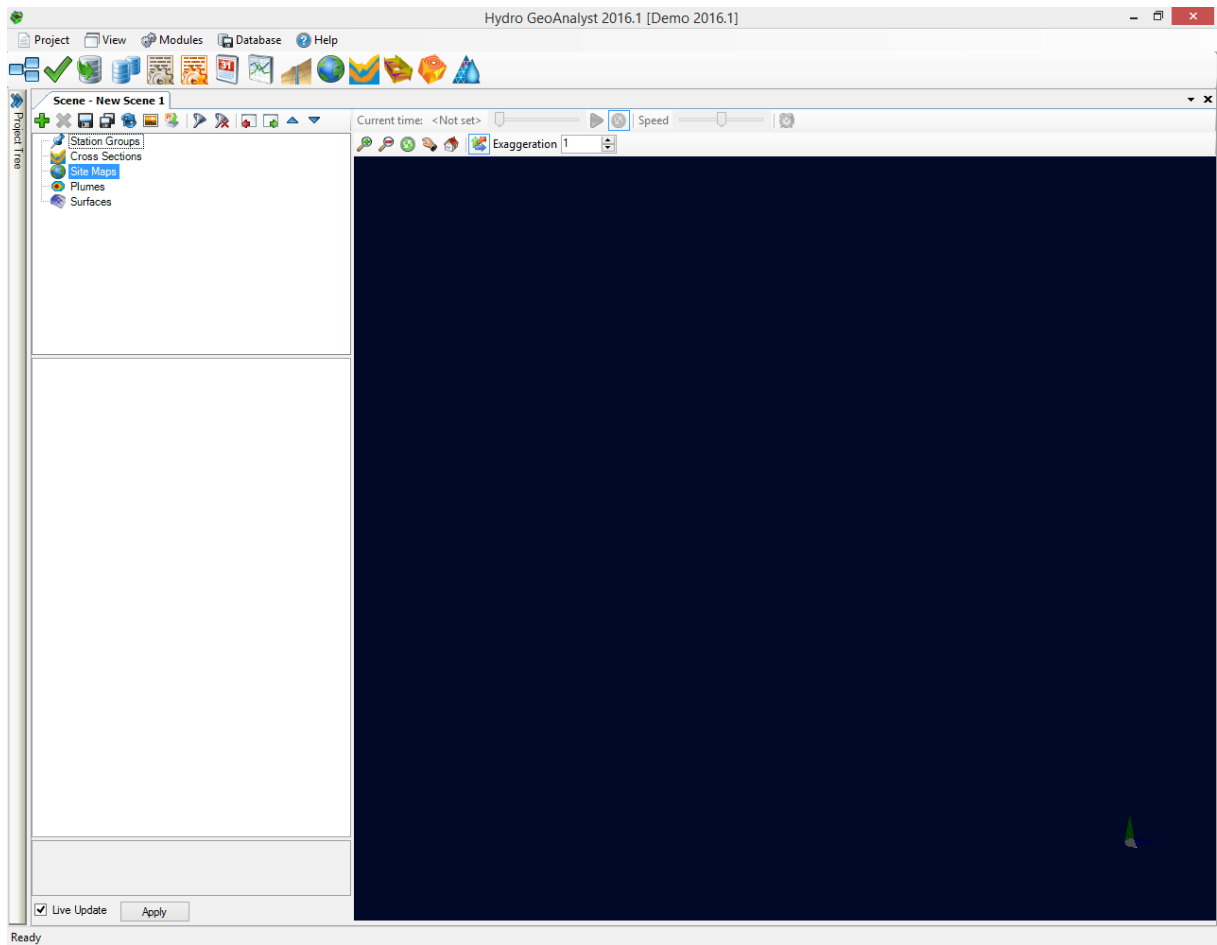
For more details on the Cross Section Editor please refer to [Cross Section Editor](#).

Take some time to review some of the other cross sections within the Demo Project to become familiar with them. In the next section we will visualize the cross section in a 3D Scene.

## 2.9 3D Visualizations

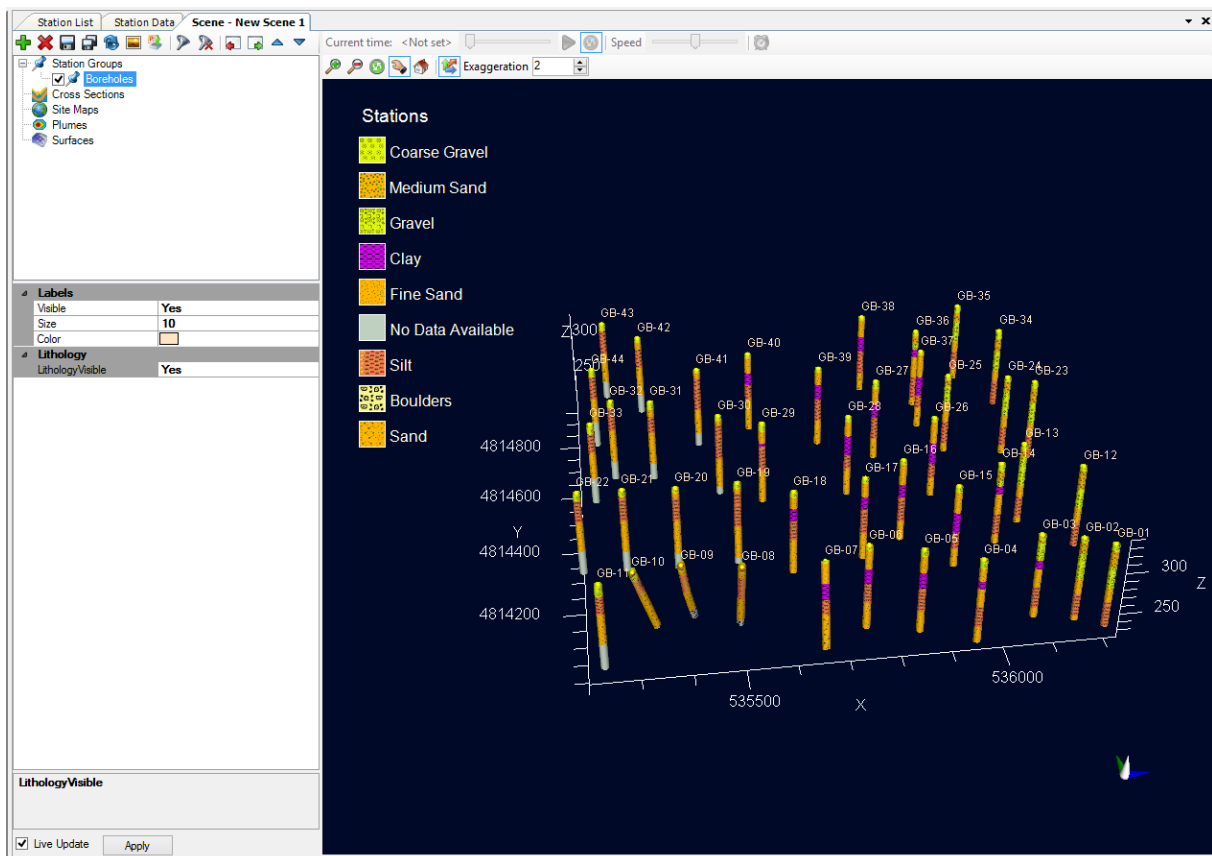
The Scene Viewer within HGA allows you to visualize your data in 3D space to get a better understanding of your entire project.

To create a new scene simply select the Scene Viewer button  from the main toolbar and an empty scene will load as a new tab.



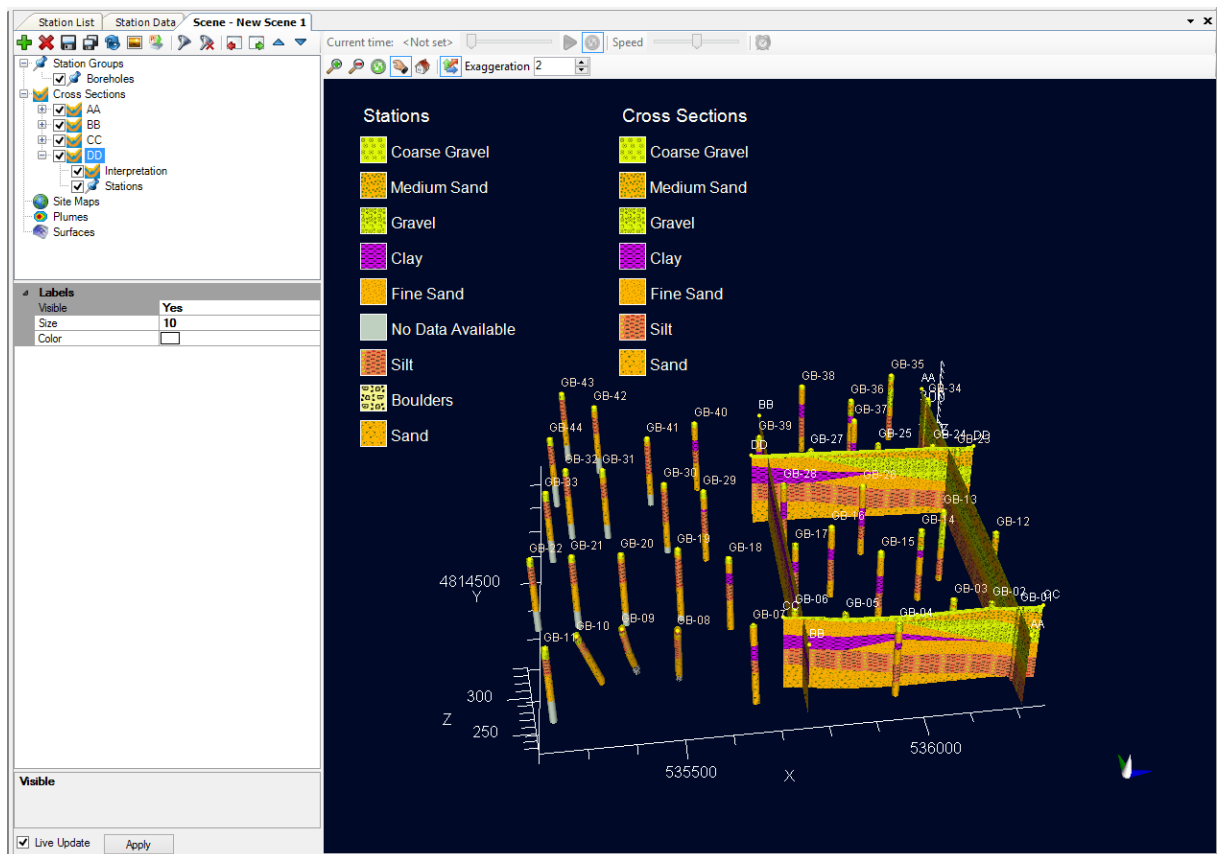
Begin by loading the Boreholes station group into the scene. Select the Boreholes station group on the Project Tree and drag it over into the (black) viewer area and drop it. The stations will appear. Rotate the image around to adjust the view. Also try increasing the Exaggeration to 2 to better visualize the stations.





In a similar way you can drag and drop cross sections into a scene. Try loading the following Cross Sections; AA, BB, CC, and DD.

Your scene should look something like:



You will notice that there is now a legend for the soil types found within the station data as well as a legend with the soil types used for the cross section interpretations. You can turn these off by selecting the Cross Sections branch of the scene tree and then setting the Legends Visible option to No.


Station List    Station Data    **Scene - New Scene 1**

The interface shows a tree view on the left with the following structure:


- Station Groups
  - Boreholes
  - Cross Sections**
    - AA
    - BB
    - CC
    - DD
    - Interpretation
    - Stations
  - Site Maps
  - Plumes
  - Surfaces

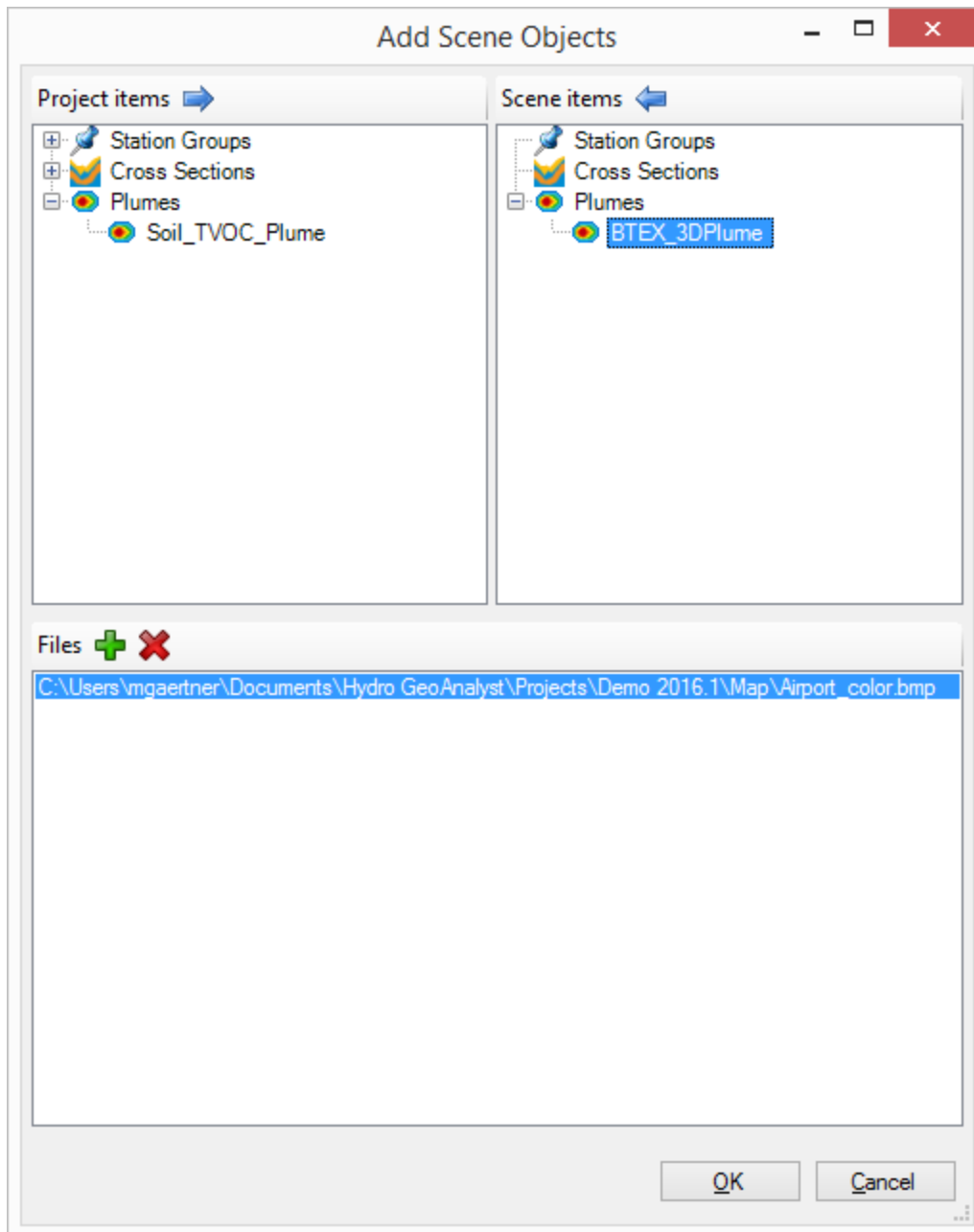
The right-hand panel displays the following settings:

<b>Interpretations</b>	
Interpretation Type	Geology
<b>Labels</b>	
Visible	Yes
Size	10
Color	<input type="text"/>
<b>Legend - Cross Sections</b>	
Visible	No
Title	Cross Sections
Title size	14
Entry size	12
Title color	<input type="text"/>
Entry color	<input type="text"/>
Background color	<input type="text"/>
Border color	<input type="text"/>
Border width	1
Horizontal location	32
Vertical location	5
Columns	1
<b>Legend - Stations</b>	
Visible	No
Title	Stations
Title size	14
Entry size	12
Title color	<input type="text"/>
Entry color	<input type="text"/>
Background color	<input type="text"/>
Border color	<input type="text"/>
Border width	1
Horizontal location	3
Vertical location	5
Columns	1

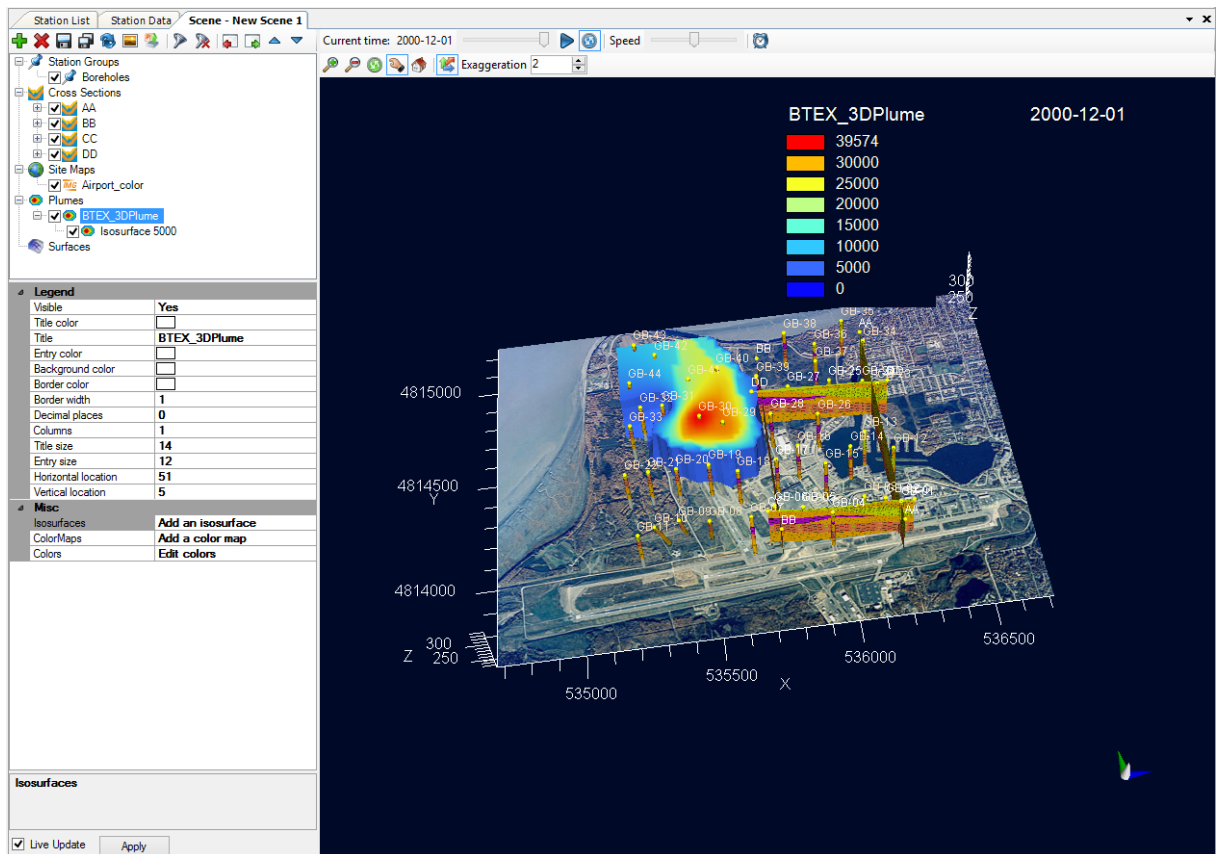
You can also add multiple items into the scene at once by selecting the green plus  and use the Add Scene Objects dialog.


At the top of the dialog you can select Project items on the left side - for example select the BTEX\_3DPlume and then select the blue right arrow. You will notice the BTEX\_3DPlume item moves to the Scene items (on the right hand side).

We also want to add the site map from our map project. Select the green plus  in the bottom half of the dialog and then browse to the Airport\_color.bmp image that is found in the Map sub folder of the Demo Project.







Select the save button  in the toolbar and you will be prompted to save your scene.

Then you are able to close the scene tab and reopen it from the Project Tree later.

These are just some of the features of the Scene Viewer in HGA. For more details on the Scene Viewer please refer to [Scene Viewer](#).

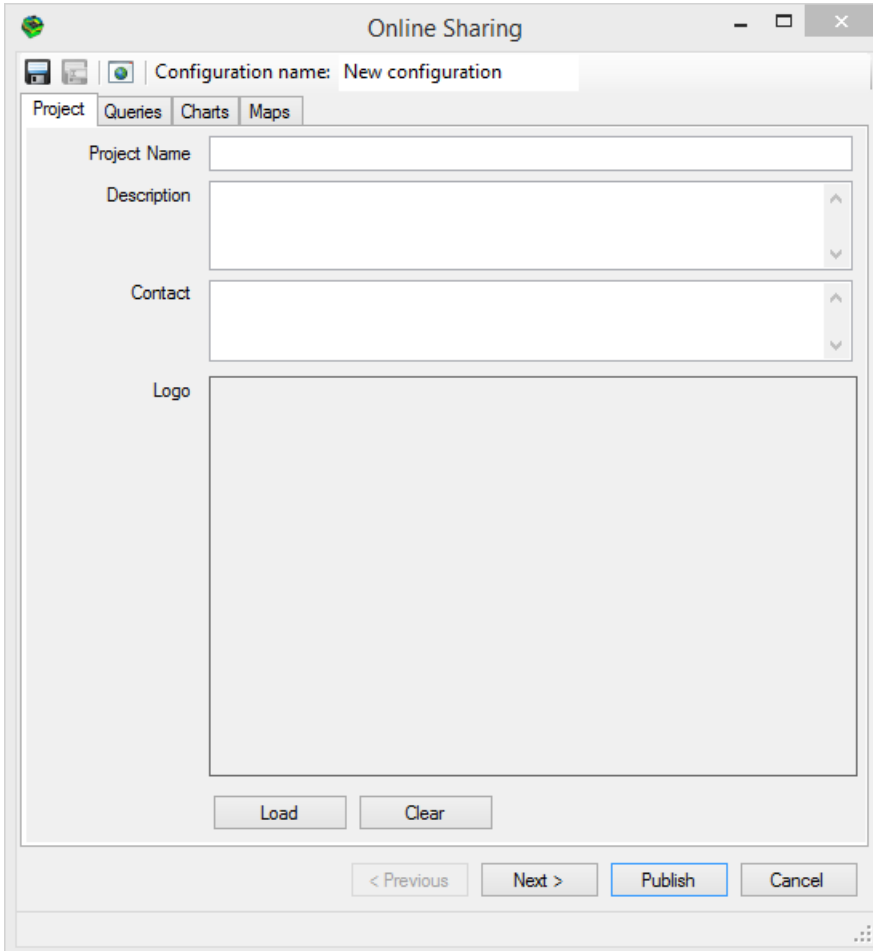
## 2.10 Online Sharing

Hydro GeoAnalyst includes an Online Sharing module, which is a helpful tool for sharing project data with colleagues or stakeholders who may not own or be

familiar with Hydro GeoAnalyst. The Online Sharing module makes it very easy for you to publish site maps and the results of data queries in your project. The release of Hydro GeoAnalyst version 8.0 also extends data charting directly through the Online Sharing module. The Online Sharing module now supports multiple online sharing 'configurations' as well, meaning you can create different data sets with different stakeholders. Let's review the capabilities of the Online Sharing module by creating an online sharing configuration of our own.

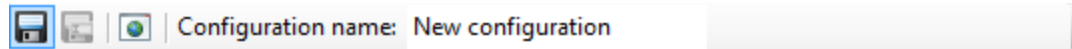
Before we go any further let's clarify some terms relating to the online sharing process. When discussing the Online Sharing module, a configuration refers to all of the settings input during the Online Sharing process, and a 'share' or an 'online share' refers to the published results of a configuration. Since an online sharing configuration relies on dynamic data pulled from the HGA database it is possible to generate a multitude of online shares based on a single configuration. Once new data is added to the database you may publish a configuration again to update the resulting online share.

To launch the Online Sharing module click 'Modules' > 'Online Sharing' from the main menu. The Online Sharing window will open, as shown below:



The screenshot shows the 'Online Sharing' window with a toolbar at the top containing icons for Project, Queries, Charts, and Maps. The 'Configuration name' field is set to 'New configuration'. Below the tabs, there are four input fields: 'Project Name', 'Description', 'Contact', and 'Logo'. The 'Description', 'Contact', and 'Logo' fields have scrollbars. At the bottom of the form are 'Load' and 'Clear' buttons. At the very bottom of the window are navigation buttons: '< Previous', 'Next >', 'Publish', and 'Cancel'.

At the top of the window you will see a small toolbar:



These toolbar options include the following (from left to right):

- Save settings: saves the current configuration to the Project Tree (under the Online Sharing node)
- Save as: allows you to save the existing configuration under a new name
- Launch browser: will open your default browser and display the results of the online share (only available after the online share has been published)
- Configuration name: to specify a name for the online sharing configuration

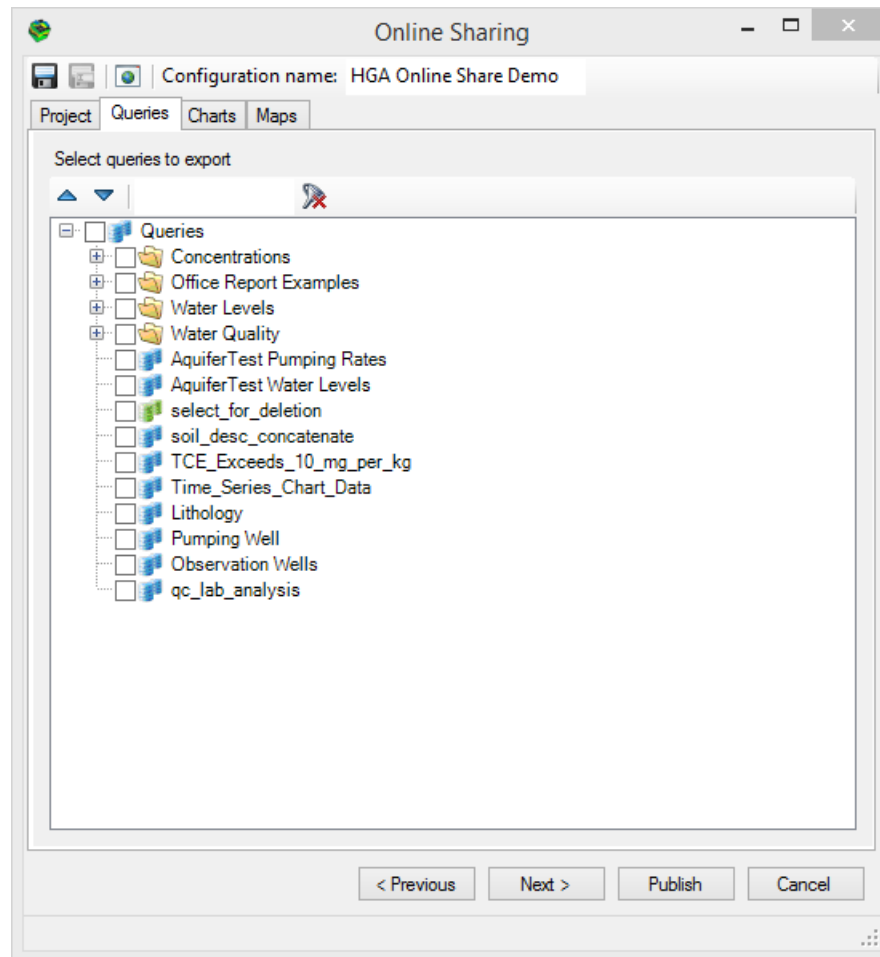
When you first launch the Online Sharing module you will see the 'Project' tab, as shown in the image above. The Project tab allows you to specify information about the project and provide descriptive information which will be displayed on the homepage of your published online share. You can also specify a name for the new online sharing configuration. The 'Project Name' field can be anything you like, and does not necessarily have to be related to the name of your database. Under description you may provide information about the data included in the online share, or any other relevant information. Contact information can be provided as required in the 'Contact' field. And finally, you may include your own company logo or any other image using the 'Load' and 'Clear' buttons under the 'Logo' field.

For now let's enter the following information into these fields:

- Configuration name: HGA Online Share Demo
- Project name: HGA Online Share Demo
- Description: Online share of data query, charts and station group
- Contact: your name
- Logo: load an image of your choice

When this information has been input proceed to the next step in the Online Sharing module by clicking the 'Next >' button. This will bring you to the 'Queries' tab within the Online Sharing module.





The Queries tab allows you to select any existing data query saved to your project for sharing online. The results of the data queries will be published online as data tables. A toolbar is available on the Queries tab:

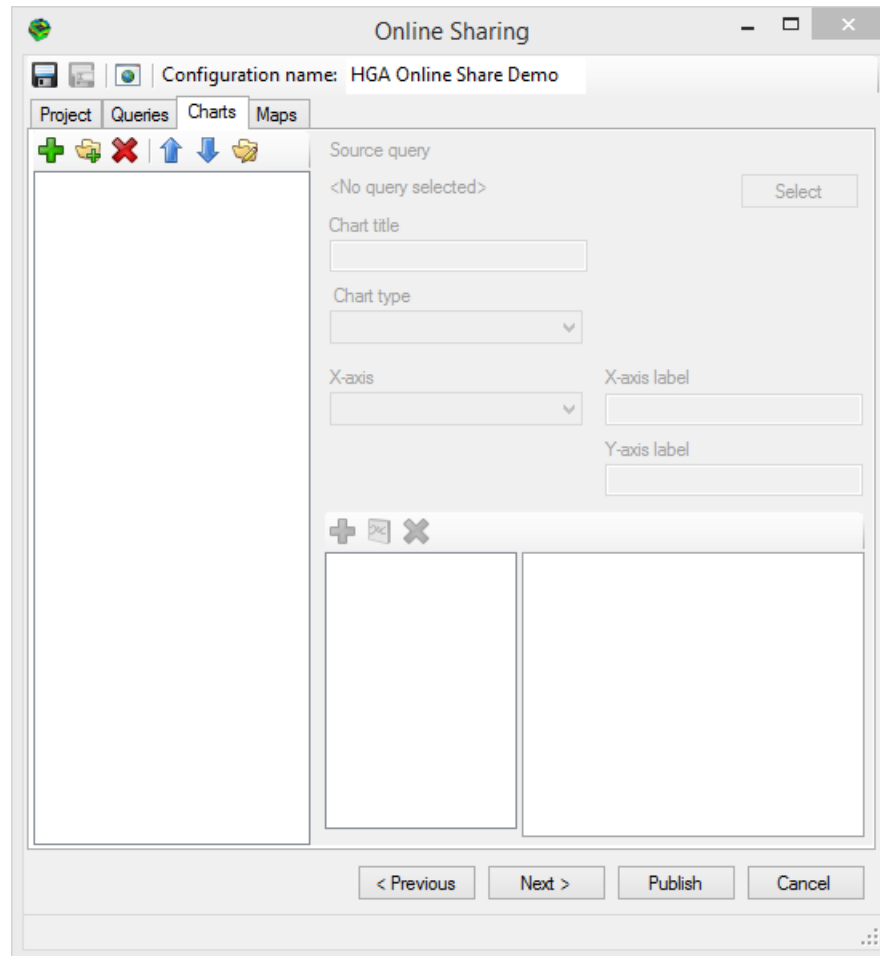


The toolbar buttons/field allows you to expand or collapse nodes in the query table and apply a filter.

Let's select a few queries for demonstration purposes. Ensure the following queries are 'checked' by clicking the boxes next to each one:

- Concentrations > TVOC\_Exceeds\_1000\_ug\_L
- Water Quality > WD\_Data\_SO4
- Water Quality > WQ\_Data\_Calcium
- AquiferTest Pumping Rates
- AquiferTest Water Levels
- Lithology

When these queries have been selected proceed to the next step in the Online Sharing module by clicking the 'Next >' button. This will bring you to the 'Charts' tab within the Online Sharing module.



The Charts tab allows you to publish simple time-series data charts based on the results of available project queries. As you can see, the Charts tab is mostly unavailable until a chart has been added. This can be accomplished using the toolbar buttons available in the Charts tab:



These toolbar options include the following (from left to right):

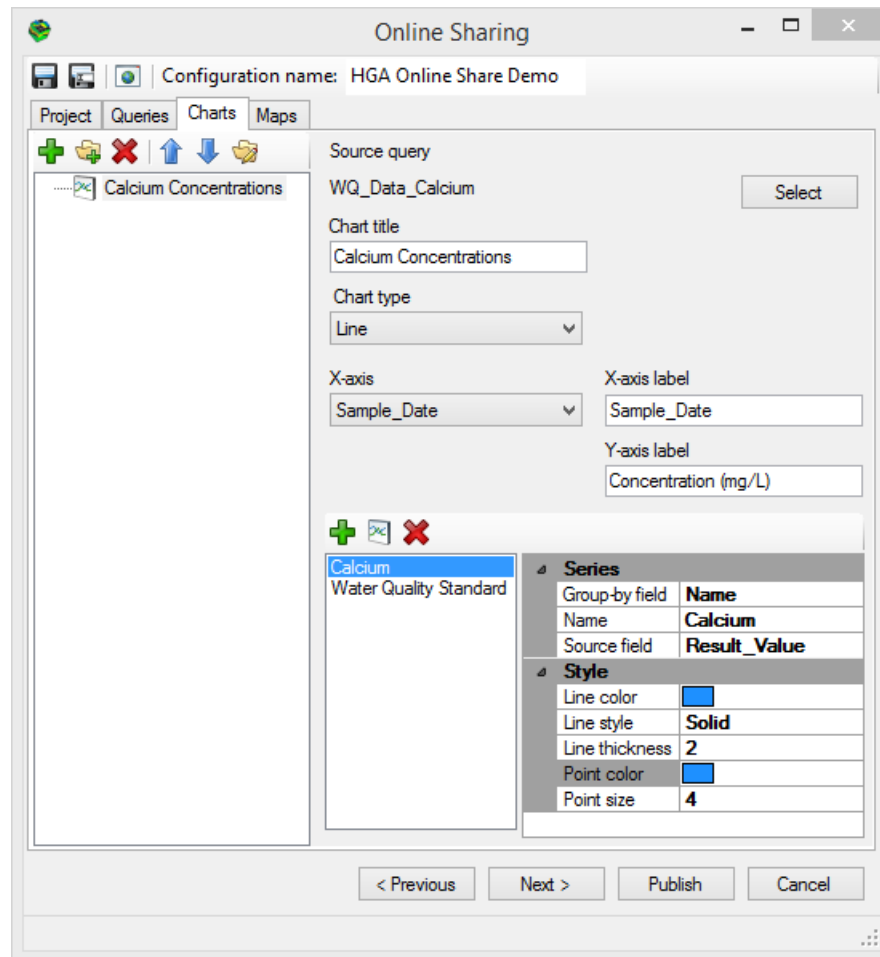
- Add a chart page: adds a new chart to the list of charts available in the online share
- Add a folder: adds a new folder to the list of charts, which can be used to organize your charts
- Delete: deletes the selected chart and removes it from the online share
- Move up: move selected chart/folder higher on the list of charts
- Move down: move selected chart/folder lower on the list of charts

- Rename folder...: Rename the selected folder
- Configuration name: to specify a name for the online sharing configuration

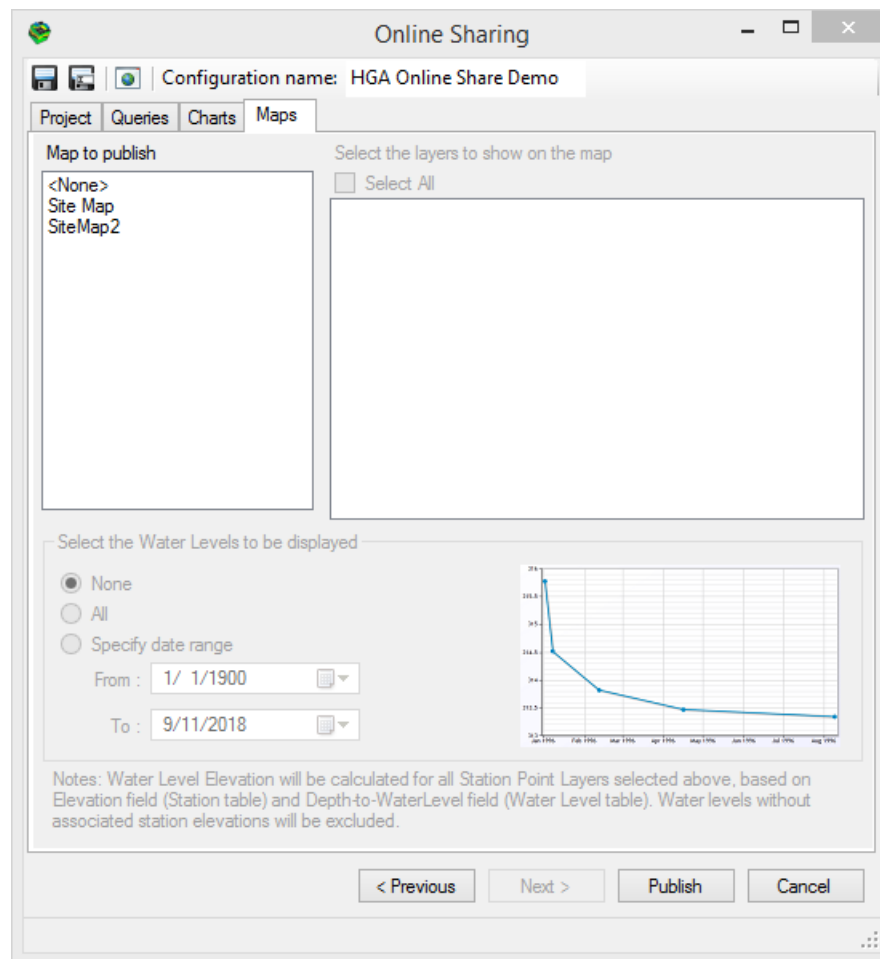
Lets add a new chart to display some water quality data (specifically calcium concentrations). To add a chart take the following steps:

- Click the 'Add a chart page' button in the toolbar
- Type: '**Calcium Concentrations**' as the chart title in the window that appears
- Click OK to apply the chart title
- In the Open Query window select the 'Water Quality > **WQ\_Data\_Calcium**' data query
- Click OK to select the query
- Select '**Sample\_Date**' as the X-axis
- Type '**Concentration (mg/L)**' in the Y-axis label field
- Click the green + button in the secondary toolbar ('**Add series**' button)
- Select '**Name**' as the 'Group-by field' (this will separate the data into groups based on the 'Name' field)
- Type '**Calcium**' in the 'Name' field
- Select '**Result\_Value**' in the 'Source field' field
- Click the '**Add trend line**' in the secondary toolbar
- Type '**100**' in the 'Constant value' field
- Type '**Water Quality Standard**' in the 'Name' field
- Change the line color and point color to red for the Water Quality Standard line

Now is a good time to save the configuration. Do this by clicking the Save button in the main toolbar. When you're finished the display should look something like the image below (note: Calcium series has been selected in the image below):

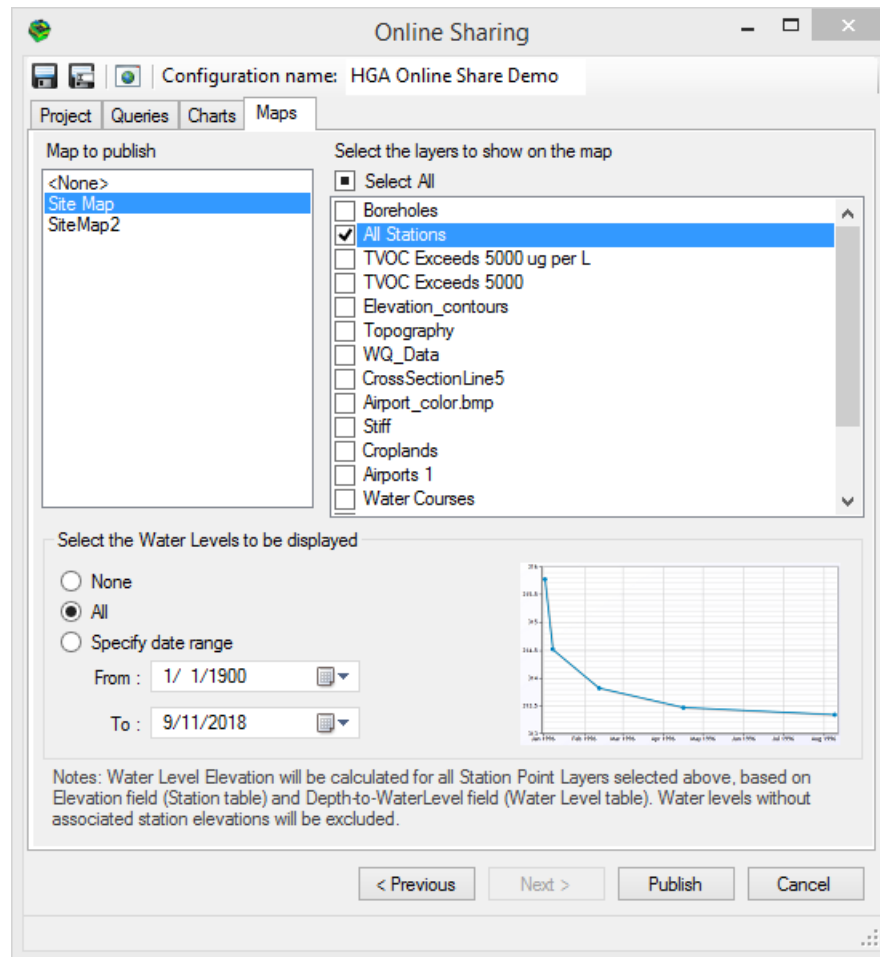


Once the chart info has been input we can proceed to the last tab in the Online Sharing module. Click the 'Next >' button and you will arrive at the 'Charts' tab:



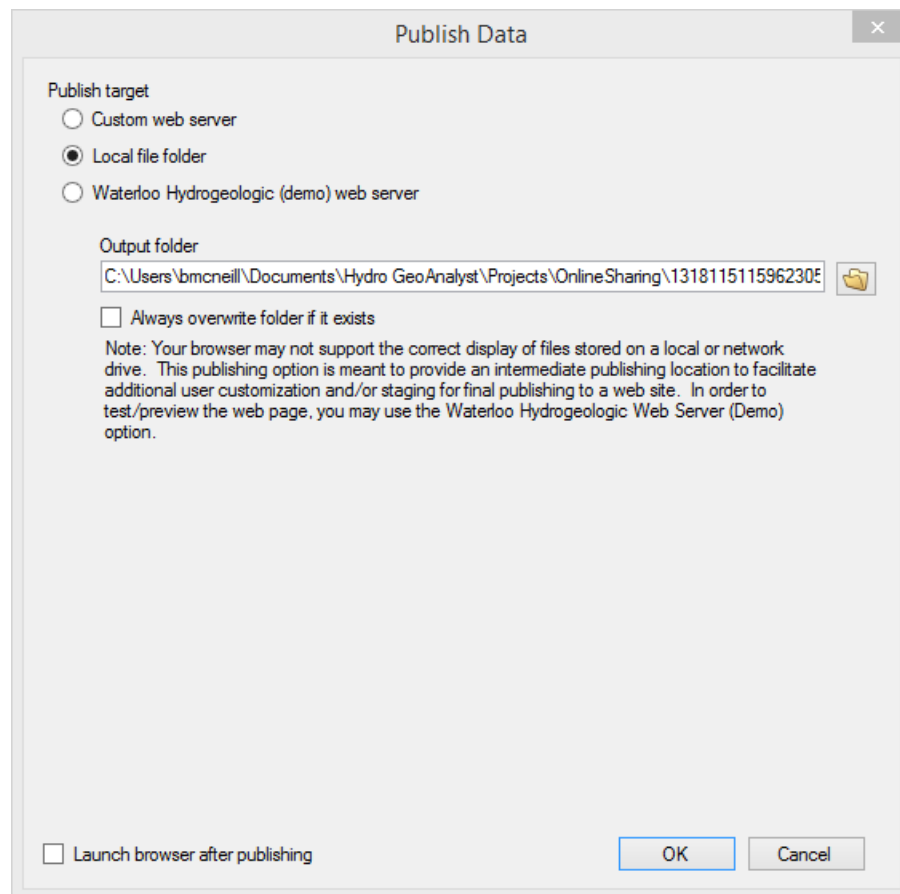
The Maps tab allows you to select from any existing map projects within the given HGA project, and to select any number of data items associated with that map project for online sharing. It is also possible to publish water level data associated with any station point layers. Sharing maps may take a while, so we'll limit our map data to a single station group.

Under the 'Map to publish' table select '**Site Map**'. This will activate a list of map layers in the table on the right. Select the '**All Stations**' map layer by clicking the associated checkbox. Finally, we will include all water level data associated with the selected station group by selecting '**All**' under the 'Select the Water Levels to be displayed' frame. When you're finished, the Maps tab should look like the image below:



Finally we are ready to publish the online share based on the configuration details that we have specified. Before we publish the online share it's always a good idea to **Save the configuration**.

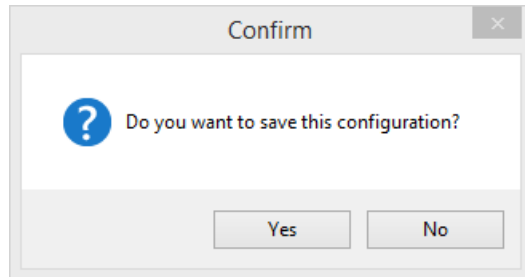
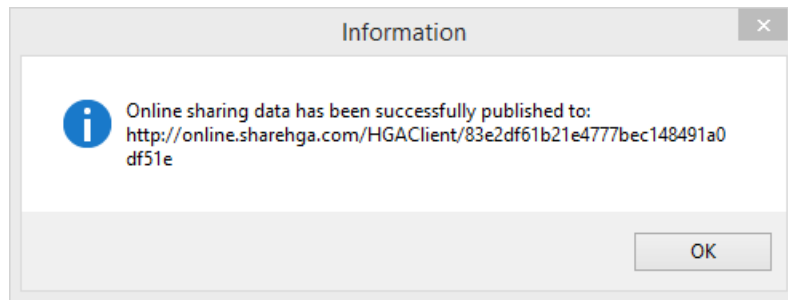
To publish the online share simply click the 'Publish' button, and the following window will appear:



Hydro GeoAnalyst allows you to publish your online shares three ways: using a custom web server (always recommended for your project data, which may be sensitive), to a local file folder, or to the Water Hydrogeologic web server. It is NOT recommended to use the Waterloo Hydrogeologic web server to host private, proprietary or confidential information or to use the Waterloo Hydrogeologic web server for long-term data sharing. But for the purposes of this demonstration we will publish to the Waterloo Hydrogeologic web server.

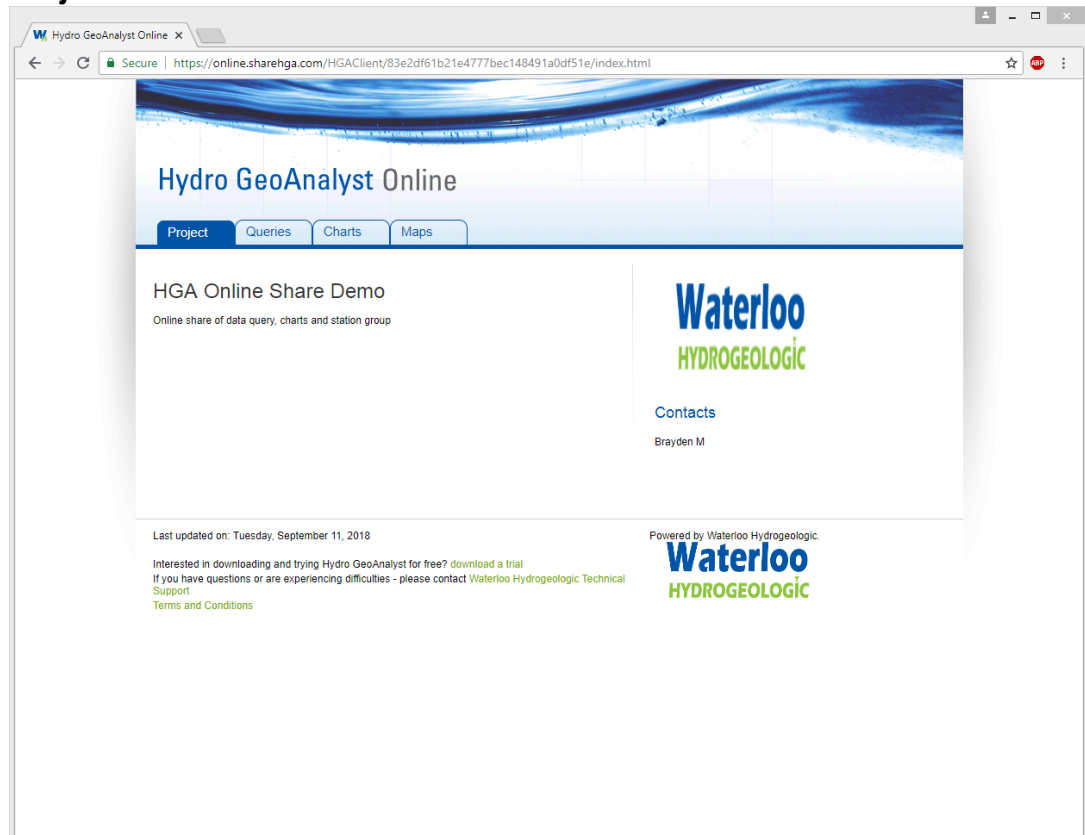
Select '**Waterloo Hydrogeologic (demo) web server**' as the 'Publish Target', select the '**Launch browser after publishing**' button (bottom right), and then click **OK**.

The publishing step may take a few minutes, and when it's complete a message should be displayed indicating that your online sharing data has been successfully published. When you click OK a 2nd message will appear asking if you would like to save the configuration:



Once these messages are dismissed your internet browser should launch automatically, and the online share will be displayed. The results of the online share will be divided into four tabs, based on the inputs during the previous steps. A screenshot of each tab is displayed below:

### Project Tab





### Queries Tab

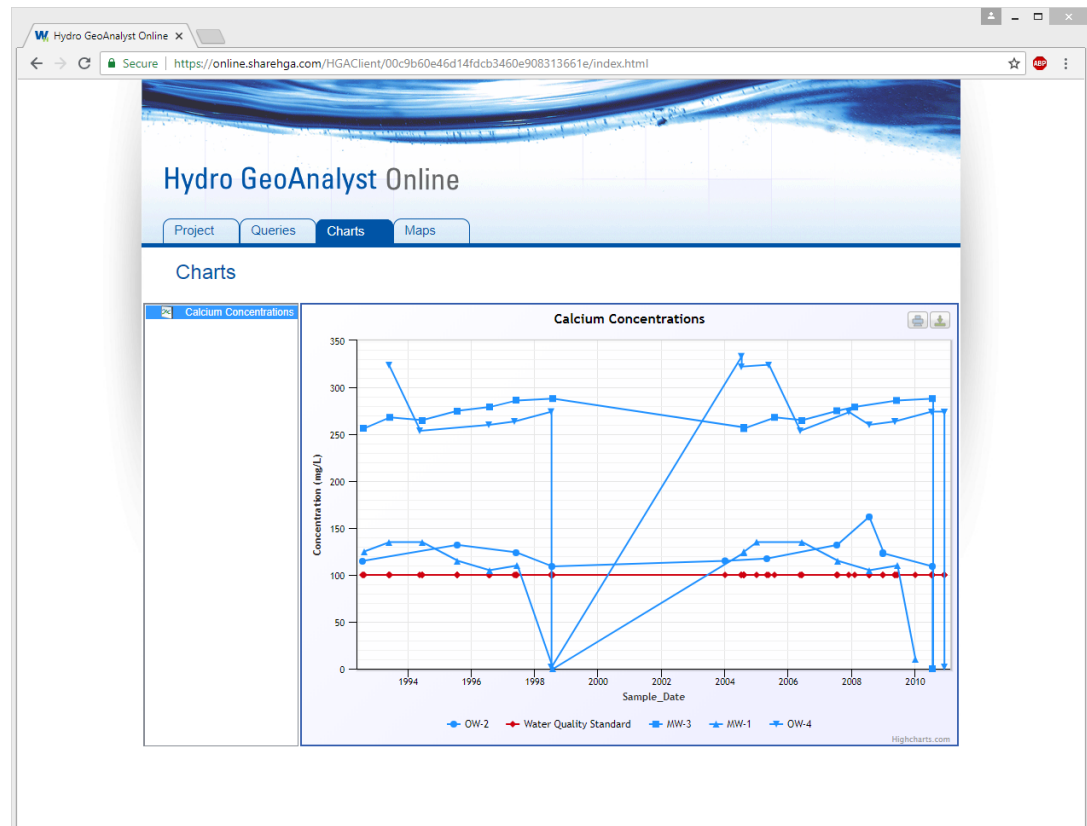
Hydro GeoAnalyst Online

Project Queries Charts Maps

Queries TVOC\_Exceeds\_1000\_ug\_L

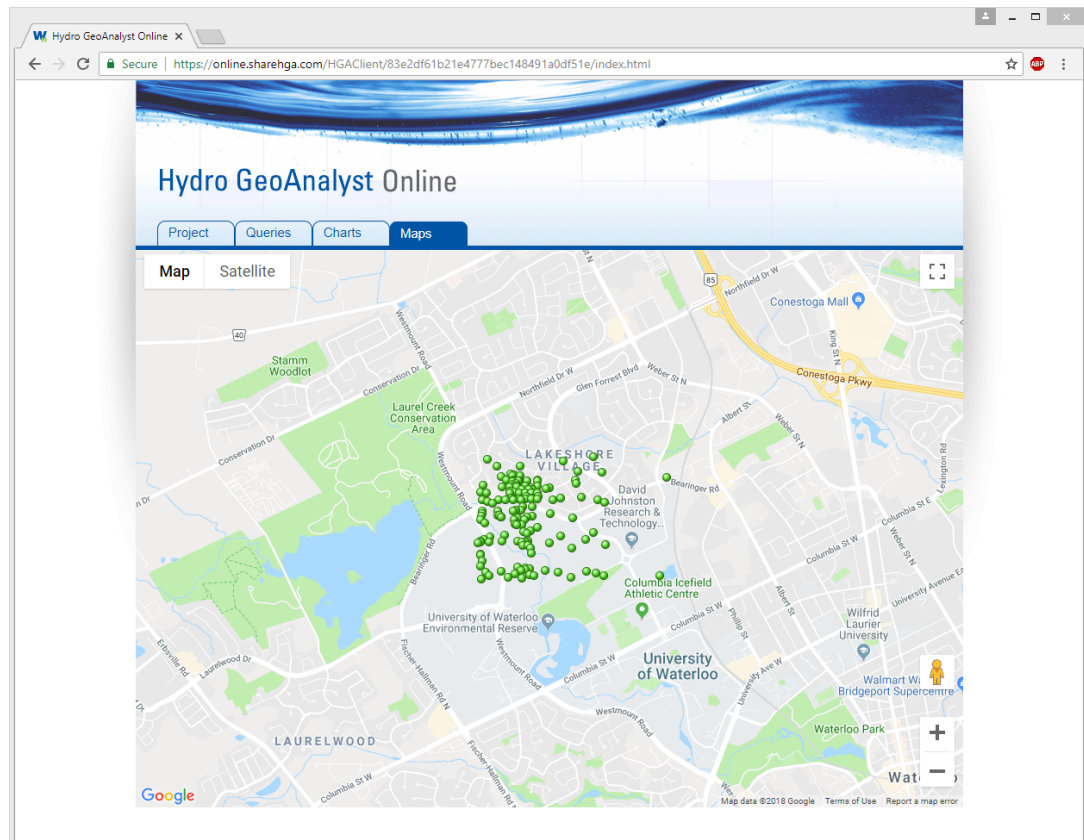
name	id	x (m)	y (m)	Chemical_N...	Result_Value	Result_U
W-08	8	535470	4814653	TVOC	5200	ug/L
W-08	8	535470	4814653	TVOC	4680	ug/L
W-08	8	535470	4814653	TVOC	4160	ug/L
W-08	8	535470	4814653	TVOC	3640	ug/L
W-08	8	535470	4814653	TVOC	3120	ug/L
W-09	9	535485	4814546	TVOC	7400	ug/L
W-09	9	535485	4814546	TVOC	6660	ug/L
W-09	9	535485	4814546	TVOC	5920	ug/L
W-09	9	535485	4814546	TVOC	5180	ug/L
W-09	9	535485	4814546	TVOC	4440	ug/L
W-10	10	535627	4814653	TVOC	3926	ug/L
W-10	10	535627	4814653	TVOC	3534	ug/L
W-10	10	535627	4814653	TVOC	3141	ug/L
W-10	10	535627	4814653	TVOC	2748	ug/L
W-10	10	535627	4814653	TVOC	2356	ug/L
W-11	11	535546	4814553	TVOC	81000	ug/L
W-11	11	535546	4814553	TVOC	72900	ug/L
W-11	11	535546	4814553	TVOC	64800	ug/L
W-11	11	535546	4814553	TVOC	56700	ug/L
W-11	11	535546	4814553	TVOC	48600	ug/L
W-12	12	535638	4814583	TVOC	5004	ug/L
W-12	12	535638	4814583	TVOC	4504	ug/L
W-12	12	535638	4814583	TVOC	4003	ug/L
W-12	12	535638	4814583	TVOC	3503	ug/L
W-12	12	535638	4814583	TVOC	3002	ug/L

### Charts Tab

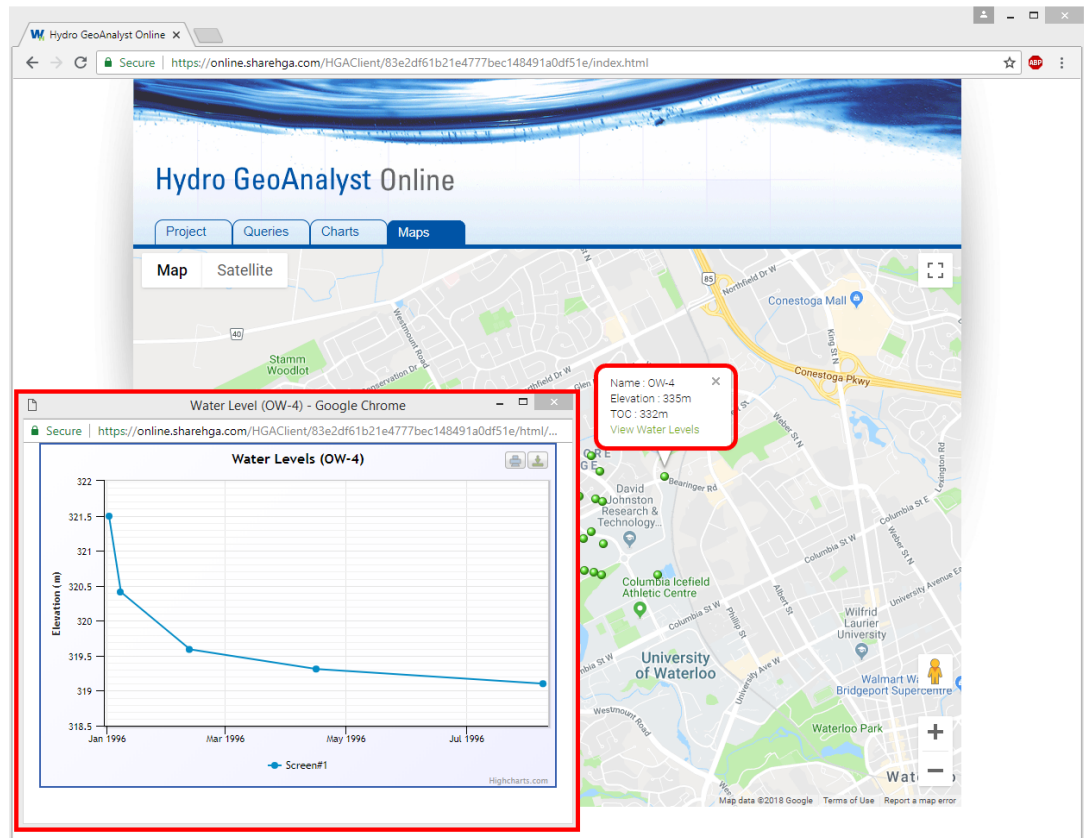


**\*Note:** if your chart doesn't look like the image above (i.e. dates out of order) you can sort the results of the WQ\_Data\_Calcium chart by date and republish the online share.

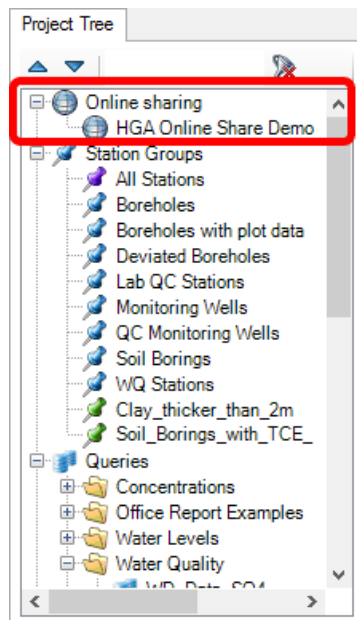
## Maps Tab



As you can see, all the of the data that we specified in the online sharing configuration have been published to a webserver. The link to this webpage can now easily be shared with project stakeholders. Also note that by clicking on a station in the Maps tab you can view some information about that well. If water level data for the selected station is available you can click 'View Water Levels' in the information box to open a new window with water level data (see image below).



Spend some time reviewing the results of the online share. When you are finished you can close the browser and return to Hydro GeoAnalyst. You should see the online sharing configuration that we created saved to the Project tree:



---

Existing online sharing configurations can be republished periodically to make new project data available. By saving existing configurations it is easier than ever to share a wide variety of project data with a variety of stakeholders and colleagues, and to ensure that the data is always up to date.

---

### 3 Fundamental Concepts

Before beginning to work with Hydro GeoAnalyst (HGA) you may want to review the topics in this section to get an understanding of the fundamental concepts of the program. This might help you become more proficient with the software in less time.

The topics go through the basic concepts of the program as well as main HGA interface, including the various modules available to you. The topics also provide you with an introduction to entering data both manually as well as with the EDD workflow which helps you to validate your data before importing it into the database.



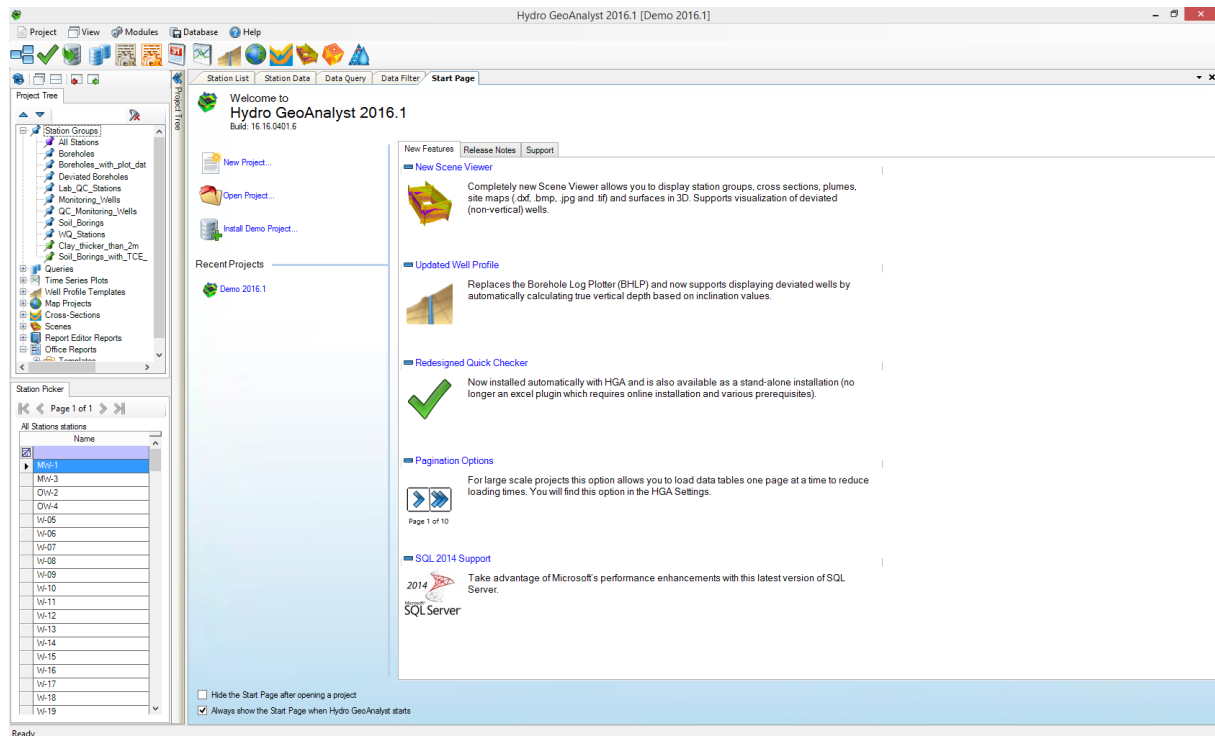
#### Learning more

The Fundamental Concepts section provides an introduction to key concepts that will help you get the most out of Hydro GeoAnalyst.

- See [Start Page Tab](#)
- See [About the Interface](#)
- See [Toolbars](#)
- See [Station Table](#)
- See [Station Groups](#)
- See [Data Categories](#)
- See [Adjustable Windows](#)
- See [Project Tree & Station Picker Tab](#)
- See [Station List Tab](#)
- See [Station Data Tab](#)
- See [Non Station Data Tab](#)
- See [Data Query Tab](#)
- See [Data Filter Tab](#)
- See [Data Entry](#)
- See [EDD Workflow](#)
- See [Spatial Geo Point](#)

### 3.1 Start Page Tab

When first launching HGA you will find a Start Page to help you do common tasks such as creating a new project or opening an existing project – even installing the Demo Project. There is also a lot of valuable information such as; what's new in the latest version, links to online resources including “How To” videos to help you learn about the new features more quickly, and links to our Technical Support staff to make it easier to ask questions and report issues.



The **New Features** tab will describe each of the new features. Some features will also include links to videos about the new feature.

The **Release Notes** tab will display our online [Readme](#) file. This contains detailed information about the new features, a list of features and bugs fixed from previous versions, as well as known issues and limitations of the current version.

On the **Support** tab you will find additional sources of information to help you, including how to contact our support team. If you have a question or concern with the product, you can use this link to initiate an email to the support team and it will include all the System Information which can be very helpful for our support team to help resolve your concern. If you are having difficulties explaining the concern try using the Problem Step Recorder – it does just what the name implies – it creates a recording of the steps you took (all the clicks) with screen captures to help make it clear what you were trying to do.

Then on the right side of the Support tab there are links to more information including:

- The HGA [YouTube channel](#) with videos of tutorials, webinars, and more;
- The online Frequently Asked Questions ([FAQs](#)); and
- Available [Training Options](#).

### 3.2 About the Interface

Once a project is loaded, the main window will appear; the HGA demo project is displayed below.

ID	Station Name	X(m)	Y(m)	Elevation(m)	TOC(m)	Station Type	Total Depth(m)
1	Mw-1	535,250.19	4,814,315.00	332.10	331.80	Observation Well	
2	Mw-3	536,668.13	4,814,036.00	334.80	332.10	Observation Well	
3	OW-2	535,535.50	4,814,905.00	333.90	330.90	Observation Well	
4	OW-4	536,720.69	4,814,826.00	335.40	331.60	Observation Well	
5	W-05	535,548.40	4,814,637.30	331.00	332.00	Observation Well	100.00
6	W-06	535,459.40	4,814,704.90	330.80	331.80	Observation Well	100.00
7	W-07	535,476.10	4,814,781.10	330.90	331.90	Observation Well	100.00
8	W-08	535,469.50	4,814,652.70	330.60	331.60	Observation Well	100.00
9	W-09	535,484.70	4,814,546.50	329.90	330.90	Observation Well	100.00
10	W-10	535,626.80	4,814,652.90	329.50	330.50	Observation Well	100.00
11	W-11	535,545.90	4,814,553.50	332.10	333.10	Observation Well	100.00
12	W-12	535,637.70	4,814,582.90	330.20	331.20	Observation Well	100.00
13	W-13	535,800.00	4,814,637.50	329.90	330.90	Observation Well	100.00
14	W-14	535,674.60	4,814,800.00	330.40	331.40	Observation Well	100.00
15	W-15	535,687.40	4,814,665.30	330.50	331.50	Observation Well	100.00
16	W-16	535,390.00	4,814,741.90	329.90	330.90	Observation Well	100.00
17	W-17	535,577.40	4,814,477.10	329.30	330.30	Observation Well	100.00
18	W-18	535,677.10	4,814,416.20	330.50	331.50	Observation Well	100.00
19	W-19	535,584.50	4,814,300.00	329.90	330.90	Observation Well	100.00
20	W-20	535,589.70	4,814,371.80	330.20	331.20	Observation Well	100.00
21	W-21	535,492.90	4,814,477.20	331.10	332.10	Pumping Well	100.00
22	W-22	535,635.20	4,814,503.80	330.80	331.80	Observation Well	100.00
23	W-23	535,588.40	4,814,667.30	331.10	332.15	Observation Well	100.00
24	GB-01	536,212.69	4,814,030.00	323.50	324.50	Borehole	
25	GB-02	536,156.69	4,814,050.00	326.00	327.00	Borehole	
26	GB-03	536,079.69	4,814,070.00	326.00	327.00	Borehole	
27	GB-04	535,953.69	4,814,020.00	322.00	323.00	Borehole	
28	GB-05	535,848.69	4,814,060.00	324.00	325.00	Borehole	
29	GB-06	535,743.69	4,814,070.00	330.50	331.90	Borehole	
30	GB-07	535,652.69	4,814,030.00	333.00	334.00	Borehole	
31	GB-08	535,498.69	4,814,040.00	329.50	330.50	Borehole	
32	GB-09	535,386.69	4,814,060.00	329.50	330.50	Borehole	
33	GB-10	535,295.69	4,814,030.00	338.00	339.00	Borehole	
34	GB-11	535,232.69	4,814,000.00	339.50	340.50	Borehole	
35	GB-12	536,225.92	4,814,281.80	325.93	326.93	Borehole	
36	GB-13	536,129.74	4,814,379.70	324.85	325.85	Borehole	
37	GB-14	536,065.76	4,814,320.20	323.05	324.05	Borehole	

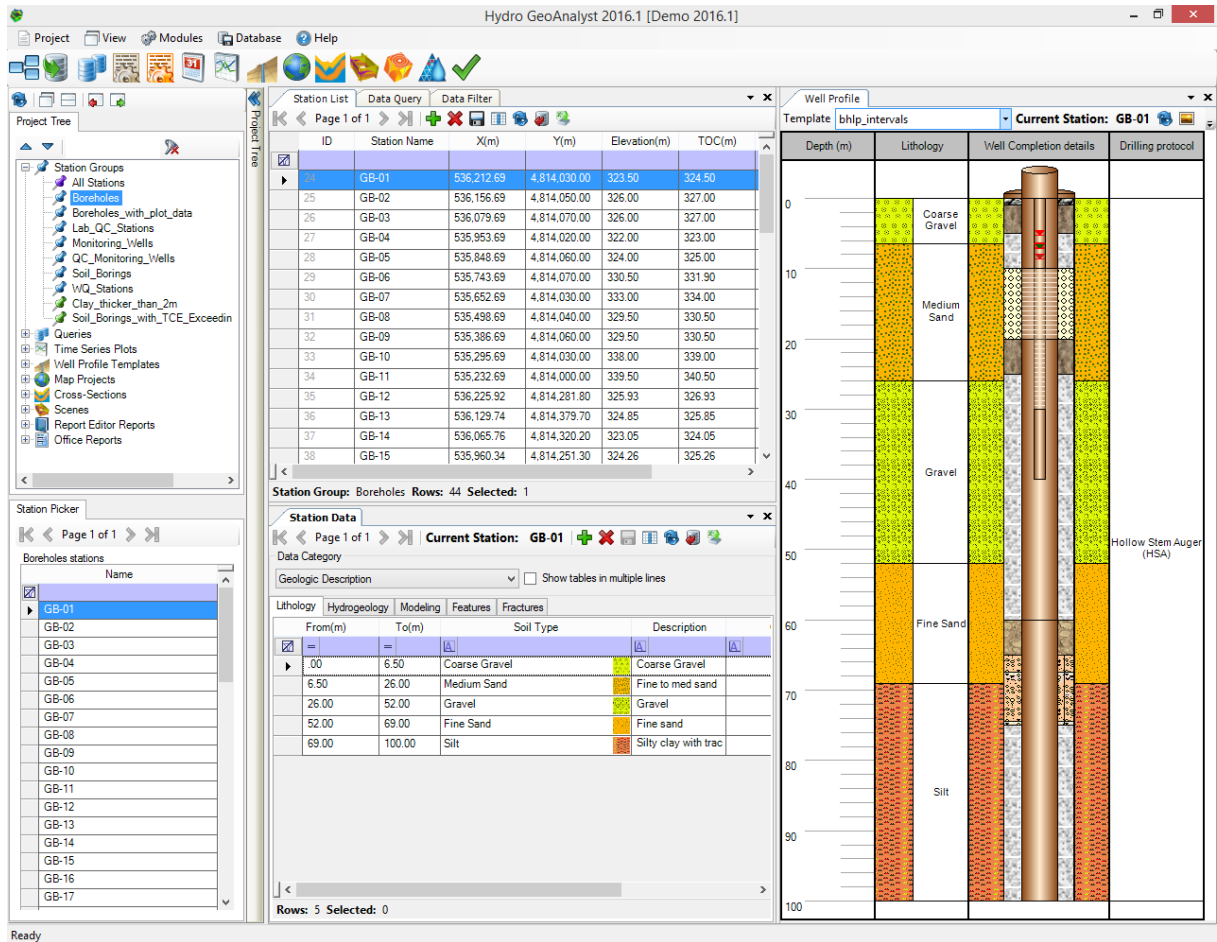
The HGA Graphical User Interface is composed of several controls:

- **Menu Bar:** Contains menu commands with access to most features that are available in the HGA package.
- **Module Toolbar:** Contains several context sensitive short-cut buttons for the most frequently used HGA features.



- **Project Tree:** Hosts a tree view listing some of the most common components of your project. These include nodes for Station Groups, Queries, Time Series Plots, Well Profile Templates, Maps, Cross Sections, Scenes, and Reports. It also includes a Station Picker which allows the user to select the station used to display data in other tabs and modules.
- **Data Tabs:** Provides access to the various parts of the project including the Station List, Data Query, Data Filter and Station Data.
- **Well Profile:** Provides a visual representation of the well for the selected station.
- **Data Grids:** Contains the grids for data entry and visualization.
- **Data Grids Toolbar:** Contains icons for the main options you can perform with the data contained within the data grid.
- **Status Bar:** Displays the program status.

You will find that you now have options to move the tabs around and dock them where you like. The default configuration is to have one tab group for the Project Tree and one tab group with the rest of the tabs (station list, station data, etc.). However, you can have more tab groups – vertical or horizontal. You can find these options by right clicking on a tab. Then you can just drag and drop the tabs where you prefer them! Here is an example configuration that you might like to use. Your configuration is remembered the next time you open the program.

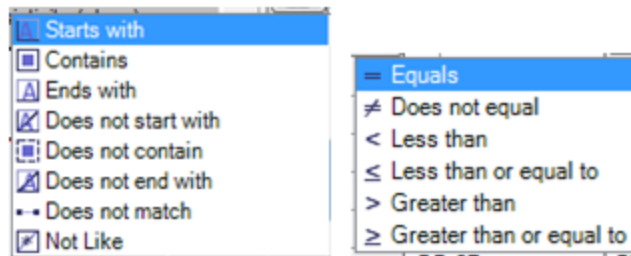


Additionally you will find some helpful filter options on the top of the columns in all of the data grids. The first row on any data grid is your filter row.

The screenshot shows the Station List table with filter options on the top of each column. The table has 7 columns: Station Name, X(m), Y(m), Elevation(m), TOC(m), Total Depth(m), and Station Type(m). The filter row is the first row, and the data rows follow. The current station group is Boreholes, and there are 43 rows selected.

Station Name	X(m)	Y(m)	Elevation(m)	TOC(m)	Total Depth(m)	Station Type(m)
GB-01	536212.69	4814030.00	323.50	324.50		Borehole
GB-02	536156.69	4814050.00	326.00	327.00		Borehole
GB-04	535953.69	4814020.00	322.00	323.00		Borehole
GB-05	535848.69	4814060.00	324.00	325.00		Borehole
GB-06	535743.69	4814070.00	330.50	331.90		Borehole
GB-07	535652.69	4814030.00	333.00	334.00		Borehole
GB-08	535498.69	4814040.00	329.50	330.50		Borehole
GB-09	535386.69	4814060.00	329.50	330.50		Borehole
GB-10	535295.69	4814030.00	338.00	339.00		Borehole
GB-11	535232.69	4814000.00	339.50	340.50		Borehole
GB-12	536225.92	4814281.80	325.93	326.93		Borehole
GB-13	536129.74	4814379.70	324.85	325.85		Borehole
GB-14	536065.76	4814320.20	323.05	324.05		Borehole
GB-15	535960.34	4814251.30	324.26	325.26		Borehole
GB-16	535866.68	4814349.40	326.56	327.56		Borehole
GB-17	535776.66	4814293.00	328.30	329.30		Borehole

So you can quickly filter using many of the options you would be used to seeing in Excel.















Additionally, if you select the drop down list in the filter row you will find a list of all the unique values in that column.

Parameter_Result	Water Level	M
D	Chemical Name	
/2000	BT (Custom)	
/2000	TC (Blanks)	
0/2000	BT BTEX (NonBlanks)	
0/2000	TCE	
/2000	BTEX	
/2000	TCE	
/2000	BTEX	
/2000	TCE	
/2000	BTEX	
/2000	TCE	
/2000	BTEX	
/2000	TCE	
/2000	BTEX	

### 3.3 Toolbars

There are different tool bars available within the program. The top toolbar with the larger buttons provides quick access to the various modules in HGA:



	• <a href="#">Template Manager</a>
	• <a href="#">User Manager</a>
	• <a href="#">HGA Quick Checker</a>
	• <a href="#">Import Data</a>
	• <a href="#">Query Builder</a>
	• <a href="#">Material Specifications Editor</a>
	• <a href="#">List Editor</a>
	• <a href="#">Event Planning</a>
	• <a href="#">Well Profile</a>
	• <a href="#">Map Manager</a>
	• <a href="#">Cross Section Editor</a>
	• <a href="#">Scene Viewer</a>
	• <a href="#">AquiferTest</a>
	• <a href="#">AquaChem</a>

There are also toolbars available on the individual tab groups specific to the actions you may wish to perform on the data contain within the tab group.

Below is the general tool bar found on most tab groups.



It provides options to scroll through the list of records (forward, backwards, first and last), an option to add a record and delete a record as well as save any edits made.

There is also an option to print, an option to show/hide columns and a refresh option.

By placing your cursor over any of the icons in the tool bars you will find a tooltip indicating what the button does.

### 3.4 Station Table

The Station Table stores all the station location information for all projects residing in the database. The Station Table may contain an unlimited number of fields. Though, as a minimum, the Station Table must contain the following fields:

- Station ID (ID)
- Station Name (Name)
- Station Coordinate (X)
- Station Coordinate (Y)
- Station ground surface elevation (Elevation)
- Top of Casing (TOC)

If plotting stations on a map or cross section is desired, then the following fields are required:

- Station X co-ordinate
- Station Y co-ordinate
- Station ground surface elevation (Elevation)

Station coordinates are stored in the Stations Table in latitude-longitude format by default. However, each project may contain its own projection and coordinate system settings, so that station locations may be entered and displayed in an alternate format (e.g. UTM, State Planar, etc.).



**Please Note:** Hydro GeoAnalyst supports storing and displaying spatial data in a local coordinate system (or site coordinates). There is no need to adapt your spatial data to world coordinates, if you prefer to work in site coordinates.

Stations can be added, modified, or deleted through the Station List tab. The Station List tab displays a limited number of fields for viewing and editing; for a more detailed view of each station, the Station Data tab must be used; the information displayed in the Stations Table can be found in the Description [Data Category](#) within this tab, in the Location table as shown below.

ID	Station Name	X(m)	Y(m)	Elevation(m)	TOC
1	MW-1	535250.19	4814315.00	332.100	331.80
2	MW-3	536668.13	4814036.00	334.800	332.10
3	OW-2	535535.50	4814905.00	333.900	330.90
4	OW-4	536720.69	4814826.00	335.400	331.60
5	W-05	535548.40	4814637.30	331.000	332.00
6	W-06	535459.40	4814704.90	330.800	331.80
7	W-07	535476.10	4814781.10	330.900	331.90
8	W-08	535469.50	4814652.70	330.600	331.60
9	W-09	535484.70	4814546.50	329.900	330.90
10	W-10	535626.80	4814652.90	329.500	330.50
11	W-11	535545.90	4814553.50	332.100	333.10
12	W-12	535637.70	4814582.90	330.200	331.20
13	W-13	535800.00	4814637.50	329.900	330.90
14	W-14	535674.60	4814800.00	330.400	331.40
15	W-15	535687.40	4814665.30	330.500	331.50
16	W-16	535390.00	4814741.90	329.900	330.90
17	W-17	535577.40	4814477.10	329.300	330.30
18	W-18	535677.10	4814416.20	330.500	331.50

### 3.5 Station Groups

Many operations in HGA require the selection of one or more stations. An example of such an operation is data entry. One or more stations for which you would like to add, view and/or modify data need to be selected so that the Station Data tab is accessible (activated).


The complete list of stations that comprise a project can be viewed in the Station List tab by selecting the All Stations item, under the Station Group node in the project tree. By default, all projects will contain a station group named All Stations that lists all stations in the database belonging to the project. However, for some of the tasks commonly performed in HGA, retrieving the complete list of stations in the project may not be necessary. Moreover, retrieving all the stations when only few of them are needed may be a time-consuming process especially for large databases containing hundreds or thousands of stations.


The solution is to create Station Groups. Grouping stations into their logical groups allows efficient management and quick retrieval of data stored in the database. For instance, all stations which contain groundwater chemistry sampling data can be grouped together under a group named as GW Sample Locations. Whenever these stations need to be updated with a new groundwater sampling round, selecting the GW Sample Locations group displays only those stations that belong to this group.


Station groups can be created based on any criteria. Common examples include:

- Locations of the stations (e.g. locations sorted by City, Project Sites, etc.)
- Station type (e.g. Monitoring Locations, Boreholes, etc.), or
- Purpose of Study (e.g. remediation, site monitoring)

There are three kinds of Station Groups in HGA:

 **All Stations:** This station group is in all projects and all stations that are entered (imported or manually) into the project will be found in this station group. You can not delete or rename this station group.

 **Static:** Select one or more stations directly in the Station List tab, right-mouse click, and select the Add to Station Group option from the pop up menu.

 **Dynamic:** Using the query builder, define a more advanced search criteria, and build a station group with those stations that satisfy the query criteria.

All Station Groups created for a project are listed in the Project Tree under the Station Groups branch. Double clicking on any of the sub-branches corresponding to a Station Group will load the Station List tab, and display the appropriate stations belonging to that group. An example is shown below.

ID	Station Name	X(m)	Y(m)	Elevation(m)	TOC(m)	Station Type
1	MW-1	535,250.19	4,814,315.00	332.10	331.80	Observation Well
2	MW-3	536,668.13	4,814,036.00	334.80	332.10	Observation Well
3	OW-2	535,535.50	4,814,905.00	333.90	330.90	Observation Well
4	OW-4	536,720.69	4,814,826.00	335.40	331.60	Observation Well
5	W-05	535,548.40	4,814,637.30	331.00	332.00	Observation Well
6	W-06	535,499.40	4,814,704.90	330.80	331.80	Observation Well
7	W-07	535,476.10	4,814,781.10	330.90	331.90	Observation Well
8	W-08	535,469.50	4,814,652.70	330.60	331.60	Observation Well
9	W-09	535,484.70	4,814,546.50	329.90	330.90	Observation Well
10	W-10	535,626.80	4,814,652.90	329.50	330.50	Observation Well
11	W-11	535,545.90	4,814,553.50	332.10	333.10	Observation Well
12	W-12	535,637.70	4,814,582.90	330.20	331.20	Observation Well
13	W-13	535,800.00	4,814,637.50	329.90	330.90	Observation Well
14	W-14	535,674.60	4,814,800.00	330.40	331.40	Observation Well
15	W-15	535,687.40	4,814,665.30	330.50	331.50	Observation Well
16	W-16	535,390.00	4,814,741.90	329.90	330.90	Observation Well
17	W-17	535,577.40	4,814,477.10	329.90	330.90	Observation Well
18	W-18	535,677.10	4,814,416.20	330.50	331.50	Observation Well
19	W-19	535,584.50	4,814,300.00	329.90	330.90	Observation Well
20	W-20	535,599.70	4,814,371.80	330.20	331.20	Observation Well
21	W-21	535,492.90	4,814,477.20	331.10	332.10	Observation Well
22	W-22	535,635.20	4,814,503.80	330.80	331.80	Observation Well
23	W-23	535,588.40	4,814,667.30	331.10	332.15	Observation Well
24	GB-01	536,212.69	4,814,030.00	323.50	324.50	Borehole
25	GB-02	536,156.69	4,814,050.00	326.00	327.00	Borehole
26	GB-03	536,079.69	4,814,070.00	326.00	327.00	Borehole
27	GB-04	535,953.69	4,814,020.00	322.00	323.00	Borehole
28	GB-05	535,848.69	4,814,060.00	324.00	325.00	Borehole
29	GB-06	535,743.69	4,814,070.00	330.50	331.90	Borehole
30	GB-07	535,652.69	4,814,030.00	333.00	334.00	Borehole
31	GB-08	535,498.69	4,814,040.00	329.50	330.50	Borehole
32	GB-09	535,386.69	4,814,060.00	329.50	330.50	Borehole
33	GB-10	535,296.69	4,814,030.00	338.00	339.00	Borehole
34	GB-11	535,232.69	4,814,000.00	339.50	340.50	Borehole
35	GB-12	536,225.92	4,814,281.80	325.93	326.93	Borehole
36	GB-13	536,129.74	4,814,379.70	324.85	325.85	Borehole
37	GB-14	536,065.76	4,814,320.20	323.05	324.05	Borehole

Ready

If desired, selected stations can be removed from a static station group or the Station Group can be deleted as a whole. To remove stations from a static station group simply select the stations (by highlighting the row) and then select the delete button - this will remove the station from the station group - but will not delete the station from the database. To delete a station from the database you must first select the All Stations station group - and delete the stations from here.

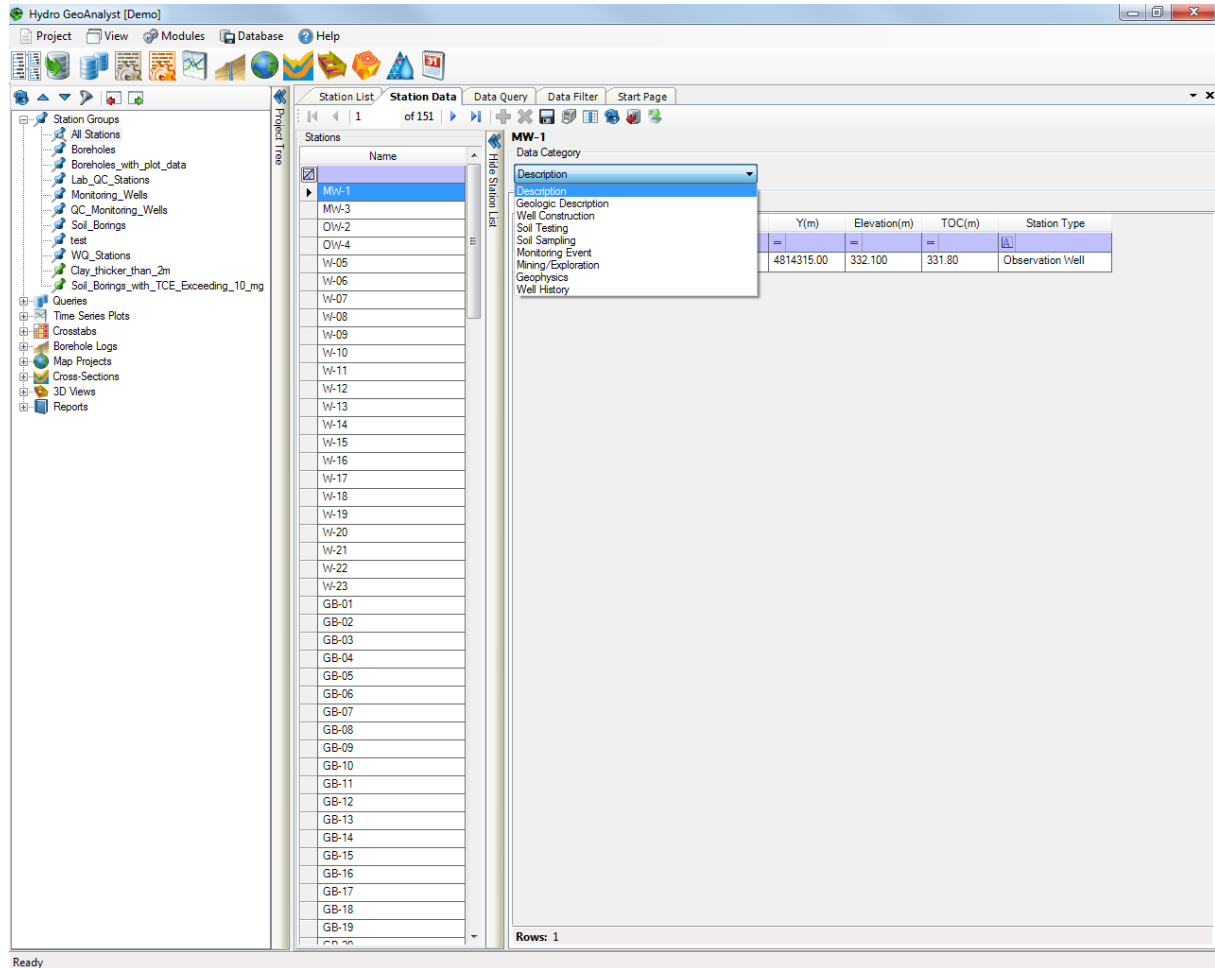
To delete an entire station group right click on the station group in the Project tree and select delete.

### 3.6 Data Categories

The tables in an HGA database can be organized into a logical grouping by placing them into any one of the provided data categories. HGA provides several data categories, which might be considered common data categories found for environmental data. However, you can create as many categories as you wish within the [Template Manager](#). This way you can completely customize the way in which the tables are organized within HGA.



The Station Data categories can be accessed by selecting the Station Data tab and select the Data Category combo box (ensure that one or more stations are selected in the Station List tab).



After a Data Category has been selected, the appropriate tables and fields belonging to this category will be displayed in the Station Data tab.

The following is a list of the data categories provided in the HGA Demo Project, along with some of the data entities that may be linked to each category:

- Description (e.g. station name, location, coordinates, elevation, site, etc.)
- Geologic Description (e.g. lithology, soil properties, hydrogeologic properties, etc.)
- Well Construction (e.g. drilling protocol, annular filling, monitoring points, casing materials, well dimensions, etc.)
- Soil Testing (e.g. SPT, pocket penetrometer, vane shear test, dynamic cone)

- Soil Sampling (e.g. Rock Coring, Soil Chemistry results, Soil Vapor, Moisture Content, Particle Size Distribution, Atterberg, Standard Proctor, Unconfined Compression, Direct Shear, Odometer (Consolidation))
- Monitoring Events (e.g. weather conditions, bailing, field properties, water quality, groundwater levels, groundwater chemistry)
- Mining / Exploration (e.g. Alteration, Mineralization, Structure, Samples, Down Hole Survey, Down Hole Geophysics)
- Geophysics (e.g. Conditions, Gamma, Neutron, 64 in E-log, 16 in E-log, Density)
- Well History (e.g. Pumping Rate, Pump, Screens, Top of Casing, status)

All of the above data categories may be renamed and used differently if desired. For example, the category named Geology could be renamed to Surface Water and tables such as Catchments, Surface Water Monitoring Locations, Rivers, etc. could be organized under it. Placing tables under any one of these categories does not have any effect on how the tables are stored in the database.

### 3.7 Adjustable Windows

When opening an HGA project for the first time, the default window displays will appear. There are two groups, one with the [Project Tree & Station Picker](#) tabs (on the left) and the main group area with the following four tabs:

- [Station List](#)
- [Station Data](#)
- [Data Query](#)
- [Data Filter](#)

The [Start Page](#) may also be shown.

Station List

ID	Station Name	X(m)	Y(m)	Elevation(m)	TOC(m)	Station Type	Total Depth(m)
1	MW-1	535,250.19	4,814,315.00	332.10	331.80	Observation Well	
2	MW-3	536,668.13	4,814,036.00	334.80	332.10	Observation Well	
3	OW-2	535,535.50	4,814,905.00	333.90	330.90	Observation Well	
4	OW-4	536,720.69	4,814,826.00	335.40	331.60	Observation Well	
5	W-05	535,548.40	4,814,637.30	331.00	332.00	Observation Well	100.00
6	W-06	535,459.40	4,814,704.90	330.80	331.80	Observation Well	100.00
7	W-07	535,476.10	4,814,781.10	330.90	331.90	Observation Well	100.00
8	W-08	535,469.50	4,814,652.70	330.60	331.60	Observation Well	100.00
9	W-09	535,484.70	4,814,546.50	329.90	330.90	Observation Well	100.00
10	W-10	535,626.80	4,814,652.90	329.50	330.50	Observation Well	100.00
11	W-11	535,545.90	4,814,553.50	332.10	333.10	Observation Well	100.00
12	W-12	535,637.70	4,814,582.90	330.20	331.20	Observation Well	100.00
13	W-13	535,800.00	4,814,637.50	329.90	330.90	Observation Well	100.00
14	W-14	535,674.60	4,814,800.00	330.40	331.40	Observation Well	100.00
15	W-15	535,687.40	4,814,665.30	330.50	331.50	Observation Well	100.00
16	W-16	535,390.00	4,814,741.90	329.90	330.90	Observation Well	100.00
17	W-17	535,577.40	4,814,477.10	329.30	330.30	Observation Well	100.00
18	W-18	535,677.10	4,814,416.20	330.50	331.50	Observation Well	100.00
19	W-19	535,584.50	4,814,300.00	329.90	330.90	Observation Well	100.00
20	W-20	535,599.70	4,814,371.80	330.20	331.20	Observation Well	100.00
21	W-21	535,492.90	4,814,477.20	331.10	332.10	Pumping Well	100.00
22	W-22	535,635.20	4,814,503.80	330.80	331.80	Observation Well	100.00
23	W-23	535,588.40	4,814,667.30	331.10	332.15	Observation Well	100.00
24	GB-01	536,212.69	4,814,030.00	323.50	324.50	Borehole	
25	GB-02	536,156.69	4,814,050.00	326.00	327.00	Borehole	
26	GB-03	536,079.69	4,814,070.00	326.00	327.00	Borehole	
27	GB-04	535,953.69	4,814,020.00	322.00	323.00	Borehole	
28	GB-05	535,848.69	4,814,060.00	324.00	325.00	Borehole	
29	GB-06	535,743.69	4,814,070.00	330.50	331.90	Borehole	
30	GB-07	535,652.69	4,814,030.00	333.00	334.00	Borehole	
31	GB-08	535,498.69	4,814,040.00	329.50	330.50	Borehole	
32	GB-09	535,386.69	4,814,060.00	329.50	330.50	Borehole	
33	GB-10	535,295.69	4,814,030.00	338.00	339.00	Borehole	
34	GB-11	535,232.69	4,814,000.00	339.50	340.50	Borehole	
35	GB-12	536,225.92	4,814,281.80	325.93	326.93	Borehole	
36	GB-13	536,129.74	4,814,379.70	324.85	325.85	Borehole	
37	GB-14	536,065.76	4,814,320.20	323.05	324.05	Borehole	

Station Group: All Stations Rows: 233 Selected: 0

You have several options to adjust the view of these groups. You can add additional groups (right-click on any existing tab) either vertical or horizontal. Several of the modules within HGA will launch as a tab (e.g. Query Builder, Well Profile, List Editor, Material Specification, Event Planning etc.)

You can rearrange the order of the tabs within a group by simply dragging and dropping a tab.

You can also drag a tab from one tab group to another or to a new window on a different screen.

Here is an example of another way to organize your windows:

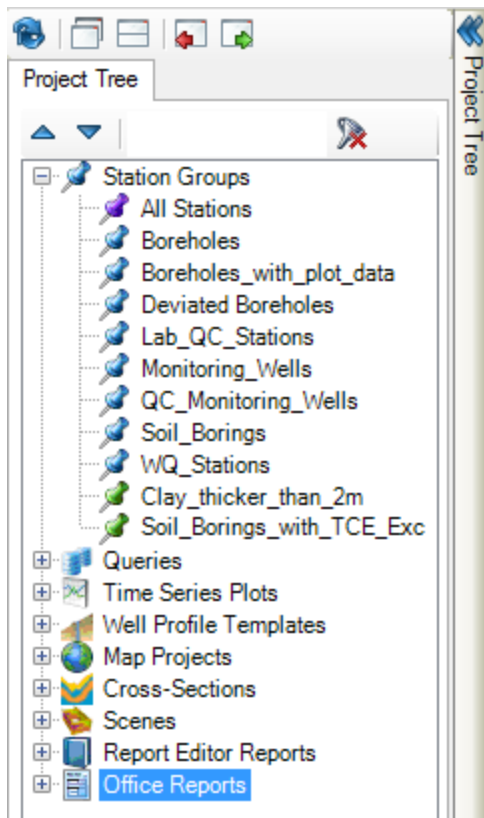
The screenshot displays the Hydro GeoAnalyst 2016.1 [Demo 2016.1] interface. The main window is divided into several panes:

- Project Tree:** Lists various data categories including Station Groups (All Stations, Boreholes, etc.), Queries, Time Series Plots, Well Profile Templates, Map Projects, Cross-Sections, Scenes, and Reports.
- Station List:** A table showing 44 borehole stations with columns for ID, Station Name, X(m), Y(m), Elevation(m), and TOC(m). Station GB-01 is selected.
- Station Picker:** A list of borehole stations (GB-01 to GB-17) with GB-01 selected.
- Station Data:** A detailed view for the selected station (GB-01), showing a table of soil data with columns for From(m), To(m), Soil Type, and Description. The data is categorized by Lithology, Hydrogeology, Modeling, Features, and Fractures.
- Well Profile:** A vertical cross-section showing the well's depth (0 to 100m) and the lithology encountered. The well is labeled as a Hollow Stem Auger (HSA). The lithology layers include Coarse Gravel, Medium Sand, Gravel, Fine Sand, and Silt.

### 3.8 Project Tree & Station Picker Tab




The project tree lists the following items:

- Station Groups
- Queries
- Time Series Plots
- Well Profile Templates
- Map Projects
- Cross-Sections
- Scenes
- Reports






These items may be part of any project. Each item is organized as a branch in the tree view with one or more items under each branch. By selecting an item in the project tree you will either activate the appropriate tab or launch appropriate module to view this item.

You have the following options in the Project Tree:

-  This allows you to collapse all branches in the Project Tree.
-  This allows you to expand all branches in the Project Tree.
-  This allows you to filter for anything in the Project Tree - simply start typing the name of the item you are looking for.

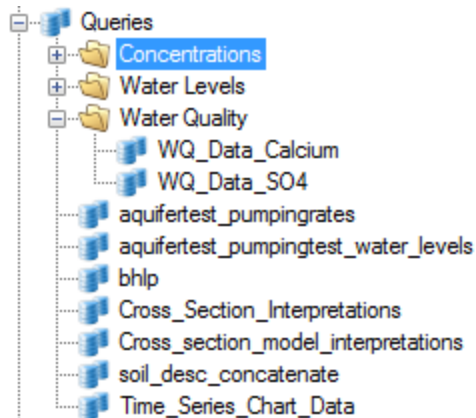
You also have the following options available:

-  This allows you to refresh the Project Tree.
-  This allows you to dock the Project Tree on the left.
-  This allows you to dock the Project Tree on the right.

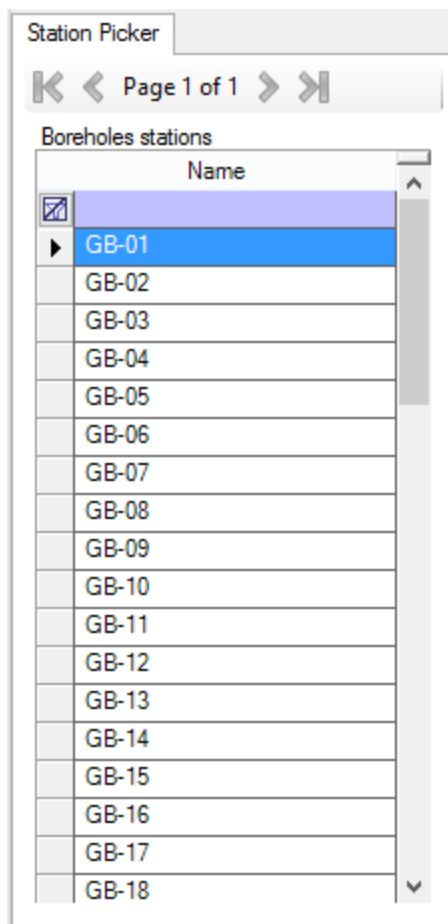
You can organize any of the branches of the Project Tree (except for the Reports branch as it has its own structure) by creating folders to group the items under the branch. Simply right click the branch and select Add Folder...

Provide a name for the folder and now you can drag and drop items from that branch into the folder.

Here for example you can see how the Queries branch of the Demo Project is organized with folders:

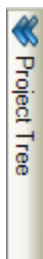


There is also a Station Picker tab within the Project Tree which allows you to select the station to display in the currently selected tab.



The Station Picker displays stations from the currently selected station group. To change the station group double click on the station group in the Project Tree.

You can hide/show the Project Tree & Station Picker by selecting the double blue arrows.



### 3.9 Station List Tab

The Station List tab provides an overview of the available stations in the selected Station Group. This tab displays any fields from the Station table (the main table within the HGA database) for example name, X-coordinate, Y-coordinate, Elevation etc.

These fields may be modified for a selected station (simply click in the cell you wish to edit); or a new station may be created here (selecting the green plus icon), and the values for these fields may be defined. The Station List tab may be used to quickly enter numerous stations, and define the basic attributes for each station.

The first line on this tab is the filter line and as such is highlighted in purple-blue. The filter line is similar to what you find in Excel when you apply a filter. You can enter values to filter the list of what is displayed only to those values that you are interested in.

You can also highlight a record (will turn bright blue) by clicking on the button on the left hand side of the grid and then right click on the record and select copy. Then you can paste this into for example an excel spreadsheet and both the header information and the records you highlighted will be pasted into the excel spreadsheet.








ID	Station Name	X(m)	Y(m)	Elevation(m)	TOC(m)	Station Type	Total Depth(m)
1	Mlv-1	535,250.19	4,814,315.00	332.10	331.80	Observation Well	
2	Mlv-3	536,668.13	4,814,036.00	334.80	332.10	Observation Well	
3	Olw-2	535,535.50	4,814,905.00	333.90	330.90	Observation Well	
4	Olw-4	536,720.69	4,814,826.00	335.40	331.60	Observation Well	
5	Wl-05	535,548.40	4,814,637.30	331.00	332.00	Observation Well	100.00
6	Wl-06	535,459.40	4,814,704.90	330.80	331.80	Observation Well	100.00
7	Wl-07	535,476.10	4,814,781.10	330.90	331.90	Observation Well	100.00
8	Wl-08	535,469.50	4,814,852.70	330.60	331.60	Observation Well	100.00
9	Wl-09	535,484.70	4,814,546.50	329.90	330.90	Observation Well	100.00
10	Wl-10	535,626.80	4,814,652.90	329.50	330.50	Observation Well	100.00
11	Wl-11	535,545.90	4,814,553.50	332.10	333.10	Observation Well	100.00
12	Wl-12	535,637.70	4,814,582.90	330.20	331.20	Observation Well	100.00
13	Wl-13	535,800.00	4,814,637.50	329.90	330.90	Observation Well	100.00
14	Wl-14	535,674.60	4,814,800.00	330.40	331.40	Observation Well	100.00
15	Wl-15	535,687.40	4,814,655.30	330.50	331.50	Observation Well	100.00
16	Wl-16	535,390.00	4,814,741.90	329.90	330.90	Observation Well	100.00
17	Wl-17	535,577.40	4,814,477.10	329.30	330.30	Observation Well	100.00
18	Wl-18	535,677.10	4,814,416.20	330.50	331.50	Observation Well	100.00
19	Wl-19	535,584.50	4,814,300.00	329.90	330.90	Observation Well	100.00
20	Wl-20	535,599.70	4,814,371.80	330.20	331.20	Observation Well	100.00
21	Wl-21	535,492.90	4,814,477.20	331.10	332.10	Pumping Well	100.00
22	Wl-22	535,635.20	4,814,503.80	330.80	331.80	Observation Well	100.00
23	Wl-23	535,588.40	4,814,667.30	331.10	332.15	Observation Well	100.00
24	GB-01	536,212.69	4,814,030.00	323.50	324.50	Borehole	
25	GB-02	536,156.69	4,814,050.00	326.00	327.00	Borehole	
26	GB-03	536,079.69	4,814,070.00	326.00	327.00	Borehole	
27	GB-04	535,953.69	4,814,020.00	322.00	323.00	Borehole	
28	GB-05	535,848.69	4,814,060.00	324.00	325.00	Borehole	
29	GB-06	535,743.69	4,814,070.00	330.50	331.90	Borehole	
30	GB-07	535,652.69	4,814,030.00	333.00	334.00	Borehole	
31	GB-08	535,498.69	4,814,040.00	329.50	330.50	Borehole	
32	GB-09	535,386.69	4,814,060.00	329.50	330.50	Borehole	
33	GB-10	535,295.69	4,814,030.00	338.00	339.00	Borehole	
34	GB-11	535,232.69	4,814,000.00	339.50	340.50	Borehole	
35	GB-12	536,225.92	4,814,281.80	325.93	326.93	Borehole	
36	GB-13	536,129.74	4,814,379.70	324.85	325.85	Borehole	
37	GB-14	536,065.76	4,814,320.20	323.05	324.05	Borehole	

The toolbar for the Station List tab contains the following controls:

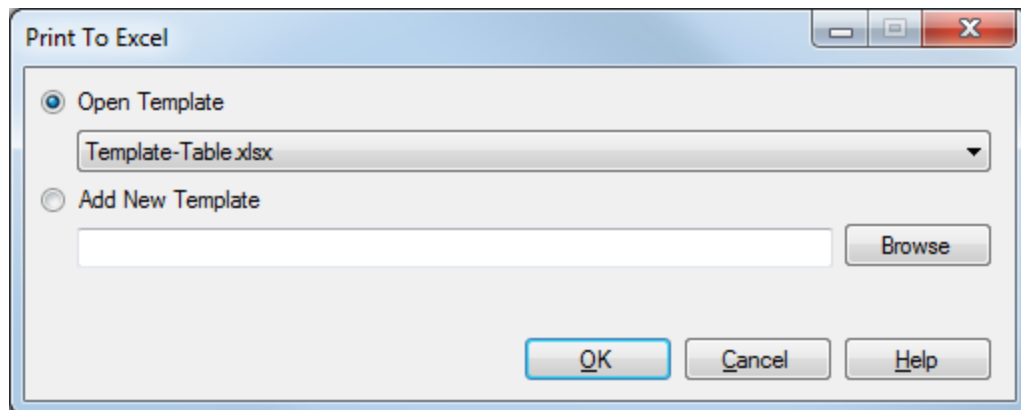


Navigates to a given station, skipping to the first station (in the sort order), to the previous station, to the specified station, to the next station, or to the last station.



-  Adds a new record.
-  Deletes the currently selected record(s).
-  Saves the changes you have made.
-  Allows you to select which columns you want to show or hide.
-  Refreshes the data in the current tab.
-  Exports the data from the current tab.
-  Prints the data from the current tab to a Microsoft Excel™ template.

When printing your Station List to an Excel template for the first time, you will be prompted to select a template. Provided with HGA is a template called Template - Table.xlsx. You can modify this template by going to the folder where your templates have been stored (see [HGA Settings](#) for more details) and adjust it to suit your needs. Perhaps you may want to change the logo etc. Any templates stored in this folder will be available in the drop down list under the Open Template option.



Once you have selected a template you can select the OK button and the Excel template will open with your data in it - ready for printing!

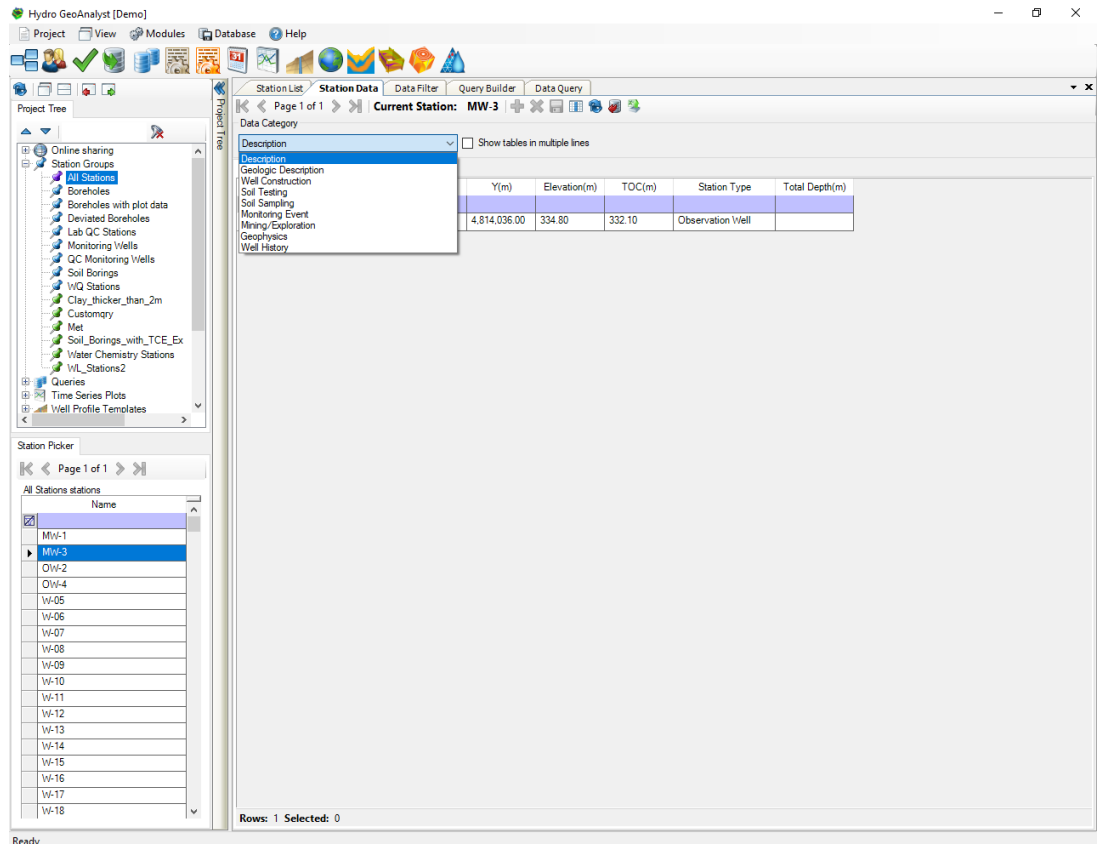
### 3.10 Station Data Tab

For a more detailed view of a single Station's attributes, the Station Data tab should be selected, and an appropriate [Data Category](#) chosen. The Station Data tab provides access to all data related to a single station. Once a Station is added to the project, detailed information on the station can be added, edited, or deleted through the Station Data tab.

The first line on this tab is the filter line and as such is highlighted in purple-blue. The filter line is similar to what you find in Excel when you apply a filter. You can enter values to filter the list of what is displayed only to those values that you are interested in.

You can also highlight a record (will turn bright blue) by clicking on the button on the left hand side of the grid and then right click on the record and select copy. Then you can paste this into for example an excel spreadsheet and both the header information and the records you highlighted will be pasted into the excel spreadsheet.

By selecting a Data Category (from the drop down) you will find different tables (each tab is a table). And each table has different fields (each column is a field).



The toolbar for the Station Data tab contains the following controls:



Navigates to a given station, skipping to the first station (in the sort order), to the previous station, to the specified station, to the next station, or to the last station.



Adds a new record.






deletes the currently selected record(s).



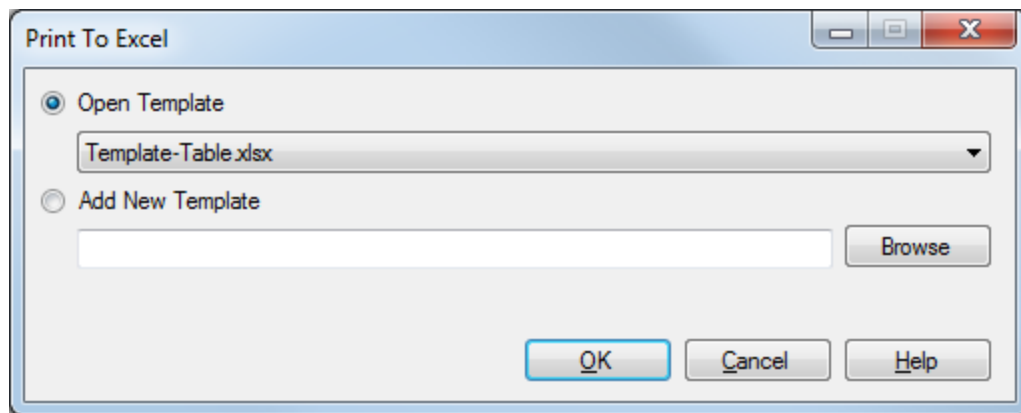
saves the changes you have made.



allows you to select which columns you want to show or hide.

-  refreshes the data in the current tab.
-  exports the data from the current tab.
-  Prints the data from the current tab to a Microsoft Excel™ template.

When printing your Station Data to an Excel template you will be prompted to select a template. Provided with HGA is a template called Template - Table.xlsx. You can modify this template by going to the folder where your templates have been stored (see [HGA Settings](#) for more details) and adjust it to suit your needs. Perhaps you may want to change the logo etc. Any templates stored in this folder will be available in the drop down list under the Open Template option.

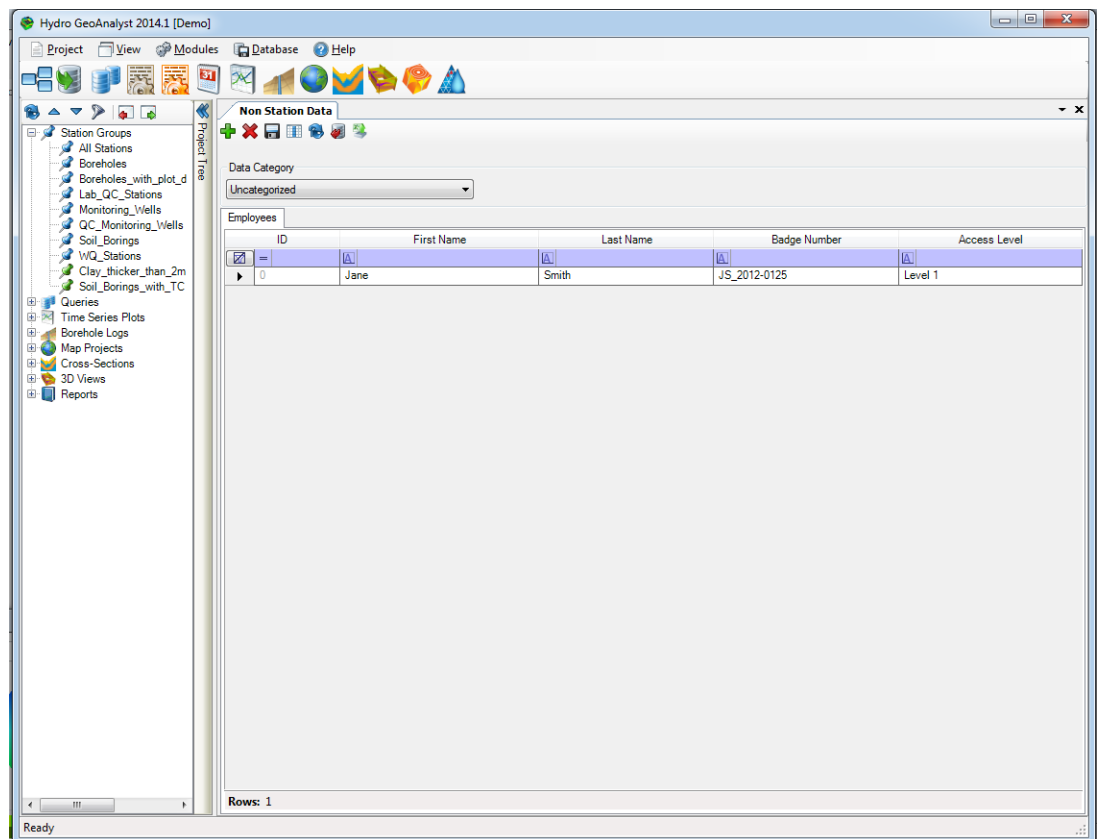


Once you have selected a template you can select the OK button and the Excel template will open with your data in it - ready for printing!








### 3.11 Non Station Data Tab

The Non Station Data tab provides you the ability to view any Non Station table within the project database. You can find out more information about how to add a Non Station Data table in your database in the [Template Manager](#) section.

You can also enter data manually into a Non Station table within this tab.



The toolbar for the Non Station Data tab contains the following controls:

-  Adds a new record.
-  Deletes the currently selected record(s).
-  Saves the changes you have made.
-  Selects which columns you want to show or hide.
-  Refreshes the data in the current tab.
-  Exports the data from the current tab.
-  Prints the data from the current tab to an Excel template.

### 3.12 Data Query Tab

The Data Query Tab will display the results of executing (running) a query. When you select a query from the Queries branch of the project tree, the Data Query tab will be activated and display the results of the selected query.

Row#	Name	Sample_ID	Sample_Da	Chemical_Na	Result_Val	Result_Unit	Detection_Li	Quality_Code	ParameterInf	Analysis_D	Method_Nam	Dilution_Fact	Batch_ID
1	Mw-1	1-2004-1	08/12/2004	Ag	.02	mg/L	.01	O	Ag				Mw-1-2004-
2	Mw-1	1-2004-1	08/12/2004	As	14.00	mg/L	.01	O	As				Mw-1-2004-
3	Mw-1	1-2004-1	08/12/2004	Ba	.00	mg/L	.00	O	Ba				Mw-1-2004-
4	Mw-1	1-2004-1	08/12/2004	Benzene	.00	mg/L	1.00	O	Benzene	02/17/2011	EPA 524.2 R		Mw-1-2004-
5	Mw-1	1-2004-1	08/12/2004	Ca	124.00	mg/L	.06	O	Ca	02/17/2011			Mw-1-2004-
6	Mw-1	1-2004-1	08/12/2004	Cl	.00	mg/L	1.00	O	Cl	02/17/2011			Mw-1-2004-
7	Mw-1	1-2004-1	08/12/2004	Cond	1,225.00	uS	1.00	O	Cond	02/17/2011			Mw-1-2004-
8	Mw-1	1-2004-1	08/12/2004	Ethylbenzen	.00	mg/L	2.00	O	Ethylbenzen	02/17/2011			Mw-1-2004-
9	Mw-1	1-2004-1	08/12/2004	Fe	1.20	mg/L	.01	O	Fe				Mw-1-2004-
10	Mw-1	1-2004-1	08/12/2004	HCO3	125.00	mg/L	1.00	O	HCO3	02/17/2011			Mw-1-2004-
11	Mw-1	1-2004-1	08/12/2004	Hg	10.00	mg/L	.00	O	Hg	02/17/2011			Mw-1-2004-
12	Mw-1	1-2004-1	08/12/2004	K	1.60	mg/L	.10	O	K				Mw-1-2004-
13	Mw-1	1-2004-1	08/12/2004	Li	.00	mg/L	.01	O	Li				Mw-1-2004-
14	Mw-1	1-2004-1	08/12/2004	Mg	21.00	mg/L	.02	O	Mg				Mw-1-2004-
15	Mw-1	1-2004-1	08/12/2004	Mn	.60	mg/L	.02	O	Mn				Mw-1-2004-
16	Mw-1	1-2004-1	08/12/2004	Na	81.00	mg/L	.01	O	Na				Mw-1-2004-
17	Mw-1	1-2004-1	08/12/2004	Pb	.05	mg/L	.01	O	Pb				Mw-1-2004-
18	Mw-1	1-2004-1	08/12/2004	PCE	.00	mg/L	2.00	O	PCE				Mw-1-2004-
19	Mw-1	1-2004-1	08/12/2004	pH	7.13		.00	O	pH				Mw-1-2004-
20	Mw-1	1-2004-1	08/12/2004	Sample_Dep	5.00		.00	O	Sample_Dep				Mw-1-2004-
21	Mw-1	1-2004-1	08/12/2004	SO4	851.00	mg/L	1.00	O	SO4				Mw-1-2004-
22	Mw-1	1-2004-1	08/12/2004	TCE	9.00	mg/L	1.00	O	TCE	02/17/2011	EPA 524.2 R		Mw-1-2004-
23	Mw-1	1-2004-1	08/12/2004	TDS	720.00	mg/L	1.00	O	TDS				Mw-1-2004-
24	Mw-1	1-2004-1	08/12/2004	Temp	14.80	Degrees C	.00	O	Temp				Mw-1-2004-
25	Mw-1	1-2004-1	08/12/2004	Toluene	.00	mg/L	1.00	O	Toluene	02/17/2011			Mw-1-2004-
26	Mw-1	1-2004-1	08/12/2004	Vinyl chloride	.00	mg/L	1.00	O	Vinyl chloride				Mw-1-2004-
27	Mw-1	1-2004-1	08/12/2004	Xylene	.00	mg/L	1.00	O	Xylene				Mw-1-2004-
28	Mw-1	1-2004-31	08/12/2004	Ag	.02	mg/L	.01	D	Ag				Mw-1-2004-
29	Mw-1	1-2004-31	08/12/2004	As	15.00	mg/L	.01	D	As				Mw-1-2004-
30	Mw-1	1-2004-31	08/12/2004	Ba	.90	mg/L	.00	D	Ba				Mw-1-2004-
31	Mw-1	1-2004-31	08/12/2004	Benzene	.00	mg/L	1.00	D	Benzene	02/17/2011	EPA 524.2 R		Mw-1-2004-
32	Mw-1	1-2004-31	08/12/2004	Ca	125.00	mg/L	.06	D	Ca				Mw-1-2004-
33	Mw-1	1-2004-31	08/12/2004	Cl	.00	mg/L	1.00	D	Cl				Mw-1-2004-
34	Mw-1	1-2004-31	08/12/2004	Cond	1,200.00	uS	1.00	D	Cond				Mw-1-2004-
35	Mw-1	1-2004-31	08/12/2004	Ethylbenzen	.00	mg/L	2.00	D	Ethylbenzen				Mw-1-2004-
36	Mw-1	1-2004-31	08/12/2004	Fe	.96	mg/L	.01	D	Fe				Mw-1-2004-
37	Mw-1	1-2004-31	08/12/2004	HCO3	125.00	mg/L	1.00	D	HCO3				Mw-1-2004-

The first line on this tab is the filter line and as such is highlighted in purple-blue. The filter line is similar to what you find in Excel when you apply a filter. You can enter values to filter the list of what is displayed only to those values that you are interested in.

You can also highlight a record (will turn bright blue) by clicking on the button on the left hand side of the grid and then right click on the record and select copy. Then you can paste this into for example an excel spreadsheet and both the header information and the records you highlighted will be pasted into the Excel spreadsheet.

The toolbar for the Data Query tab contains the following controls:



Navigates to a given station, skipping to the first station (in the sort order), to the previous station, to the specified station, to the next station, or to the last station.



Creates a new query (you will be moved to the Query Builder tab and prompted for a name for your new Query).



Edits the current query (you will be moved to the Query Builder tab with the current query open).



Executes query again.



Deletes the current query.



Uses the current query to generate a plume for visualization in the Scene Viewer.



Creates a Pivot table in Excel based on the results of the current query. You can find more information in the Pivot Tables section.



Opens the Perform Lab QA/QC Assessment tool from the Quality Control module based on the current query.



Allows you to select which query columns are shown or hidden.



Exports the results of the query.



Saves the changes you made (by applying a filter) to the existing query.



Saves the changes you made (by applying a filter) as a new query (you will be moved to the Query Builder tab).

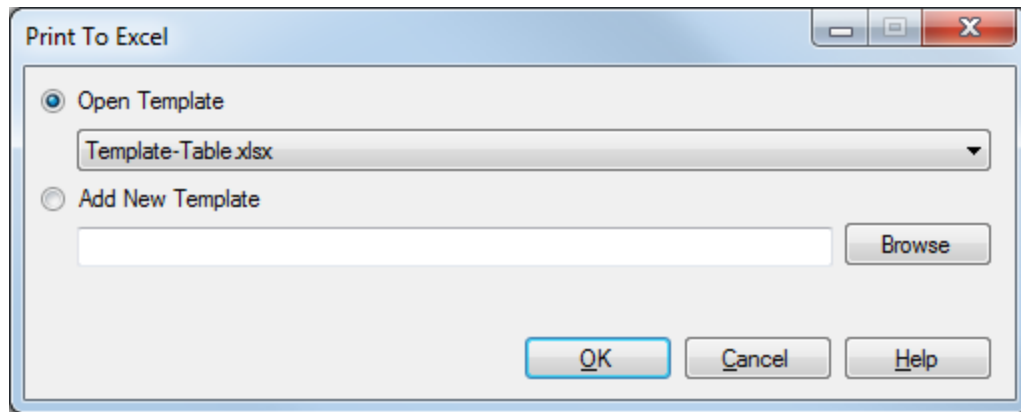


Prints the results of your query to an Excel template.



Sends the results of your query as a time series Chart in Excel.

When printing your query results to an Excel Template you will be prompted to select a template. Provided with HGA is a template called Template - Table.xlsx. You can modify this template by going to the folder where the templates have been stored (see [HGA Settings](#) for more details) and adjust it to suit your needs. Perhaps you may want to change the logo etc. Any templates stored in this folder will be available in the drop down list under the Open Template option.



Once you have selected a template you can select the OK button and the Excel™ template will open with your data in it - ready for printing!

When using the Chart in Excel option you will be prompted to select a template. We have provided several template options which were installed with HGA. You can modify templates by going to the folder where the templates have been stored (see [HGA Settings](#) for more details) and adjust it to suit your needs. Perhaps you may want to change the logo etc. Any templates stored in this folder will be available in the drop down list.

It would be a good idea to review the templates before you use them. In this example, we want to create 2 plots on each page with 2 parameters on each plot. So we will write a query to pull the 4 parameters we want in the plots: TCE, Vinyl Chloride, Benzene and Ethylbenzene.

Here, for example, is our query:

Display Fields

Function	Expression	Alias	Order By
▶	[station].[Name]	Station Name	
	[parameter_sample].[sample..	Sample_Date	
	[parameter_result].[chemical...	Chemical_Name	
	[parameter_result].[result_val...	Result_Value	
	[parameter_result].[result_unit]	Result_Unit	

+ × ↑ ↓

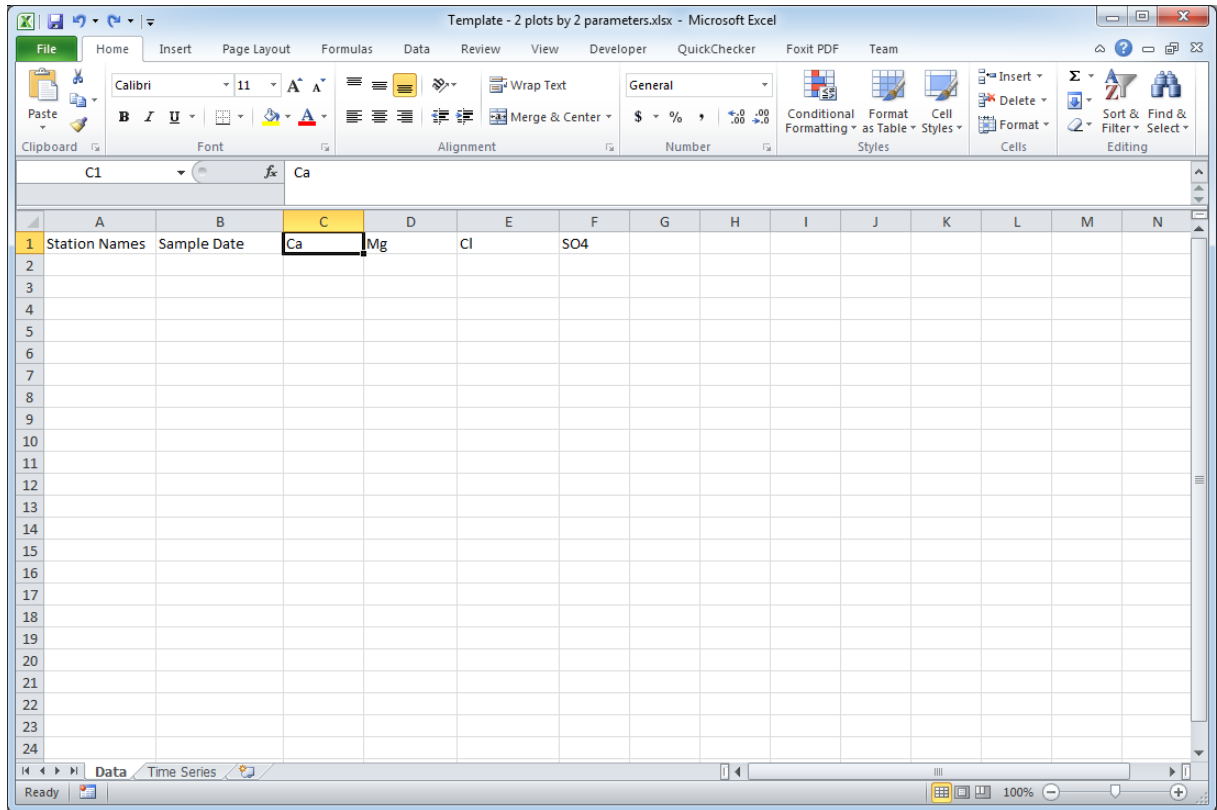
Conditions

(	Expression	Operator	Value	)	And/Or
▶	[parameter_result]...	=	Ca		OR
	[parameter_result]...	=	Mg		OR
	[parameter_result]...	=	Cl		OR
	[parameter_result]...	=	SO4		

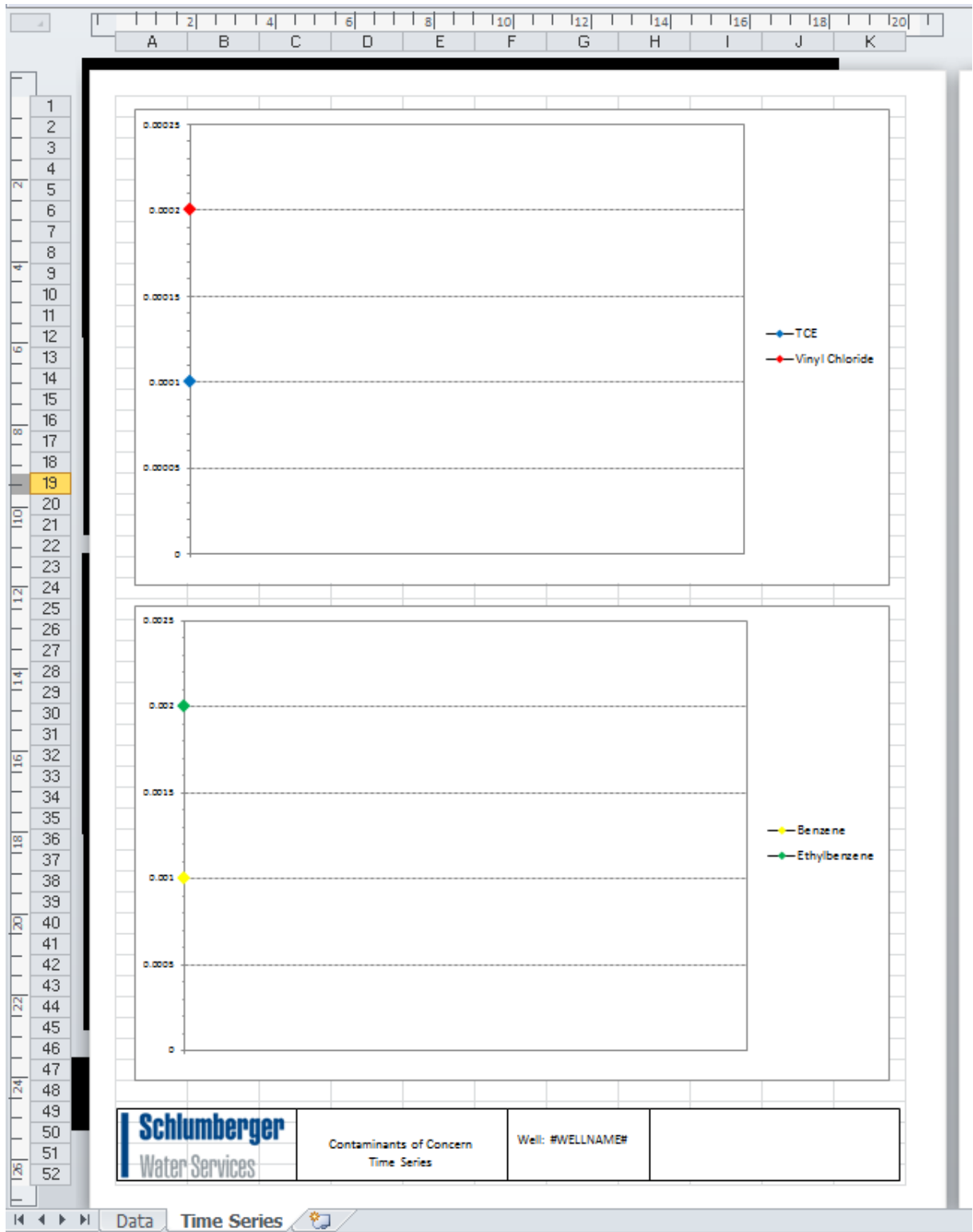
+ × ↑ ↓ | Source Condition Project

Now we will review the template that matches what I want to plot - Template - 2 plots by 2 parameters.






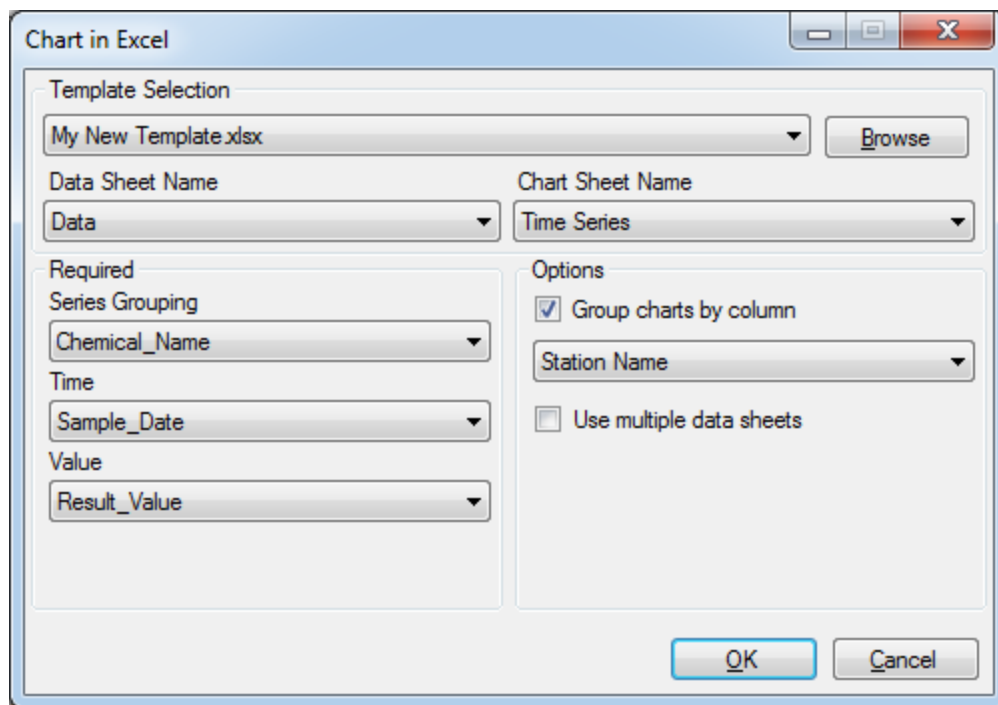
On the Data tab we can see this template is set for Ca, Mg, Cl, SO4. So we will change this to the 4 parameters that we want to plot. Once we have changed the parameters, we can review the Time Series tab to see what it will look like.



Here we can see that TCE and Vinyl Chloride are going to be placed on the top chart and Benzene and Ethylbenzene on the bottom chart which is the way we want to chart them. If, however, we want to switch them we would just need to reorder them on the Data tab.

Also, we can adjust the footer - change the logo, title etc. Once we like the way it looks we can save as a new template - making sure to save it in the same folder as the original templates so HGA can find them. Now we are going to run our query and use our new template to chart the data.

So when we select the  button the first thing we need to do is select our new template from the drop down list.

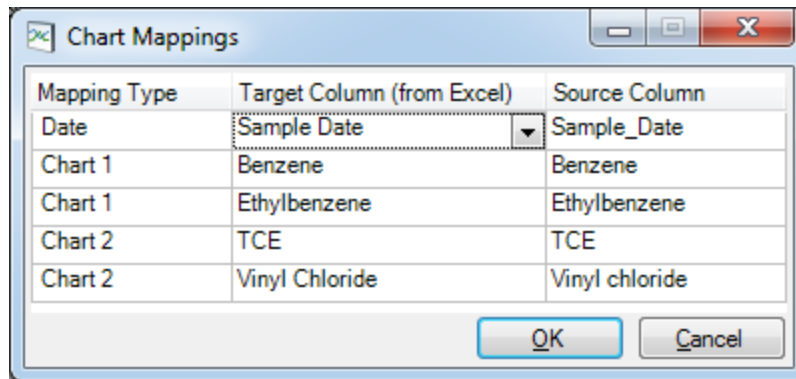


The screenshot shows the 'Chart in Excel' dialog box with the following settings:

- Template Selection: My New Template.xlsx
- Data Sheet Name: Data
- Chart Sheet Name: Time Series
- Required:
  - Series Grouping: Chemical\_Name
  - Time: Sample\_Date
  - Value: Result\_Value
- Options:
  - Group charts by column
  - Station Name
  - Use multiple data sheets

Then select the Required mappings - the Series grouping would be the chemical name, the Time is the Sample Date, and the Value is the Result Value. Also we want to have one page for every station so we select the Group charts by option and select Station Name.

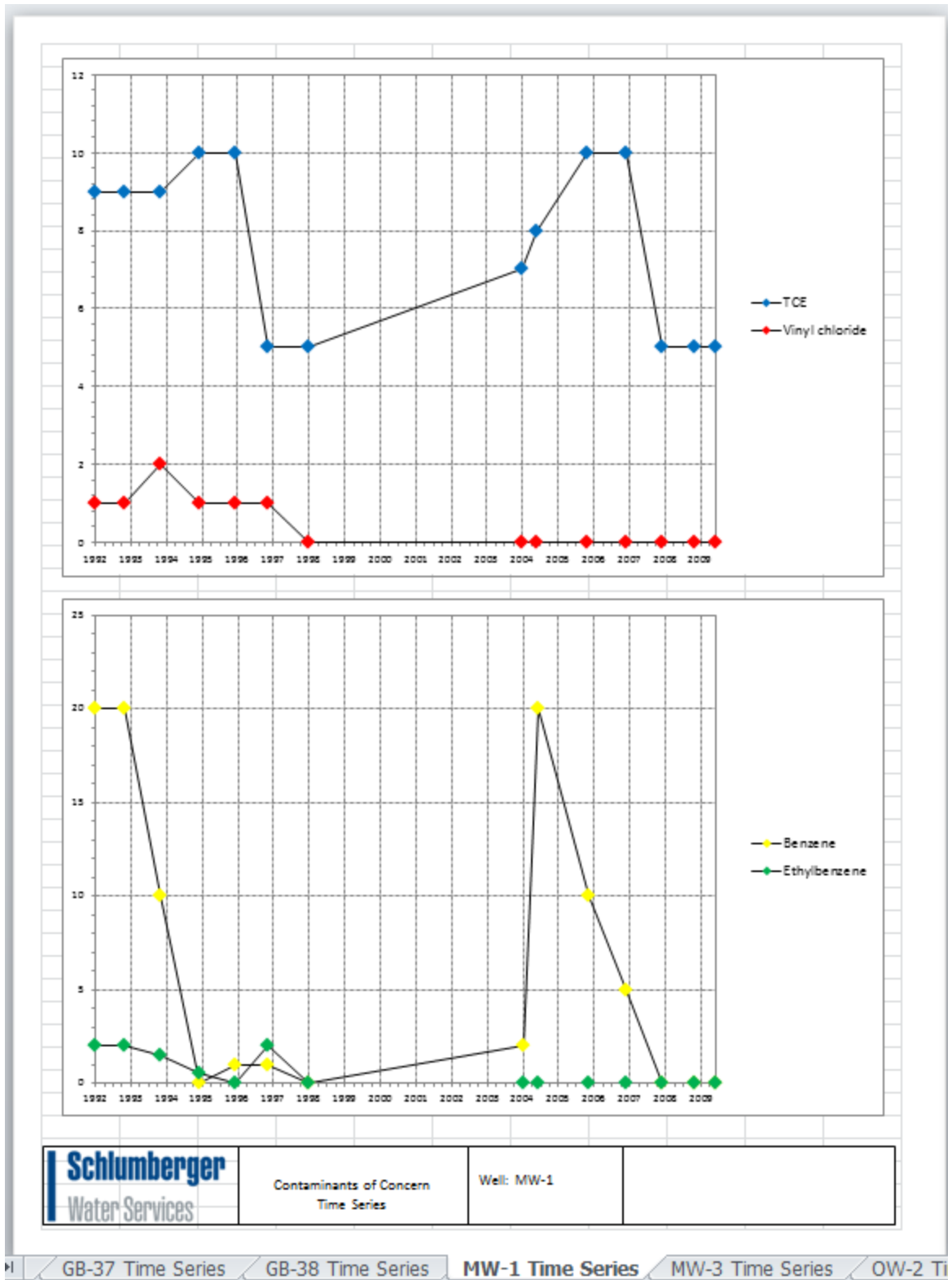
When we select OK, we get the Mappings dialog:



The chemical names automatically match because they are exactly the same within our template as they are stored within the database.

Also make sure that you map the Date field. Then select OK and you will be prompted for a name for the excel spreadsheet that will be created.

Once you provide a name it will open in Excel and you can review to see that each station has its own tab for the time series chart.



Provided with HGA is a template for the Chart in Excel option called Template-Chart.xlsx. You can modify this template by going to the folder where the templates have been stored (see [HGA Settings](#) for more details) and adjust it to suit your needs. Perhaps you may want to change the logo etc. Any templates stored in this folder will be available in the drop down list under the Template Selection option.

### 3.13 Data Filter Tab

The Data Filter tab allows you to browse through the database tables to see the results of all stations in a particular table. You can select to browse the entire project, database, or a particular Station Group. Then select the table you are interested in. Select the execute button and you will see all the results.

The first line on this tab is the filter line and as such is highlighted in purple-blue. The filter line is similar to what you find in Excel when you apply a filter. You can enter values to filter the list of what is displayed only to those values that you are interested in.

You can also highlight a record (will turn bright blue) by clicking on the button on the left hand side of the grid and then right click on the record and select copy. Then you can paste this into for example an excel spreadsheet and both the header information and the records you highlighted will be pasted into the excel spreadsheet.

sample_id	chemical_na	result_valu	result_unit	reporting_detection	analysis_method	qualifier	outlier	analysis_dat	dilution_factor	CAS_number
1-2004-1	Toluene	0	mg/L	1		<MDL		17/02/2011		
1-2004-1	Vinyl chloride	0	mg/L	1		<MDL				
1-2004-1	Xylene	0	mg/L	1		<MDL				
1-2004-31	Ag	0.0199999	mg/L	0.008						
1-2004-31	As	15	mg/L	0.01						
1-2004-31	Ba	0.8999999	mg/L	0.002						
1-2004-31	Benzene	0	mg/L	1	EPA 524.2 Rev 4	<MDL		17/02/2011		
1-2004-31	Ca	125	mg/L	0.06						
1-2004-31	Cl	0	mg/L	1		<MDL				
1-2004-31	Cond	1200	uS	1						
1-2004-31	Ethylbenzene	0	mg/L	2		<MDL				
1-2004-31	Fe	0.9599999	mg/L	0.01						
1-2004-31	HCO3	125	mg/L	1						
1-2004-31	Hg	11	mg/L	0.001						
1-2004-31	K	1.5	mg/L	0.1						
1-2004-31	Li	0	mg/L	0.01		<MDL				
1-2004-31	Mg	22	mg/L	0.02						
1-2004-31	Mn	0.6000000	mg/L	0.02						
1-2004-31	Na	80	mg/L	0.01						
1-2004-31	Pb	0.0500000	mg/L	0.01						
1-2004-31	PCE	0	mg/L	2		<MDL				
1-2004-31	pH	7.1500000		0						
1-2004-31	Sample_Dept	5		0						
1-2004-31	SO4	550	mg/L	1				17/02/2011		
1-2004-31	TCE	9	mg/L	1	EPA 524.2 Rev 4					
1-2004-31	TDS	726	mg/L	1				17/02/2011		
1-2004-31	Temp	14.8000000	Degrees C	0						
1-2004-31	Toluene	0	mg/L	1		<MDL		17/02/2011		
1-2004-31	Vinyl chloride	0	mg/L	1		<MDL				
1-2004-31	Xylene	0	mg/L	1		<MDL				
1-2004-74	Ag	0.0199999	mg/L	0.008						
1-2004-74	As	15	mg/L	0.01						

The toolbar for the Data Filter tab contains the following controls:



These navigation options allow you to scroll through the records.



This allows you to execute the filter (runs a query to return the records).



This allows you to delete the currently selected records.



This allows you to show or hide the columns.



This allows you to export the results of the query.



Saves the filter as a Query (you will be moved to the Query Builder).


### 3.14 Data Entry

#### Manual Data Entry

---

You can manually entered and/or edited data in the following tabs:

- Station List
- Station Data
- Non Station Data

You can use the  to add a new record (row) within one of the above tabs.

#### Data Transfer System (DTS)

---

It may be more efficient to import the data using the Data Transfer System (DTS). The DTS give you several options for importing your data:

- General
- EDD
- Mobile EDD
- Chemical
- Diver
- LAS

For more details on how to import data using the DTS, please refer to [Importing Data](#).

### 3.15 EDD Workflow

The EDD (Electronic Data Deliverable) workflow provides an efficient way of getting validated data into HGA. The workflow includes the following three steps:

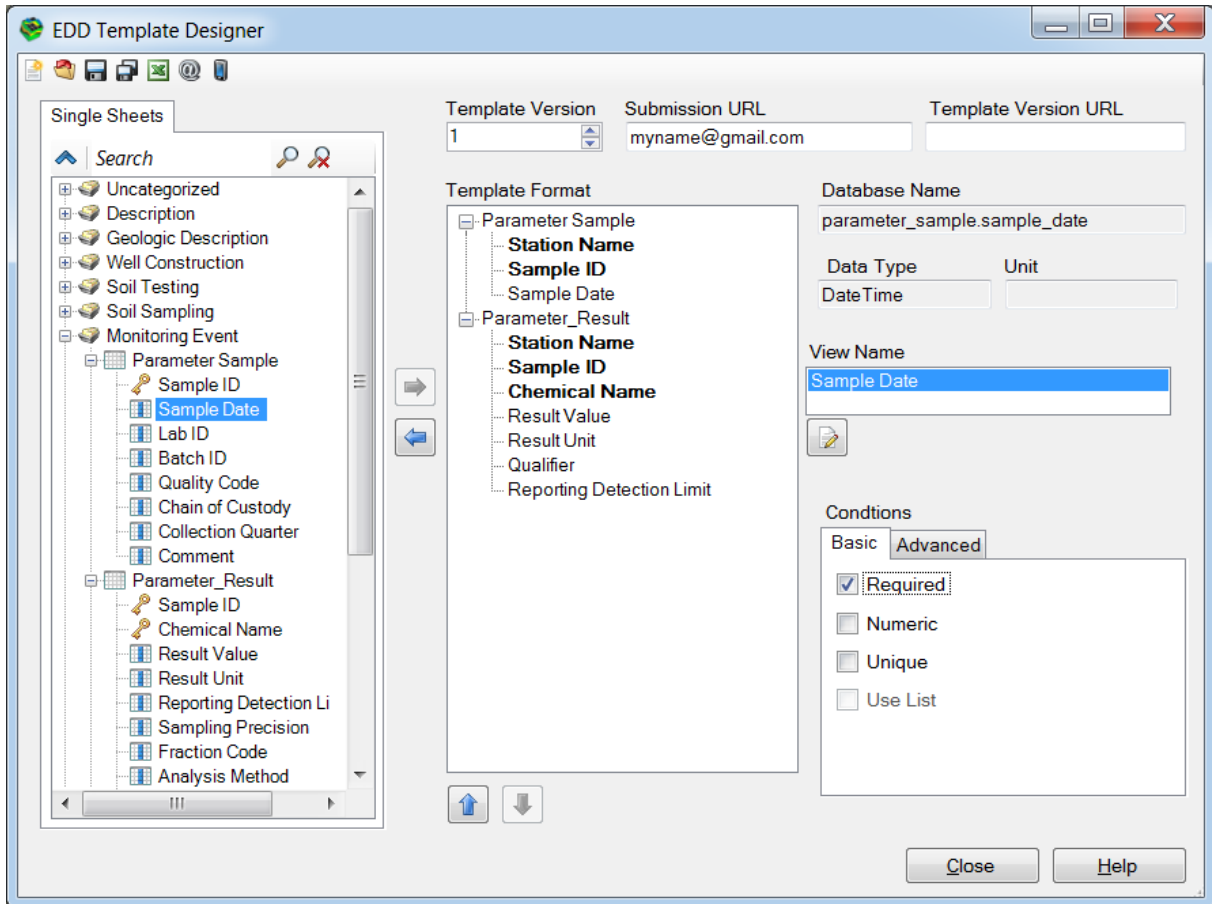
1. EDD Template Designer
2. HGA QuickChecker
3. EDD Import

Additionally, we also have an option to make your EDD mobile so you can use it on mobile devices like tablets and smart phones.

#### 3.15.1 EDD Template Designer

You can find this option by selecting Modules / EDD Template Designer. In this first step of the workflow you can create a template (which can be opened in Excel) for others to use to validate their data. In the EDD Template Designer you select which fields you wish to have in your template by simply dragging and dropping them onto the Template Format.

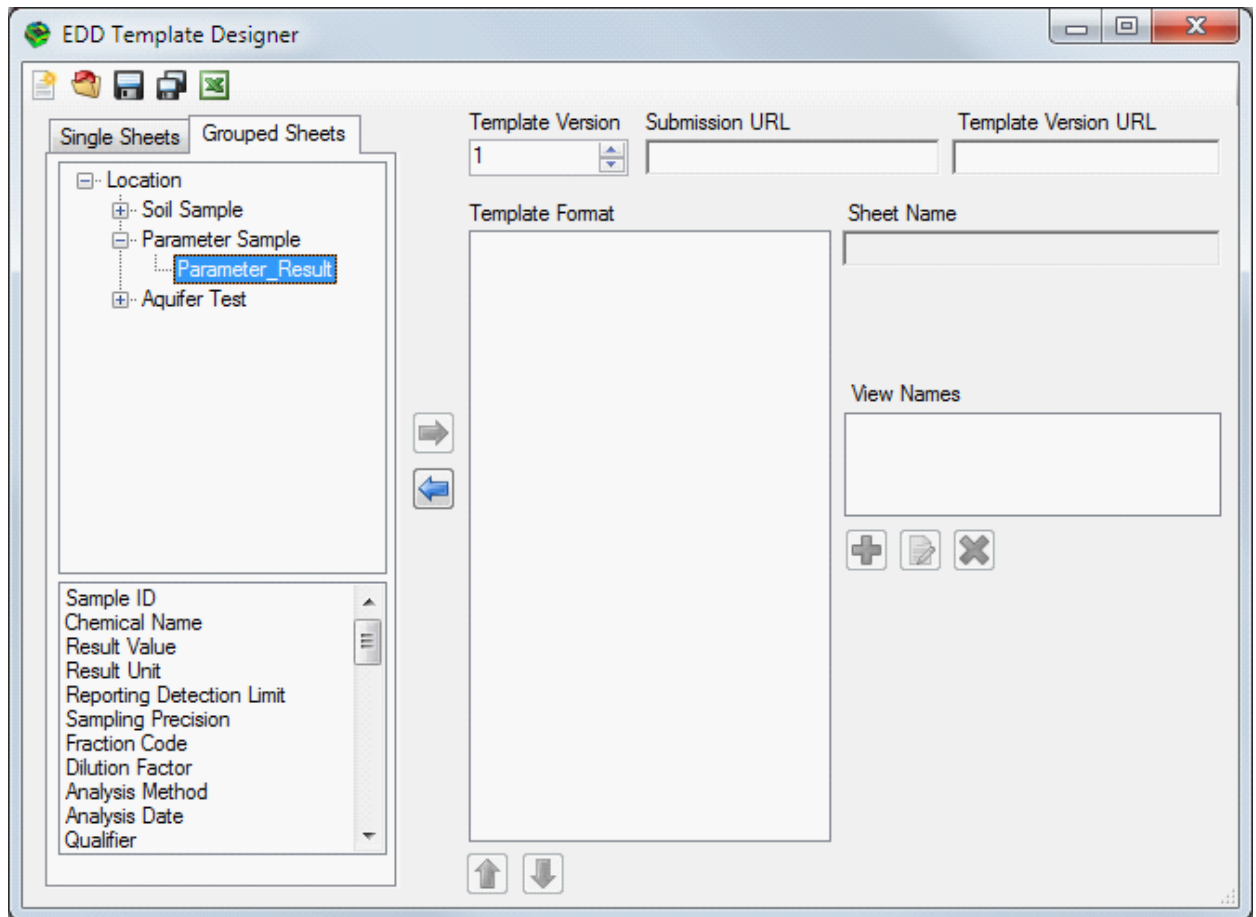




The list of available fields on the left are provided as you would be used to seeing them in the Template Manager or the Query Builder. First branch are the Data Categories, next branch are the Tables, and the final branches are the fields. As you drag and drop fields into the Template Format section you will notice that other fields may show up there automatically – these are also bolded. These are fields that are required to be able to import the data into the select table.

If you select fields from the Single Sheets tab – the Template will create a new worksheet for each table where fields were selected from. In the example above fields were selected from both the Parameter Sample and the Parameter Result tables – and therefore when you open this template in Excel you will find both a worksheet was created for each table.

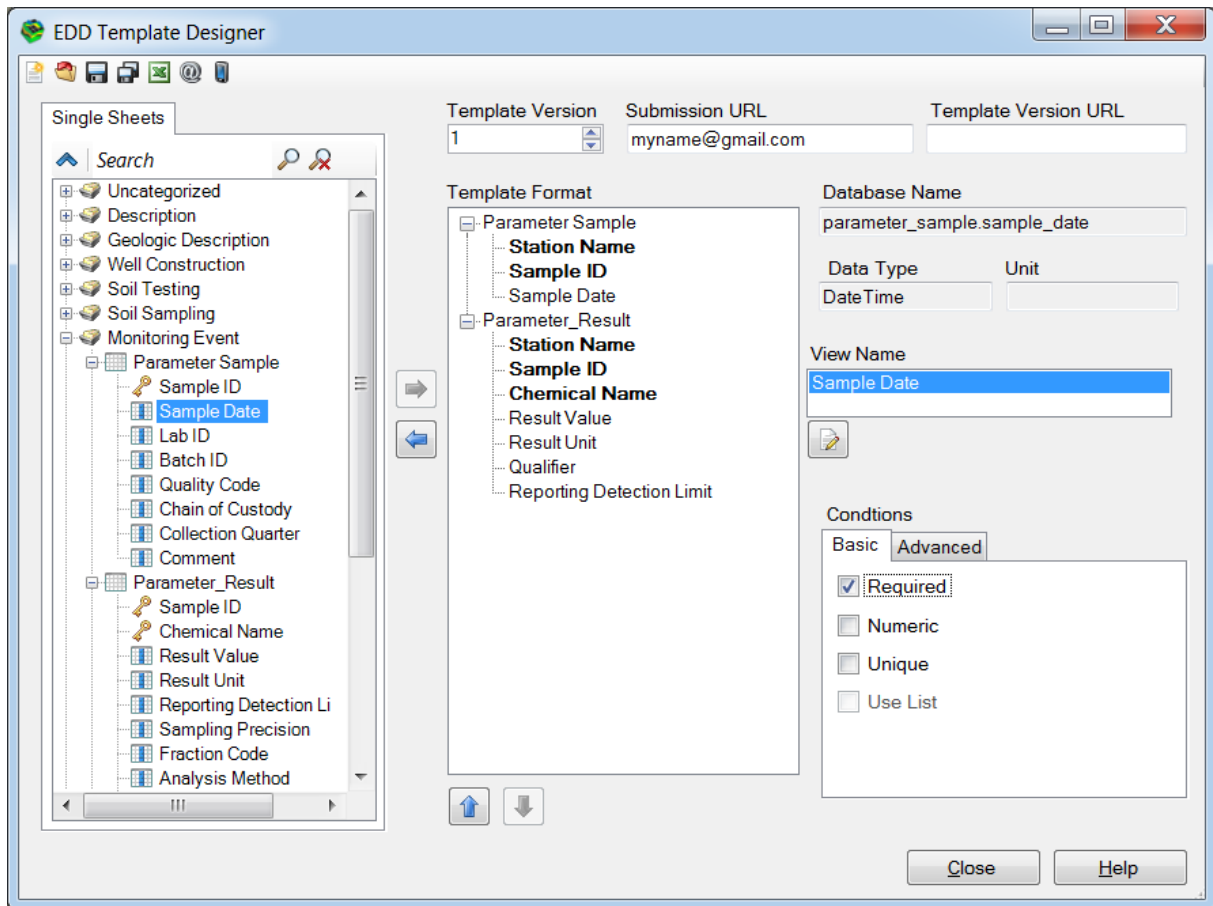
If however you select the Grouped Sheets tab – you will notice that the fields are presented in another way. Here you will find the tables that are related to each other (by database foreign keys) are grouped on a branch. When you select the child table (lowest branch) you will find a list of ALL fields of the related tables below.



When you select fields from the Grouped Sheets tab you will create a template with only one worksheet.

You have some additional options when creating your EDD Template. You can set a version number (to keep tracked in case in the future you wish to update a template). A submission URL can be set as either an email address or as an FTP folder to upload to. A Template Version URL can be entered so that when using the template in the HGA QuickChecker and the EDD import routine it can be verified that it is the most up to date version of the template.

Additionally, you can add conditions onto the fields you have chosen that the HGA QuickChecker will verify. For example – you can make the Sample Date field required (even though it is not a required field to enter the data into the database). Also there is an option for more Advanced Conditions - here you can enter any Excel functions for additional conditions.




### 3.15.2 HGA Quick Checker

The HGA Quick Checker is a tool to help you organize your data from spreadsheets into a format ideal for importing into your database and then validate it before importing it into the database.

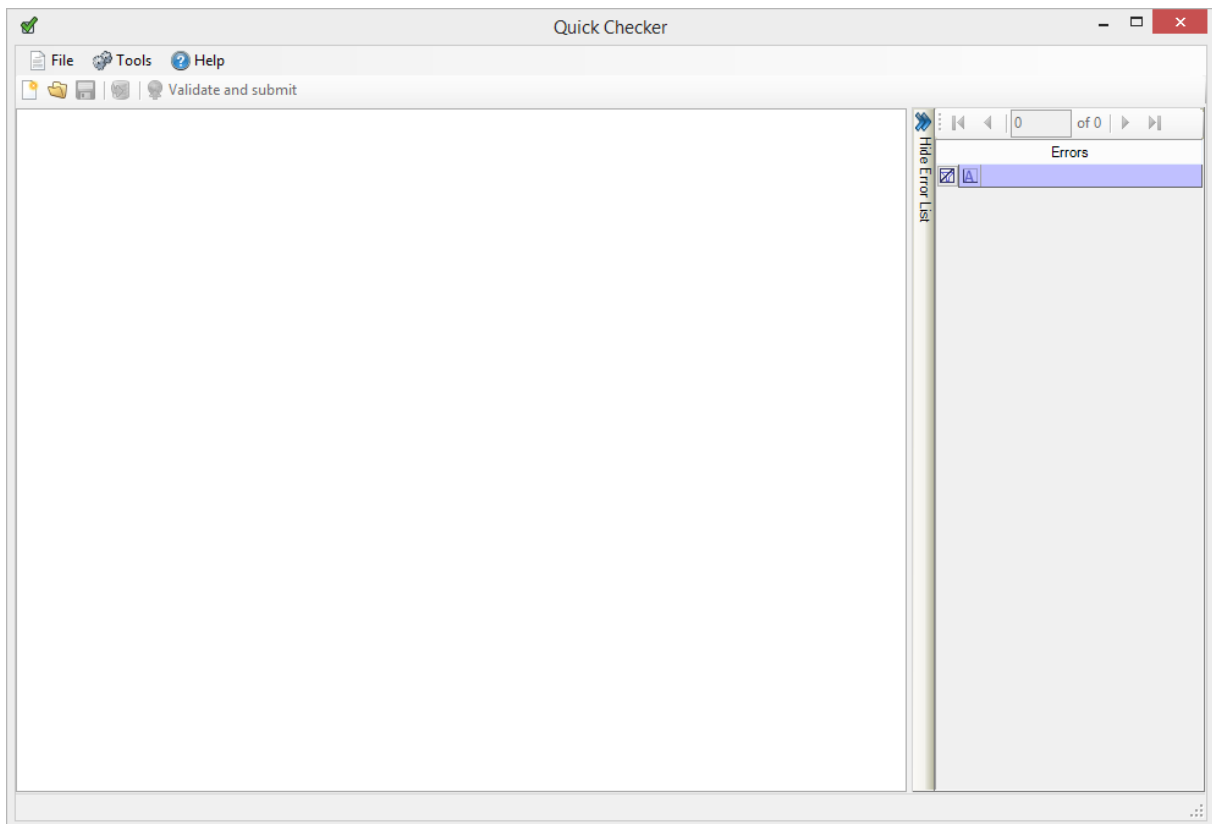
The Quick Checker module is an important part of the overall [EDD workflow](#), which includes four simple steps:



- Create a new Electronic Data Deliverable (EDD) template using the EDD Template Designer
- Open the EDD template and the source data file within the Quick Checker
- Use the Quick Checker to validate your data against the EDD template, and generate a \*.zip\_hga import file
- Import the \*.zip\_hga directly into HGA; data mapping and validation has already been completed by the Quick Checker

This tool launches as its own module from the main toolbar by selecting the  button on the main HGA toolbar. This module is also available as a stand alone installation for use on

computers that do not have HGA installed. This installation can be downloaded by contacting technical support ([support@waterloohydrogeologic.com](mailto:support@waterloohydrogeologic.com)). This means that project partners (i.e. field personnel, water quality laboratories) can use the Quick Checker without requiring a full license of Hydro GeoAnalyst. This allows them to provide you with a single data file (i.e. the \*.zip\_hga import file) which is already pre-validated and pre-mapped, making it extremely simple for the database manager to import that data.

When the Quick Checker module is first launched, the window below will open:



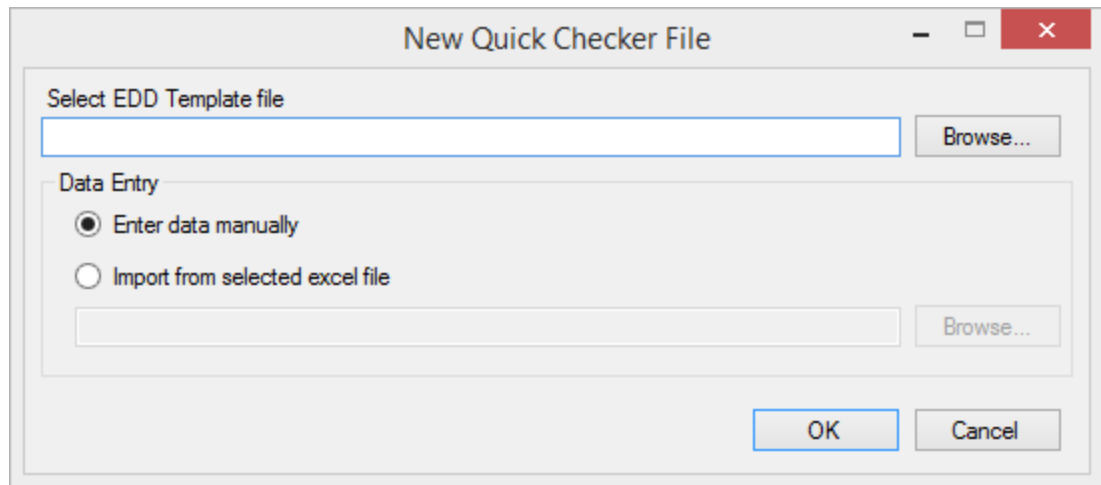
You can select the new button  to create a new quick checker file or open an existing one by selecting the  button and browsing to your saved \*.qck file.

The Quick Checker method is based on the following components:

- An EDD template file (\*.tmpl), which contains data validation criteria
- A Microsoft Excel data file (\*.xls, \*.xlsx), which contains the data to be imported
- A Quick Checker file (\*.qck), which represents the combination of the EDD template and Excel data files (i.e. intermediate file type, after import but before validation)

- A validated Quick Checker import file (\*.zip\_hga), which can be imported directly into HGA

When creating a new file you will be prompted to select the EDD template file you wish to use and then you are given the option to either enter data manually or import data from a selected excel file.



When choosing to import data from an excel file you will need to map your spreadsheet to the fields in the EDD similar to the way you map in the General import routine. If your spreadsheet does not contain one of the fields you have the option to Add empty column so you can manually enter this data for validation.

Location: Lithology

Select MS Excel workbook to map to template table 'Lithology'

Sheet 1

Header Row: 1



Start Importing Data Using Row: 2

Map 'Lithology' fields accordingly

Destination	Source
Station Name	Station
From	From
To	To
Soil Type	Soil Type
Description	Description
Color	<Add empty column>
Odor	<Add empty column>

All required fields (highlight in green) must be mapped

OK Cancel Help

This quickly brings your data into the Quick Checker for validation. You should see a data tab associated with data table that was included in the EDD template file. You still have the option to add or edit data after importing the data in. This can be done manually by simply selecting the desired data field and typing the required values. If the EDD template includes a 'pick list' for any particular field then the pick list will be displayed when entering values into that field (e.g. see the 'Color' field in the image below). It's also possible to manually add or remove rows from the Quick Checker using the 'Add New Row' (  ) and 'Delete Selected Row(s)' (  ) buttons.

In the following example you can see there are some problems with the data. The tab where errors occur are flagged (red) and the errors are displayed on the right hand side Error section. If you double click on an error it will take you to the row containing the error so you can correct it. Once all errors are corrected the flag will disappear, and the data will then be ready for validation.

Quick Checker - Lithology EDD.tmp1

File Tools Help  
Validate and submit

Location: 1 of 78



Station Name	From (m)	To (m)	Soil Type	Description	Color	Odor
Station1	0	6.5	Coarse Gravel	Coarse Gravel	grey	
Station1	6.5	26	Medium Sand	Fine to med sand	black	
Station1	26	52	Gravel	Gravel	blue	
Station1	52	69	Fine Sand	Fine sand	brown	
Station1	69	100	Silt	Silty clay	buff	
Station2	0	4.3	Coarse Gravel	Coarse Gravel	grey	
Station2	4.3	17	Medium Sand	Fine to med sand	grey-blue	
Station2	17	48	Gravel	Gravel	olive	
Station2	48	66	Fine Sand	Fine sand	orange	
Station2	66	94	Silt	Silty clay		
Station2	94	100	Sand	Silty to Fine Sand		
Station3	0	4	Coarse Gravel	Coarse Gravel		
Station3	4	8	Medium Sand	Fine to med sand		
Station3	8	27	Gravel	Gravel		
Station3	27	39.5	Clay	Silty clay		
Station3	39.5	62	Fine Sand	Fine sand		
Station3	62	87.5	Silt	Silty clay		
Station3	87.5	100	Sand	Silty to Fine Sand		
Station3	0	8	Coarse Gravel	Coarse Gravel		
Station4	8	33	Clay	Silty clay		
Station4	33	54	Fine Sand	Fine sand		
Station4	54	80	Silt	Silty clay		
Station4	80	100	Sand	Silty to Fine Sand		
Station5	0	6	Coarse Gravel	Coarse Gravel		
Station5	6	26	Clay	Silty clay		
Station5	26	45	Fine Sand	Fine sand		
Station5	45	73.5	Silt	Silty clay		
Station5	73.5	100	Sand	Silty to Fine Sand		
Station6	4	4	Clay	Silty clay		
Station6	4	16	Coarse Gravel	Coarse Gravel		
Station6	16	34	Fine Sand	Fine sand		
Station6	34	67	Silt	Silty clay		
Station6	67	105	Sand	Silty to Fine Sand		
Station7	0	11	Clay	Silty clay		
Station7	11	15	Coarse Gravel	Coarse Gravel		
Station7	15	24	Fine Sand	Fine sand		
Station7	24	60	Silt	Silty clay		
Station7	60	100	Sand	Silty to Fine Sand		

Errors

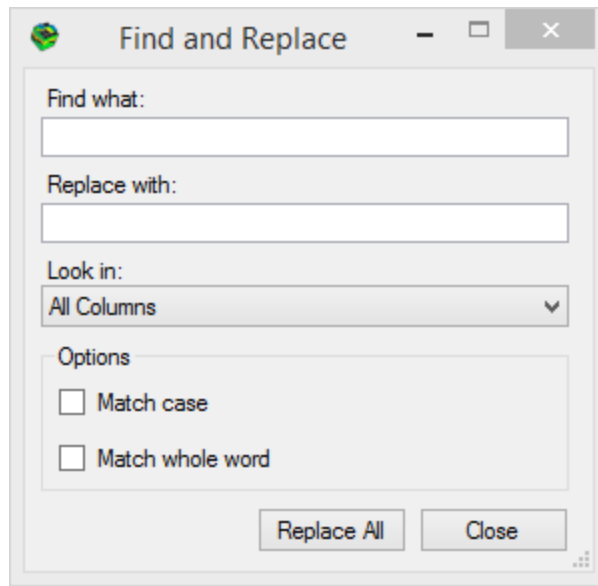
- Station Name cannot have null values
- From cannot have null values

C:\Users\mgaertner\Documents\Hydro GeoAnalyst\Projects\Demo 2016.1\Data files\Sample\_Lithology.xls

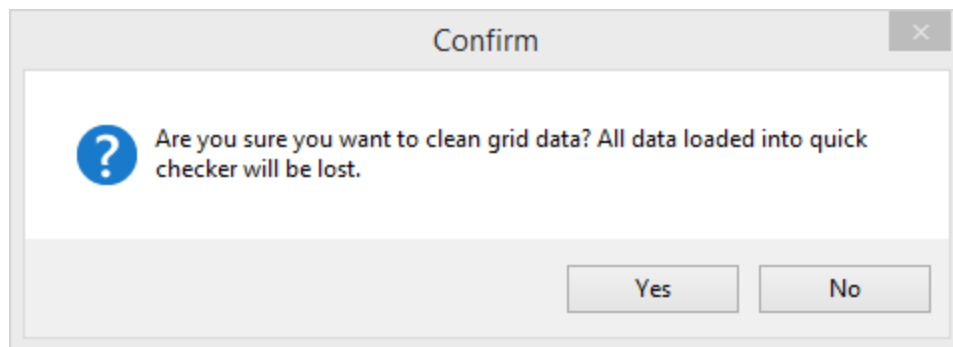
Data contains errors.


Under the Quick Checker toolbar you will be able to save the existing Quick Checker file (\*.qck) for future use by clicking the Save button (  ). If you have additional Excel spreadsheets with further data to be imported you can click the 'Import MS Excel File' button (  ). This allows you to incorporate data from multiple spreadsheets into the HGA Quick Checker file. It's also possible to export the data contained within the Quick Checker at anytime by clicking 'Tools' > 'Export to Excel..' from the main toolbar. This will open a Windows Explorer window, allowing you to select a location and file name for the exported data.

It's also possible to perform data corrections using the 'Find and Replace' tool, which can be accessed by clicking 'Tools' > 'Find and Replace...' from the main toolbar. This will open the 'Find and Replace' window, as shown below.



Finally, it's possible to clear all the data currently loaded into the Quick Checker using the 'Clear Data' tool the main toolbar. Selecting the 'Clear Data' tool will open a warning message, asking if you would really like to clean the grid data. Selecting Yes will clear all data from the Quick Checker.



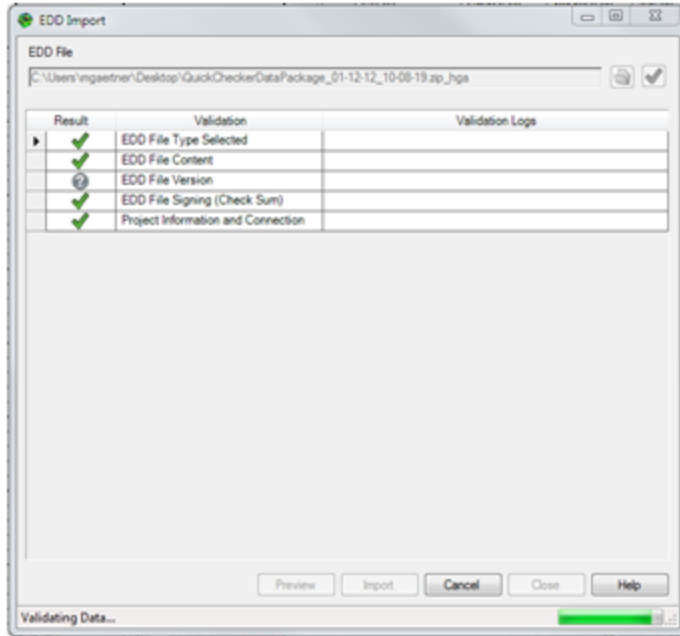
Once all of the required data has been loaded, and all data errors have been resolved, you can then click the 'Validate and Submit' button (  **Validate and submit** ). You will then be prompted to save your file as a \*.zip\_hga file which can be easily imported through the DTS. See the next section for more information about importing the validated data file.

### 3.15.3 EDD Import

To launch the EDD Import routine select Modules / Import / EDD. Then specify the location of the \*.zip\_hga file that was generated within the HGA QuickChecker.

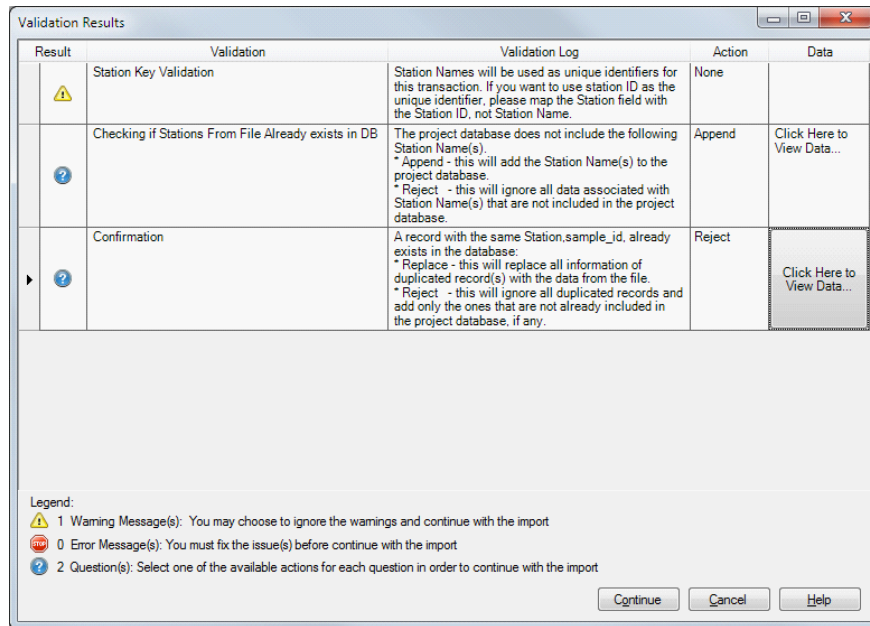


Please be aware that you should not attempt to unzip or modify the file in any way as this can invalidate the file and cause difficulties importing the data.

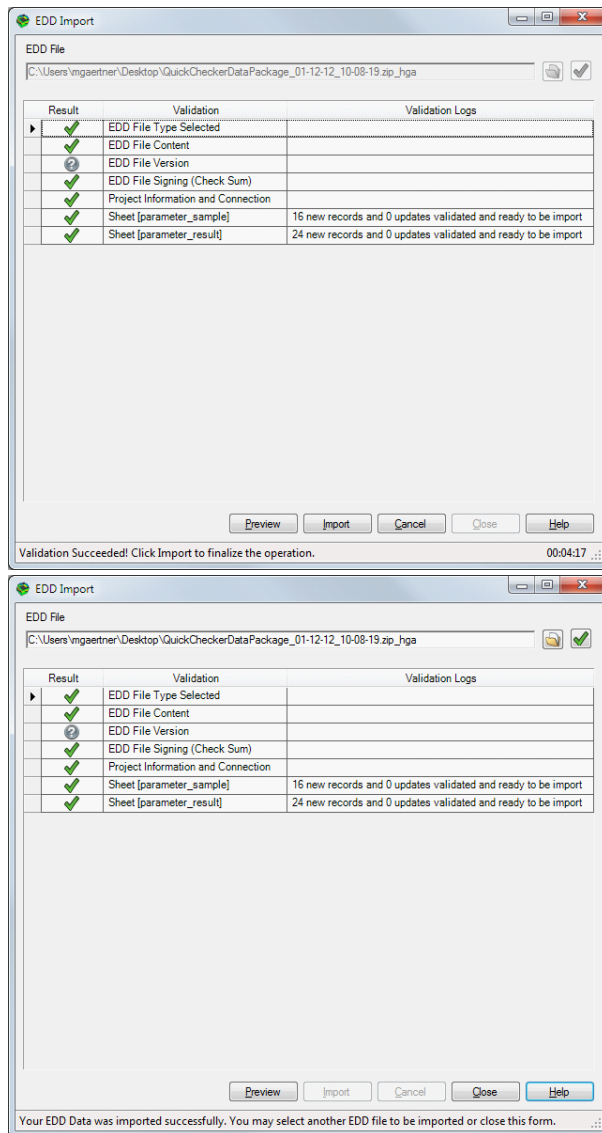


As soon as the file is validated you will see the Validation Results dialog appear. Here you may need to answer a question before continuing. For example the Validation found that some of the station names I am trying to import do not exist in the database – therefore I can choose to append the new station names or reject records for stations that do not exist. I make my choice by selecting the appropriate option in the Action column. If I wish to see which stations are not currently in the database I can select the Click Here to View Data option. For this example I choose to Append the stations (so any station names in my data that are not in the database will be automatically added).

Then the validation also found I have duplicates in the database – some of the sample IDs already exist in the database! Again, I can select what I want to do – either overwrite what is in the database or reject the duplicate sample IDs. For this example I will reject these sample IDs.



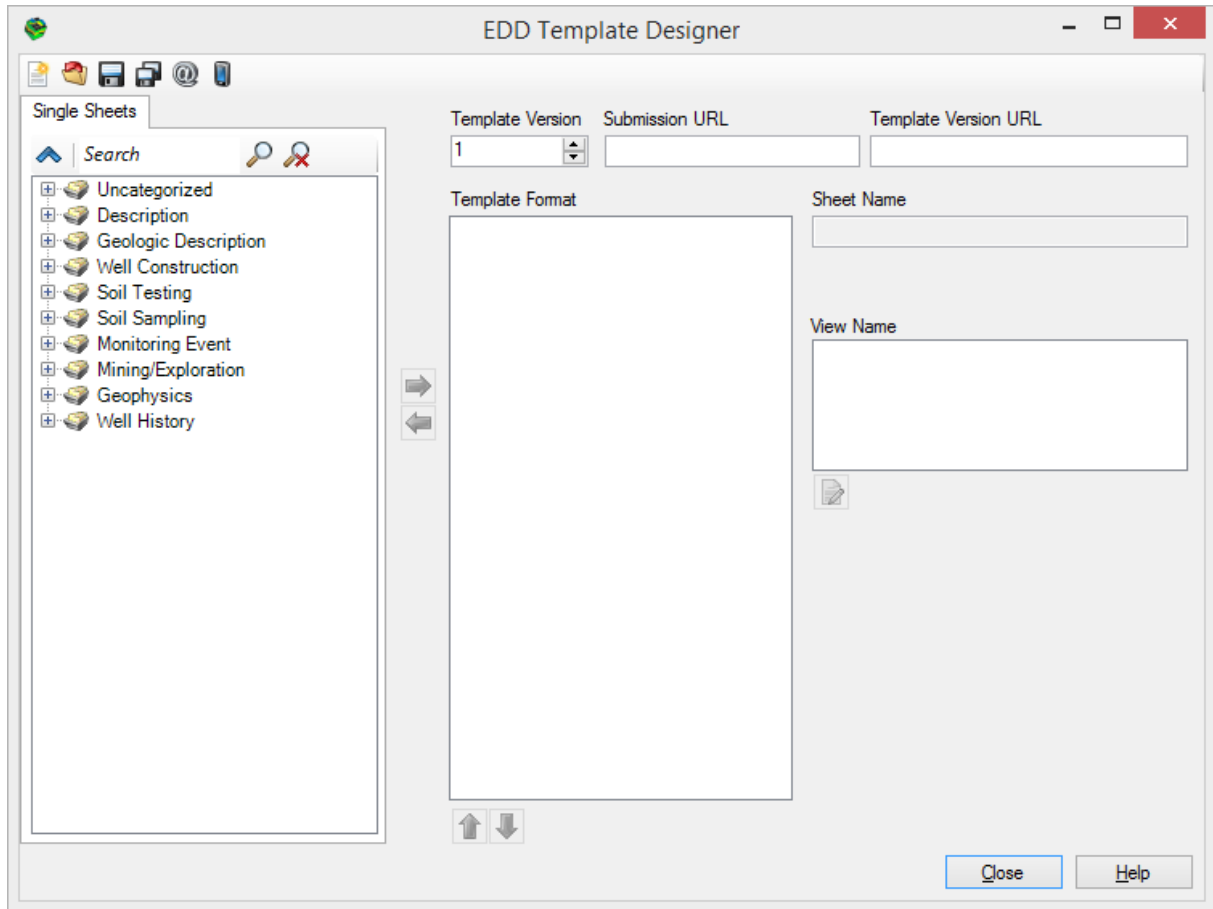
Now I can continue with the import. Now the Import dialog is updated – and I can see how many records will be imported.



Select the Import button to import the records – and the import dialog updates to inform you that the import was successful. Now you can select another EDD file to import or close the dialog box.

### 3.15.4 Mobile EDD


Within the EDD Template Designer you will now find an option to Publish Mobile EDD. So instead of using your EDD within the HGA QuickChecker (MS Excel plugin) you can now use your EDD on a mobile device!

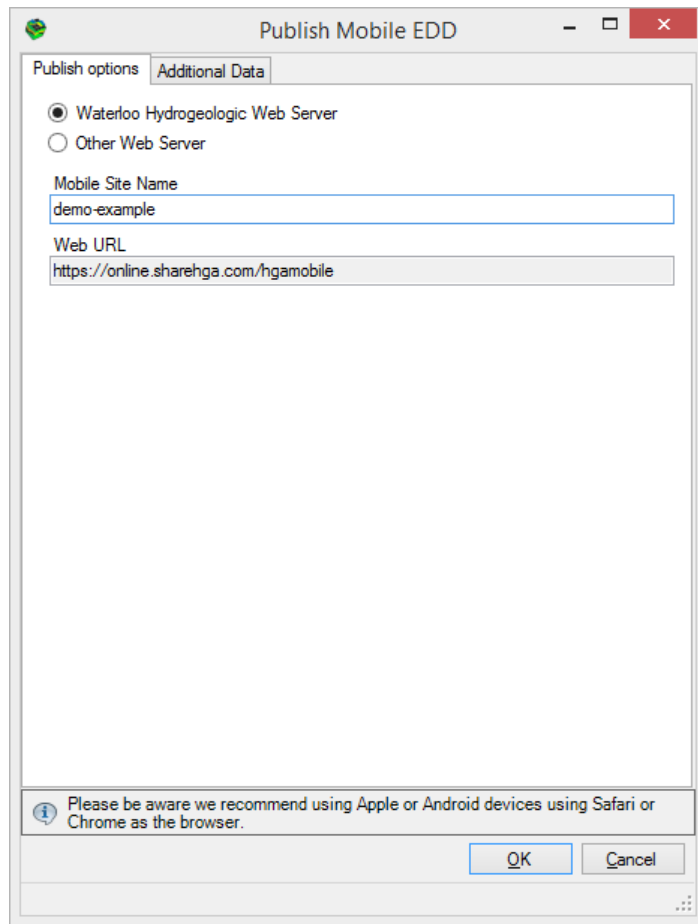


Create your EDD as you did previously. Select the fields from the various tables that you wish to collect data for while you are out in the field. Fields where you have created a list within the List Editor can be used to provide a drop down list in your Mobile EDD.

Please be aware of the following limitations for Mobile EDDs:

- you must include the Station Name from the Location table within your Mobile EDD template.
- the Advanced option under the Conditions in the EDD Template Designer is not supported in the Mobile EDDs.
- You are limited to a maximum of 12 tables.

When you are happy with your EDD template select the Publish Mobile EDD button  and you will be provided with the following options.



The default option is to publish this Mobile EDD to our Waterloo Hydrogeologic Web Server – therefore all you need to do is confirm the name (Web link folder) that will be used – by default it takes the Project name and the EDD template name.

Or if you prefer you can publish to another Web Server. When publishing to your own webserver you need to provide the URL, the FTP Host as well as the User Name and Password.

Publish Mobile EDD

Publish options Additional Data

Waterloo Hydrogeologic Web Server

Other Web Server

Mobile Site Name  
Demo 2016.1\_Lithology EDD

Web URL ( Eg: http://online.sharehga.com/hgamobile )  
http://

FTP Host Name ( Eg: ftp.sharehga.com )  
ftp.sharehga.com

FTP Server Folder ( Eg: web/content/fetch )  
web/content/hgamobile

User Name

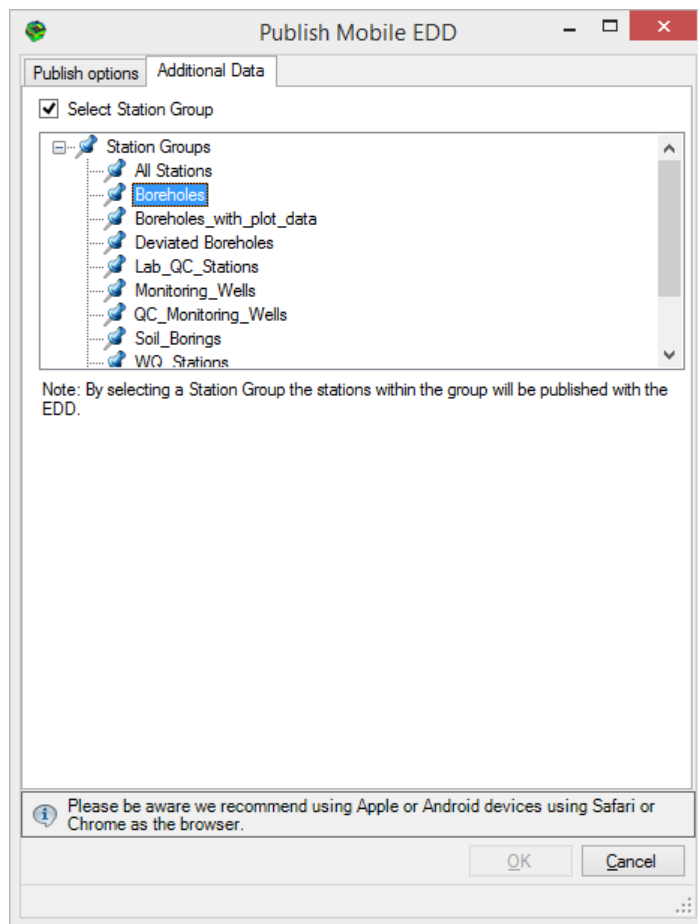
Password

Port  
22

Please be aware we recommend using Apple or Android devices using Safari or Chrome as the browser.

OK Cancel

You also have an option to publish a station group within your Mobile EDD - you will find this option on the Additional Data tab - select the station group you wish to publish with the EDD. This means that the stations in that station group will appear listed in the Home Page of the Mobile EDD. This can be very helpful if the stations already exist within your HGA project and you are sending someone into the field to collect data for specific stations. If you do not use a station group it simply means you will be creating new stations while collecting your data in the field.



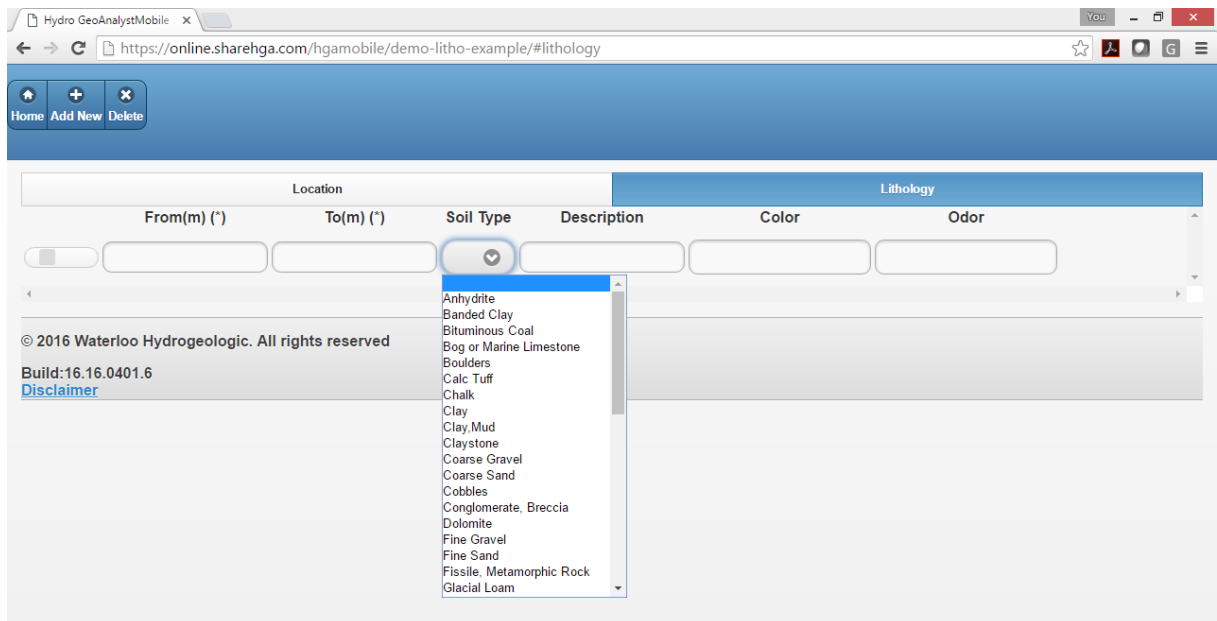
**Note:** We recommend using Apple or Android devices using Safari or Chrome as your browser.

Here is the Litho EDD that comes with the Demo project as a Mobile EDD. The home page provides you the option to add a new station or submit the data that you have collected. If the EDD was published with a station group you would find the list of stations from the station group by selecting the plus button beside Stations.



When you select Add New Station you are brought to another page showing all the tables and fields from your EDD Template.

In this example I selected the Lithology tab. Here you will find the fields from the EDD including the soil type. The soil type field has a list associated with it - and you can see this list is also available within the mobile EDD to ensure only appropriate values are being entered.



You can add more records by selecting the Add New button.

Here for example I have added 4 rows:



The screenshot shows the 'station1' data entry form in the Hydro GeoAnalyst Mobile application. The form is organized into two main sections: 'Location' and 'Lithology'.

Location		Lithology			
From(m) (*)	To(m) (*)	Soil Type	Description	Color	Odor
<input type="checkbox"/> 0	<input type="checkbox"/> 10	<b>Coarse Gravel</b>	Coarse gravel	brown	none
<input type="checkbox"/> 10	<input type="checkbox"/> 24	<b>Fine Gravel</b>	Fine gravel - some sand	brown	none
<input type="checkbox"/> 24	<input type="checkbox"/> 28	<b>Silt</b>	Silty	black	earthy

© 2016 Waterloo Hydrogeologic. All rights reserved  
Build:16.16.0401.6  
[Disclaimer](#)

Once you have finished collecting your data you need to return to the Home page. You will find your list of stations - if you select one of the stations you will be returned to the tabs for that station so that you can edit the data associated with the station. If you select the X button to the right of the station name will be given the option to delete the station. All stations by default are marked as "In Progress" - if you wish to submit your data to be imported into HGA you first need to indicate that you are done collecting the data for the station by selecting the check box for the station. You will notice that the "In Progress" flag has changed to "Done".

The screenshot shows the 'Stations' list in the Hydro GeoAnalyst Mobile application. The list is titled 'Stations' and contains one entry, 'station1', which is marked as 'Done' with a checked checkbox. Below the list are buttons for 'Add New Station' and 'Submit'.

Waterloo  
HYDROGEOLOGIC  
Hydro GeoAnalyst  
Mobile EDD (demo-litho-example)

Stations

Search stations

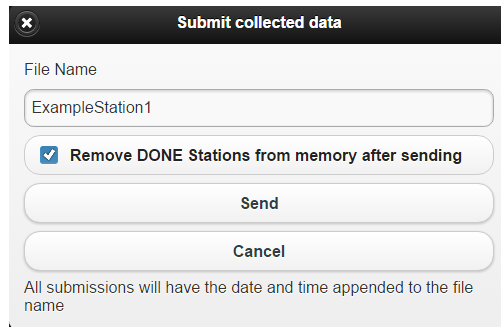
Done  
station1

Add New Station Submit

© 2016 Waterloo Hydrogeologic. All rights reserved  
Build:16.16.0401.6  
[Disclaimer](#)

Only stations which have been designated as Done will be submitted.

To submit the data select the Submit button.

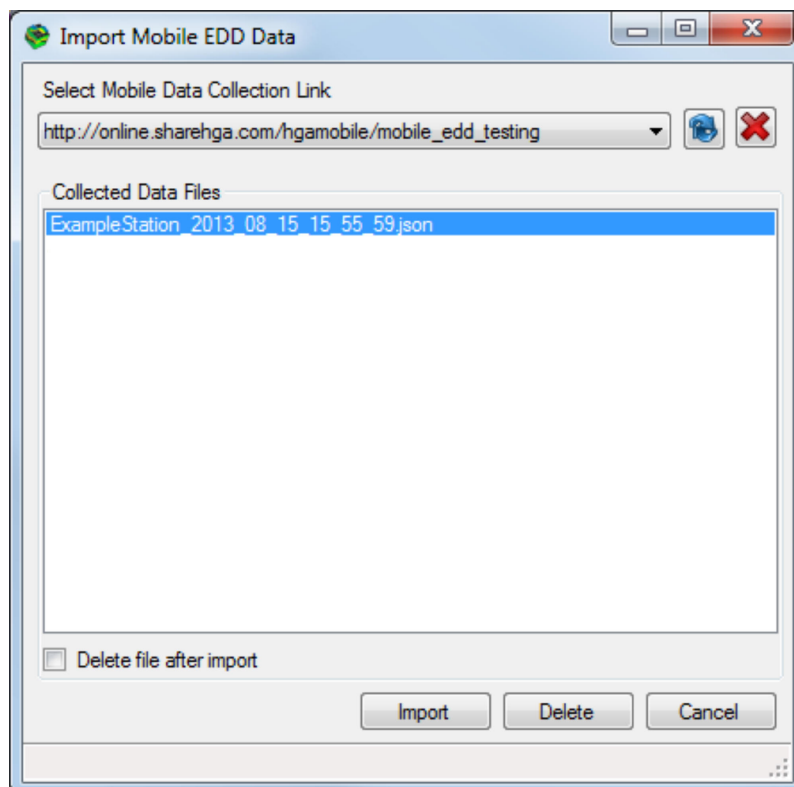


The screenshot shows a dialog box titled "Submit collected data". It contains a "File Name" input field with the text "ExampleStation1". Below the input field is a checked checkbox labeled "Remove DONE Stations from memory after sending". At the bottom of the dialog are two buttons: "Send" and "Cancel". A small note at the very bottom states: "All submissions will have the date and time appended to the file name".

You need to provide a name for the file that is being submitted – please note that the date will be automatically added to the name you provide.

You also have the option to Remove Done stations from memory after sending. This will remove the data from the device after it has been submitted. This way you can submit your data throughout the day (when you have a wifi connection) and carry on with collecting additional data.

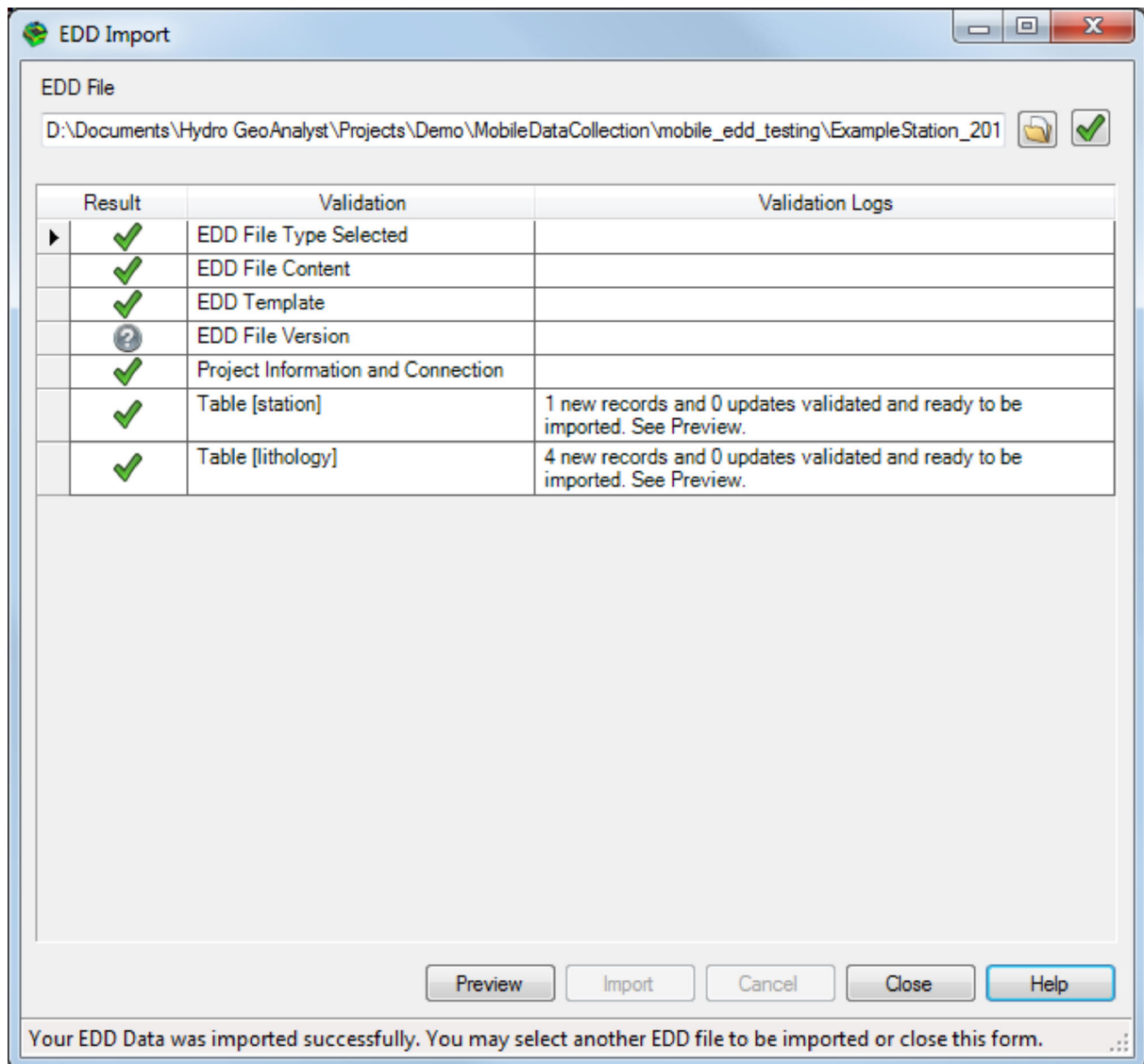
When you return to the office you can import this data into Hydro GeoAnalyst by selecting Modules / Import / Mobile Data.



HGA will remember the Mobile EDD's that you published for your project – you can select them from the drop downlist. Then hit the refresh button to see the files that were submitted from this site.

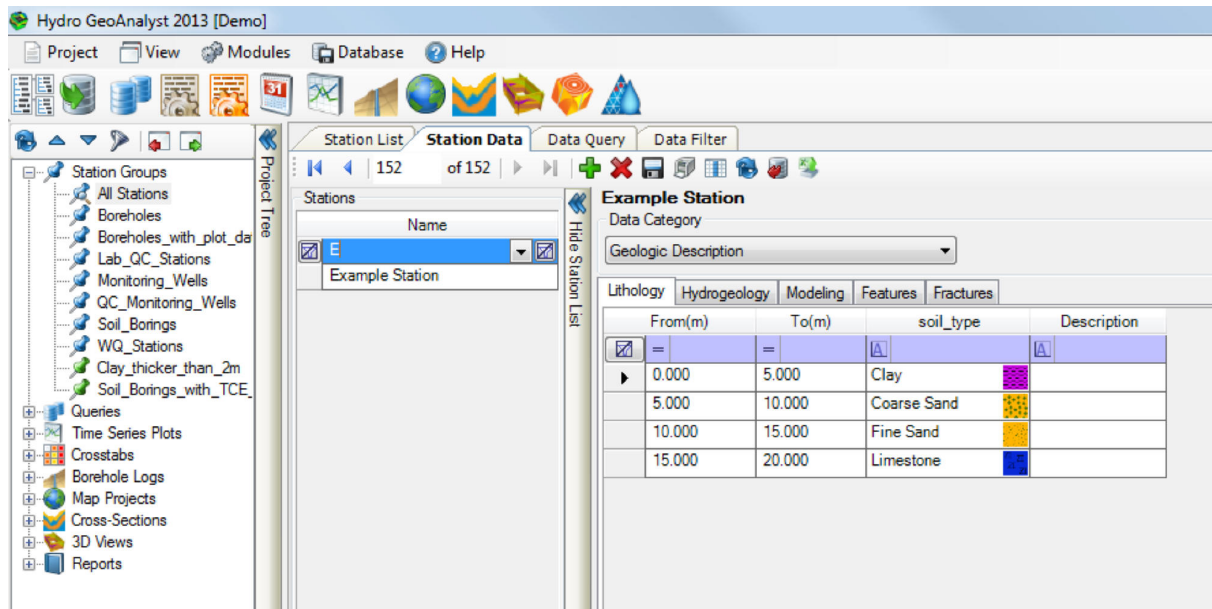
Select the file you wish to import and select the Import button.

You will see a validation dialog which shows how many new records will be imported. In this example I created one new station and entered 4 new lithology records.



Select the Import button to finalize the import process.

I can review the data that was imported within HGA – for example here are the 4 new lithology records imported:



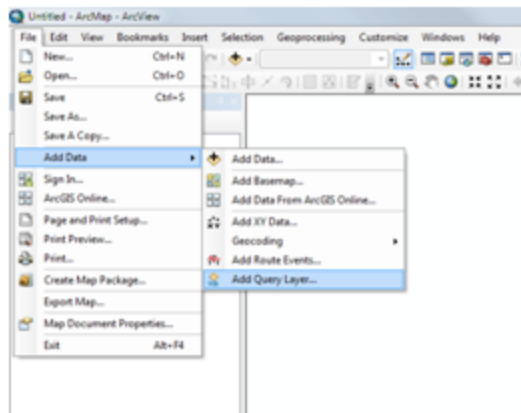
### 3.16 Spatial Geo\_Point

Making use of the Spatial GeoPoint option within SQL Server 2008 R2 or later we can have a more direct link to ArcGIS. When creating or upgrading HGA projects to Version 2012 (or later) and using SQL Server 2008 R2 (or later) there will be a new field called `geo_point` in the Location (station) table. We have hidden this field from your view in the Main HGA view as this is a system field that is automatically calculated based on the X and Y fields.

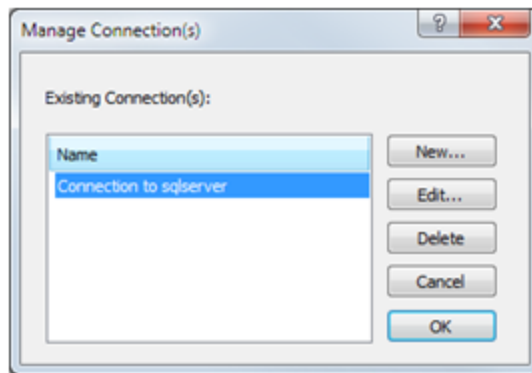
Additionally, any Map – Ready queries will now include this field as well. ArcGIS is able to recognize this field and be able to plot your stations using this field. Any time you make changes to your X and Y coordinates in HGA (for example adding, deleting, or editing) the `geo_point` will be automatically recalculated. Therefore all you need to do is select the refresh button (F5) in ArcGIS and your points will automatically be adjusted as it is directly reading the points from the database.

Please be aware that if you are using a Projected Coordinate system for your project the `geo_point` is being calculated as WGS 1984 (lat/long) as this is the internal way HGA stores coordinates in the database. If you are using a local coordinate system for your project then the `geo_point` will not contain any coordinate system information (only the values of the coordinates).

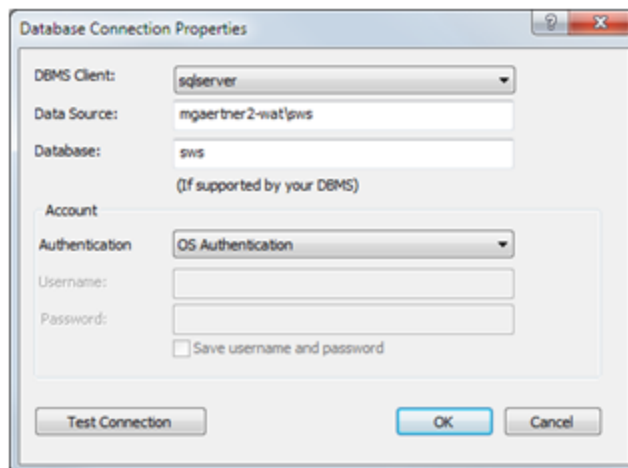
Within ArcGIS you can select File/Add Data/Add Query Layer



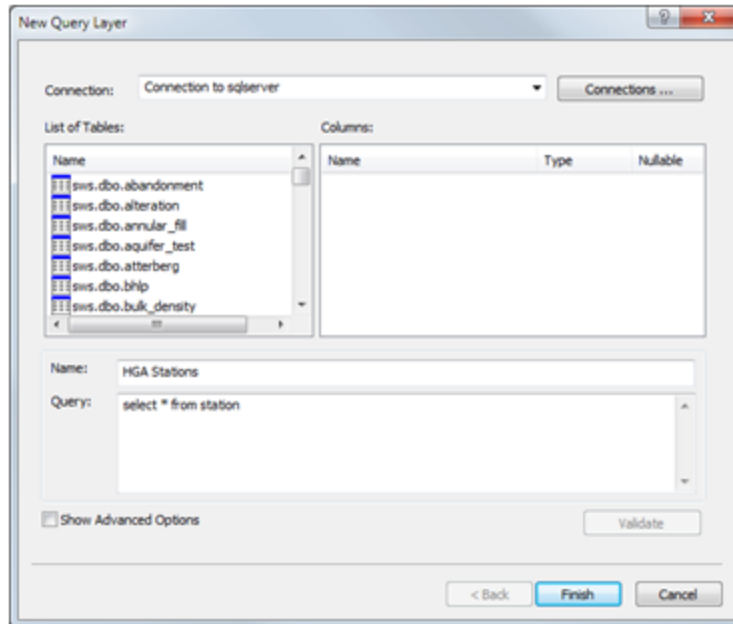
Select New to make a new connection



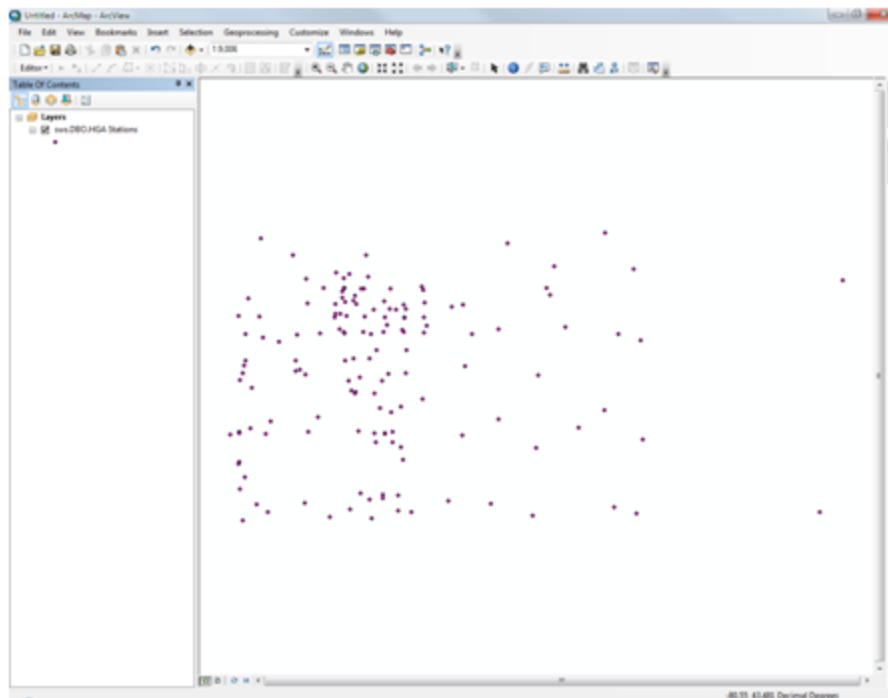
Provide your SQL Server details (please remember you must be using SQL Server 2008 R2) and the database you wish to connect to.



Then select OK and you will see the New Query Layer dialog box – here you can see all the tables and fields in your database. You can write your own SQL statement – or you can copy a SQL statement from one of your HGA saved queries (in HGA in the Query Builder on the SQL Statement section). For this example I wrote a simple query to take all the information from the station table.



When you select the finish button the layer will be added to your map.

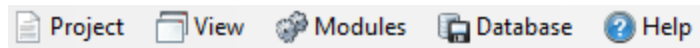


---

If any changes are made to the database stations within HGA (you delete stations or add new stations or even edit the stations coordinates) all you need to do is hit the refresh button in ArcGIS (F5 or View/Refresh) and the points will be automatically updated.

## 4 Menu Bar

The HGA menu items have been specifically designed for optimal flexibility and ease of use. The items in the menu bar are context sensitive; this means that one or more menu items may be greyed out if a specific feature is not applicable for a particular view.

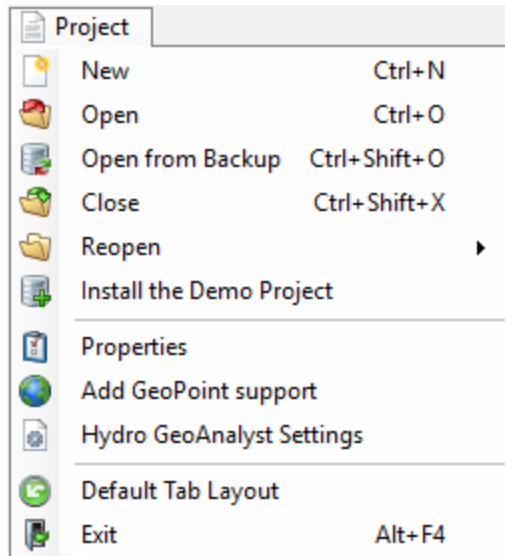


The following sections describe the items which appear in the menu bar.

- [Project](#)
- [View](#)
- [Modules](#)
- [Database](#)
- [Help](#)

### 4.1 Project

The Project menu contains options for project level actions as described below.





**New** 

This option launched the New Project wizard which is described further in the next section: [Creating New Projects](#).

**Open** 

The Open menu item is used to open existing HGA projects by selecting the \*.hga file. The \*.hga file contains basic information for the project, including a connection string to the HGA database.

The Open button in the Project Tree toolbar performs the same function.

**Open from Backup** 

Use this option to open a back up copy of the HGA project and database. This is useful if receiving a copy of someone else's project and database and needing to have a copy on your SQL Server.

Open Project from Backup

Restore from

SQL Backup File  
C:\Files\\_HGA\Projects\Demo.bak Browse...

Project File  
C:\Files\\_HGA\Projects\Demo.hga Browse...

Restore to

Project Name  
Demo\_Restored

Data source type  
Local Database

Instance name  
MSSQLLocalDB

Database name  
Demo

Ready

OK Close

Ready

### Close

Close the project which is currently open.

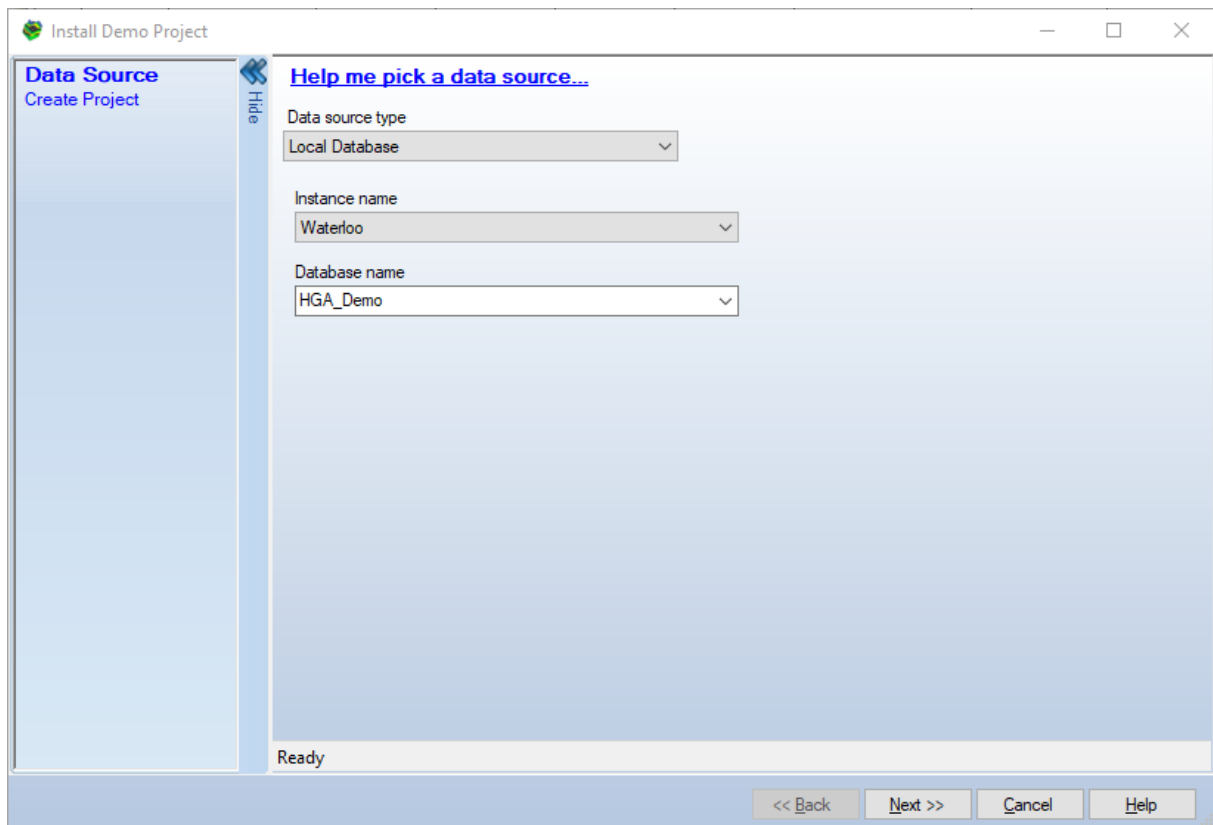
### Reopen

This menu item provides a list of projects that have been recently opened. The most recent project will appear at the top. Simply select the desired project, and it will be loaded into HGA.

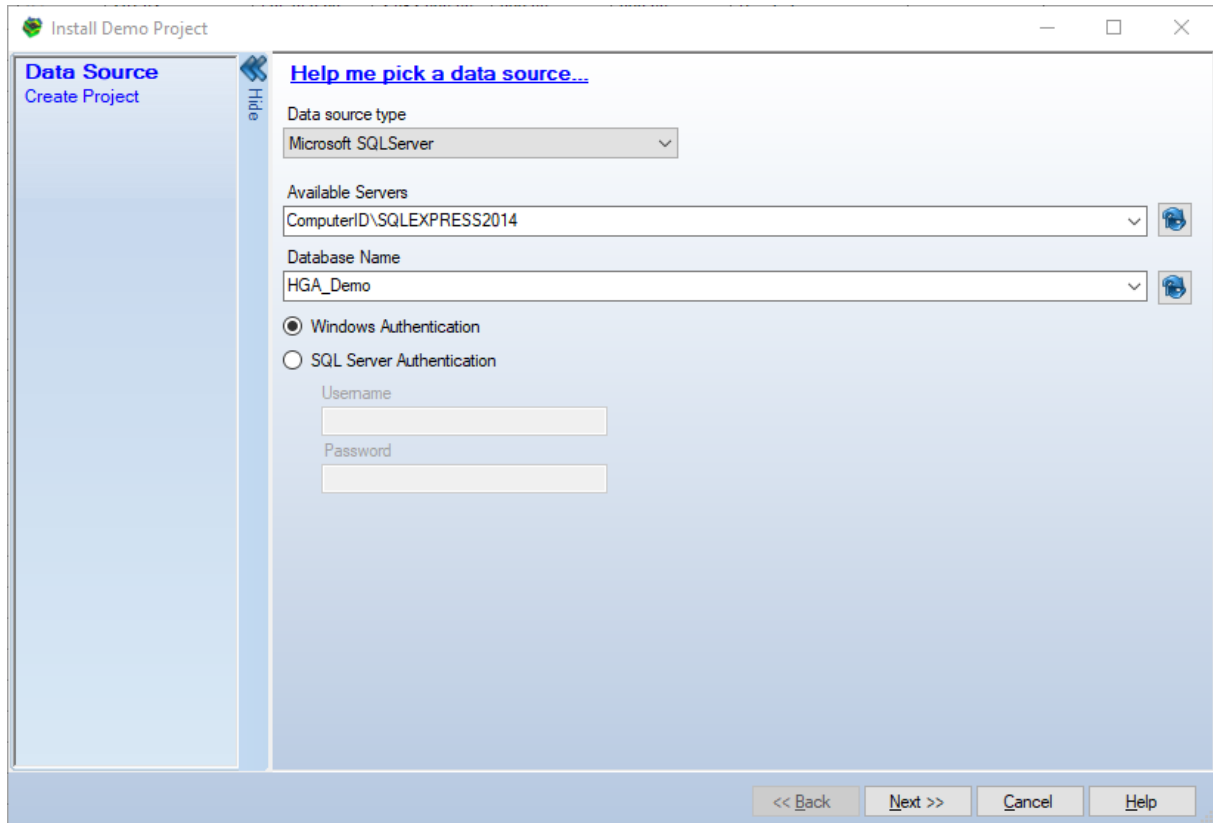
## Install the Demo Project

You can Install the Demo Project from within the program by selecting Project / Install the Demo Project (there is also an option to do this from the Start Page).

The Default option will install the Demo Project to a Local Database (e.g. SQL 2014). Simple select Next and then Finish to Install the Demo Project.



However, if you prefer, you can install the Demo Project to a SQL Server database by adjusting the Database Type option.

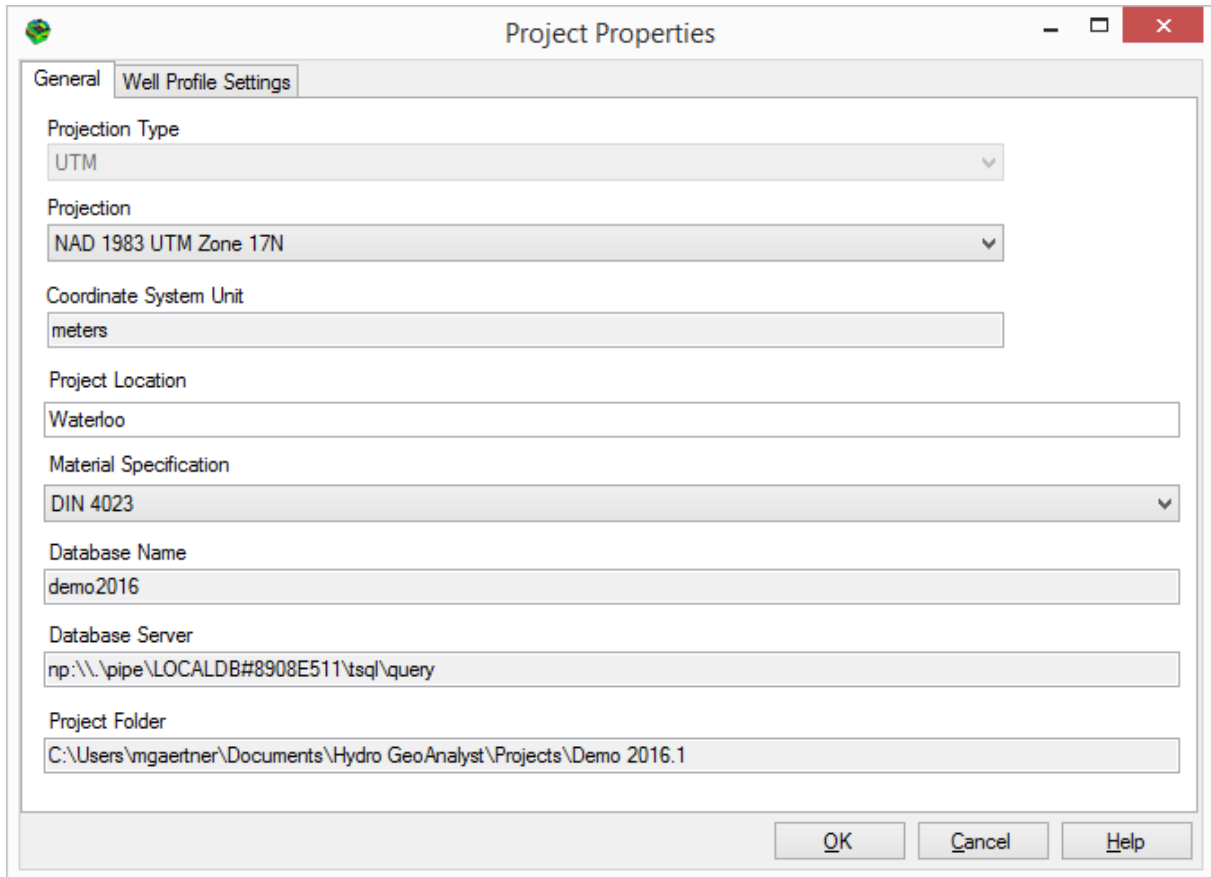


You simply need to provide the name of the SQL Server you wish to use, the Database Name for the Demo Project, and then select if you wish to use Windows Authentication or SQL Server Authentication.

The Demo Project files will be installed to the location designated under Project / HGA Settings (the Project tab). The default location is under Documents / Hydro GeoAnalyst.

### Properties

This menu item will load a window displaying the properties for the current project.



The screenshot shows the 'Project Properties' dialog box with the 'General' tab selected. The 'Well Profile Settings' sub-tab is also visible. The dialog contains the following fields and values:

- Projection Type: UTM
- Projection: NAD 1983 UTM Zone 17N
- Coordinate System Unit: meters
- Project Location: Waterloo
- Material Specification: DIN 4023
- Database Name: demo2016
- Database Server: np:\\.\pipe\LOCALDB#8908E511\tsql\query
- Project Folder: C:\Users\mgaertner\Documents\Hydro GeoAnalyst\Projects\Demo 2016.1

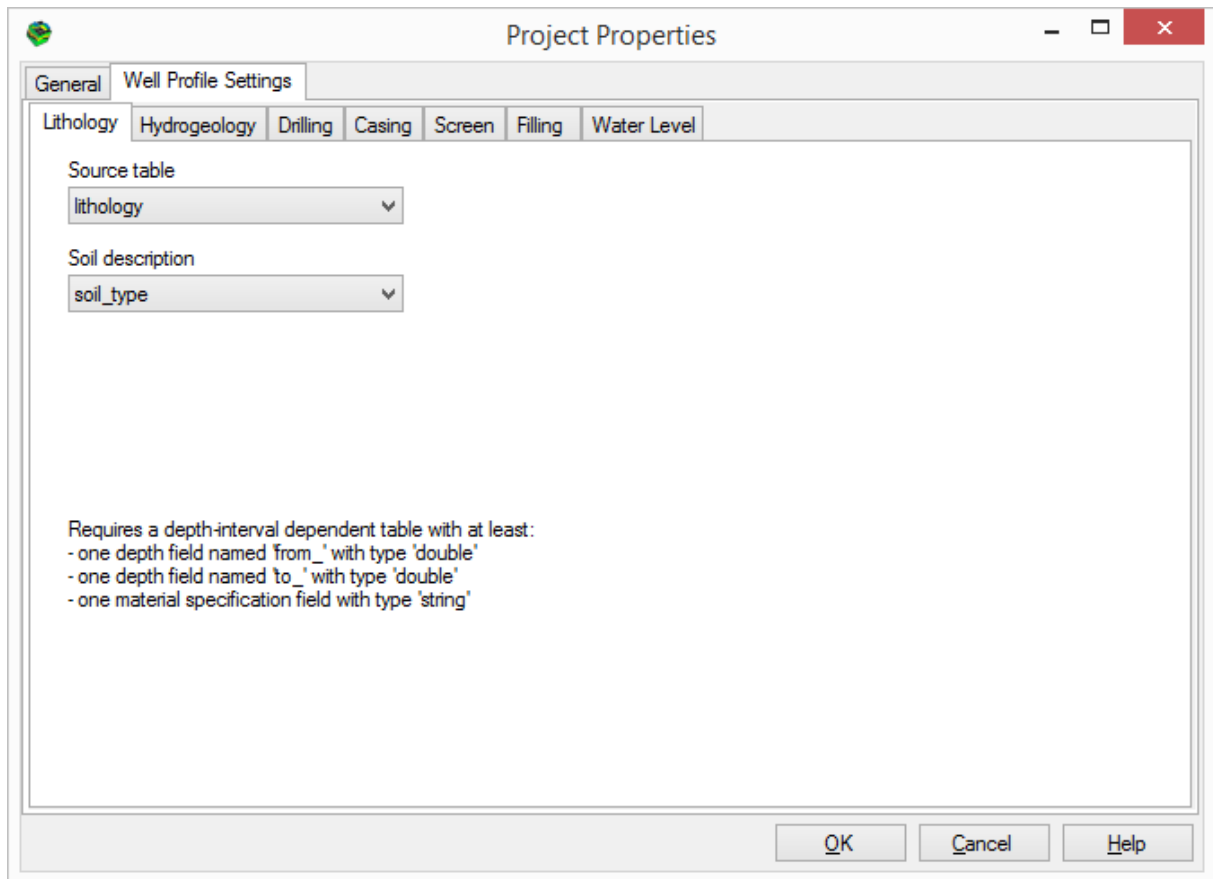
Buttons for 'OK', 'Cancel', and 'Help' are located at the bottom right of the dialog.

On the General tab you can find the settings selected during project creation including:

- Projection Type
- Projection
- Coordinate System Unit
- Project Location
- Material Specification
- Database Name
- Database Server
- Project Folder



**Please Note:** While you can adjust the Projection and Material Specification here - all other settings are read-only (and cannot be adjusted from this dialog).



On the Well Profile Settings tab you will find the settings used within the Well Profile module - here you can specify which tables and fields are to be used to obtain information related to geology and well construction details.

Each item that requires a setting has its own tab including:

- Lithology
- Hydrogeology
- Drilling
- Casing
- Screen
- Filling
- Water Level

For each item, provide the table and the field that stores the patterns or provides interval data to be used in all the graphical displays. For example, in the Lithology tab, select a table which contains the Lithology information for your project; then select a field from this table which contains the Soil Description information. The information provided in this window will be used when displaying profile diagrams in Hydro GeoAnalyst. The geological data and the corresponding patterns will also be displayed in the cross section editor, and in the Scene Viewer.

Only tables with the following parameters can be displayed in this dialog:

**Lithology:** Tables must have two fields with type DOUBLE (from\_, to\_) and one field with type STRING (soil\_type)

**Hydrogeology:** Tables must have two fields with type DOUBLE (from\_, to\_) and one field with type STRING (ex. formation name)

**Drilling:** Tables must have three fields with type DOUBLE: (from\_, to\_, diam\_), and one field with type STRING (method)

**Casing:** Tables must have three fields with type DOUBLE (from\_, to\_, diam\_) and one field with type STRING (ex. material).

If it's desired to have multiple well casings, or nested piezometers, you must also define two additional fields:

**Casing ID:** field type LONG (used to distinguish different well casings)

**Parent ID:** field type LONG (required only if a well casing exists within a parent casing; if so, for the selected well casing, set the ParentID equal to the CasingID of the parent casing)

**Screen:** Tables must have three fields with type DOUBLE (from\_, to\_, diam\_) and one field with type STRING (ex. material).

If you have multiple well casings, you must add an additional field:

**CasingID:** field type LONG (used to distinguish different well casings). This allows to assign multiple screens to multiple well casings.

**Filling:** Tables must have two fields with type DOUBLE (from\_, to\_) and one field with type STRING (ex. material)

**Water Level:** Tables must have one fields with type DOUBLE (depth\_) and one field with type STRING (ex. comments). In the Water Level tab, you may also select the reference datum for measuring depth to water levels: select "Ground Surface Elevation, or Top of Casing"



**Please Note:** The depth-point and depth-interval information (from, to fields) are depths and not elevations. As such, the Well Profile and Cross Section editor require that data be entered as "depth to" and not an elevation above sea level or a benchmark.

### Add GeoPoint support

Making use of the Spatial GeoPoint option within SQL Server 2008 R2 or later your project can have a more direct link to ArcGIS. When creating or upgrading HGA projects to Version 2012 (or later) and using SQL Server 2008 R2 (or later) there will be a new field called

geo\_point in the Location (station) table. For more information see the discussion on [Spatial Geo Point](#).

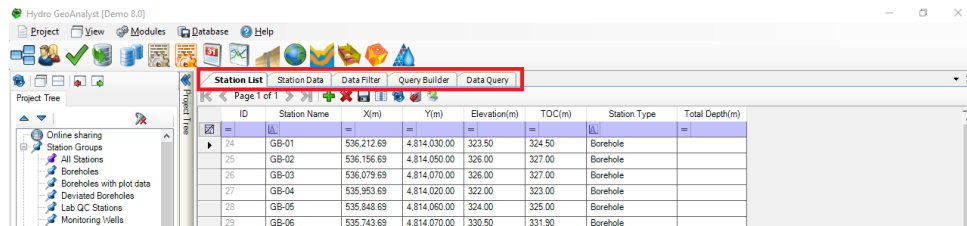
## Hydro GeoAnalyst Settings

This option opens the Settings for Hydro GeoAnalyst. For more information, see the sub-section on [HGA Settings](#).

## Default Tab Layout

The Default Tab Layout will restore your HGA main interface to show the Project Tree on the left and the follow four tabs on the right:

- Station List
- Station Data
- Data Query
- Data Filter



Any other tabs that were opened will be closed. Any other tab groups that were created will be removed.

## Exit

This menu item will close HGA, and all related windows (if any are open).

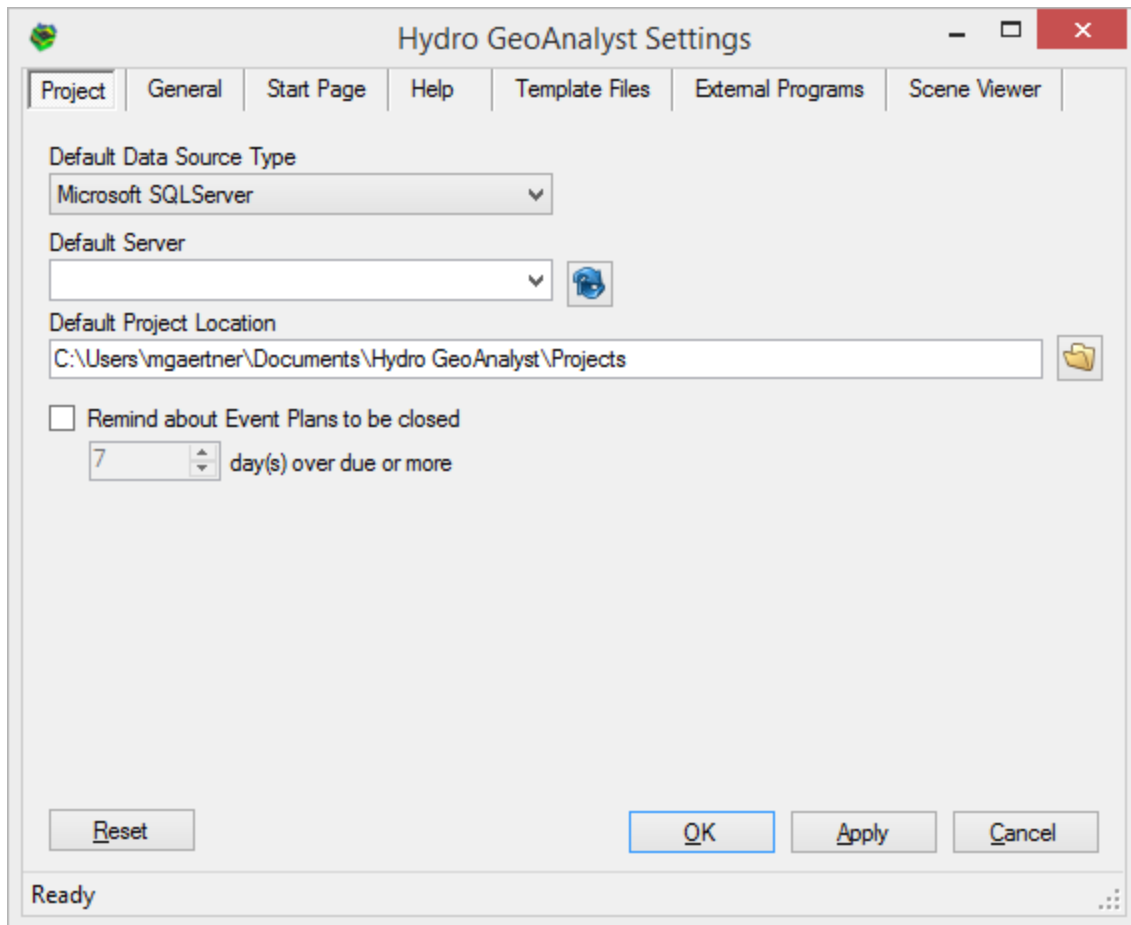
### 4.1.1 HGA Settings

The HGA Settings dialog provides various settings for a number of options within the program.

#### Project

Here you can specify the default server and default location for project files. These settings are taken into account when creating new projects or when installing the Demo project.

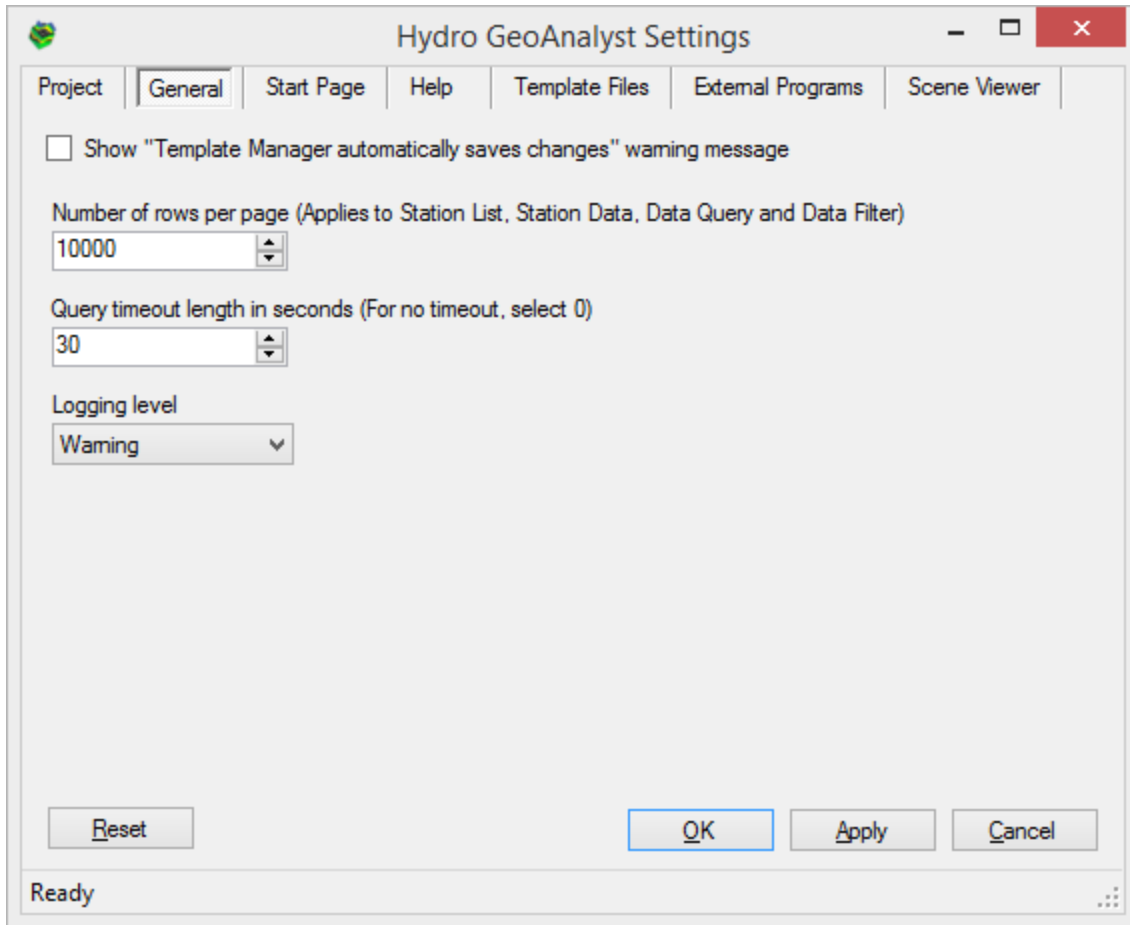




Additionally you can specify when you will be reminded to close any outstanding Event Plans.

## General

Here you can turn the Template Manager warning message on or off. As well as find an option to set the Query timeout length and error logging Level.



Also, when working with large projects you can specify the maximum number of rows to load in the Data views (Station List, Station Data and Data Filter tabs). The default is 10,000 rows. This can help prevent long wait times as HGA is trying to load data. If a maximum has been reached in one of the data views you will notice this indicated at the bottom of the tab. It will also indicate the total rows that are stored in the database.

**Rows:** 10000 **Warning:** Maximum number of rows reached. **Total Rows:** 2390218

There are 4 levels of logging available:

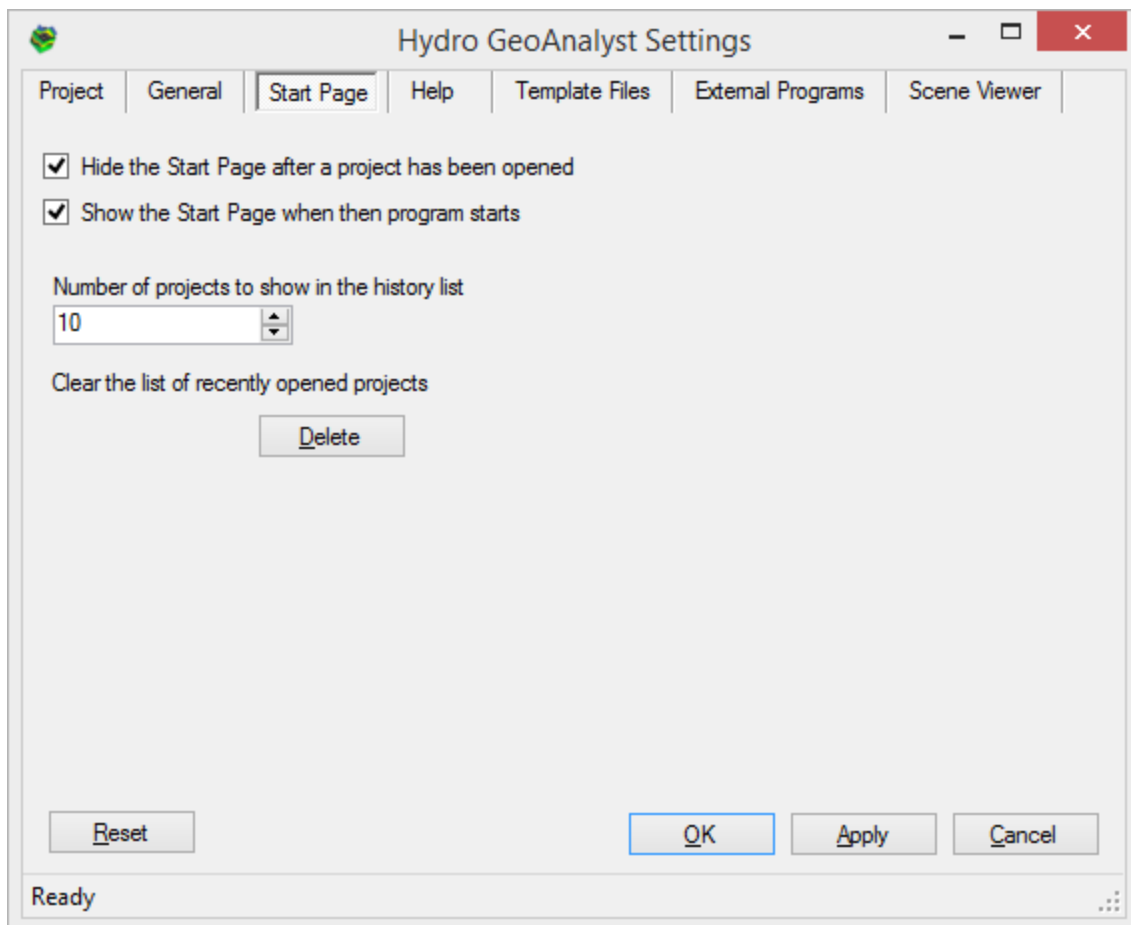
- Error - this logs unexpected (bad) things
- Warning - this logs the errors as well as warning which might point to impending errors
- Information - this logs errors and warnings as well as other helpful things
- Verbose - this logs errors, warnings, information as well as debugging information

The Warning level is the default level - however if you are encountering errors Technical Support may suggest to increase the logging level and have you reproduce the issue and then send the log file to help us understand the problem.

However, be aware that changing the level to Verbose may have a negative impact on performance - so you might want to lower the level once you have provided Support with your log file!

## Start Page

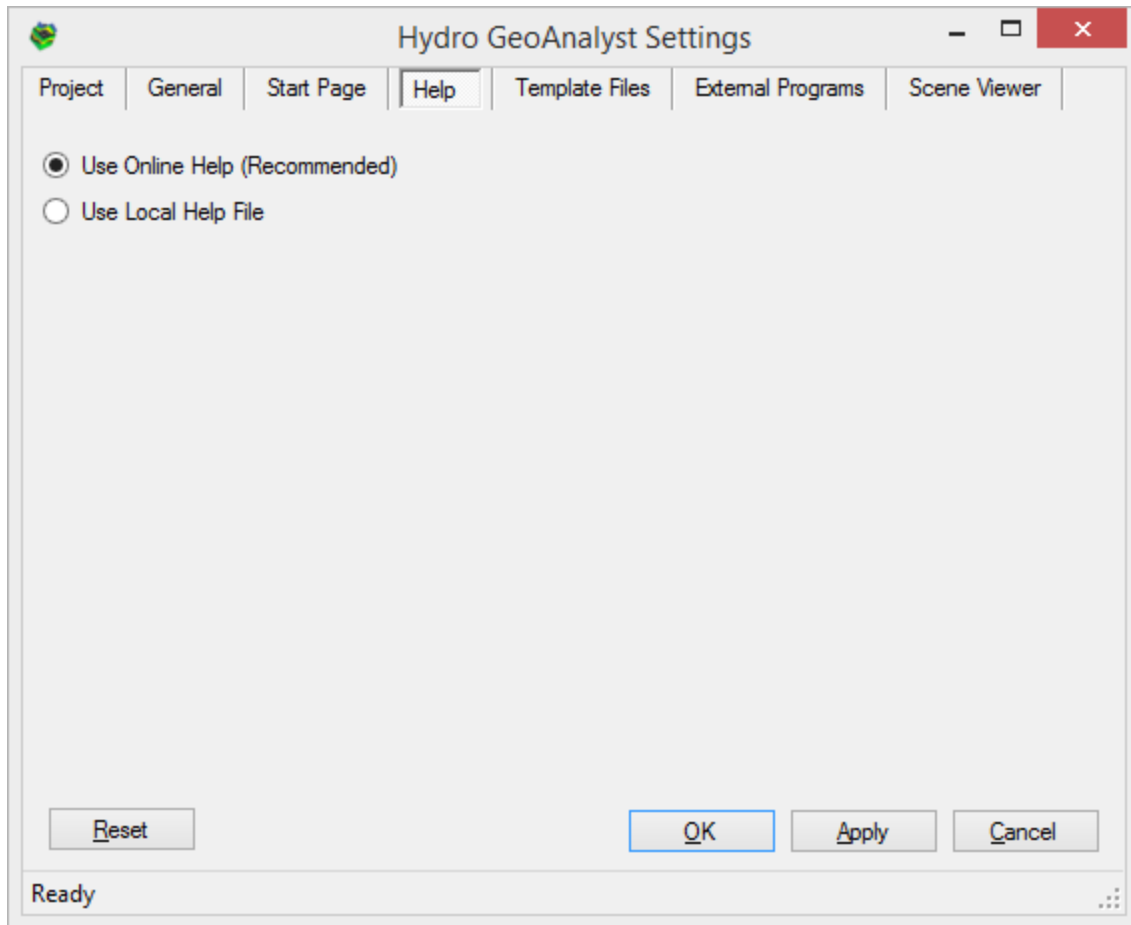
Here you can specify if you want the Start Page to be hidden after opening a project as well as if you want the Start Page to be shown when you start HGA.



Additionally, you can change the number of projects to show in the list of recently opened project - or even clear the list completely.

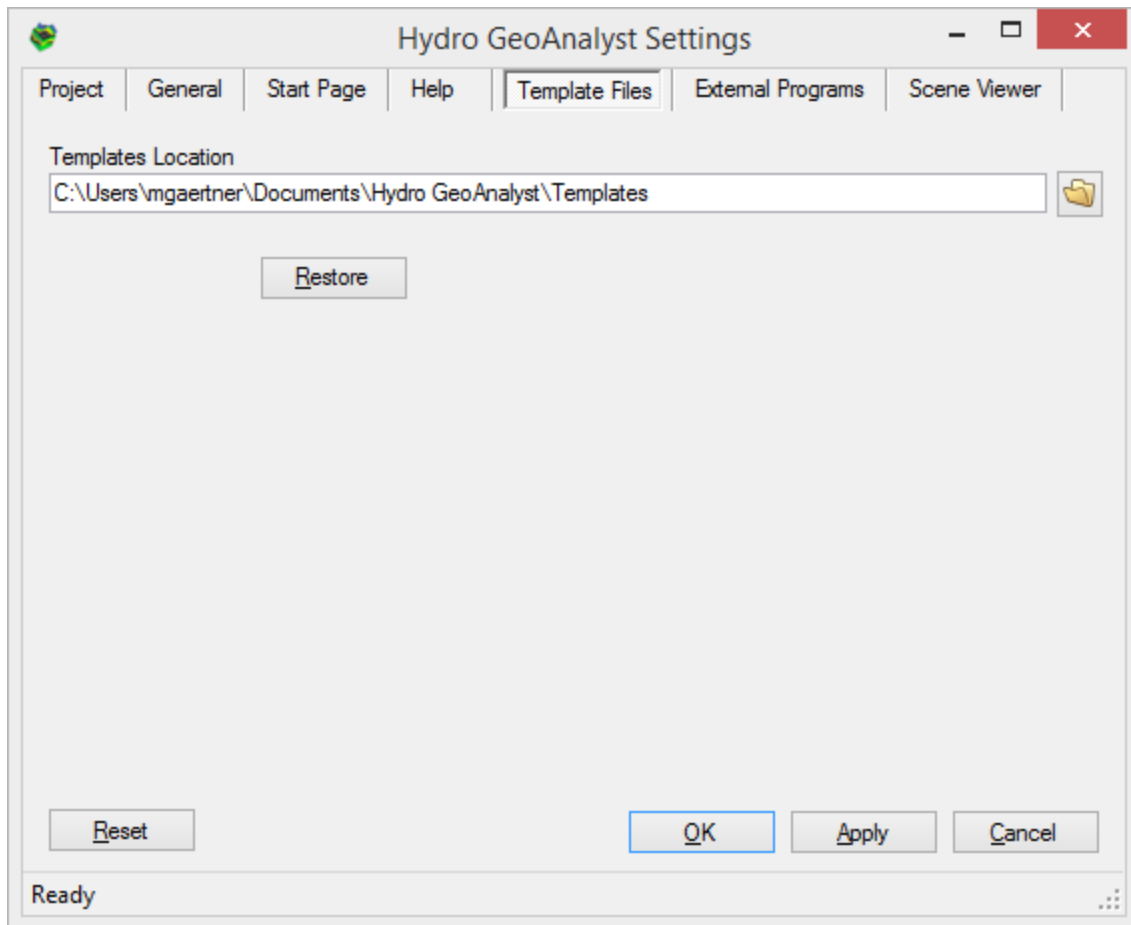
## Help

Here you can specify if you want to use the Online Help (Recommended) or the Local (In Program) Help. We recommend the Online Help (if you are connected to the internet) as this set of documentation can be updated more frequently than the Local Help.



## Template Files

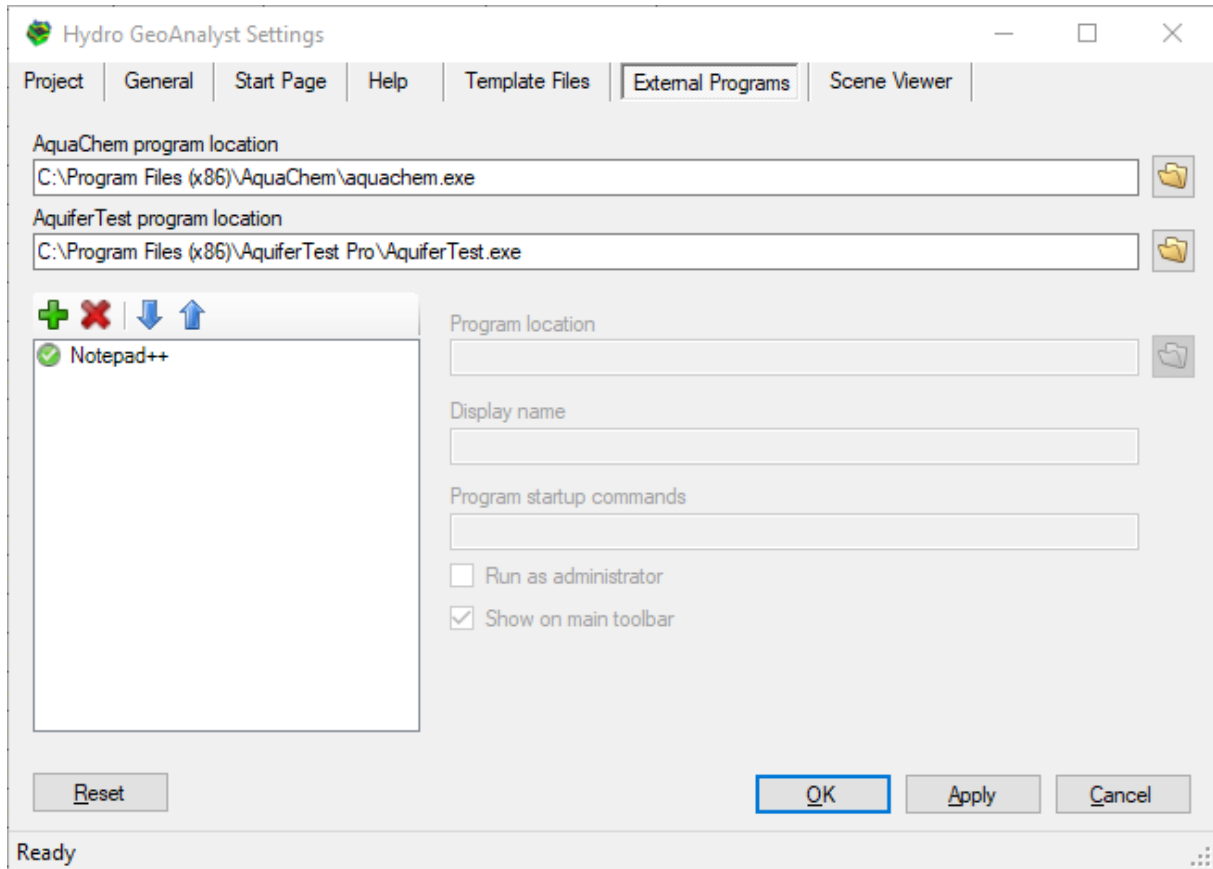
Here you can specify where you want to store the HGA template files. These template files include the database template files used when creating a New Project as well as the office template files for printing to Excel™ and PowerPoint™ as well as the Word™ template used for printing Event Plans. The office template files are organized into appropriately named folders. Do not adjust the folder names as this is how HGA knows which templates are available.



You will also find the option to restore all the templates - in case you want to move them to a different location or if you have made changes to the original ones and want to revert back.

### [External Programs](#)

Here you can specify the location of the AquaChem, AquiferTest, and other external programs to call them within the Hydro GeoAnalyst environment. This allows HGA to launch these programs from the Main Toolbar.

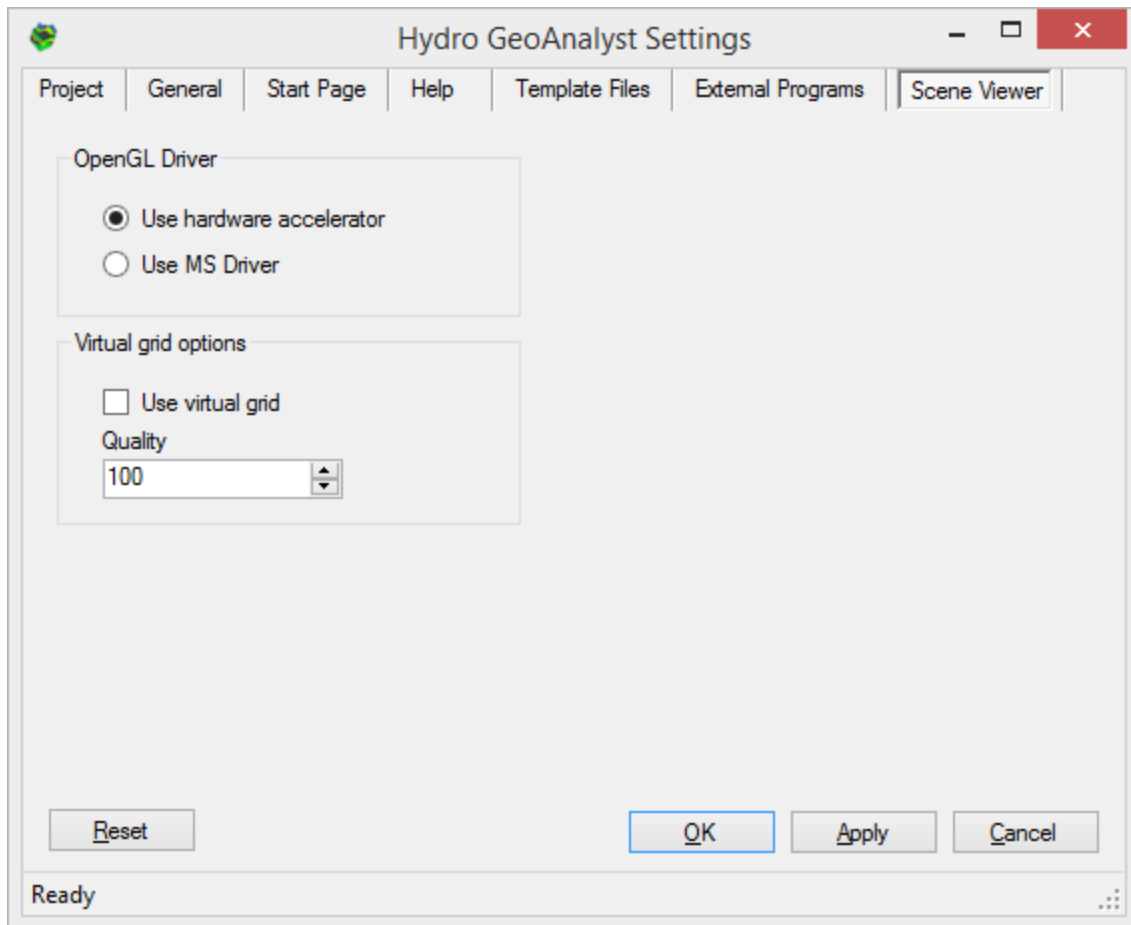


After supplying the correct path information, the toolbar will be updated with buttons that will launch the specified applications:



### Scene Viewer

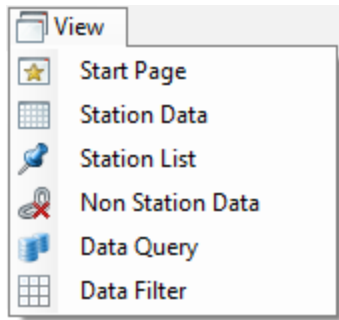
Here you will find the option to switch between using your hardware accelerator or Microsofts driver for the Open GL Driver to be used in the Scene Viewer. The default recommended option is to use your hardware accelerator, however, if you have an older machine or encounter difficulties with the way things are visualized within the Scene Viewer you might consider switching to the MS Driver option.



The HGA Settings dialog also has a Reset button which will allow you to reset **ALL** the settings to default settings.

## 4.2 View

The View menu allows you to reopen any closed tabs.



Please be aware, there are other modules that will launch as a tab (for example the Query Builder, the List Editor and the Material Specification Editor) but you can view these by selecting these modules from the Modules Menu or by selecting the Icon in the Main Toolbar.

### Start Page

If you have closed the Start Page tab you can reopen it by selecting it from the View menu.

### Station Data

If you have closed the Station Data tab you can reopen it by selecting it from the View menu.

### Station List

If you have closed the Station List tab you can reopen it by selecting it from the View menu.

### Non Station Data

If you wish to see data in tables that are not related to the Station table you can open this data tab by selecting it from the View menu.

### Data Query

If you have closed the Data Query tab you can reopen it by selecting it from the View menu.






















### Data Filter

If you have closed the Data Filter tab you can reopen it by selecting it from the View menu.

## 4.3 Modules

Any module you wish to use within HGA can be found in this menu option. Each Module is explained in further detail in following sections:



	<b>MODU LE</b>
	<a href="#">Online Shari ng</a>
	<a href="#">Templa te Man ager</a>
	<a href="#">User Man ager</a>
 Modules	
 Online Sharing	<a href="#">Quick Che cker</a>
 Template Manager	<a href="#">Import</a>
 User Manager	<a href="#">EDD</a>
 Quick Checker...	<a href="#">Tem plate</a>
 Import Data	<a href="#">Desi gner</a>
 EDD Template Designer	<a href="#">Query Build er</a>
 Query Builder	<a href="#">Quality Cont rol</a>
 Quality Control	<a href="#">Materia l Spec ificati ons Edito r</a>
 Material Specification	<a href="#">List Edito r</a>
 List Editor	<a href="#">Event Plan ning</a>
 Event Planning	<a href="#">Time Serie s Plotti ng</a>
 Time Series Plotter	<a href="#">3D Inter</a>
 3D Interpolation	
 Well Profile	
 Map Manager	
 Cross Section Editor	
 Scene Viewer	
 AquiferTest	
 AquaChem	
 Parameter List Editor	

	<a href="#">polati on</a>
	<a href="#">Well Profil e</a>
	<a href="#">Map Man ager</a>
	<a href="#">Cross Secti on Edito r</a>
	<a href="#">Scene View er</a>
	<a href="#">Aquifer Test</a>
	<a href="#">AquaC hem</a>
	<a href="#">Param eter List Edito r</a>

#### 4.3.1 Online Sharing

The Online Sharing module provides a method of publishing your HGA project data to a webpage, allowing you to share your data with other project team members and stakeholders who do not have the program.

The Online sharing module allows you to publish data that you would like to share to a webpage as a set of tables, charts, or maps. The published webpages are configurable and you can save multiple configurations so that you can share the data for different audiences and automate the sharing process.

For more details, please refer to the [Online Sharing](#) section.

#### 4.3.2 Template Manager

The Template Manager provides the tools to modify the HGA database structure, and define user-level views.

The Template Manager captures the schema of the database and displays database and view settings. The following features are available:

- Adding and deleting tables/fields




- Altering the properties of each table and field defining primary keys, defining relationships between tables
- Grouping tables under logical data categories
- Defining visibility of tables and/or fields
- Defining user level table and/or field names, units, and data formats (where applicable).
- Save user templates as a new database schema structure
- Rename fields, add fields to data categories, and modify the field formats

For more details, please refer to the [Template Manager](#) section.

### 4.3.3 User Manager

The User Manager provides the tools to manage user access to the HGA database.

The User Manager provides a direct user interface for adding, removing, and modifying user access permissions to the database. This module inherits permissions from the database and only those with administrator privileges can make changes. The following features are available:

- Add a new user 
- Remove an existing user 
- Edit permission levels for an existing user 

For more details, please refer to the [User Manager](#) section.

### 4.3.4 Quick Checker

The Quick Checker module provides a fast and efficient tool to help you organize your data from spreadsheets into a format which can be imported directly into Hydro GeoAnalyst, and to ensure that the data is validated against criteria built into an electronic data deliverable (EDD) template.

The Quick Checker module is an important part of the overall [EDD workflow](#), which includes four simple steps:

- Create a new Electronic Data Deliverable (EDD) template using the EDD Template Designer
- Open the EDD template and the source data file within the Quick Checker
- Use the Quick Checker to validate your data against the EDD template, and generate a \*.zip\_hga import file
- Import the \*.zip\_hga directly into HGA; data mapping and validation has already been completed by the Quick Checker

For more details, please refer to the [Quick Checker](#) section.

#### 4.3.5 Import

HGA has several import options for you to import your data into the program. These include:

- General
- [EDD](#)
- [Mobile EDD](#)
- [Chemical](#)
- [Diver](#)
- [LAS](#)



**Note:** When formatting your excel source file for importing using the General, Chemical or EDD import options it is important to organize your station names so they will be recognized by the import routine. Excel will take the data type format of the first 8 rows for each column - therefore, if you have station names that are completely numeric (Data Type Double), the import options may have difficulty recognizing them as names (Data Type String). To avoid this you will need to ensure that you manually assign the data type within Excel as text. You do this by right clicking on the cells and selecting Format Cells... and then selecting the Text option in the Number tab dialog that appears. You will notice that your numeric station names are now left justified in the excel column.

If you have completely numeric Sample ID's you will need to do the same for this column. In fact any field in the HGA database that is set to have a data type "String" you will need to do this in order to be able to import completely numeric values.

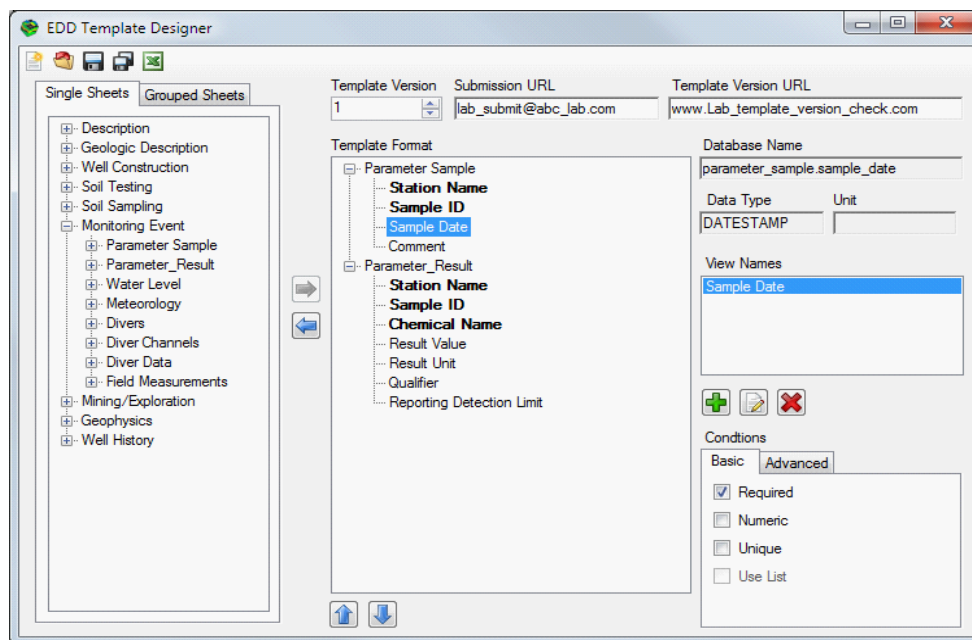


**Note:** If you are trying to import a field with non-detect values using the Chemical import option, then you need to consider rearranging your data sheet so that some results with a non-detect (< symbol) are within the first few rows. This will force Excel to recognize that the data in that column are not all strictly numeric.

To find more information on all these options review the [Importing Data](#) section.

#### 4.3.6 EDD Template Designer

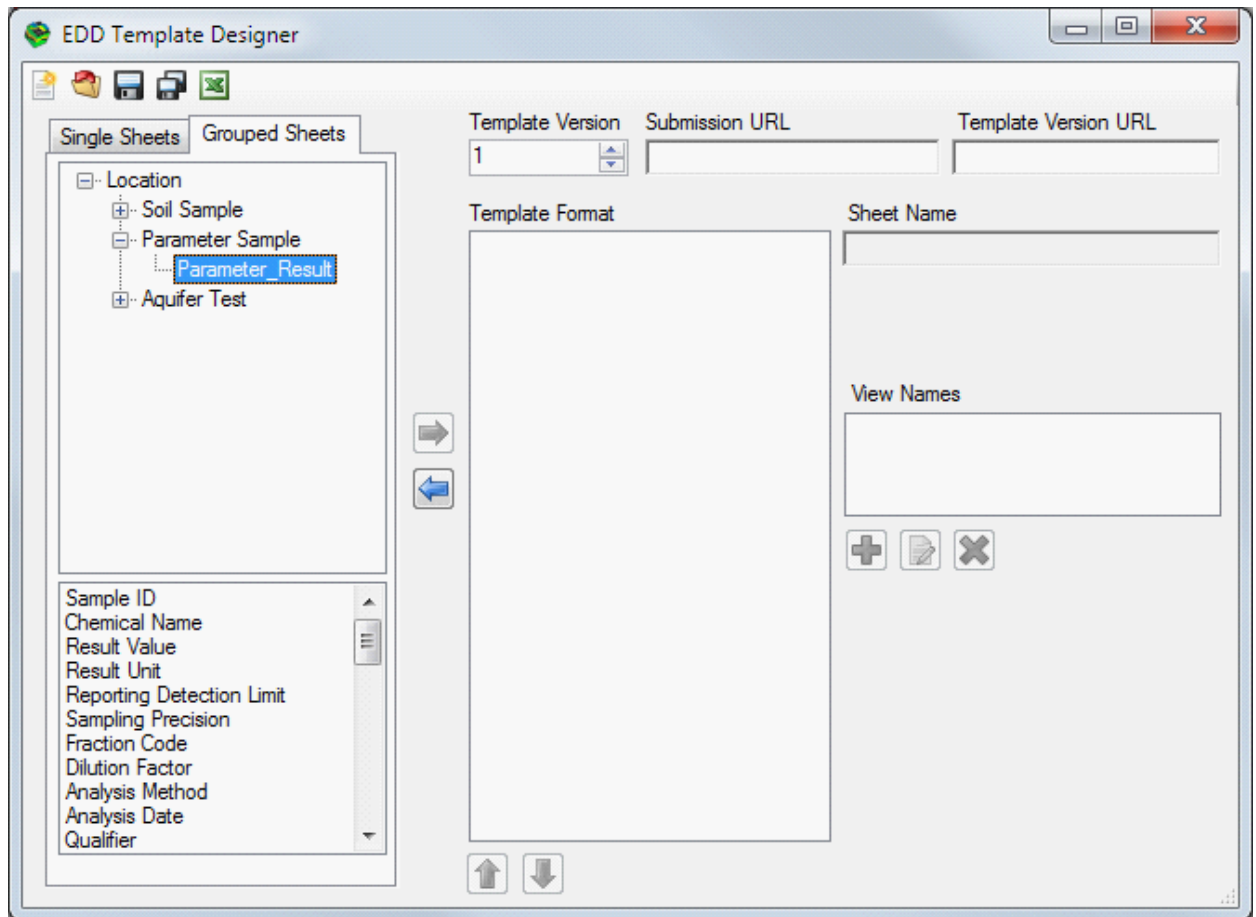
You can find this option by selecting Project / Export. In this first step of the workflow you can create a template (which can be opened in Excel) for others to use to validate their data. In the EDD Template Designer you select which fields you wish to have in your template by simply dragging and dropping them onto the Template Format.



The list of available fields on the left are provided as you would be used to seeing them in the Template Manager or the Query Builder. First branch are the Data Categories, next branch are the Tables, and the final branches are the fields. As you drag and drop fields into the Template Format section you will notice that other fields may show up there automatically – these are also bolded. These are fields that are required to be able to import the data into the select table.

If you select fields from the Single Sheets tab – the Template will create a new worksheet for each table where fields were selected from. In the example above fields were selected from both the Parameter Sample and the Parameter Result tables – and therefore when you open this template in Excel you will find both a worksheet was created for each table.

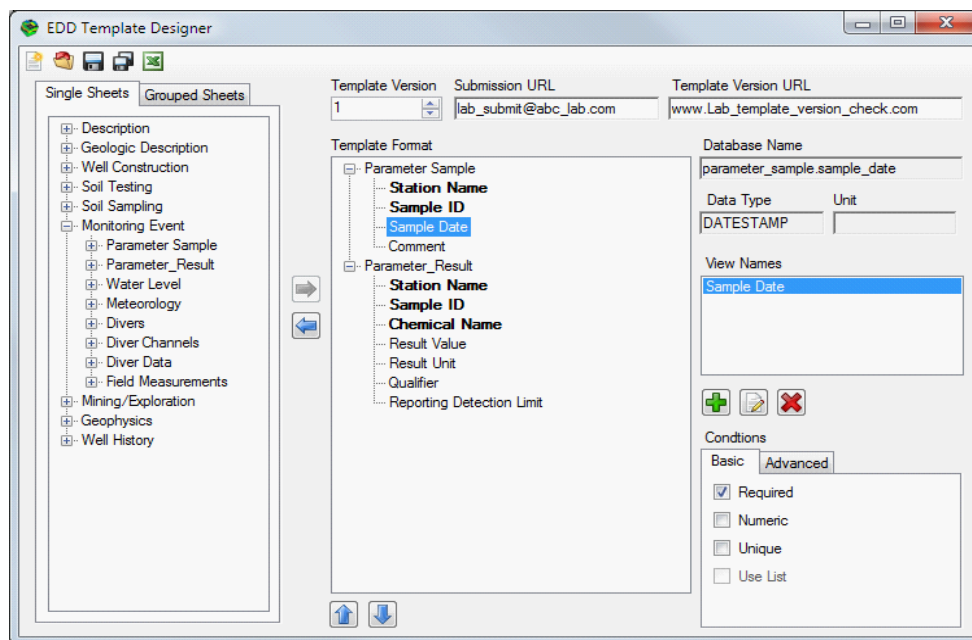
If however you select the Grouped Sheets tab – you will notice that the fields are presented in another way. Here you will find the tables that are related to each other (by database foreign keys) are grouped on a branch. When you select the child table (lowest branch) you will find a list of ALL fields of the related tables below.



When you select fields from the Grouped Sheets tab you will create a template with only one worksheet.


You have some additional options when creating your EDD Template. You can set a version number (to keep tracked in case in the future you wish to update a template). A submission URL can be set as either an email address or as an FTP folder to upload to. A Template Version URL can be entered so that when using the template in the HGA QuickChecker and the EDD import routine it can be verified that it is the most up to date version of the template.

Additionally, you can add conditions onto the fields you have chosen that the HGA QuickChecker will verify. For example – you can make the Sample Date field required (even though it is not a required field to enter the data into the database).



### 4.3.7 Query Builder

This menu item loads the Query Builder, which provides options for tasks related to queries. In the Query Builder, there are options for creating new queries, or loading previous queries.

The  button in the toolbar performs the same function.

For more details, see the [Query Builder](#) section.

### 4.3.8 Quality Control

This menu item loads the Quality Control component; with these tools, you can manage Lab Quality Control templates, and perform a quality control assessment.


For more details, please see the [Lab Quality Control](#) section.

### 4.3.9 Material Specifications Editor

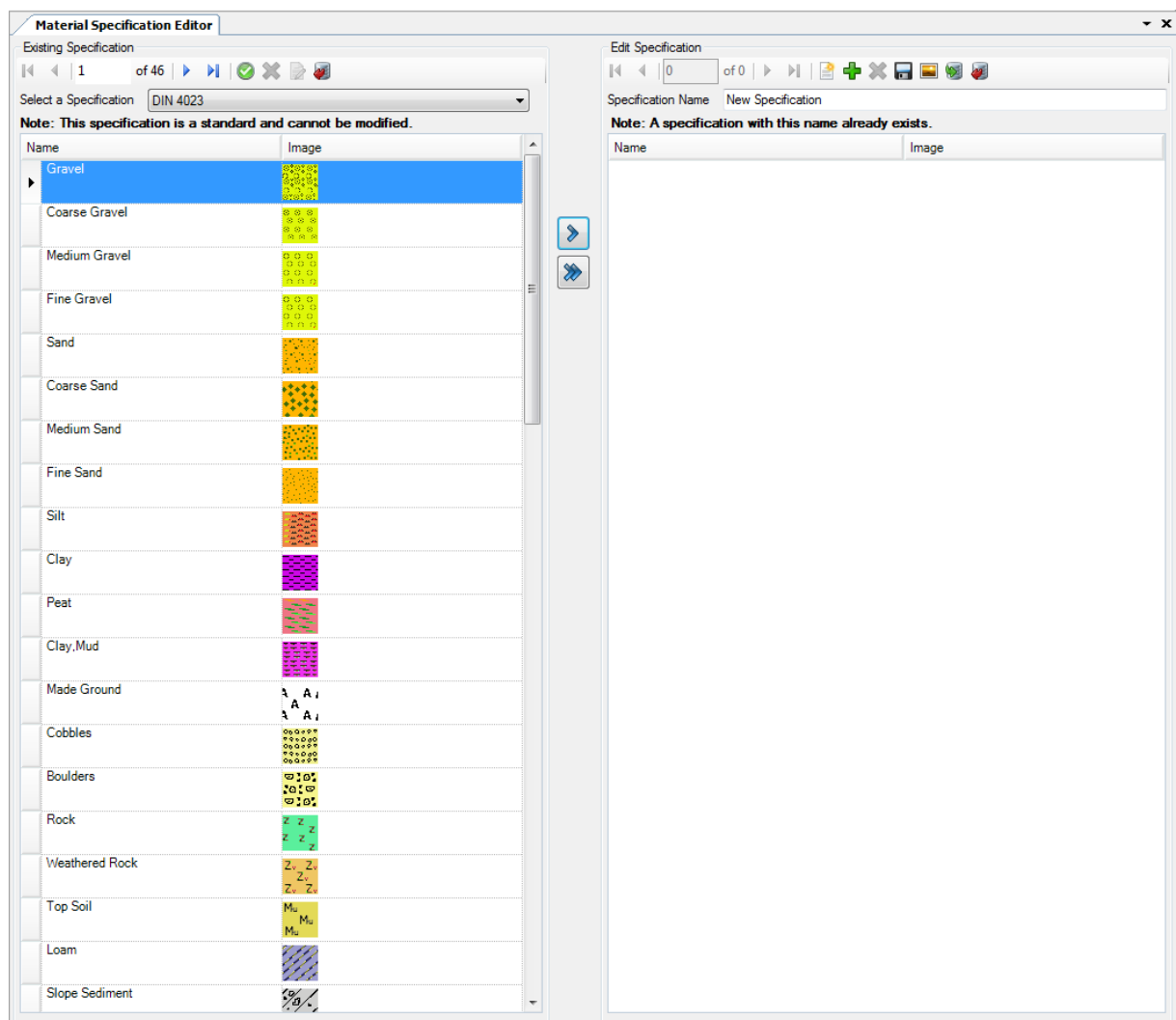
The Material Specifications Editor provides options for editing material specifications, specifically creating/editing soil classifications for your project. This Editor displays a list of

standard soil specifications shipped with HGA, and allows the display of the soil type names and patterns for each classification.

The Material Specifications Editor may be launched from two locations:

Select the Material Specifications option from the Modules menu, or click on the  button in the main toolbar.

The Material Specifications Editor will appear as a tab in the main HGA view, as shown in the following screenshot. Any view or module which loads as a tab may be pulled out of the main HGA view and dragged to a secondary monitor if you wish.




The left side of the tab displays the existing specifications (which may be chosen from the drop down box).




The right side of the tab provides the option for editing an existing custom material specification or creating a new one.


**Please Note:** You are not able to edit the specifications that come with HGA - you can only edit a custom made specification.

In the Existing Specification side the following buttons are available:

Use the  buttons to navigate through the individual entries for a specification.

Use the  button to set the selected specification as the project default.

Use the  button to delete the specification.

Use the  button to edit the selected specification (only available if you have selected a custom specification) this will move the specification to the right side of the tab for you to make your edits.


Use the  button to export the specification.

In the Edit Specification side the following buttons are available:


Use the  button to create a specification (don't forget to provide a name).


Use the  button to add a new entry to the specification.

Use the  button to delete the selected entry from the specification.

Use the  button to save the specification (it will now be available on the Existing Specification side of the tab).


Use the  button to import images file (bmp or jpg) to be entries in the specification.


Use the  button to import names for your entries in the specification.

Use the  button to export the specification.

## Creating a New Specification

When creating your own custom specification you may borrow the names and images from existing specifications.

Use the  button to copy a single entry from an existing specification to your custom specification.

Use the  button to copy all the entries from an existing specification to your custom specification.

To select an image to be associated with an entry simply select the image cell and you can browse to the location of your image.




When importing to create your specification ensure that you have the same format for your source file as what appears in the Material Specification Editor. That means there are 2 columns with the following headers: Name and Image. The minimum that needs to be populated is the Name.



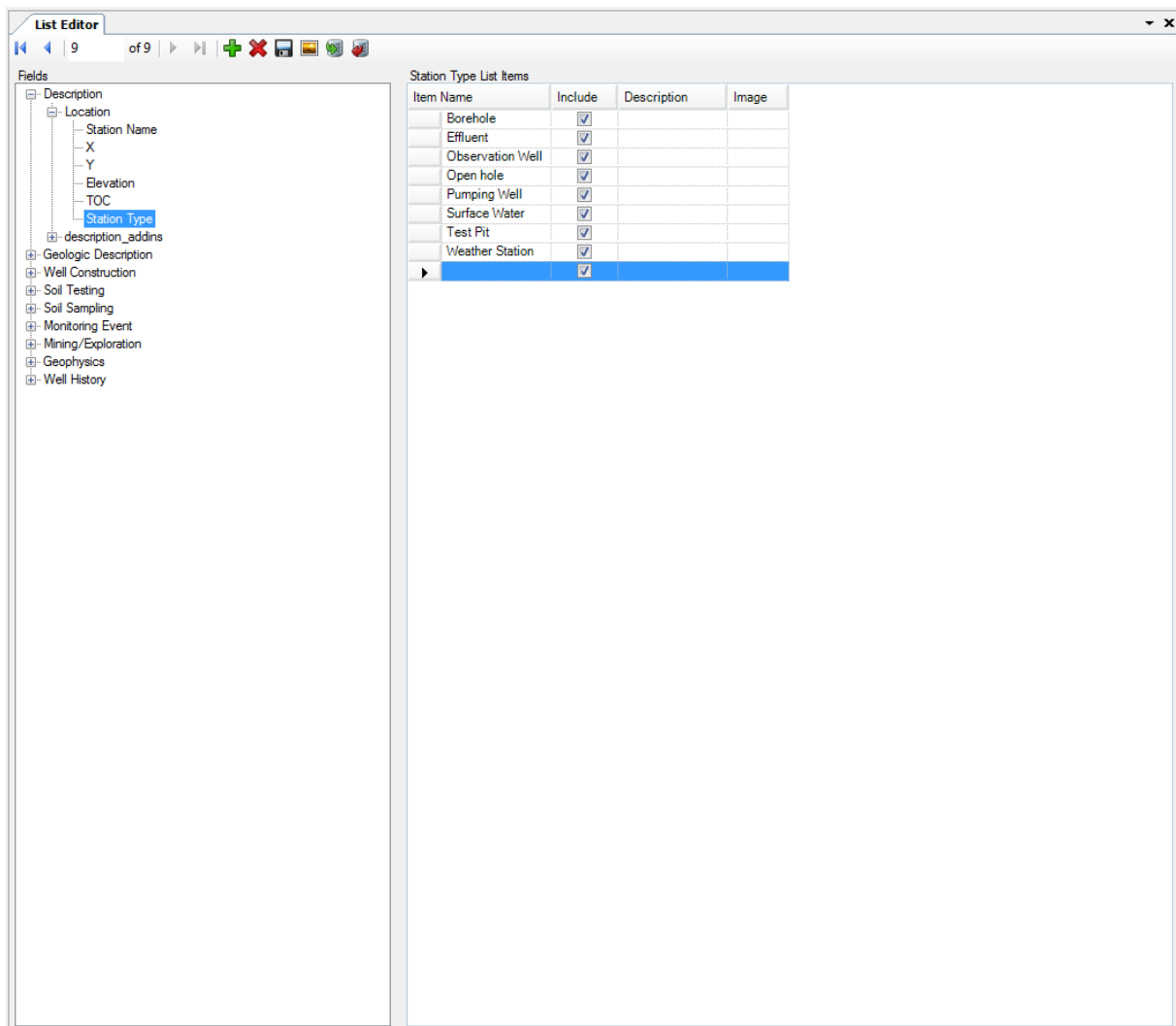
**Please Note:** If you want to re-use this custom specification in a new project, you must save the database template. Then, create a new project with this new database template, and the specification will be available. For details on saving database templates, see the [Template Manager](#) section Exporting the current template as a Database template.

#### 4.3.10 List Editor

The List Editor provides the ability to create and customize lists for any field - allowing for efficient and effective data entry. A list in HGA may be considered as a lookup table - they become drop down lists within the interface (i.e. on the Station Data tab).

Select the List Editor option from the Modules menu, or click on the  button in the main toolbar.

The List Editor will appear as a tab in the main HGA view, as shown in the following screenshot. Any view or module which loads as a tab may be pulled out of the main HGA view and dragged to a secondary monitor if you wish.



On the left side of the tab you will find the database structure tree (similar to what you find in the Template Manager or Query Builder).

Select the field you wish to create a list for by highlighting it in the tree.

On the right side of the tab you can generate your list by using any of the following buttons:

Use the buttons to navigate through the individual entries for a list.

Use the button to add a new entry to the list.

Use the button to delete the selected entry from the list.

Use the button to save the list.

Use the button to import images file (jpg or bmp) to be entries in the list.

Use the button to import names for your entries in the list.

Use the button to export the list.




When importing a file to create your list ensure that you have the same format for your source file as what appears in the List Editor. That means there are 4 columns with the following headers: Item Name, Include, Description, and Image. The minimum that needs to be populated is the Item name.



**Please Note:** If you want to re-use this list in a new project, you must save the database template. Then, create a new project with this new database template, and the list will be available. For details on saving database templates, see the [Managing Database Templates](#) section.


#### 4.3.11 Event Planning

The Event Planning module ensures that your field activities are always completed correctly and on time. Easily create multiple schedules for various stations and then create event plans that outline the details of your field activities including stations to be sampled, data to be collected, field checklists and more. Event plans are automatically converted into reports which can be printed and given to field personnel, and EDD templates that can be shared with analytical laboratories (via the QuickChecker module) and field staff (via the Mobile EDD). Hydro GeoAnalyst keeps track of all your event plans and automatically reminds you in advance when scheduled field activities are due.

The  icon launches the Event Planning module.

For more details see [Event Planning](#).

#### 4.3.12 Time Series Plotting

The plotting component in Hydro GeoAnalyst allows users to create time series plots of data stored in the HGA database. A query is required to be the source of data for a time series plot to be created. The  icon in the main toolbar launches the Time Series Plotting module.

For more details see [Time Series Plotting](#).

#### 4.3.13 3D Interpolation

The Scene Viewer is able to display and animate 3D volumetric plumes of one or more soil or groundwater contaminants. The plume is generated using the 3D Interpolation tool, then

---

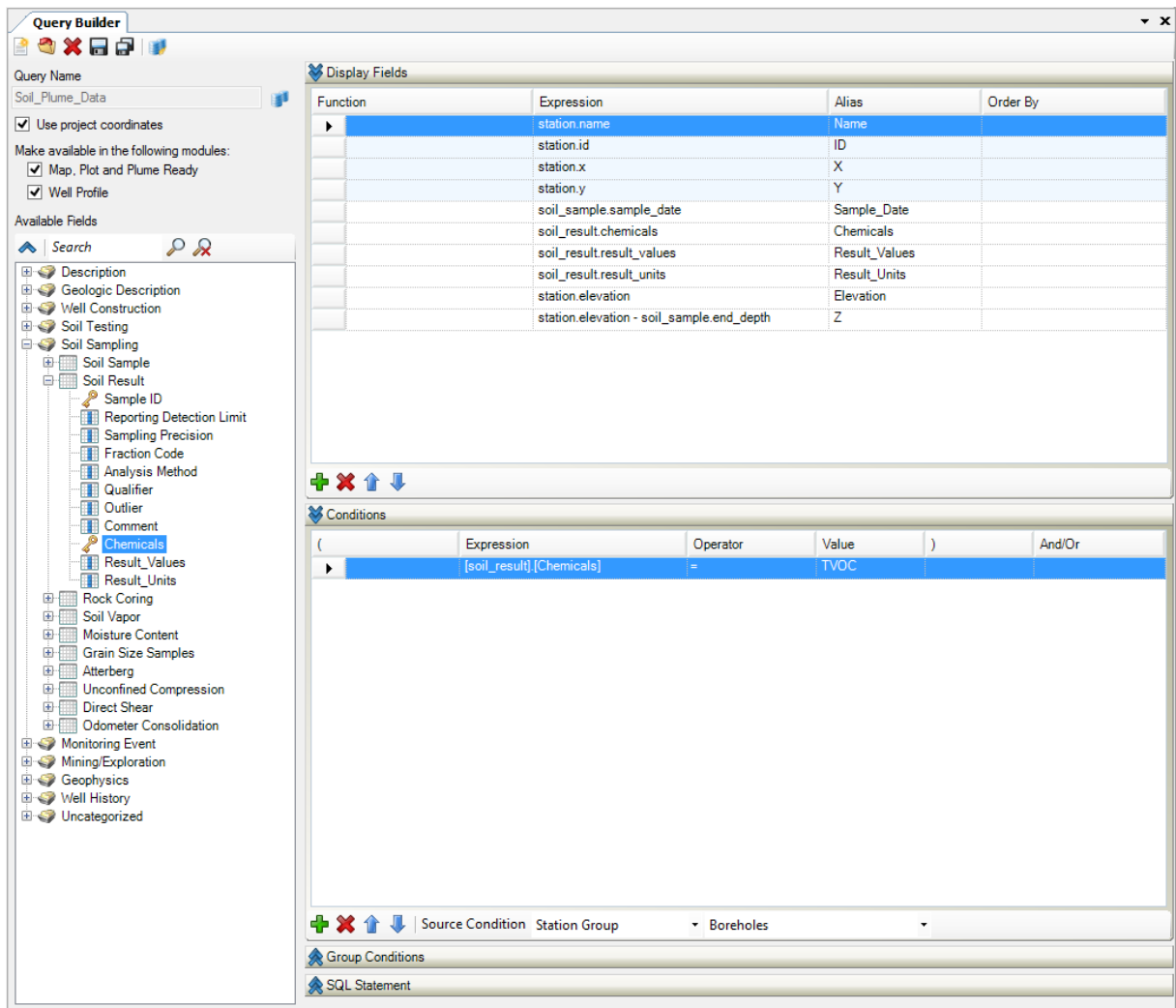
displayed with the Scene Viewer. The following section describes how to interpolate 3D points data in order to create 3D plumes; for details on viewing the plume, see the [Scene Viewer](#) section.

The 3D Interpolation starts with a data set - the data set must be created by building and executing and saving a query with the Query Builder. The query should contain the data set you are interested in analyzing, along with the fields required by the 3D Interpolation.

The following are required fields for the 3D interpolation, and as such, must be fields that are present in your data query:

- X
- Y
- Z (elevation of sampling point)
- Value (concentration value for one or more contaminants)
- Sample Date (if transient plume display is desired)

The Z value should be a field that represents the depth or elevation at which the data value (sample) was observed. If you want to display the plume on the same elevation scale as your cross sections (where data is displayed as above mean sea-level) you may need to convert your sample depths to sample elevations. This can be done in the query builder, by adding a calculated display field, as shown below:



The last display field in the screenshot above, combines the sample elevation, and the screen depth (from) fields; the screen depth is subtracted from the station elevation (or station TOC elevation if desired), using the Expression below:

station.elevation - soil\_sample.end\_depth  
and entering Z for the Alias.

Executing this query, will produce the results shown below:

RowId	Name	ID	X	Y	Sample_Date	Chemicals	Result_Values	Result_Units	Elevation	Z
42	GB-15	38	535960.33999	4814251.2999	05/15/2000	TVOC	0	mg/kg	324.26	307.46
43	GB-15	38	535960.33999	4814251.2999	05/15/2000	TVOC	0	mg/kg	324.26	281.06
44	GB-16	39	535866.67999	4814349.3999	05/15/2000	TVOC	0	mg/kg	326.56	324.46
45	GB-16	39	535866.67999	4814349.3999	05/15/2000	TVOC	0	mg/kg	326.56	299.86
46	GB-16	39	535866.67999	4814349.3999	05/15/2000	TVOC	0	mg/kg	326.56	277.66
47	GB-17	40	535776.65999	4814292.9999	05/15/2000	TVOC	0	mg/kg	328.3	320.8
48	GB-17	40	535776.65999	4814292.9999	05/15/2000	TVOC	0	mg/kg	328.3	280.3
49	GB-18	41	535625.45999	4814253.0999	05/15/2000	TVOC	0	mg/kg	332.92	321.52
50	GB-18	41	535625.45999	4814253.0999	05/15/2000	TVOC	0	mg/kg	332.92	305.02
51	GB-18	41	535625.45999	4814253.0999	05/15/2000	TVOC	0	mg/kg	332.92	294.52
52	GB-19	42	535518.5	4814305.7999	05/15/2000	TVOC	50	mg/kg	330.13	325.13
53	GB-19	42	535518.5	4814305.7999	05/15/2000	TVOC	250	mg/kg	330.13	310.13
54	GB-19	42	535518.5	4814305.7999	05/15/2000	TVOC	2500	mg/kg	330.13	290.13
55	GB-19	42	535518.5	4814305.7999	05/15/2000	TVOC	300	mg/kg	330.13	270.13
56	GB-19	42	535518.5	4814305.7999	05/15/2000	TVOC	21	mg/kg	330.13	250.13
57	GB-20	43	535394.60000	4814302.5999	05/15/2000	TVOC	0	mg/kg	330.76	320.56
58	GB-20	43	535394.60000	4814302.5999	05/15/2000	TVOC	0	mg/kg	330.76	313.06
59	GB-20	43	535394.60000	4814302.5999	05/15/2000	TVOC	0	mg/kg	330.76	294.16
60	GB-21	44	535288.75999	4814296.0999	05/15/2000	TVOC	0	mg/kg	335.95	308.05
61	GB-21	44	535288.75999	4814296.0999	05/15/2000	TVOC	0	mg/kg	335.95	305.35
62	GB-21	44	535288.75999	4814296.0999	05/15/2000	TVOC	0	mg/kg	335.95	296.05
63	GB-22	45	535199.99999	4814293.2999	05/15/2000	TVOC	0	mg/kg	337.59	325.29
64	GB-22	45	535199.99999	4814293.2999	05/15/2000	TVOC	0	mg/kg	337.59	313.29
65	GB-22	45	535199.99999	4814293.2999	05/15/2000	TVOC	0	mg/kg	337.59	287.19
66	GB-23	46	536219.27000	4814620.2997	05/15/2000	TVOC	0	mg/kg	323.47	303.07
67	GB-23	46	536219.27000	4814620.2997	05/15/2000	TVOC	0	mg/kg	323.47	301.57
68	GB-23	46	536219.27000	4814620.2997	05/15/2000	TVOC	0	mg/kg	323.47	300.07
69	GB-23	46	536219.27000	4814620.2997	05/15/2000	TVOC	0	mg/kg	323.47	298.57
70	GB-23	46	536219.27000	4814620.2997	05/15/2000	TVOC	0	mg/kg	323.47	295.87
71	GB-23	46	536219.27000	4814620.2997	05/15/2000	TVOC	0	mg/kg	323.47	285.37
72	GB-23	46	536219.27000	4814620.2997	05/15/2000	TVOC	0	mg/kg	323.47	282.67
73	GB-24	47	536163.05999	4814641.4999	05/15/2000	TVOC	0	mg/kg	325.26	312.36
74	GB-24	47	536163.05999	4814641.4999	05/15/2000	TVOC	0	mg/kg	325.26	310.86
75	GB-24	47	536163.05999	4814641.4999	05/15/2000	TVOC	0	mg/kg	325.26	302.76
76	GB-24	47	536163.05999	4814641.4999	05/15/2000	TVOC	0	mg/kg	325.26	282.36
77	GB-24	47	536163.05999	4814641.4999	05/15/2000	TVOC	0	mg/kg	325.26	275.16
78	GB-25	48	536032.57999	4814664.1999	05/15/2000	TVOC	0	mg/kg	325.81	318.91

Query: Soil\_Plume\_Data Rows: 179 Selected: 0

The last column displays the calculated sample elevations (Z). This value should be mapped to Z in the 3D Interpolation to generate your plume.



**Note:** It is recommended that the X, Y, and Z fields all be displayed with the same length units.

Once you have created a data query, you may use the 3D Interpolation module to generate a plume. To access the 3D Interpolation tools, select Tools / 3D Interpolation from the main menu, and the following dialog will appear:

The screenshot shows the '3D Interpolation' dialog box with the following settings:

- 3D Plume Project Name:** soil\_plume\_data
- Add Data Source:**
  - Data Source: Result\_Values
  - Name: Result\_Values
  - Date Field: Sample\_Date
  - Date Granularity: Day
  - Transient Plume:
- Table:**

Plume Name	Data Source	Date Field
▶ Result_Values	Result_Values	Sample_Date
- Grid Region:**

X	# of Nodes	XMin (535200.0)	XMax (536225.9)
x	40	535200.0	536225.9
Y	# of Nodes	YMin (4814000.0)	YMax (4814985.3)
y	40	4814000.0	4814985.3
Z	# of Nodes	ZMin (232.89)	ZMax (325.79)
z	5	232.89	325.79
- Interpolate using HGA:**
  - Interpolation method: Kriging
  - Advanced Settings:
  - Interpolate log values:

Buttons: OK, Cancel, Help

In the 3D Interpolation window, specify the various settings related to the grid size, extents, and data mappings.

**3D Plume Project Name:** Define the plume project name. One plume project can contain multiple plumes (e.g. for one or more contaminants).



## Add Data Source

Define the various properties relating to the data source:

**Data Source:** select a field from the data query that contains the data to be interpolated (e.g. concentration, or result value)

**Name:** define a name for the parameter

**Date Field:** select the field that contains the sampling date (if available)

**Date Granularity:** This option controls how to accumulate the data items of various date stamps. For example, assume you have data for the following sample dates (could be from the same, or other stations):

- 5 stations sampled on 03/05/99
- 6 stations sampled on 03/14/99
- 4 stations sampled on 03/19/99
- 5 stations sampled on 03/27/99
- 6 stations sampled on 04/04/99
- 5 stations sampled on 04/15/99
- 4 stations sampled on 04/25/99


If you select Day for date granularity, you will obtain 7 data sets to interpolate.

If you select Month for date granularity, you will obtain 2 data sets to interpolate:

20 stations sampled in March, and  
15 stations sampled in April

In this case, the first observation from a station will be selected.

If you select Year for date granularity, you will obtain only one data set, that will essentially be a static plume. In this case, the first 1 data set.

When you have defined the settings, press the  (Add) button to add the mapped fields; the values should then be displayed in the table at the bottom of the window.

To delete an existing 3D Plume, simply click on the  (Delete) button.

## Grid Region

Define the various properties relating to the grid size:

- **X Value:** select a field from your query to be used for the X axis
- **# of nodes:** define the number of grid nodes in the X direction
- **X min, X max:** define the minimum and maximum X values for the interpolated grid; by default, these will be read from the data source, however you may modify these values if necessary

- Similar parameters exist in the Y and Z directions.

### Interpolation Method:

Available interpolation methods include:

- Krigging (default), and
- Inverse distance

[Advanced Settings]: Press this button to see advanced settings for the selected interpolation method. For more details, see "[Appendix B: Advanced Interpolation Settings](#)".

Interpolate log values: This option will interpolate the log values of the data points and then invert the log value distribution. This option is useful when interpolating data with a high degree of variance.

When you are finished, click on the [OK] button.

HGA will create a 3D plume file, in the "Plumes" sub-directory for your project, with the file name provided, and the extension .nc. For example, TVOC.nc, in the directory:

*D:\Program Files\HGAnalyst\Projects\Demo\_Project\Plumes*

To display the plume, please proceed to the instructions in [Scene Viewer](#).

In addition to the \*.nc file, HGA will save a \*.txt file that stores the results from the query (x, y, z, value) that is used by the interpolator in generating the interpolation using the same file name, and in the same "Plume" sub-directory.



**Note:** Currently there is no method of opening plume projects in the Interpolation tool, to make modifications. Therefore, it is suggested that you save the data query so the 3D Interpolation can be quickly re-created.

#### 4.3.14 Well Profile

The Well Profile module can be used to display detailed information pertaining to a single station or well including:

- Well construction details (casing, screens, annular fill)
- Geophysical data plots
- Lithology information for each formation
- Description of the geologic formation
- The depth and or elevation of each layer

- many others...




The  icon in the main toolbar launches the Well Profile module.

For more details see [Well Profile](#).

#### 4.3.15 Map Manager

This menu item loads the Map Manager. The Map Manager can be used for creating and viewing site maps, creating thematic and contour maps, and defining cross section lines.



The  icon in the main toolbar launches the Map Manager module.

For more details see [Map Manager](#).

#### 4.3.16 Cross Section Editor

This menu item loads the Cross Section Editor. This module can be used for defining and displaying geological, hydrogeological, and model layer cross sections.



The  button in the main toolbar performs the same function.

For more details see [Cross Section Editor](#).

#### 4.3.17 Scene Viewer

The Hydro GeoAnalyst Scene Viewer is an advanced three-dimensional visualization and animation component for displaying and presenting cross sections created with the mapping component included with Hydro GeoAnalyst. Specifically, this can be used to display multiple cross sections in the form of fence diagrams using a variety of three-dimensional graphical formats. In addition, basemaps may be displayed for relating the fence diagrams to surface features. The graphical tools and presentation formats available are specifically designed for viewing geology and hydrogeology data.



The  icon launches the Scene Viewer.

For more details see the [Scene Viewer](#) section.

#### 4.3.18 AquiferTest

In order to use the AquiferTest analysis feature, you must first have AquiferTest 2011.1 or later installed on the local machine, and specify where the program is installed in the [HGA Settings](#) on the External Programs tab.

Use this feature to analyze pumping test data in AquiferTest. For this feature, you must have one or more data queries that contains the required fields for a pumping test analysis, namely:

- Well Name
- X Co-ordinate (for both Pumping Wells and Observation Wells)
- Y Co-ordinate (for both Pumping Wells and Observation Wells)
- Pumping Start
- Pumping End
- Pumping Rate
- Observed time
- Observed depth to water level

Additional fields may also be mapped and the data sent to AquiferTest; these include:

- Well Elevation
- Screen Diameter
- Borehole Diameter

For your convenience, these fields are included in the Environmental templates, in the Well History tables.

The following section describes these settings:

In the first tab, define the project units you would like to use for AquiferTest, and populate the Pumping Test information.

The screenshot shows the 'Pumping Test Analysis' software window. The 'Settings' tab is selected, showing configuration options for units and project information. The 'Units' section includes dropdown menus for Site Map (m), Time (s), Transmissivity, Dimensions (m), Discharge (m<sup>3</sup>/s), and Pressure. The 'Project Information' section contains text boxes for Project Name, Project Number, Client, and Location. A legend at the bottom left indicates that an asterisk (\*) denotes required information. At the bottom right, there are buttons for 'Analyze', 'Cancel', and 'Help'.

In the Pumping Wells tab, select the data query that contains the required fields for this module, for your pumping test analysis. Then, in the grid below, map the appropriate field to each required field. If the unit for the field is defined in the database template, then the unit will be automatically populated. Otherwise, this will be left blank. If needed, you can manually enter a conversion factor, to convert the data from the HGA source, to the AquiferTest project target units.

**Pumping Test Analysis**

Settings | **Pumping Wells** | Pumping Rate | Observation Wells

Data Source  
Browse for a query that contains the required fields for Wells, Location and Construction: Browse...


Field Mapping

Data	Match to Field
Name *	name
X Coordinate *	x
Y Coordinate *	y
Screen Diameter	
Borehole Diameter	
Elevation	

Data Preview

Row ID	name	id	x	y	Start_Date	End_Date
1	W-21	21	-80.5611001...	43.4823720...	06/06/2007	06/06/2007

\* - Required information Analyze Cancel Help

 **Note:** For station X,Y co-ordinates, the AquiferTest project units must be the same as the unit system used for the HGA project (for example, if your HGA project is using UTM, set the AquiferTest units as meters; for some State Plane, set the AquiferTest units as feet). Currently, there is no conversion for these units.

In the Pumping Rates tab, the workflow is the same as earlier mentioned. In this tab, you must map the well name, pumping rate, and the start and end interval.

The screenshot shows the 'Pumping Test Analysis' application window with the 'Observation Wells' tab selected. The window contains the following sections:

- Data Source:** A text box with the instruction 'Browse for a query that contains the required fields for Time and Pumping Rates:' and a 'Browse' button.
- Field Mapping:** A table mapping data fields to their corresponding database fields.
- Data Preview:** A table showing a single row of data.

Data	Match to Field
Name *	name
Pumping Rate *	Rate
Start Time *	Start_Date
End Time *	End_Date

Row ID	name	id	x	y	Start_Date	End_Date
1	W-21	21	-80.5611001...	43.4823720...	06/06/2007	06/06/2007

\* - Required information

Analyze Cancel Help

In the Observation Wells tab, the workflow is the same as earlier mentioned. In this tab, you must map the well name, X,Y coordinate, and the observation date/time and observed depth to water level.

**Pumping Test Analysis**

Settings | Pumping Wells | Pumping Rate | **Observation Wells**

Data Source  
Browse for a query that contains the required fields for Time and Water Level Data: Browse

Field Mapping

Data	Match to Field
Name *	name
X Coordinate *	x
Y Coordinate *	y
Observation Time *	Date_and_Time <span style="float: right;">▼</span>
Depth to *	Depth_To_Water

Data Preview

Row ID	name	id	x	y	Date_and_Time	Depth_To_Water
1	W-20	20	-80.5597864...	43.4814178...	06/06/2007	0.091463414634
2	W-20	20	-80.5597864...	43.4814178...	06/06/2007	0.21341463415
3	W-20	20	-80.5597864...	43.4814178...	06/06/2007	0.39634146341
4	W-20	20	-80.5597864...	43.4814178...	06/06/2007	0.64024390244
5	W-20	20	-80.5597864...	43.4814178...	06/06/2007	0.9756097561
6	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.0975609756
7	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.25
8	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.4329268293
9	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.5548780488
10	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.6158536585
11	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.737804878
12	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.8597560976
13	W-20	20	-80.5597864...	43.4814178...	06/06/2007	1.9207317073
14	W-20	20	-80.5597864...	43.4814178...	06/06/2007	2.0426829268
15	W-20	20	-80.5597864...	43.4814178...	06/06/2007	2.5914634146
16	W-20	20	-80.5597864...	43.4814178...	06/06/2007	3.3231707317

\* - Required information

Analyze | Cancel | Help

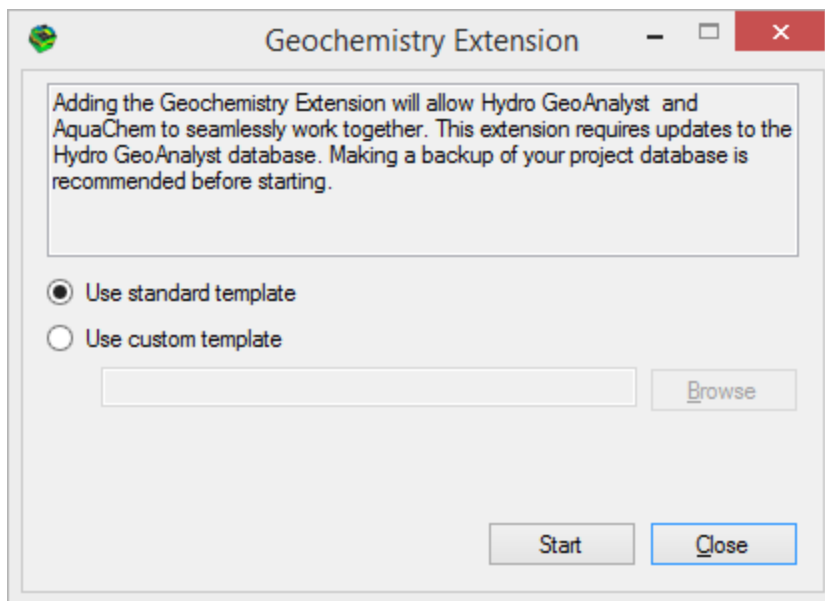
Once all the required fields are defined, click the Analyze button to send the data to AquiferTest. For more details on how to use AquiferTest, please refer to the [AquiferTest](#) help.



### 4.3.19 AquaChem

In order to use the AquaChem (Water Quality Analysis) feature, you must first have AquaChem installed on the local machine. When you select Modules / AquaChem (or select the icon from the toolbar) HGA will search for the installation, however, if it can not be found you will be prompted to browse to the location of your AquaChem executable (aquachem.exe).

Then it will check the current project database to see if the Geochemistry Extension has been added - if this has not been added you will be prompted to add this extension.



It is always a good idea to make a backup of our database before adding this extension.

The Geochemistry Extension will add several tables and fields required to allow AquaChem to run on the HGA SQL database.

If you use the standard template it will use AquaChem's Demo\_Basic.tpl file to perform the geochemistry extension. If you have a different naming convention for your chemical parameters you should use your own (custom) AquaChem template to perform the geochemistry extension.

Once the Geochemistry Extension has been added to the project database AquaChem will launch. The next time you open the HGA project and select Modules > AquaChem, it will simply launch AquaChem.

When using AquaChem with HGA, keep in mind that AquaChem is intended only for its presentation and calculation features. Data entry and maintenance operations should be performed centrally through the HGA interface and not the AquaChem interface.

The operations that must be performed in HGA include:

- Importing data
- Creating new samples
- Creating new stations

Please keep in mind that there are specific table and field requirements in the HGA project database in order to allow the Geochemistry Extension to be properly added to your project database. The following tables and fields are required:

**Station**

ID  
Name  
X  
Y  
Elevation  
TOC  
Depth

**Parameter Sample**

sample\_id  
lab\_id  
sample\_date  
comment  
watertype

**Parameter Result**

sample\_id  
chemical\_name  
result\_value  
result\_unit  
reporting\_detection\_limit  
sampling\_precision  
analysis\_method  
qualifier  
outlier  
comment  
analysis\_date

These tables and fields are all included in the current Environmental (metric or imperial) versions of the Database Templates provided with the installation of HGA. You are free to change the View Settings for these tables and fields (for instance to change them to a local term or another language) however, the database settings must remain.

## Limitations

### X and Y coordinates

When using an HGA project with projected coordinates, the X and Y coordinates in the database are stored as latitude and longitude (WGS 1984) in decimal degrees. When linking with AquaChem this information will be shown in the Coord\_Long and Coord\_Lat fields within AquaChem. While working in AquaChem these can be converted back to UTM and shown in the X and Y fields by using the UTM Conversion tool (found under Tools/Calculators menu). The X and Y fields will then NOT be dynamically linked to the HGA X and Y fields. Therefore when needing to make changes to the coordinates you must make the change in HGA and then re-run the UTM conversion in AquaChem.

When using an HGA project with local coordinates, the X and Y coordinates are stored as is in the database. Therefore when linking with AquaChem this information will be shown in the X and Y fields of AquaChem (and no further conversion is required).



#### 4.3.20 Parameter List Editor

The Parameter List Editor allows you to create groupings of parameters to make it easier to list which parameters will be analyzed by the lab within the Event Planning module.

For more details see the topic on  [Event Planning](#).

## 4.4 Database

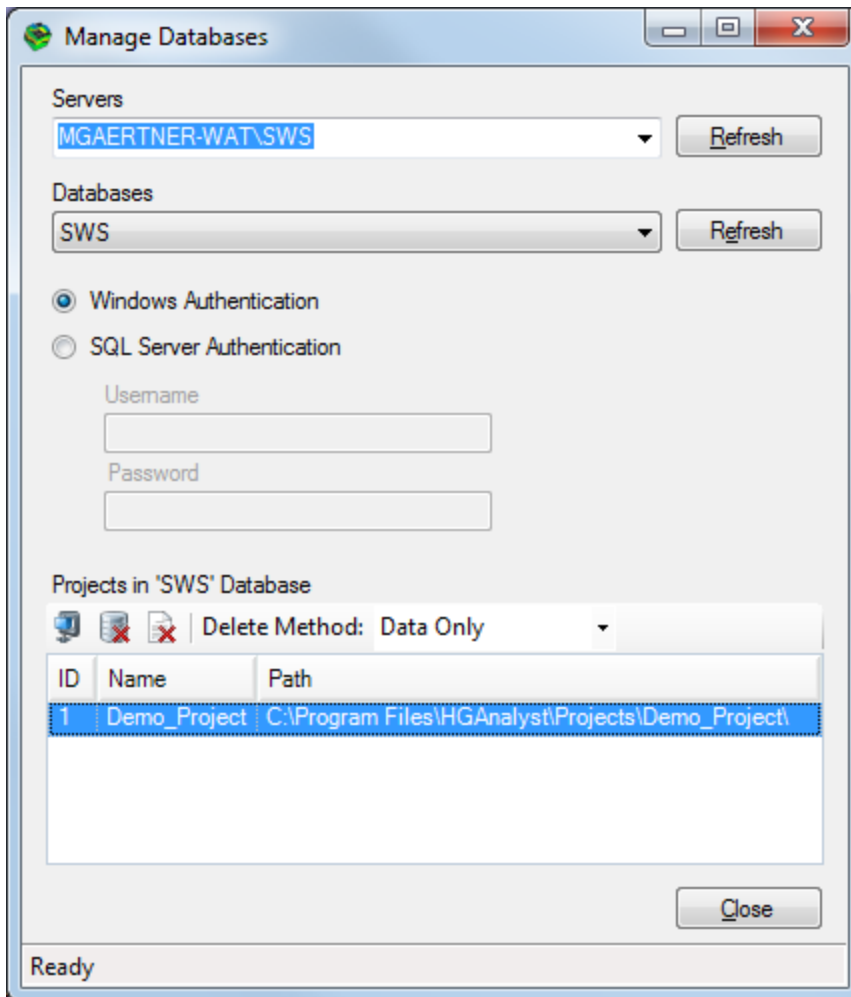
This menu item is used to backup and manage HGA databases/projects:

-  [Back Up Database](#)
-  [Manage Databases](#)


#### 4.4.1 Manage Databases

Use this option to remove unwanted databases from the local instances of SQL Express. This option is available when HGA is first loaded, and no projects have been opened.


The following dialog shows the options that are available.



In this dialog, select the Server and the Database that you would like to delete. Once the database is selected, a list of projects using the selected database will be listed at the bottom; the project list is read-only, and displayed in order to assist you to decide if the selected database can be safely deleted.

Click on the  button, to compress the file size of the database, to save disk space. After the database has been compressed, you may continue to work with it.

Click on the  button to delete the selected database.

Click on the  button to delete a project from the database (as a database may include one or more projects).

Please take note of the Delete Method - by default Data Only is selected. Only the data from a project or database will be deleted. If you also wish to delete the associated Project files you must first select the Project Folder and Data option before deleting the project or database.

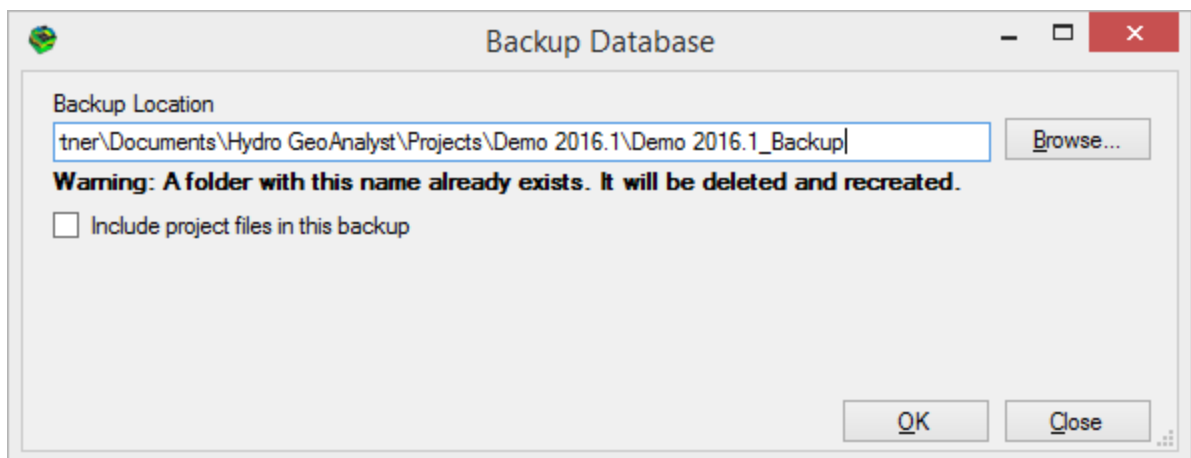


**NOTE:** Use caution when deleting databases, since the data cannot be recovered once deleted, and there is no "undo" option unless you have taken a backup.

#### 4.4.2 Backup Database

Use this option to create a backup copy of the SQL Server database used by the current project. A backup of the database is helpful, in order to preserve data, or to detach and send the database to colleagues or Technical Support. Select this menu item and provide the directory path for the file. It will be saved with the name of the database and the .BAK extension.

You also have the option to make a copy of the all the project files as well.



Please note that if the folder already exists all data from the folder will be deleted in order to create and save the backup.



**NOTE:** Backup Database works only if you are running HGA on the system that also hosts the SQL server. SQL Server does not permit saving the back up copy of the database to a mapped network drive; it can be saved only to a local drive.

## 4.5 Help

Displays either the online or in-program HGA Help depending on the settings specified under [HGA Settings](#).

### 4.5.2 About

Displays the HGA Info dialog. This contains the HGA version number, serial number and information on how to contact Waterloo Hydrogeologic.

### 4.5.3 Release Notes

This option opens your default internet browser to display the online ReadMe file explaining the changes and additions to the program for the last several releases.

### 4.5.4 View Log File

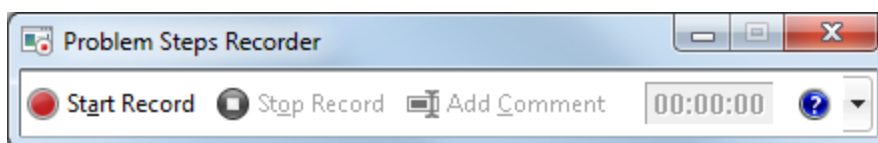
By selecting Help / View Log file the HGA log file will open up (usually in Notepad). This log file can be helpful for troubleshooting issues.

### 4.5.5 Email Log File

By selecting Help / Email Log File a new email will be created within Outlook™ with the Log File attached and addressed to our Technical Support department ([support@waterloohydrogeologic.com](mailto:support@waterloohydrogeologic.com)). The log file can be helpful when trouble shooting issues.

### 4.5.6 Problem Steps Recorder

By selecting Help / Problem Steps Recorder you will initiate a Windows program you can use to record the steps you are taking within HGA that is causing difficulties. This can be helpful to send to Technical Support to better describe exactly the steps you are taking when you encounter a problem.



---

The program is very simple to use - simple select Start Record and then reproduce your steps within HGA. Once you have finished select Stop Record and you will be prompted to save the recording as a .zip file so you can send it to Technical Support.



**NOTE:** Please be aware this option is only available on Windows 7 or later operating systems.

#### 4.5.7 License...

This menu option provides the ability to request a license as well as install a license.

If you are working with a Team License you will also find the option to check out and check in a license.

## 5 Creating New Projects


This section presents information on how to create new projects, and modify the properties of existing projects. A new project is usually created with a completely new database however, HGA is designed to also allow for managing multiple projects on a single database.

The most common workflow is to create a new database for each new project and that workflow is documented here.

### Starting the New Project Wizard

---

The New Project Wizard can be launched in two ways:

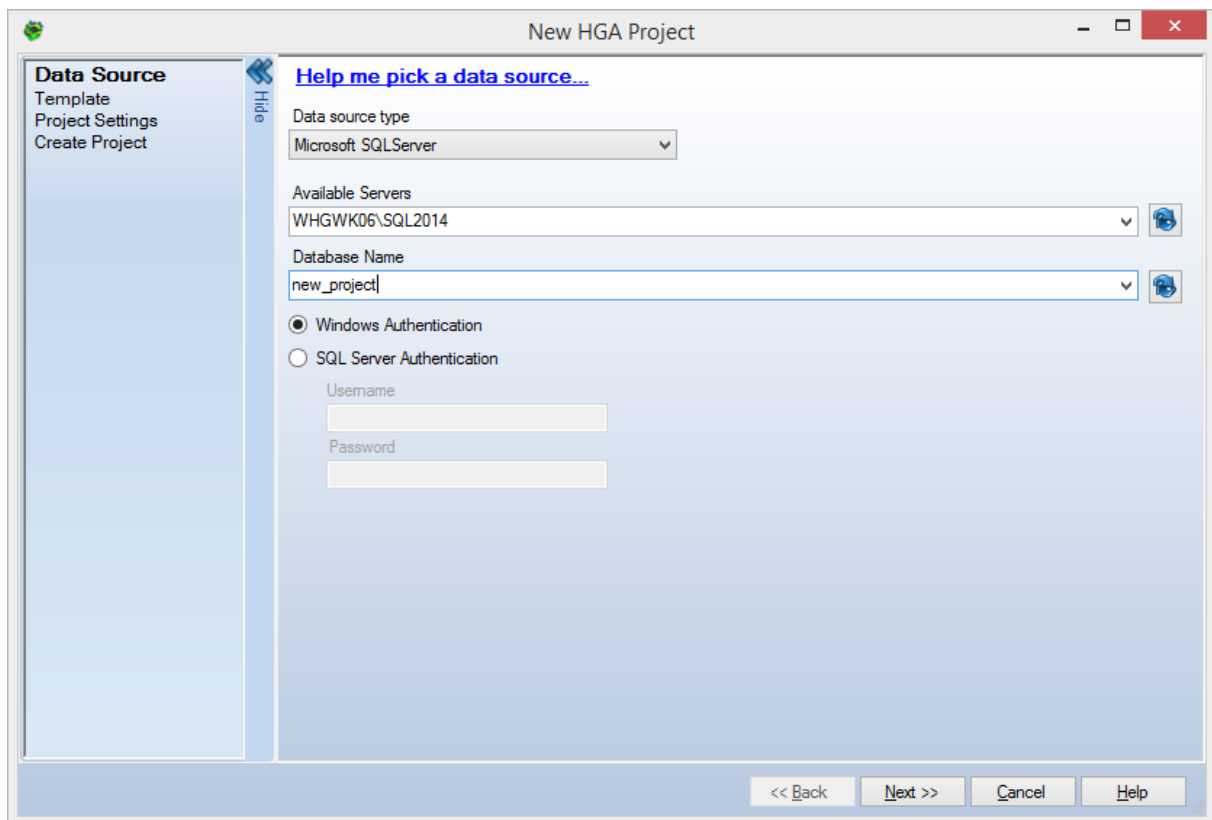
- Select Project / New from the Main Menu; OR
- Click on the  New Project... button on the Start Page.

The New Project Wizard will then appear. The Project Wizard contains various steps, each step appearing in a new window, with the various settings for a new project. It is designed in a sequential fashion; after defining the necessary inputs in each window, press the Next button to proceed. The Next button will only become activated after the necessary fields have been defined.

### 5.1 Select Data Source

The first step in the New Project Wizard provides the data source settings options.





HGA allows you to choose between Microsoft SQL Server or using the Local Database option.

If this project is intended only for you (others will not need to be given access) then the Local Database option can be used. It does not require any additional Microsoft SQL Server installation - as this is already done (silently) during the HGA installation.

If however, this project will need to be accessed by multiple users you should use the Microsoft SQL Server option. We currently support Microsoft SQL Server 2012 or 2014 (Express or Full editions).

### Local Database

If you have selected to use the Local Database you only need to specify the Instance name of your local database. When it is installed with HGA it is named Waterloo - however if you have another instance installed you can use that as well. And then provide a name for the database.



If Local Database does not appear in the dropdown consider closing and then restarting HGA to initiate the Local Database. In some cases you may have to restart your machine.

### Microsoft SQL Server

---

If you have selected Microsoft SQL Server you will need to select the SQL Server that will hold your project database and then provide a name for the database.

You have two options for authentication:

1. Windows Authentication (default)
2. SQL Server Authentication

Windows Authentication uses your log in to authenticate you on the SQL Server while SQL Server Authentication requires you to enter an appropriate User Name and Password to be authenticated on the SQL Server.



**Note:** Appropriate permissions need to be provided to use either of the authentication options. Please contact your IT support to ensure you have appropriate permissions to create new databases or create new projects on existing databases.



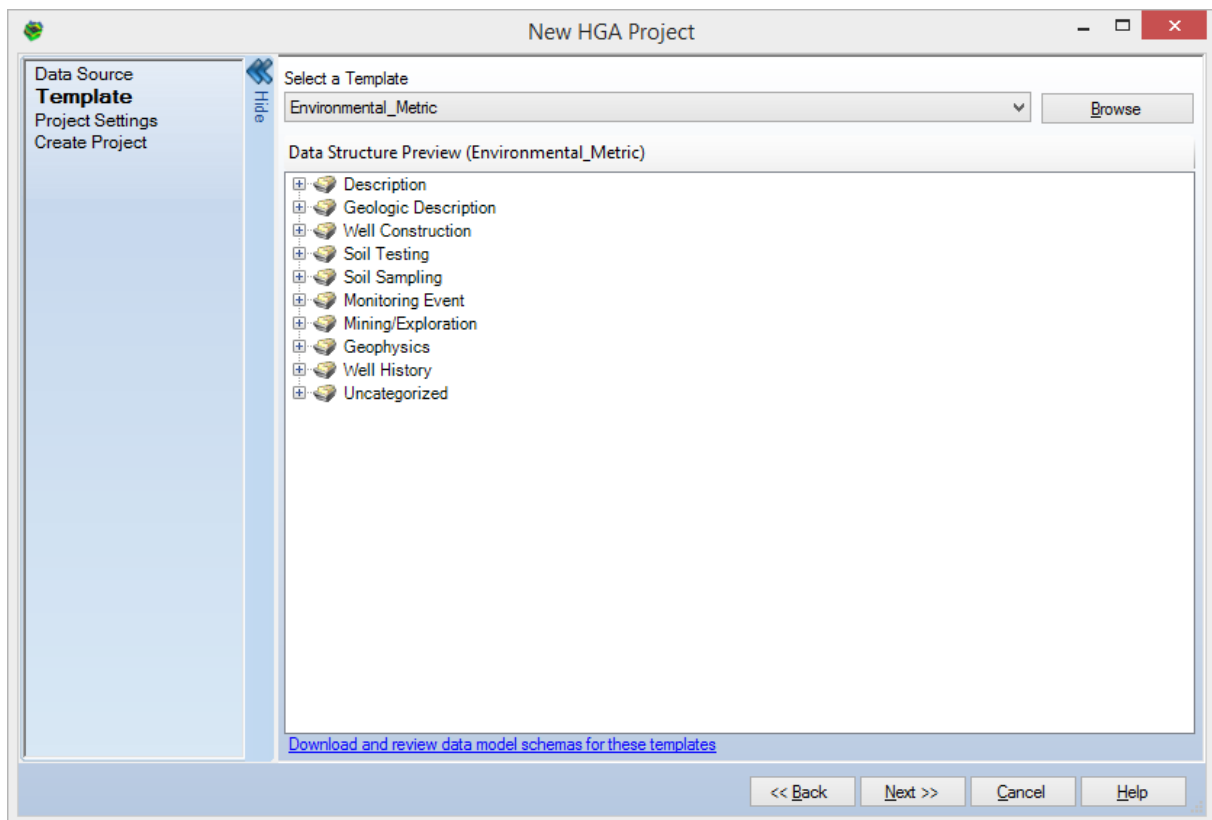
**Note:** If you cannot see your local instance of SQL Express when creating a new project, or opening an existing project, please refer to [Connection Problems](#) for some troubleshooting suggestions.

Select the Next button to proceed to the next step in the New Project wizard.

## 5.2 Select Template

This step in the New Project wizard allows you to select which database template to use for your project. Provided with HGA is a metric and imperial version of our Environmental template.

When you select a template from the drop down list you can review the database structure in the preview below.



If you have exported a database template from another project would like to use it to create a new project select the browse button and browse to the location of your template (\*.hgmt).

Select the Next button to proceed to the next step in the New Project wizard.

### 5.3 Provide Project Details

This step in the New Project wizard allows you to specify a project name and location for your project folder.

Additionally you can select a Material Specification and then the Projection Type and Projection to be used for your X and Y coordinates.

The screenshot shows the 'New HGA Project' dialog box. The 'Project Name' is 'New Project'. The 'Project Folder' is 'D:\Documents\Hydro GeoAnalyst\Projects\New Project'. The 'Material Specification' is 'USCS'. The 'Projection Type' is 'UTM'. The 'Projection' is 'NAD 1983 UTM Zone 17N'. The 'Unit' is 'meters'. The dialog has a 'Hide' button on the left and navigation buttons at the bottom: '<< Back', 'Next >>', 'Cancel', and 'Help'.

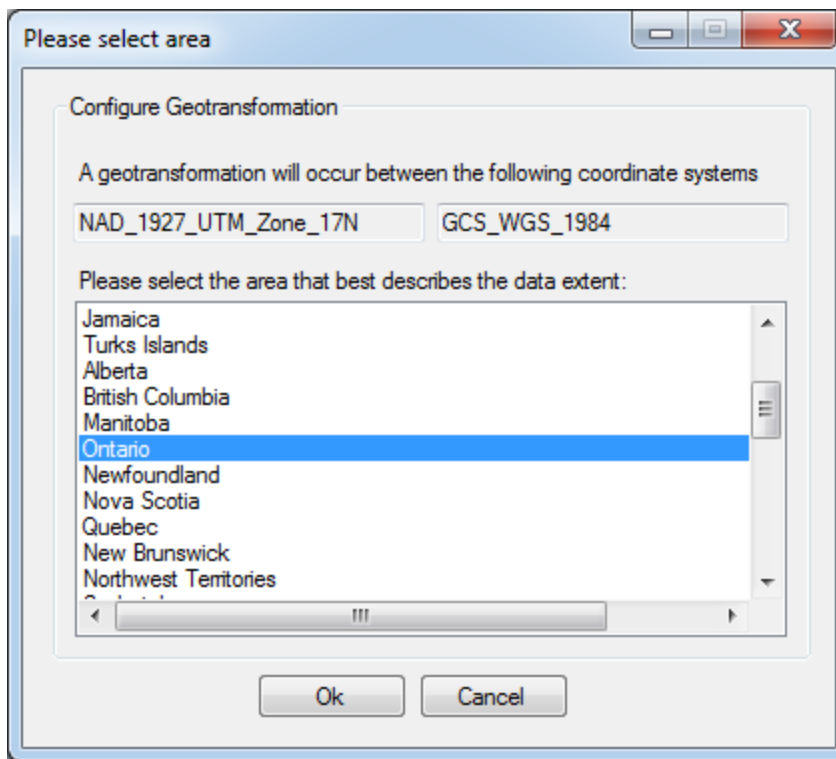
The Unit for your projection will be selected automatically, based on the selected projection type (e.g. UTM will use m, State Planer will use feet, etc.).

If the Local Projection Type option is selected, you can select the desired unit from the drop down box.



**Note:** If Local Projection Type is selected, the project coordinate system cannot be changed once the project is created. Furthermore, all imported spatial data must already be expressed in local coordinates as HGA does support conversions from projected/geographic coordinates systems to local systems.

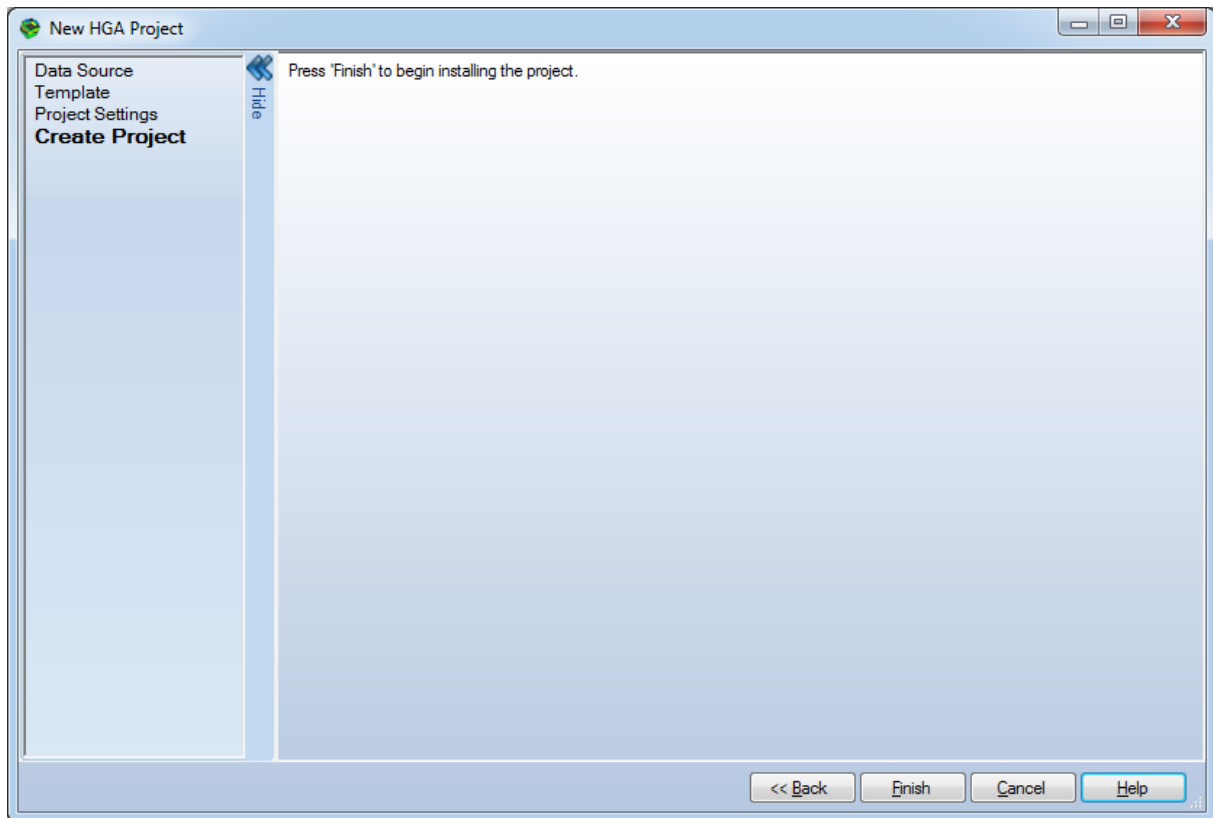
Depending on the projection type that you select, you may also be required to select an appropriate Geotransformation for your project. If required, the following dialog will display:



Simply select the area that best represents the spatial extent of your geographic data from the list, and then click the [Ok] button. Note: You will not be able to create the project until you have selected an area.

For more details on defining geotransformation settings, please refer to [Appendix F: Configuring Geotransformation Settings](#)

Once you have specified the projects settings select the Next button to proceed to the final step of the New Project wizard.



At this final step you can decide if you want to go back and adjust any selections or settings you made or complete the New Project wizard by selecting the Finish button.

A new project will be created, with the necessary tables, fields, and settings. Please be patient during this process. The new project should then appear in the main HGA interface.

## 6 Template Manager

The Template Manager is one of the most powerful tools provided with Hydro GeoAnalyst. It allows you to edit the structure of your database.

The Template Manager provides the tools to:

- Add or Delete tables and/or fields
- Alter the properties of tables and fields
- Define relationships between tables
- Group tables under logical data categories
- Save database templates for future projects
- Set visibility of tables and/or fields
- Setting user level table and/or field names, display units (where applicable), and data formats (where applicable)


### [Understanding the Template Manager](#)

Hydro GeoAnalyst comes with our standard environmental database structure (in metric and imperial templates) that are currently in use around the world. When creating a new database for your project, you have the option of selecting any of the provided database templates or simply selecting No Template and have only the table and fields required by HGA added to the project. This allows you to completely customize your project.

All database structure templates that come with Hydro GeoAnalyst also come with their respective report and well profile templates. As such, if one of the existing database templates is selected during the project creation, these templates will be copied to your project by default. You can later edit them or even remove them from your project if desired.

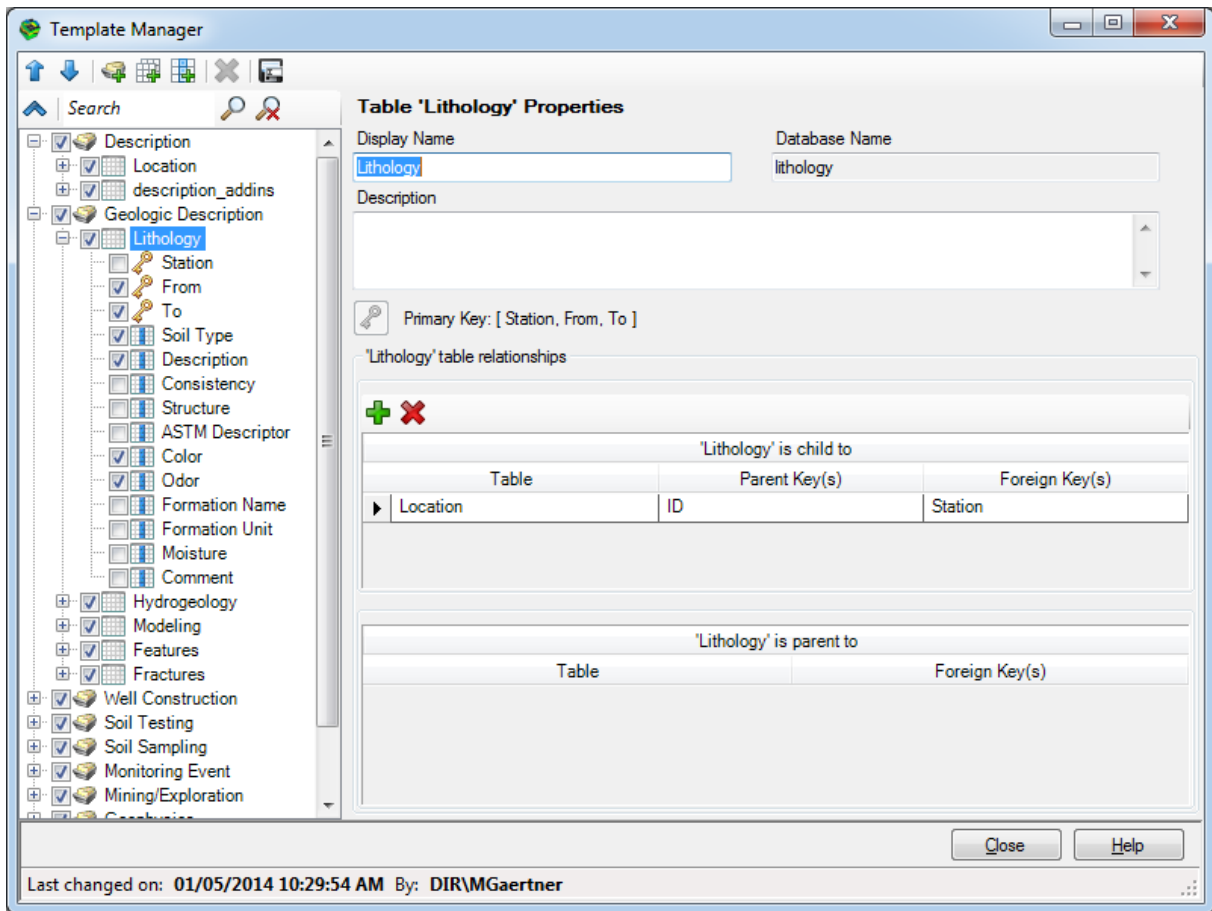
The Template Manager allows you to modify the view of the database. For example, you may only need to view tables that are related to geological investigation data. The Template Manager allows you to hide all unwanted tables and/or fields from view and display only a smaller set of relevant tables and/or fields.



The Template Manager allows you to export the currently active database structure as a new database structure, for use in creating new similar projects.

You can launch the Template Manager from the main toolbar by selecting the  icon or by selecting the Modules / Template Manager menu option.

### 6.1 Interface

On the left hand side you will find the tables and fields organized into categories. By selecting any item in the tree on the left hand side you will find all the properties of the item displayed to the right.



In the image above you can see the Lithology Table properties displayed. All the fields in this table are found by opening the Lithology table branch. Primary Key fields are indicated with a  icon while all other fields use the  icon.




**Note:** Please be aware that certain tables and fields are required by HGA - therefore you may not be able to change the Database Name of these (they will be grayed out). However, you can change the Display Name so that these tables and fields appear as you would like to see them in the main HGA interface.


You can adjust which tables and fields you see within the main HGA interface by simply adjusting the visibility option (ie. turn tables and fields on or off).


- Not visible in the main HGA interface
- Visible in the main HGA interface




To add more items to your database structure (you can add as many as you like) you need to use the following options in the tool bar:


 to add a new category

 to add a new table

 to add a new field


To adjust the order of items in your database structure you need to use the following options in the tool bar:

 moves the item (category, table or field) you currently have selected up


 moves the item (category, table or field) you currently have selected down

---

## 6.2 How to add Tables and Fields

When you are ready to adjust the structure of your database and want to add a new table use the  icon.

You will find a dialog appears when you can specify the Table Name as well as the Category the table should go into.

Then you can add as many fields as need for your table by using the  icon.

The 'Add Table' dialog box contains the following fields and options:

- Table Name:** Text box containing 'NewTable'.
- Category:** Dropdown menu showing 'Description'.
- Fields:** A table with the following columns: Primary Key, Name, Data Type, Allow Null, Auto Incre, UnitCategory, and Unit.
 

Primary Key	Name	Data Type	Allow Null	Auto Incre	UnitCategory	Unit
<input checked="" type="checkbox"/>	ID	Integer	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<input type="checkbox"/>	Description	String (255)	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	Value	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
- Automatic link to station table:**  (checked)
- Show full list of data types:**  (unchecked)
- Buttons:** OK, Cancel, Help.

Be sure to provide a name for each of your fields as well as indicate which field you would like to assign as the primary key for the table.



**Note:** if you do not assign a primary key field to a table HGA will add a field named tablename\_ID and set it to the primary key, as well as making it an auto-increment field.



**Note:** the auto-increment option is only available at the time of table creation (or field creation). You cannot assign this option to a field after the field has been created. Therefore it is important for you to consider your table properties carefully before beginning to make new tables.

Take note to select the appropriate Data Type for each of your fields and specify whether or not Nulls are allowed in that field.


If you wish to set a field to be an auto-increment field its data type **MUST** be integer.

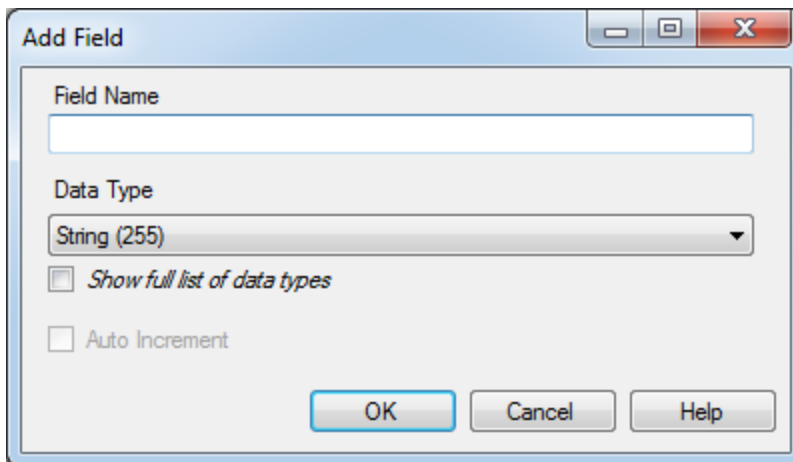
If you set a field to be double (think of this as a measured number) then you should also set a Unit Category and a Unit.

By default the table will be automatically linked to the Station table. However, you now have the option to remove this link (uncheck the Automatic link to station table option at lower left). We refer to these tables as Non Station Data tables.



**Note:** to enter data to a Non Station table manually there is now a new tab: [Non Station Data Tab](#) that allows for this. You can also import data to a Non Station table using the General Import options within the Data Transfer System described in the [Importing Data General](#) section.

When you select the OK button the table will be created and you will find it in the database tree within the Template Manager. If you decide you need additional fields in the table simply select the  icon and the Add Field dialog will appear.

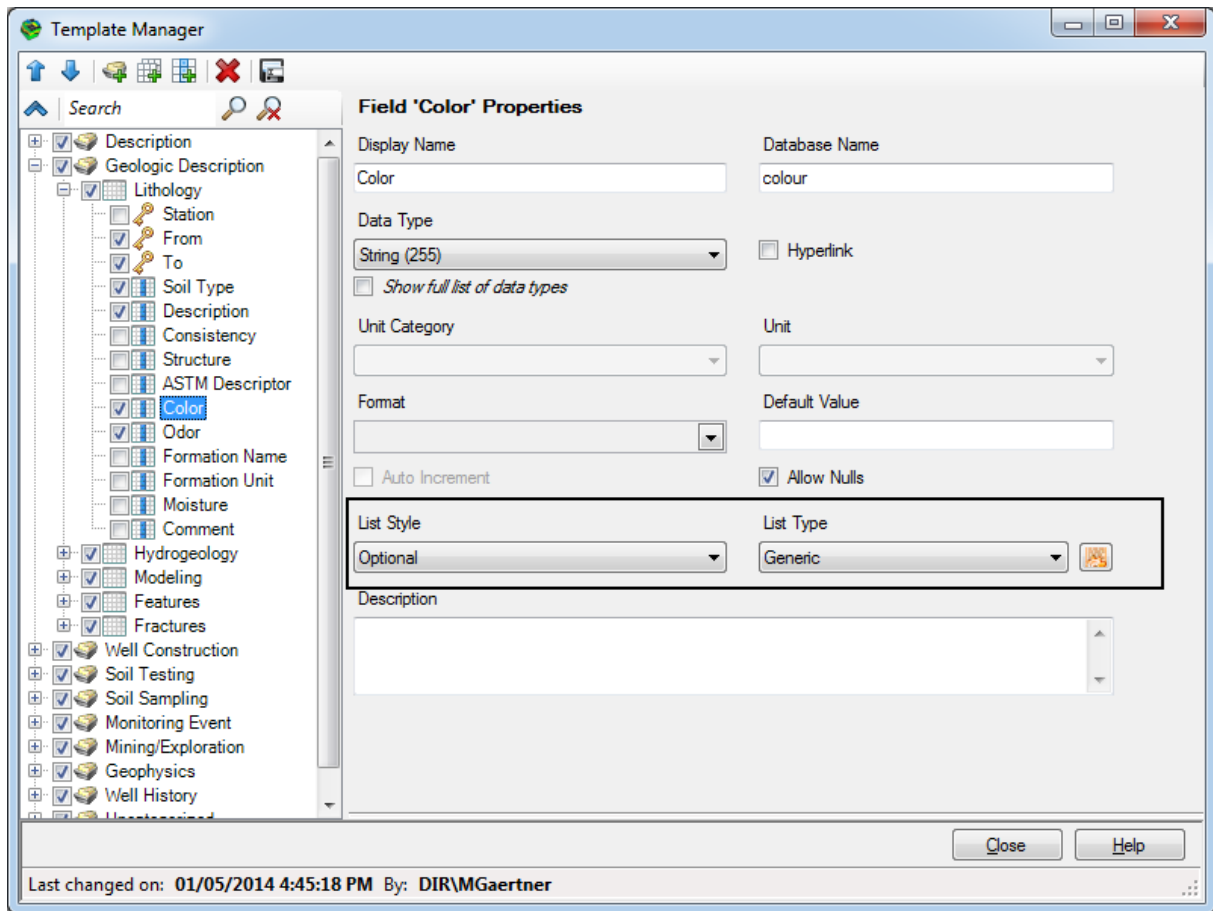
A screenshot of the 'Add Field' dialog box. It has a title bar with 'Add Field' and standard window controls. The dialog contains a text input field for 'Field Name', a dropdown menu for 'Data Type' currently showing 'String (255)', and two unchecked checkboxes: 'Show full list of data types' and 'Auto Increment'. At the bottom are three buttons: 'OK', 'Cancel', and 'Help'.

Simply provide a name for the field and select the appropriate Data Type from the drop down list. Select the OK button and the new field will be added to your table.

### 6.3 How to set a Field to use a List

Would you like to establish a set of valid values allowed to be entered for a field? You can do this by setting a field to use a List and then create the list within the [List Editor](#).

When you select a field in the Template Manager you will find the option to set a List Style as well as a List Type.



You will find three options in the List Style drop down:

**None:** there will be no list available for this field

**Optional:** there will be a list available for this field, however you can still enter things other than the list items

**Required:** you can only enter items from the list for this field (nothing else will be allowed)

You will notice that you have two options in the List Type drop down:

**Generic:** you will need to create your list in the List Editor (you will notice the icon appears so you can launch this module and make your list right from here)

**Soil:** you will need to create your list as a Material Specification (and make sure to set your material specification as the Project specification).

## 6.4 How to Adjust Table Relationships

Many tables within the standard environmental database template of HGA have relationships - one table can be referred to as the Parent table and it is related to a Child table by a Foreign key.

A common example of this can be found in the Monitoring Even category. The Parameter Sample table is the Parent to the Parameter Result table. The way this relationship is established is by a foreign key. Sample ID is the Primary Key in the Parameter Sample table and it is the Foreign Key in the Parameter Result table.

This means that the Sample ID must be unique within the Parameter Sample table (to indicate the unique sample that was taken at a particular station) - however, the sample Sample ID will be found multiple times within the Parameter Results table as there will be many results associated with the single unique sample (you will have one record for every parameter that you had the lab analyze the sample for).

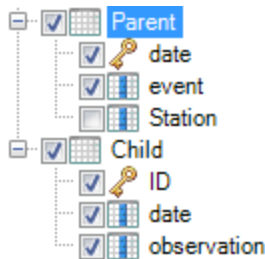
If you are adding new tables to your database you might also want to establish relationships between your new tables.

Here is an example of how you can establish a relationship between 2 tables:

Lets say you have created 2 new tables in your database - one called Parent and one called Child.

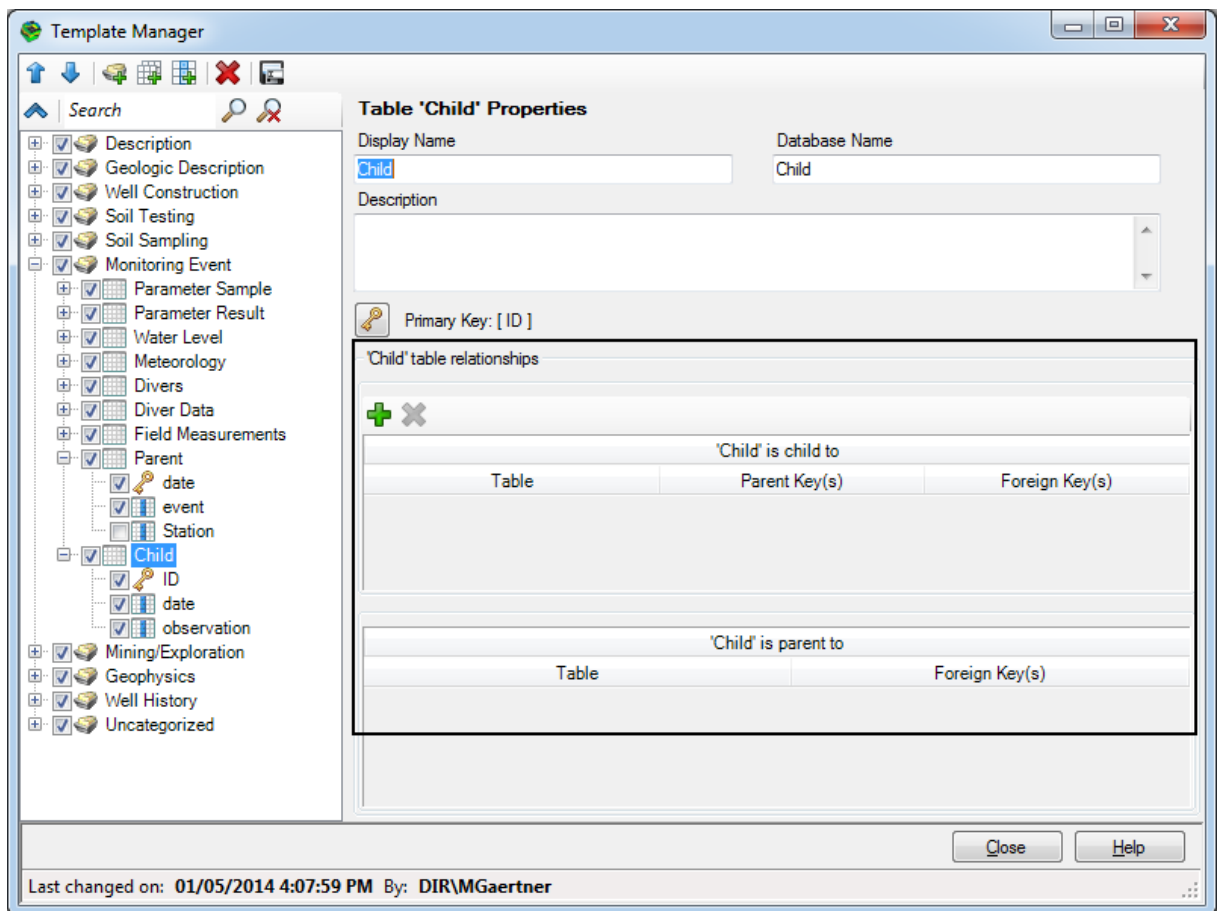
The Parent table has a date field as the primary key as well as a field to enter the name of an event for your project. And the Child table has an auto-increment ID field as the primary key, as well as a date field (which we will use to establish the relationship back to the Parent Table) as well as a field to record an observation.

Here is how these 2 tables would look in the Template Manager:

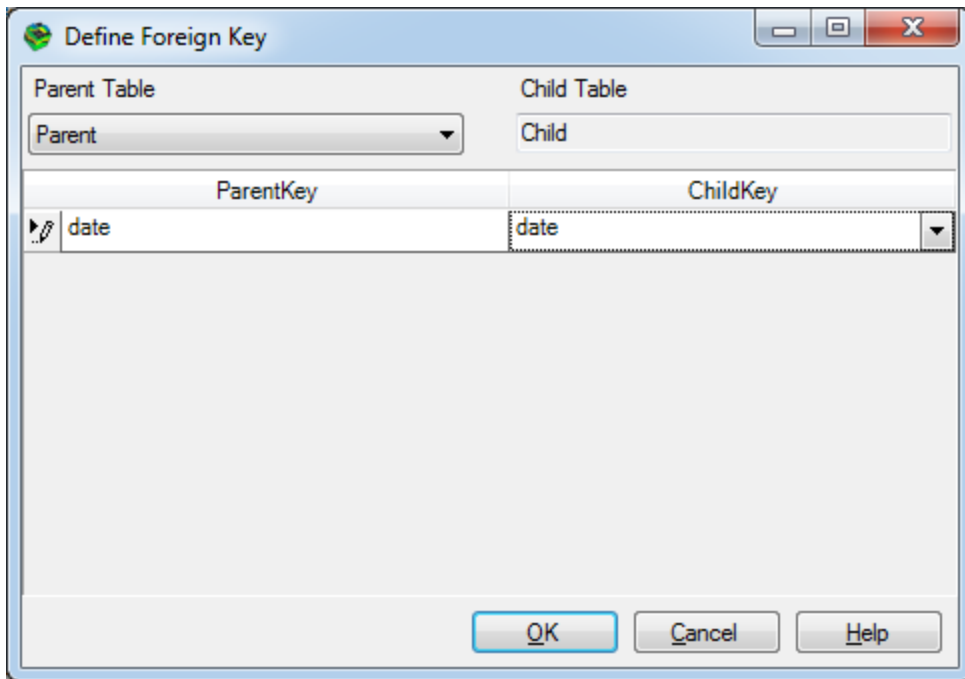


You will notice that the Station field has been added to the Parent table because I made this table have the automatic link to the Station table. However, the Child table does not have the link to the Station table (because we are going to link it to the Parent table).

Now when I select the Child table I will find the settings for this table which includes an option to set the relationships for the table.



Select the **+** to add a new relationship to this child table and the Define Foreign Key dialog will appear.

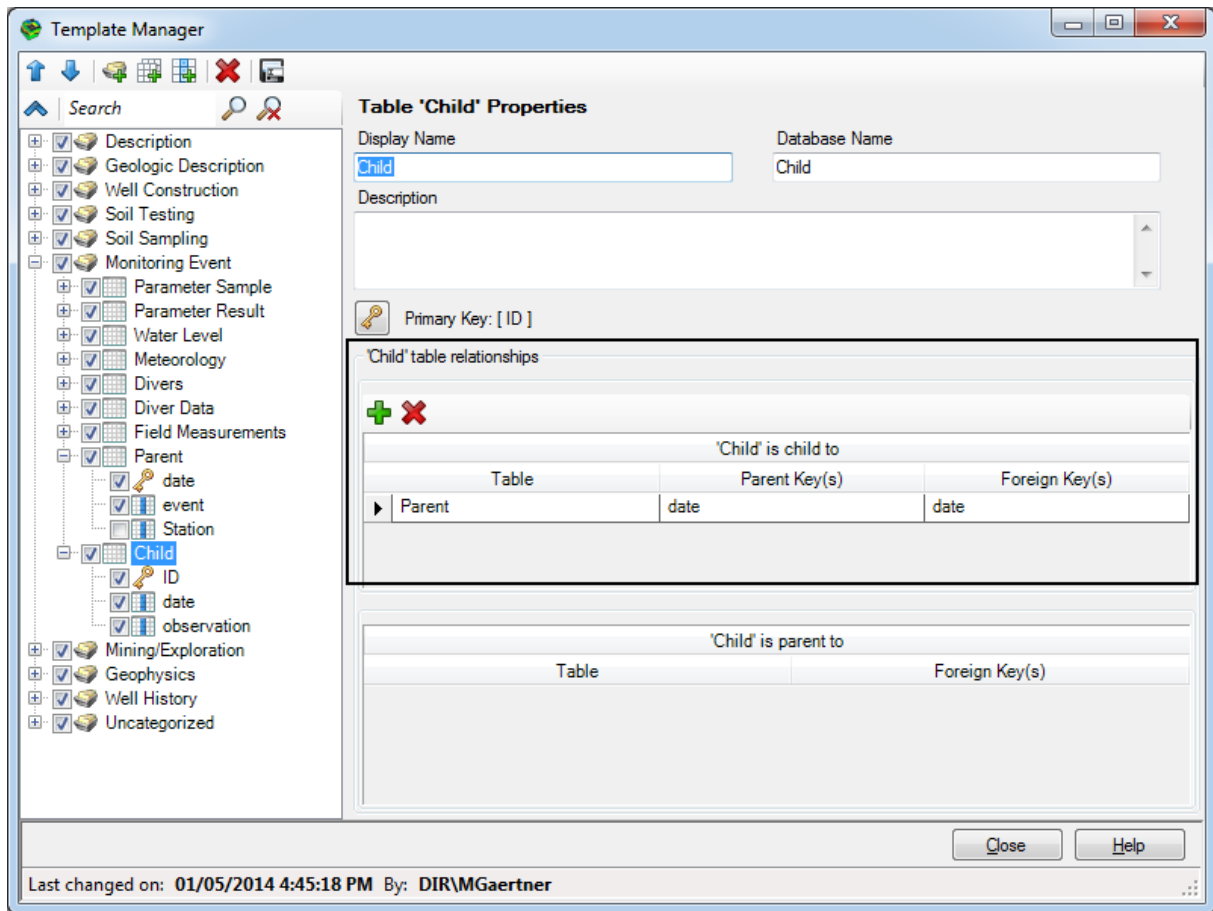


From the drop down list select the parent table (in this example it is called Parent). Then select the date field as the ParentKey and the date field as the ChildKey.




**Note:** it is common practice to use the same name for the field in both the Parent table and the Child table. Additionally the fields must have the same data type.

When you select the OK button and review the Child table you will see that the relationship has been established.

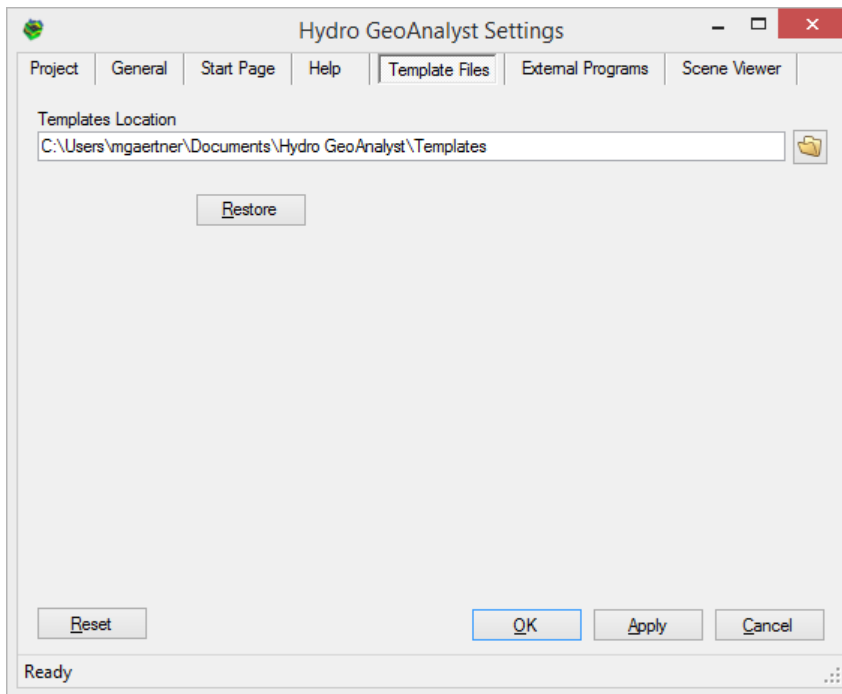


## 6.5 Managing Database Templates

If you have made many changes to the database structure as well as perhaps set up [List Editor](#) lists on fields in your database and think you might want to re-use the structure for another project you should export your project settings as a template by selecting the  icon in the Template Manager.

This will save a \*.hgt file where all your templates are saved. The default location is D:\Documents\Hydro GeoAnalyst\Templates\Project however you may have changed this. You can find out where your HGA template are saved by selecting Project/HGA settings from the main HGA interface.



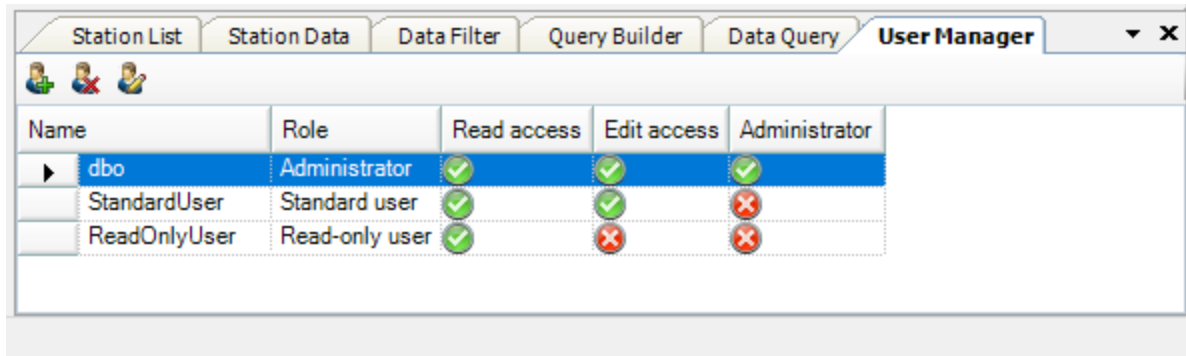


This way when you go to create a new project you will now have the option to select your own database template (instead of just the standard ones provided with HGA).

## 7 User Manager

The User Manager provides the tools to manage user access to the HGA database.

The User Manager provides a direct user interface for adding, removing, and modifying user access permissions to the database. Existing users and their access levels are shown in the main window of the module.



The User Manager module inherits permissions from the SQL database and provides a simple and easy-to-use interface for managing users and their access levels.










### User Access Levels

Users may be granted one of three access levels via the User Manager module:

- Read Access User
- Standard User
- Administrator

Permissions for the user access levels are described in the table below:

User May	Read Access User	Standard User	Administrator
View data	✓	✓	✓
Create/modify data queries	✓	✓	✓
Save data queries	✗	✓	✓

User May	Read Access User	Standard User	Administrator
Modify Data Records in Tables			
Create, Modify, and Delete Fields and Tables			
Modify User Access Levels			



**Please Note:** Administrators cannot delete or demote their own access level.

### [Adding a new user](#)

To add a new user, select the add user button  and the following dialog will appear.

**Add Project User**

Add an existing Windows user or group

Add an existing SQL Server login

User name

Create SQL Server login if does not exist

Password

Confirm password

User roles:

Administrator

Standard user

Read-only user

Note: Passwords are subject to the password policy of the SQLServer instance. For details, see the following:  
<https://docs.microsoft.com/en-us/sql/relational-databases/security/password-policy>

OK Cancel

There are two types of user you may add:


**Windows User or Group:** user accounts and passwords will be managed using Windows Authentication. When using this option, you may only add existing users or groups on a Windows domain.

**SQL Server Login:** permissions are managed by SQL Server. When using this option, you have the option to add existing users or create a new user along with a corresponding password.



**Note:** SQL server login account passwords are subject to the SQL Server password policy as specified in the following link: <https://docs.microsoft.com/en-us/sql/relational-databases/security/password-policy>


## Removing an existing user

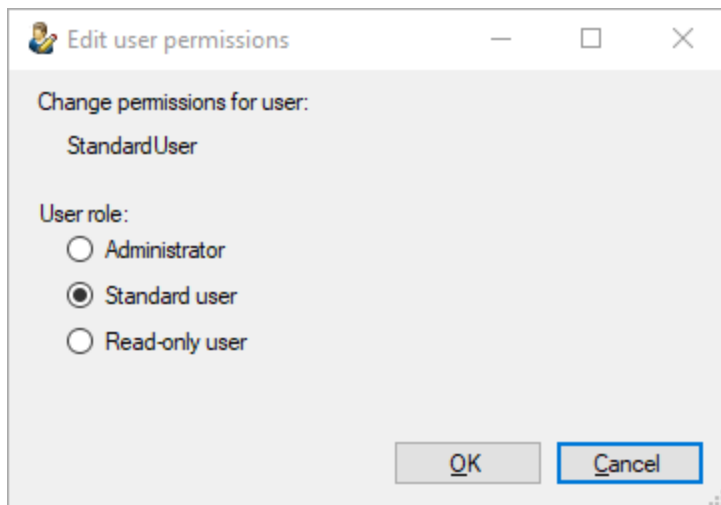
To remove an existing user, select the Delete Selected User button . You will be prompted to confirm the deletion.



**Note:** You cannot delete or modify your own permissions.


## Editing permission levels for an existing user

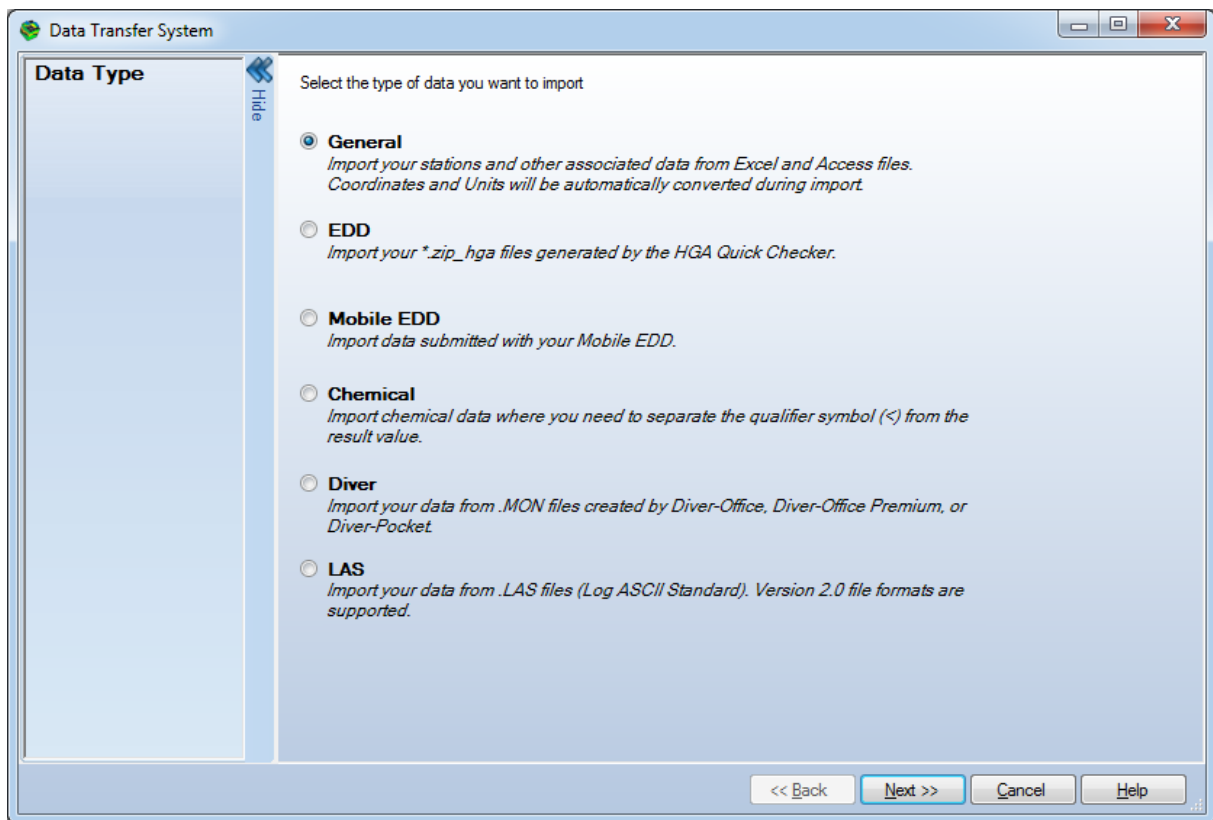
To modify an existing user, select the Edit Selected User button . You will be presented with the option to select one of the three user types for the selected user(s).



## 8 Import Data

The Data Transfer System (DTS) is a flexible tool used for importing data into an HGA project. When starting a new project, it will be necessary to enter data from other sources into the HGA database. While you can enter data manually on the [Station List Tab](#) and the [Station Data Tab](#) or [Non Station Data Tab](#) it is more efficient to import your data.

You launch the DTS by selecting Modules / Import or by selecting the  Import icon from the toolbar. The DTS will launch and give you several options for importing depending on what kind of data you wish to import.



You need to select the option you want and then select the Next button to launch the appropriate module to import your data:

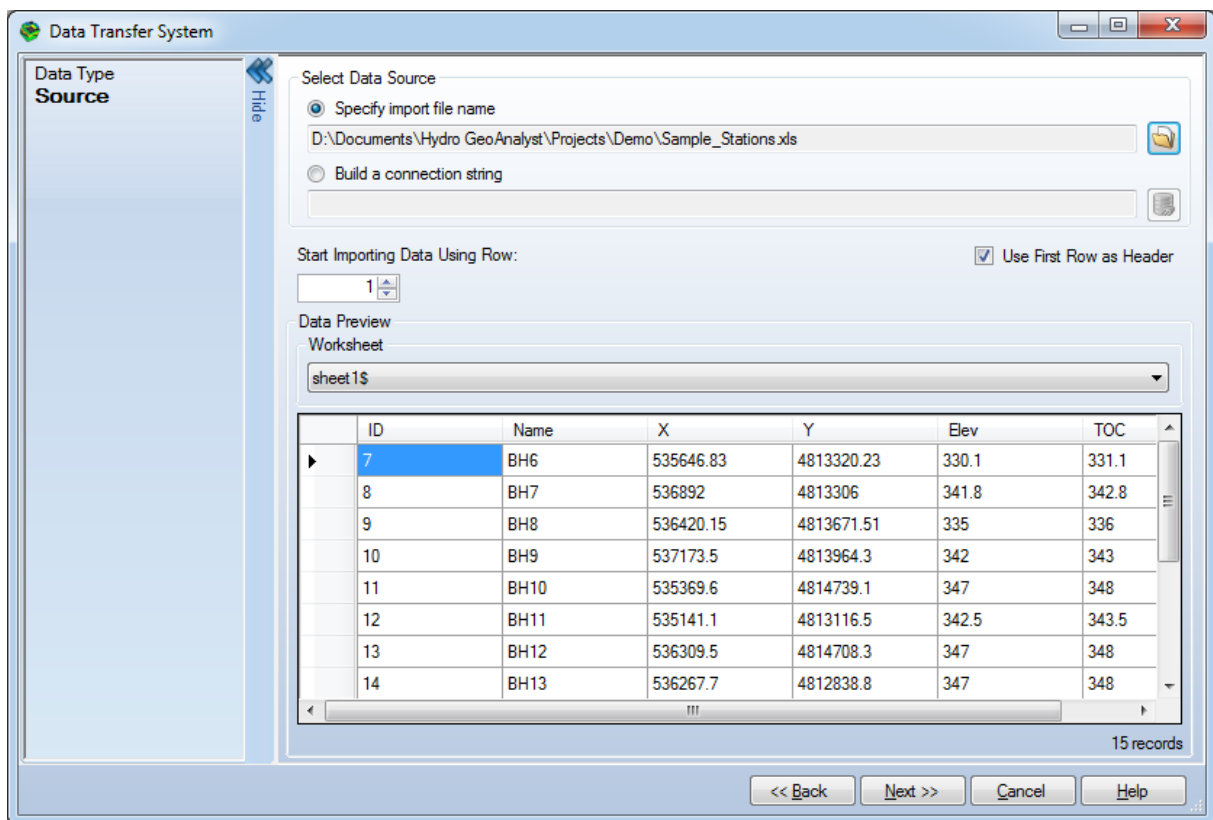
- The [General](#) option should be used when you are importing general tabular data. The general option is particularly recommended when you are importing stations as it will perform coordinate transformations. Additionally, you may convert data units during your import using the General option.
- The [EDD](#) option lets you import the files that have been validated within our Quick Checker program.

- The [Mobile EDD](#) option lets you import data that has been submitted through a Mobile EDD form.
- The [Chemical](#) option is available if you are importing chemical results (usually received from a lab) and you need to separate out text qualifiers (i.e. the < sign) from your result value.
- The [Diver](#) option is available to import pressure transducer data Diver dataloggers.
- The [LAS](#) is available to import Log ASCII Standard (LAS) files, a standard format introduced by the Canadian Well Logging Society in 1989.

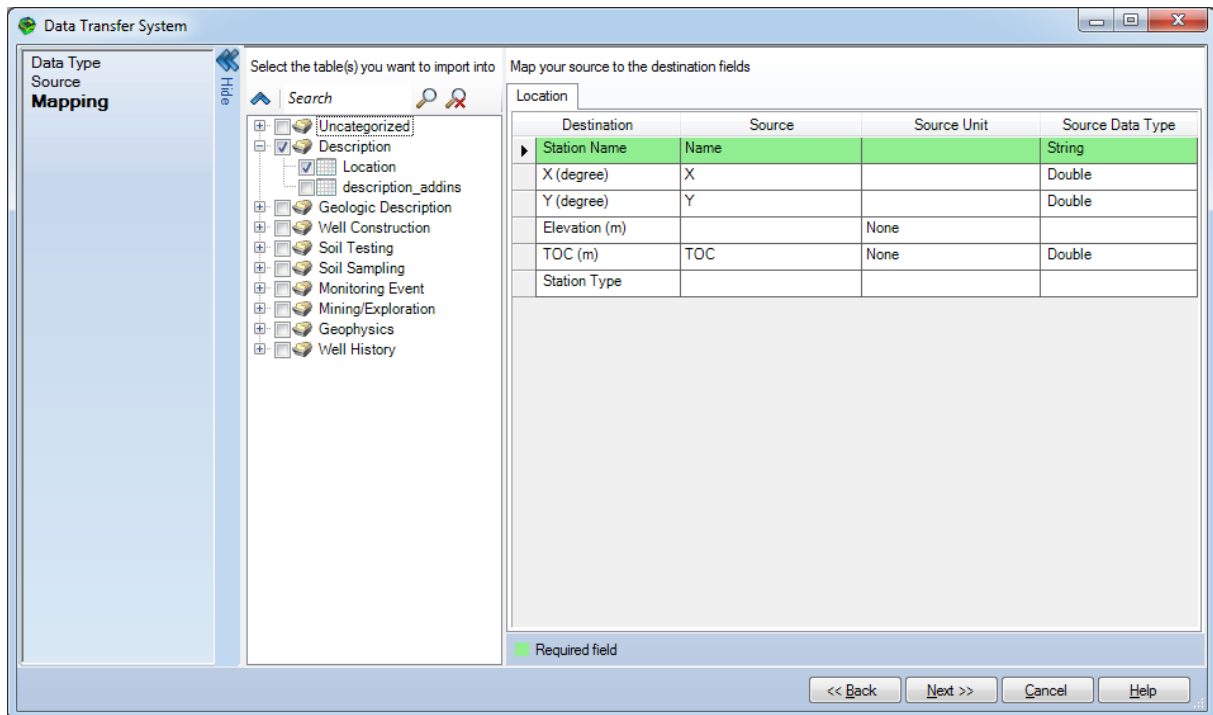
## 8.1 General

The General option begins with you selecting the file you wish to import. It supports the following file formats: .txt, .xls, .xlsx, .mdb, or .acddb.

If you need to you can also build a connection string to another MS SQL Server and import data directly from another database.



Once you have selected a file you will see a preview of the data. Select the Next button to proceed to the Mapping step.

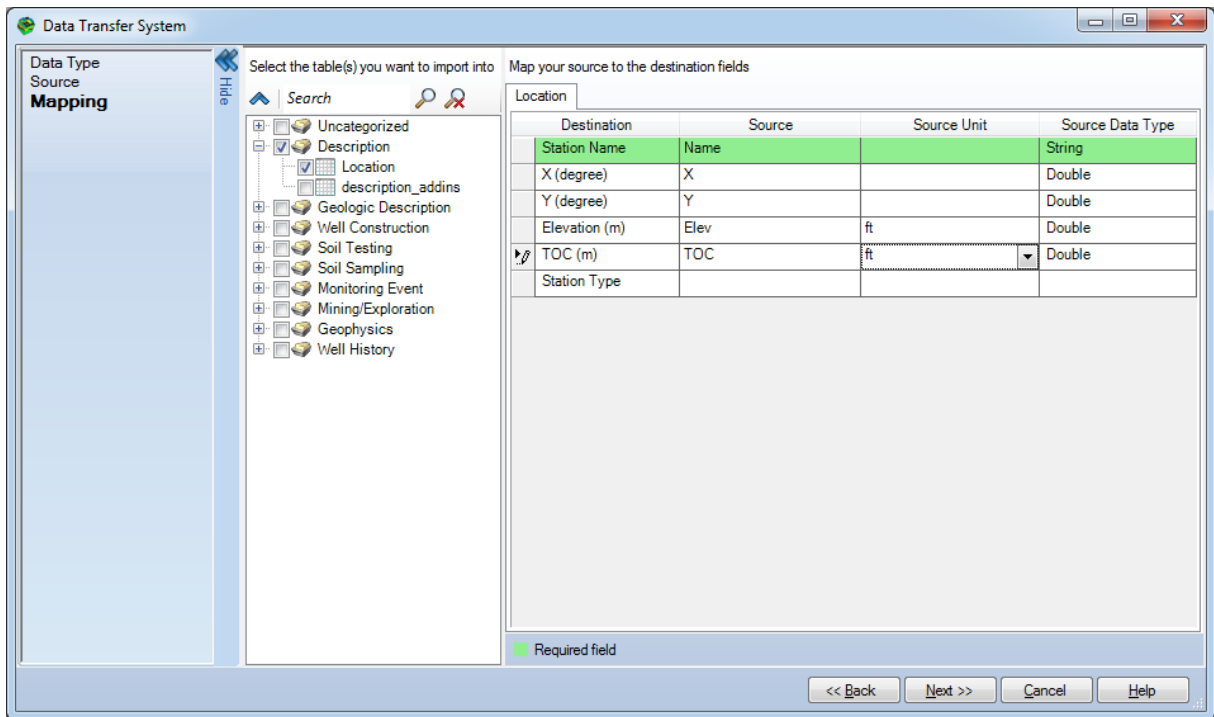


On the Mapping step you need to select the table you wish to import into. In the example above I selected the Location table (i.e. the station table) as I am going to import new stations into my project.

Once I have selected the table I want to import into I can see the fields for that table on the right hand side. Any required fields are highlighted green. The minimum required is the Station Name. You will also notice that if the column headers in my source file (an Excel spreadsheet in this case) is the exact same as the field in the database - they will map automatically. It seems my column for elevation did not map - this is because in my excel spreadsheet I just called it Elev - so I must map this myself by picking it from the drop down.

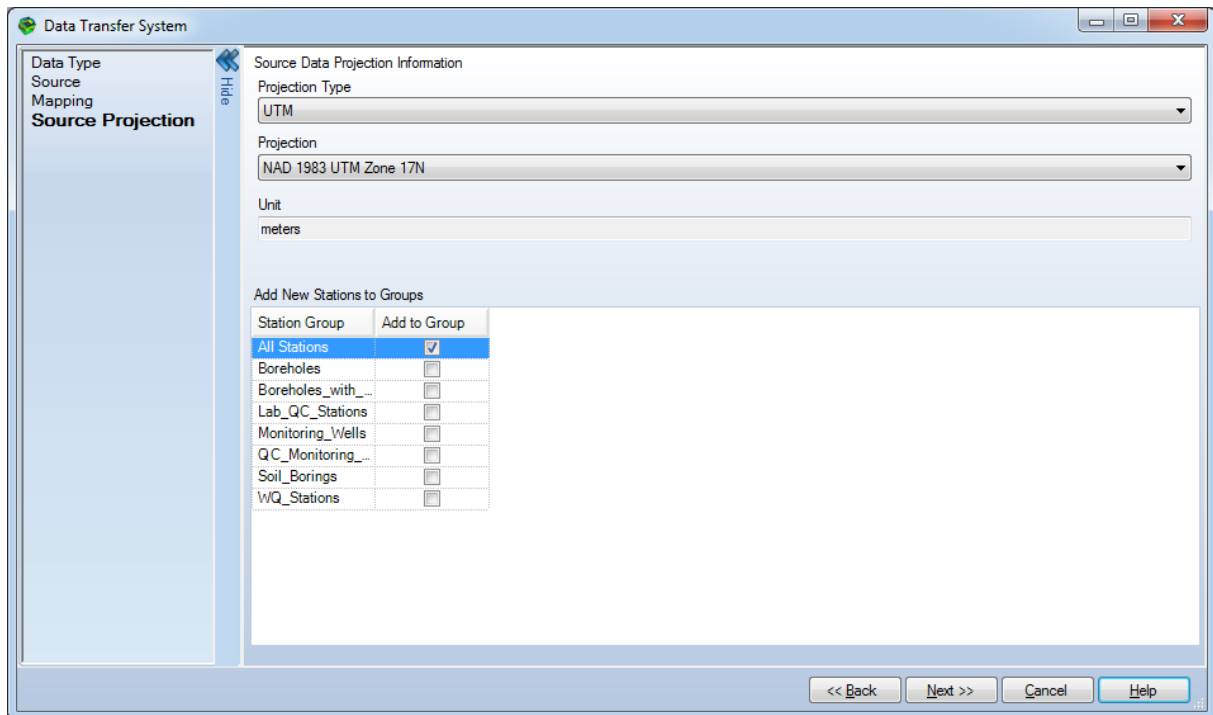
Additionally I need to indicate the unit for both the Elevation and TOC fields. As mentioned previously this is to allow for unit conversion during the import process. You can see the database I am trying to import into has the Elevation and TOC set as meters (unit is found in brackets in the Destination column). So if my source file is in feet I need to indicate that here.





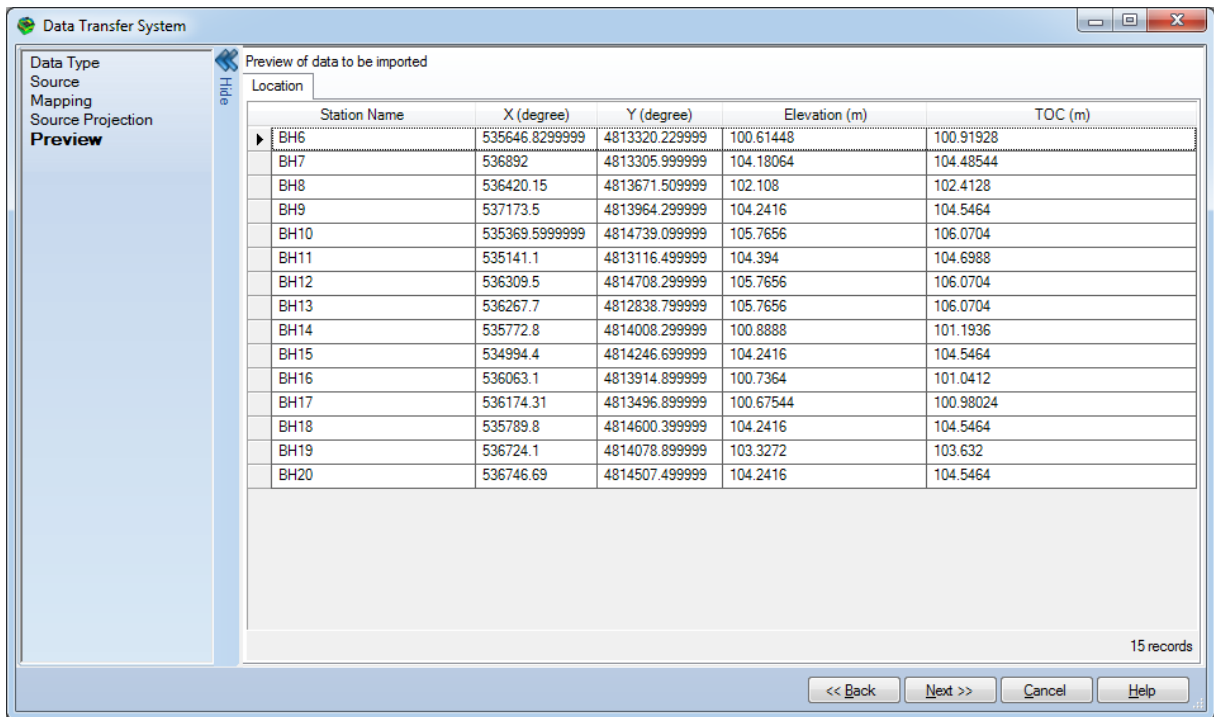
Select the Next button to move on to the next step - indicating the Projection. This step will only appear if you are importing into the Location (Station) table as you need to indicate what projection your X and Y coordinates are in.

In this case they are in the same projection as my project - so this is selected by default.

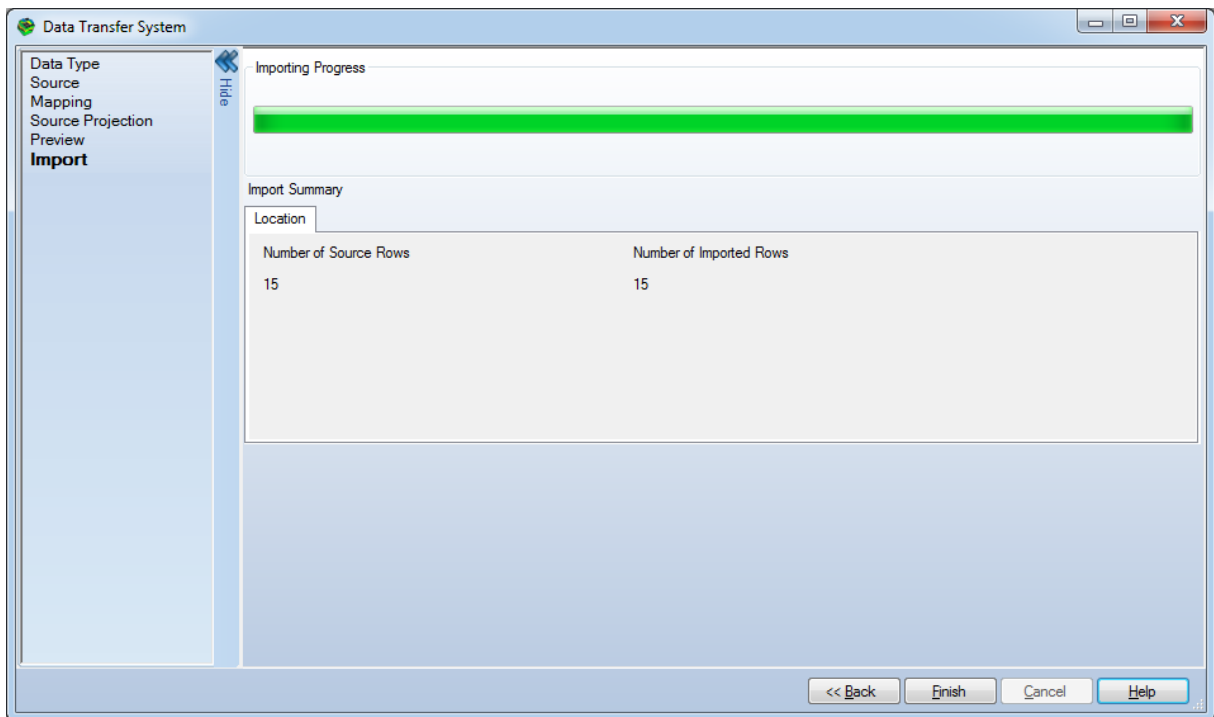


You also have the option to indicate if you wish to put these stations into a specific Station Group. By default all stations will go into the All Stations station group - but you can also place them into additional groupings to help you organize your stations (this can be very useful later when you are querying the database).

When you select the Next button you will see a preview of the data to be imported.



You will notice that the Elevation and TOC have been converted into meters. Select the Next button to perform the import.



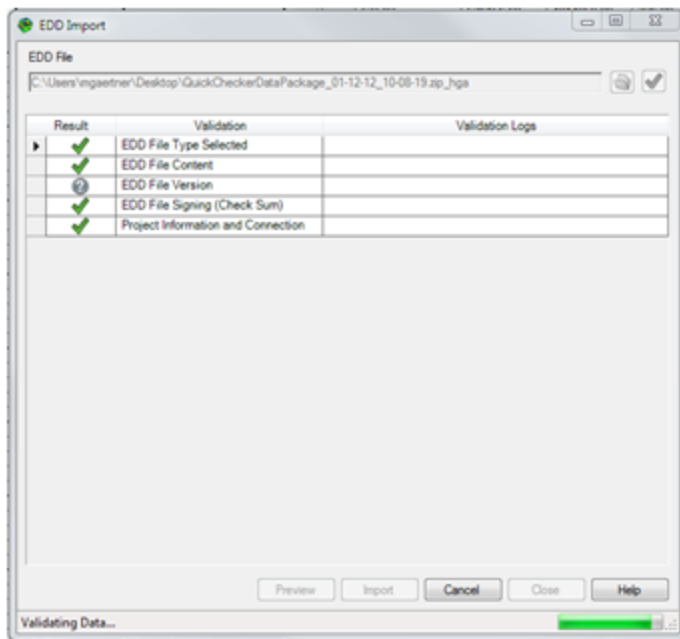
You can watch the progress of your import. When it is completed it will summarize how many records were in your source file and how many were imported so you can compare. If data contained any errors or caused any warnings a dialog would appear that summarizes the problems with your data.

Select the Finish button to close the wizard. Your new stations should now be available within the Station List tab.

## 8.2 EDD

The EDD option prompts you to specify the location of the \*.zip\_hga file that was generated within the HGA QuickChecker.

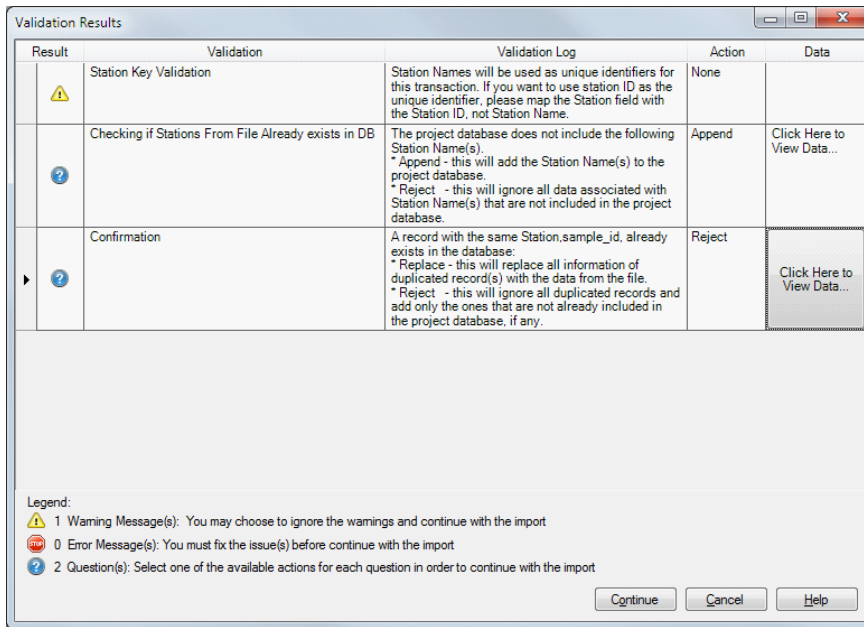
Please be aware that you should not attempt to unzip or modify the file in any way as this can invalidate the file and cause difficulties importing the data.



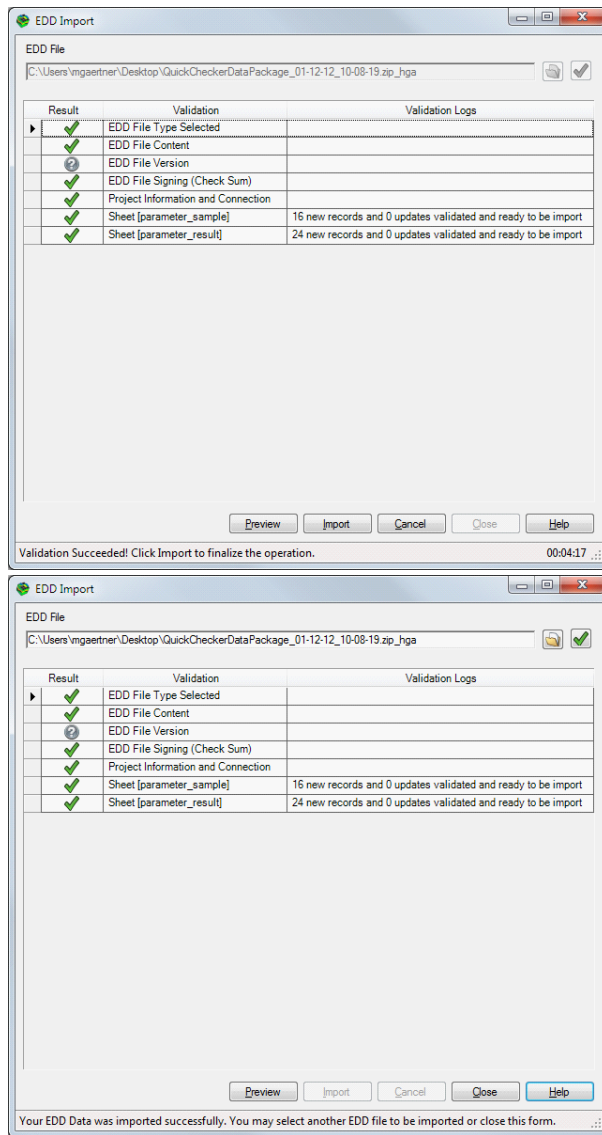
As soon as the file is validated you will see the Validation Results dialog appear. Here you may need to answer a question before continuing. For example the Validation found that some of the station names I am trying to import do not exist in the database – therefore I can choose to append the new station names or reject records for stations that do not exist. I make my choice by selecting the appropriate option in the Action column. If I wish to see which stations are not currently in the database I can select the Click Here to View Data option. For this example I choose to Append the stations (so any station names in my data that are not in the database will be automatically added).

Then the validation also found I have duplicates in the database – some of the sample IDs already exist in the database! Again, I can select what I want to do – either overwrite what is in

the database or reject the duplicate sample IDs. For this example I will reject these sample IDs.



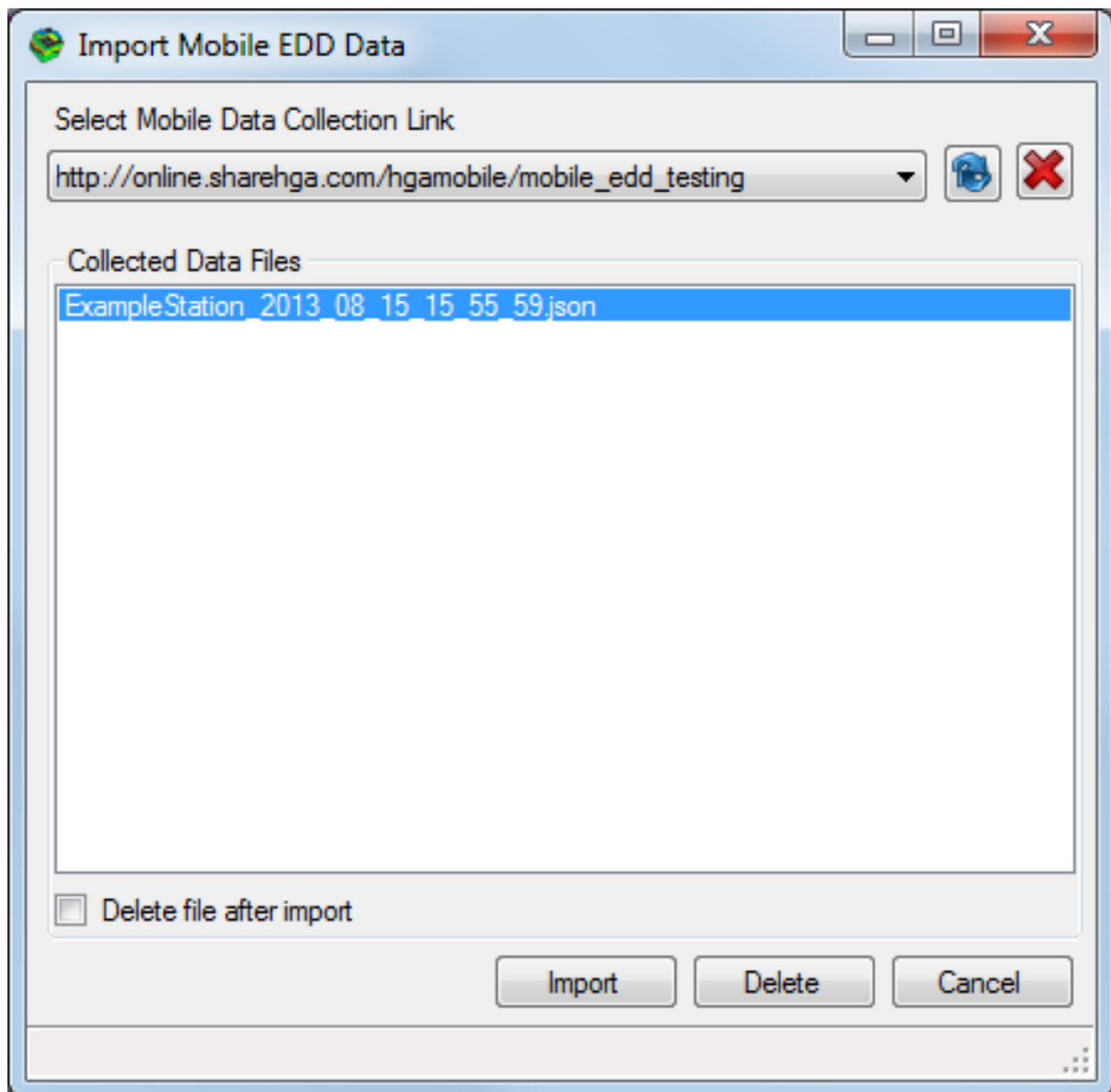
Now I can continue with the import. Now the Import dialog is updated – and I can see how many records will be imported.



Select the Import button to import the records – and the import dialog updates to inform you that the import was successful. Now you can select another EDD file to import or close the dialog box.

### 8.3 Mobile EDD

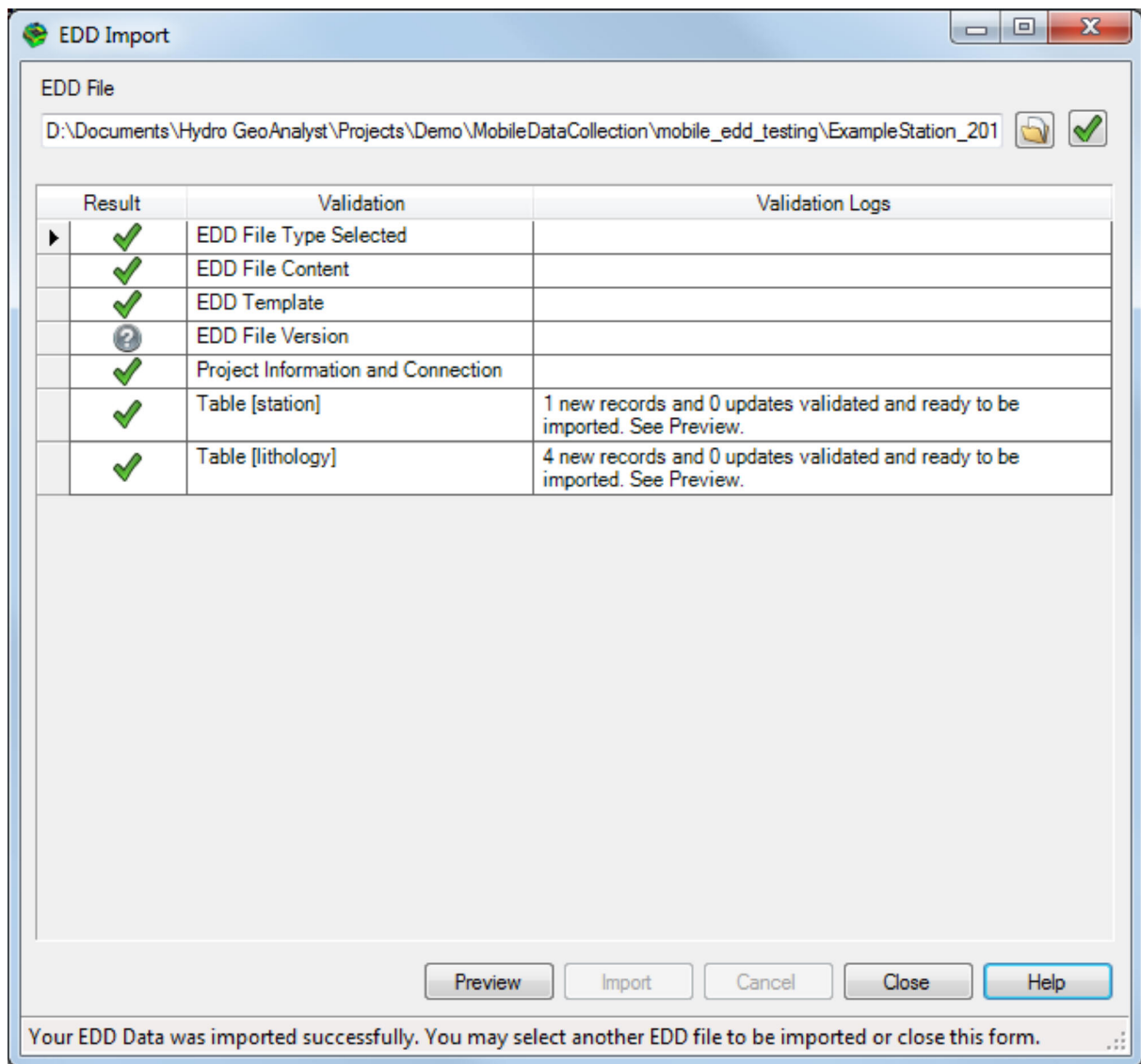
The Mobile EDD option allows you to import data that was submitted by a Mobile EDD.



HGA will remember the Mobile EDD's that you published for your project – you can select them from the drop downlist. Then hit the refresh button to see the files that were submitted from this site.

Select the file you wish to import and select the Import button.

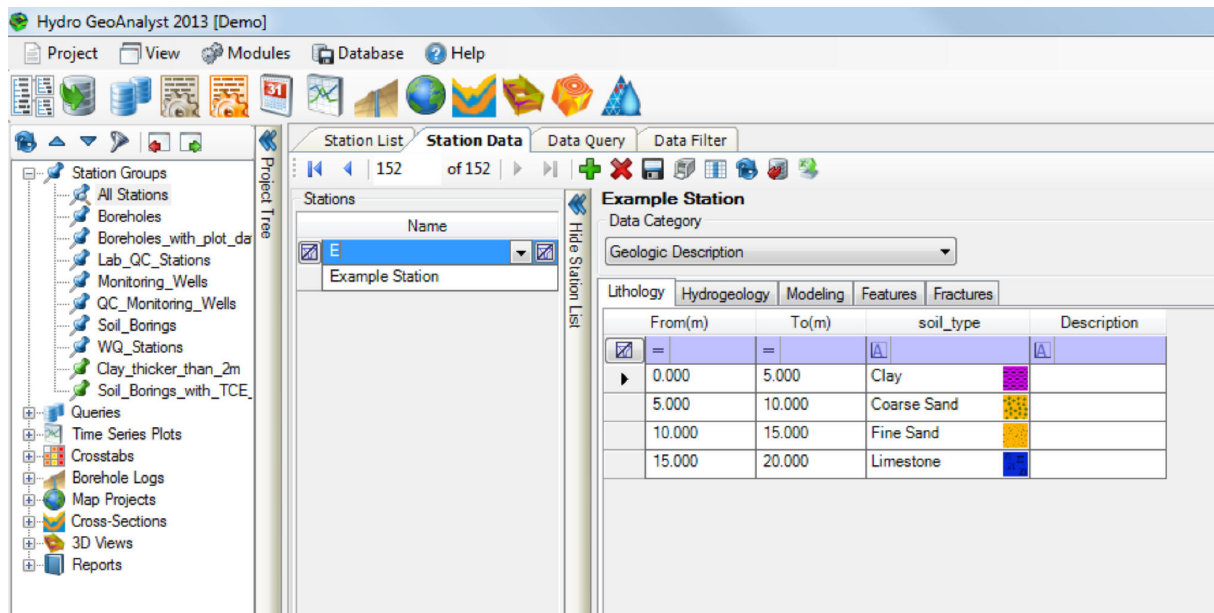
You will see a validation dialog which shows how many new records will be imported. In this example I created one new station and entered 4 new lithology records.



Select the Import button to finalize the import process.

I can review the data that was imported within HGA – for example here are the 4 new lithology records imported:



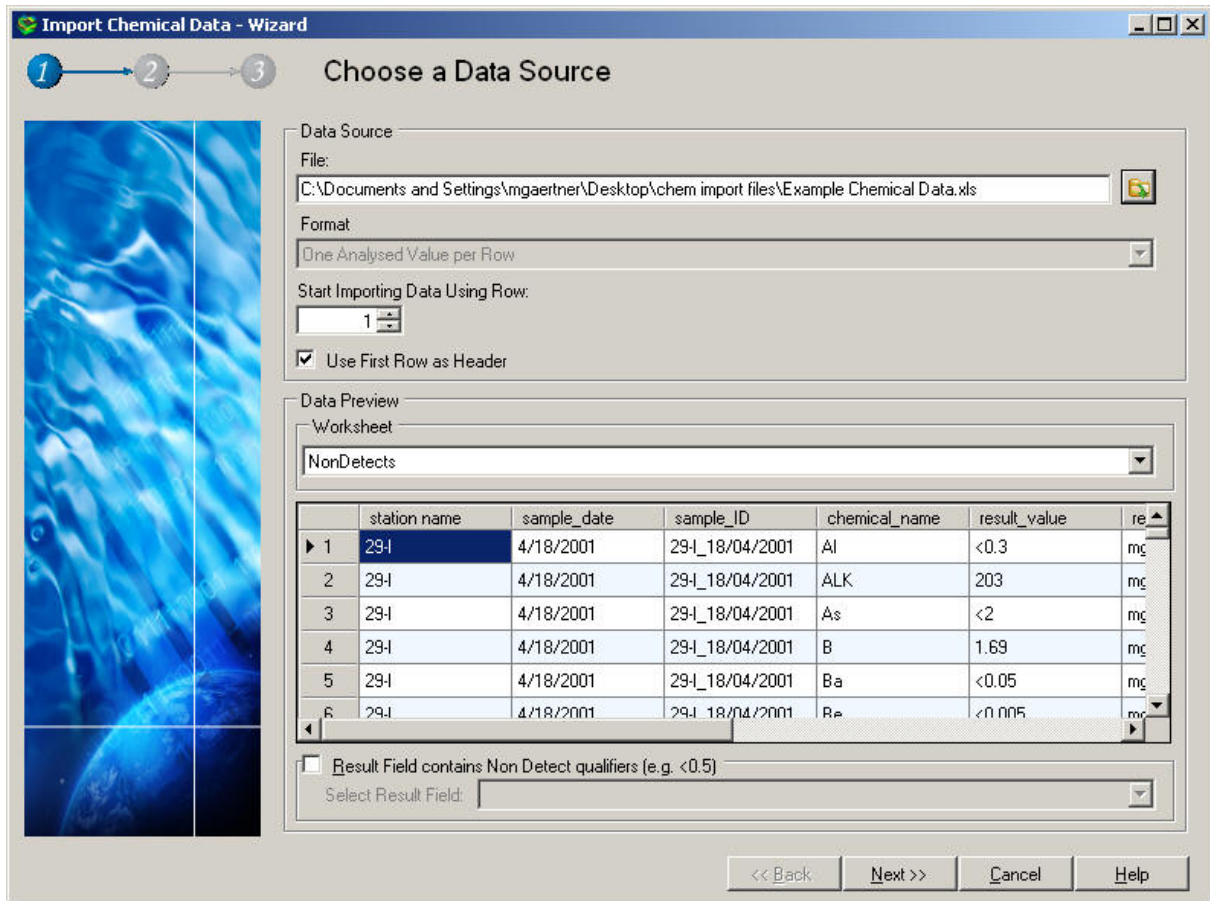


## 8.4 Chemical

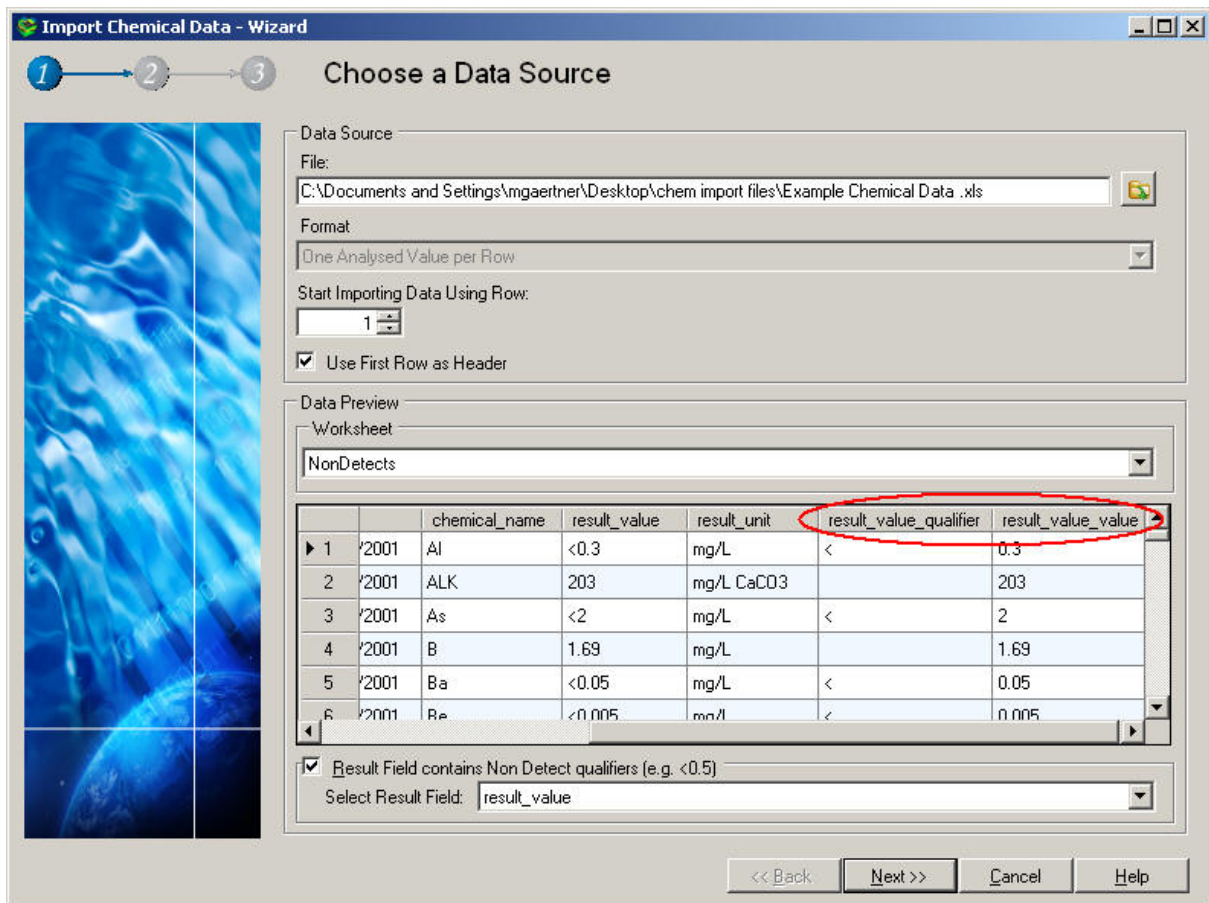
Use this option for importing your chemical data (samples and results) when stored in an .xls or .xlsx file. Please be aware you need to have a primary key on your Result table that consists of the Sample ID and Chemical Name fields in order to import your chemical data with this import routine. Please see Template Manager section for further information on setting a primary key.

### Step 1 Choose a Data Source

Select the source file you wish to import and you will see a preview of your data. You also have options for setting which row to begin importing at and if the first row contains header information.



You also have the option to select if your result field contains Non Detect qualifiers (e.g. <0.5), when you select the result field you will find that 2 new columns of data appear in your data preview. one that contains just the qualifier and one that contains the value. These columns can then be used for the mapping in Step 2.



**Import Chemical Data - Wizard**

1 → 2 → 3 **Choose a Data Source**

**Data Source**

File: C:\Documents and Settings\mgaertner\Desktop\chem import files\Example Chemical Data .xls

Format: One Analysed Value per Row

Start Importing Data Using Row: 1

Use First Row as Header

**Data Preview**

Worksheet: NonDetects

		chemical_name	result_value	result_unit	result_value_qualifier	result_value_value
▶ 1	'2001	Al	<0.3	mg/L	<	0.3
2	'2001	ALK	203	mg/L CaCO3		203
3	'2001	As	<2	mg/L	<	2
4	'2001	B	1.69	mg/L		1.69
5	'2001	Ba	<0.05	mg/L	<	0.05
6	'2001	Be	<0.005	mg/L	<	0.005

Result Field contains Non Detect qualifiers (e.g. <0.5)

Select Result Field: result\_value

<< Back Next >> Cancel Help

## Step 2 Data Mapping

This step requires you to select the category and result table you wish to import the data into. Fields highlighted in green are required. You also have the option to show the fields from the sample table - this allows you to import information other than the Sample ID into the sample table (for example the sample date).

As mentioned in Step 1 - here you can map the newly created result value\_value and result value\_qualifier fields. All data within your result field that appears as a string (i.e. text) will have been separated into the result\_value\_qualifier field. While all data that appears as double (i.e. a number) will have been separated into the result value\_value field.

Import Chemical Data - Wizard

1 → 2 → 3 Data Mapping

Source

Map Source Fields to Destination Fields

Use	Name	Type
<input checked="" type="checkbox"/>	station name	String
<input checked="" type="checkbox"/>	sample_ID	String
<input checked="" type="checkbox"/>	chemical_name	String
<input checked="" type="checkbox"/>	result_value_value	Double
<input checked="" type="checkbox"/>	result_unit	String
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input type="checkbox"/>		
<input checked="" type="checkbox"/>	result_value_qualifier	String
<input type="checkbox"/>		
<input type="checkbox"/>		
<input checked="" type="checkbox"/>	sample_ID	String
<input type="checkbox"/>		
<input type="checkbox"/>		
<input checked="" type="checkbox"/>	sample_date	DateTime
<input type="checkbox"/>		

Destination

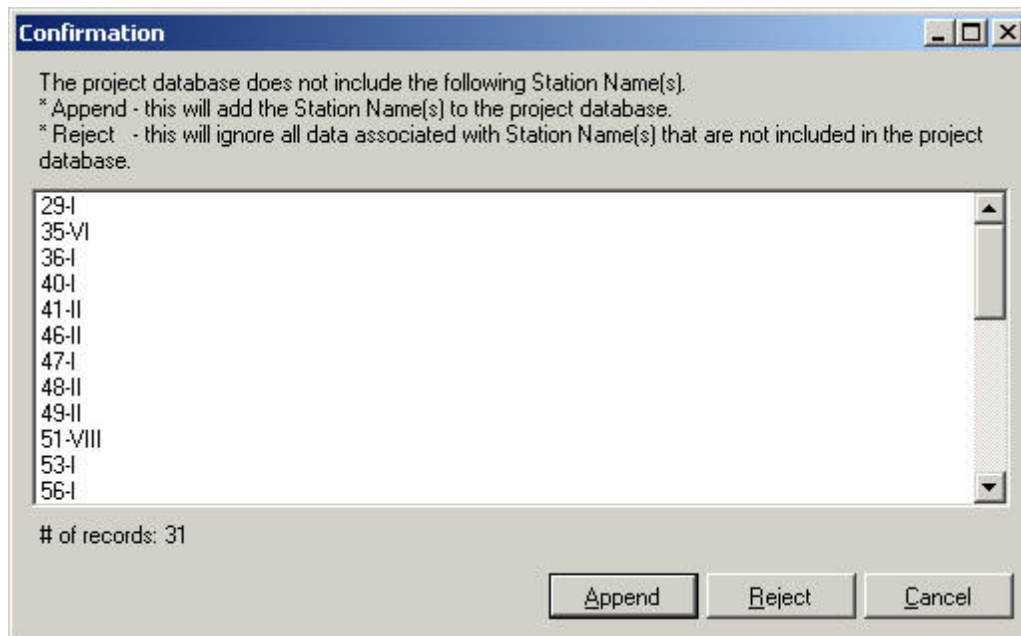
Category: Monitoring Event Table: Parameter\_Result

Field Name	Type	Table
Station		
Sample ID	STRING	parameter_result
Chemical Name	STRING	parameter_result
Result Value	DOUBLE	parameter_result
Result Unit	STRING	parameter_result
Reporting Detection L...	DOUBLE	parameter_result
Sampling Precision	DOUBLE	parameter_result
Fraction Code	STRING	parameter_result
Analysis Method	STRING	parameter_result
Qualifier	STRING	parameter_result
Outlier	STRING	parameter_result
Comment	STRING	parameter_result
Sample ID	STRING	parameter_sample
Lab ID	STRING	parameter_sample
Duplicate	STRING	parameter_sample
Quality Control	STRING	parameter_sample
Sample Date	DATESTAMP	parameter_sample
Sample Time	TIMESTAMP	parameter_sample

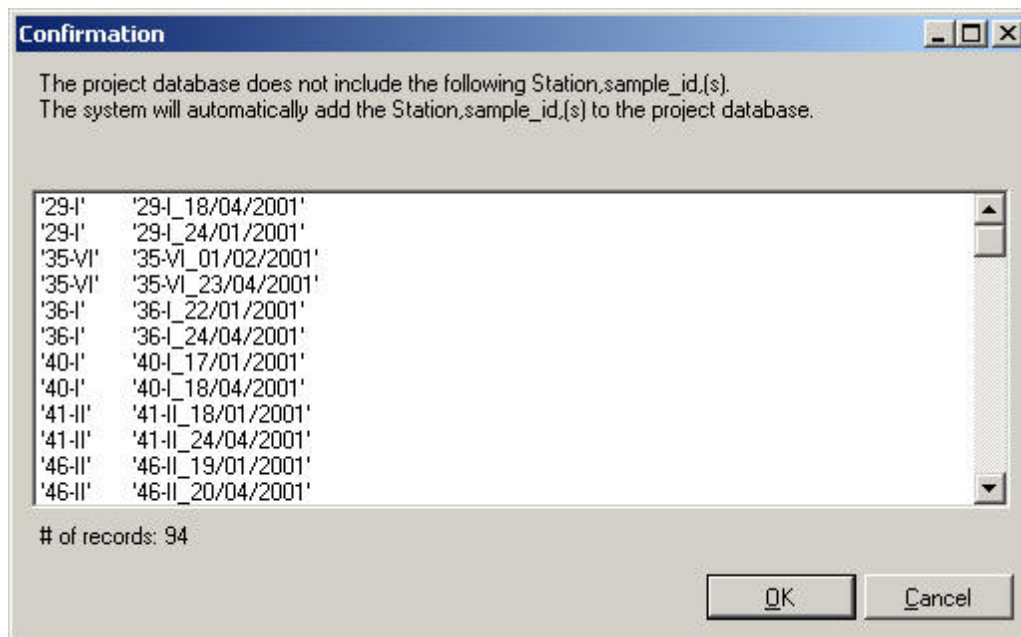
Required Fields  Show parameter\_sample fields

<< Back Next >> Cancel Help

After selecting the next button you may receive a message indicating that some station names were not found within the database. You will have the option to append the stations to you station table or reject those stations (and the data associated with those stations).

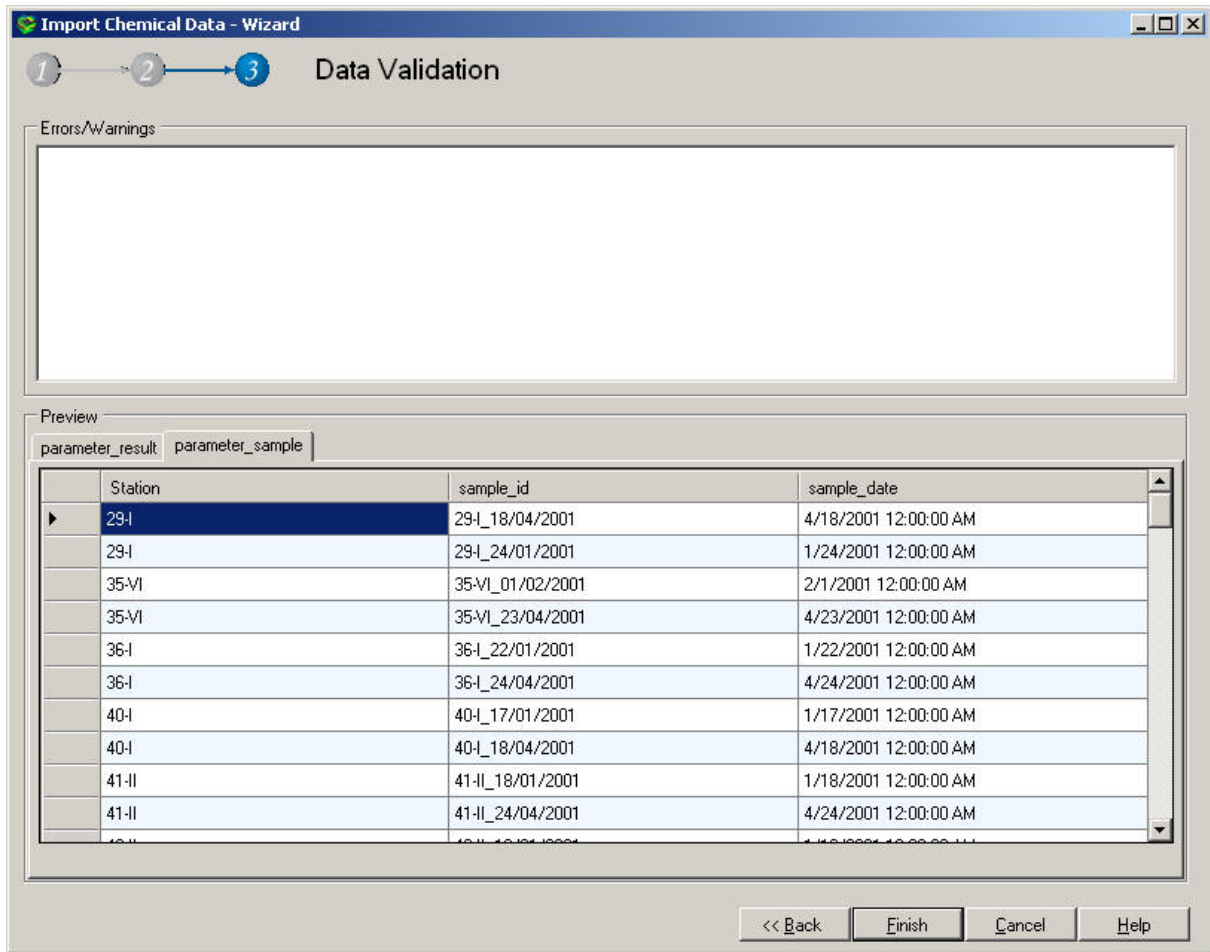


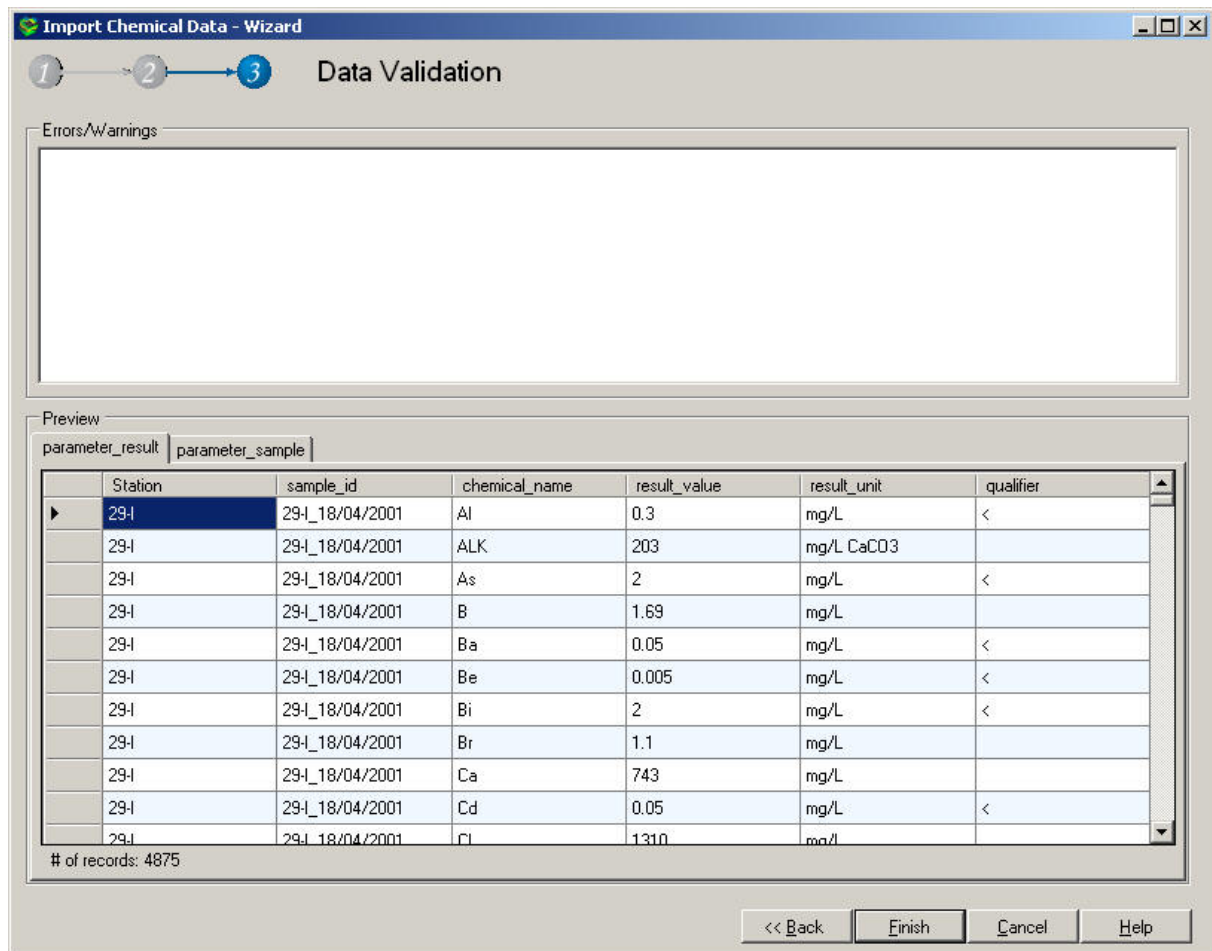
And then you will receive a message indicating any sample ID's that are not in your database which will be added.



### Step 3 Data Validation

In the last step you will see a preview of the data to be imported into the sample table as well as into the results table. By selecting Finish the data will be imported. Any errors or warning will also be displayed.





After the records are successfully imported you will receive a message indicating how many records were imported.



## 8.5 Diver

This option allows for importing data from a MON file, a format generated from datalogger monitoring software such as Diver-Pocket, LoggerDataManager, or Diver-Office. MON files consist of three sections: Logger Settings, Data Series and Data.



The Logger Settings section contains the current settings of the logger including the location, sample method, sample interval, serial number and available channels.

The Data Series section contains information on when field measurements were taken.

The Data section contains all the measurements for each channel, ordered by date and time.

To import MON file data into your database, follow the steps below:

- STEP 1: Select MON Data Files
- STEP 2: Map Data Fields
- STEP 3: Import Data into the Database



**Please note:** that the MON data import procedure can accommodate multiple MON files simultaneously. However, for demonstration purposes, only one MON file will be used in the following guide.

Also, before you import data from MON files, the water level values need to be compensated with respect to the top of the well casing. This can be done through Van Essen datalogger software (Diver-Office, Data Logger Manager) by performing barometric compensation on the MON data, using the "Top of Casing" method.

Diver data applications, e.g., Diver-Office, allow you reference the water level data in various ways, i.e., with respect to the top of casing, with respect to a vertical datum, or with respect to the Diver itself. The first step is to specify how the water level data is referenced in the MON file.



**Please note:** If you wish to show water level data on cross sections and borehole log plots, the water level data must be reference to the top of casing (or ground surface) and the data must be imported into the Water Level table.

### [STEP 1: Select MON Data Files](#)

---

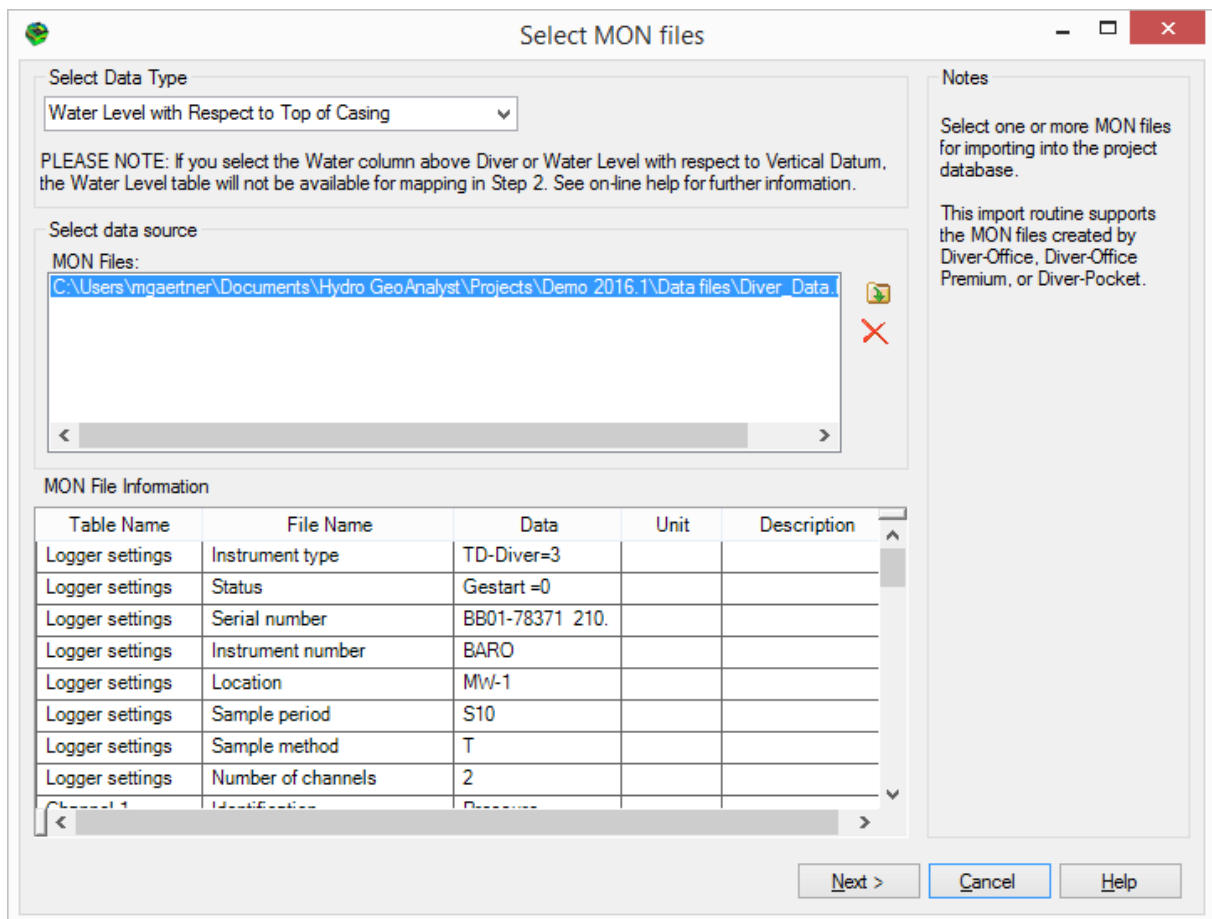
Specify the MON data source:

Click the Open Folder button 

Locate and select a MON file(s), and click [Open].

The selected MON file(s) will now appear under the Select data source frame (shown below).



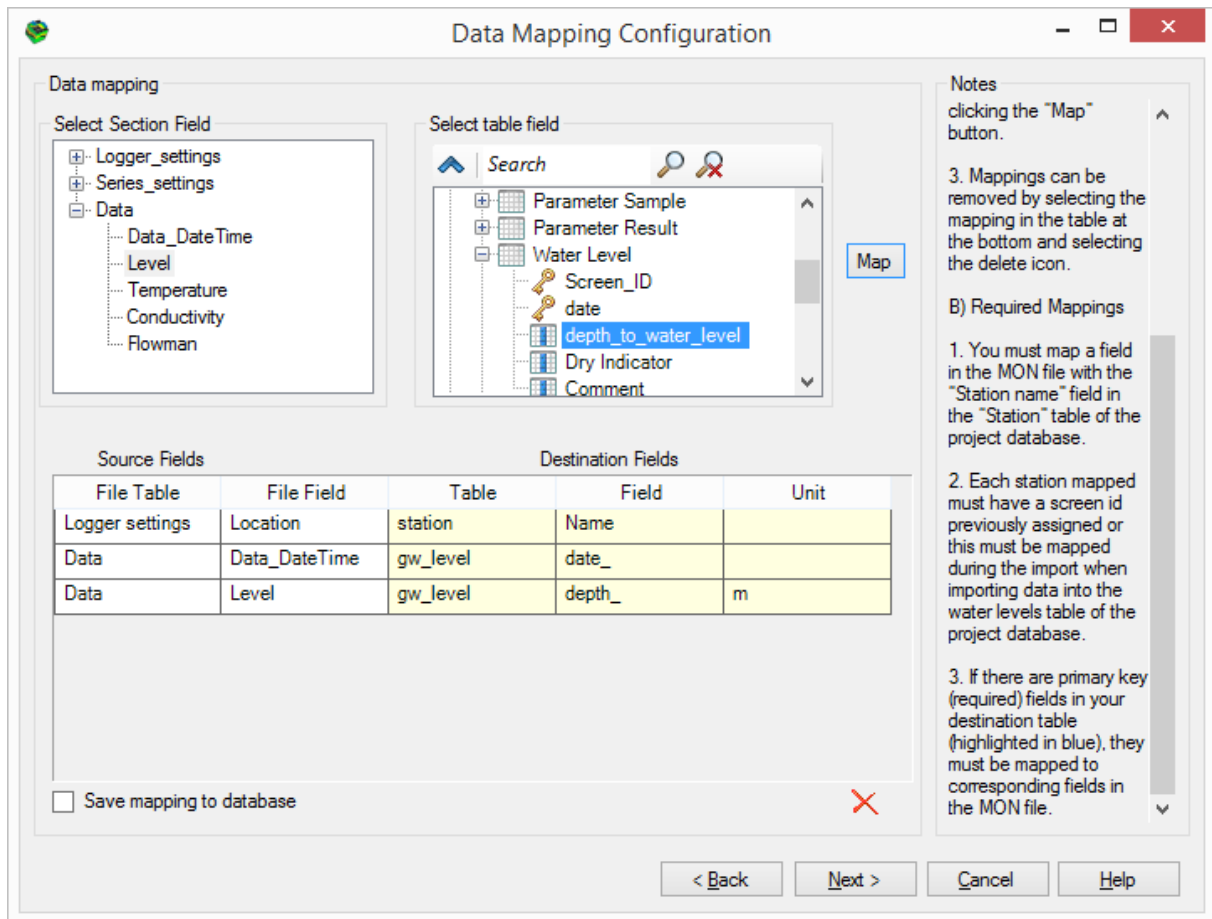


Below the Select data source frame is the MON file Information table. This table contains the datalogger information of the selected MON file.

To remove a MON file from the list, select the file and click the Delete button .

Select the Next button to proceed to Step 2: Data Mapping.

## STEP 2: Map Data Fields



The next step in the MON data import operation is to map the MON file fields (source) with the appropriate database fields (destination). To map a source field with a destination field,

- Select a source field from the MON file in the Select Section Field frame
- Select the matching HGA destination field from the Select Table Field frame
- Click the Map button.

### Rules for Mapping

The Station Name field of the Location table must be mapped.

All destination tables and fields must already exist in the HGA database.


All channel tables (e.g. Level, Temperature, Conductivity, Oxygen) in the database must include a Screen ID.

All mapped tables in the database must have primary key(s) mapped.

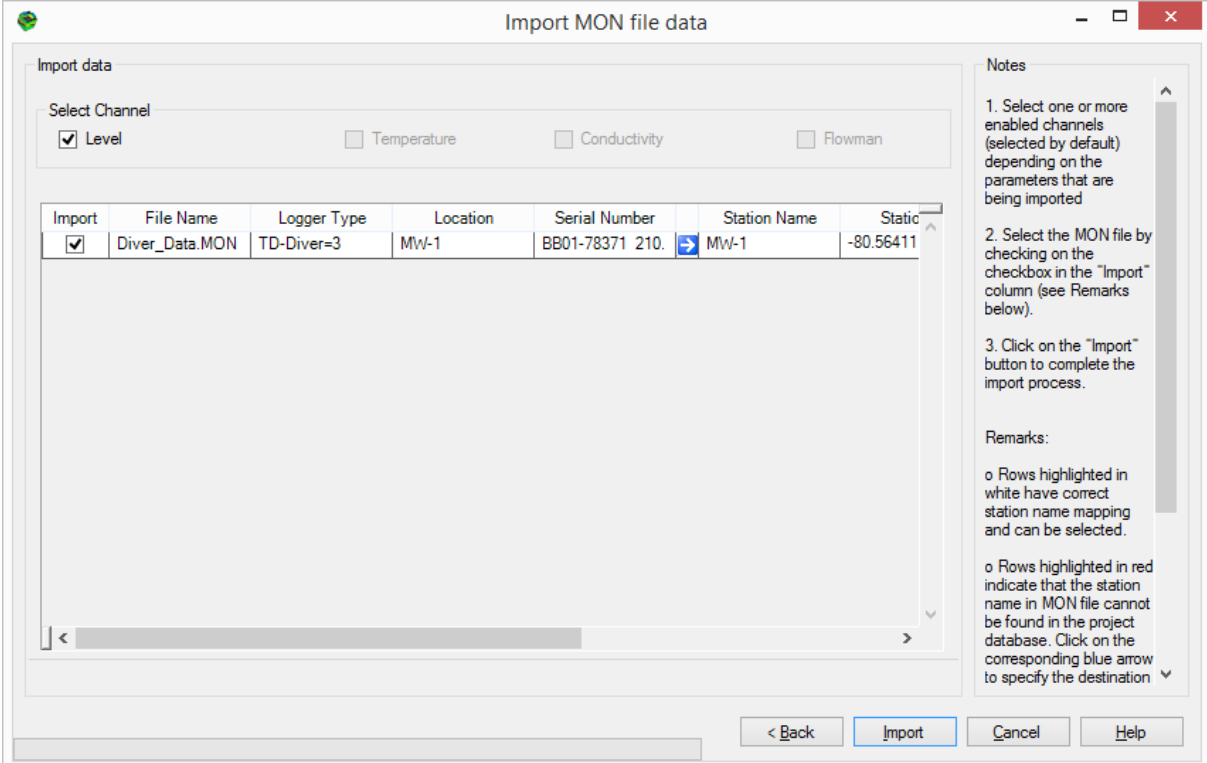
Data type of mapped fields must be compatible.

The mapped fields will now display in the table at the bottom of the Data Mapping Configuration dialog. Repeat this process for additional fields.

To remove mapping,

- Select the appropriate row in the preview grid
- Click the Delete button .
- Select the Save mapping to database checkbox to retain the mapping for future MON file import operations.
- Select the Next button to proceed to Step 3: Importing Data into the Database.


### STEP 3: Import Data into the Database



Import data

Select Channel

Level  Temperature  Conductivity  Flowman

Import	File Name	Logger Type	Location	Serial Number	Station Name	Static
<input checked="" type="checkbox"/>	Diver_Data.MON	TD-Diver=3	MW-1	BB01-78371 210	 MW-1	-80.56411

Notes

1. Select one or more enabled channels (selected by default) depending on the parameters that are being imported
2. Select the MON file by checking on the checkbox in the "Import" column (see Remarks below).
3. Click on the "Import" button to complete the import process.

Remarks:

- o Rows highlighted in white have correct station name mapping and can be selected.
- o Rows highlighted in red indicate that the station name in MON file cannot be found in the project database. Click on the corresponding blue arrow to specify the destination

< Back Import Cancel Help

From the Select Channel frame, select a parameter (i.e. Level, Temperature, Conductivity, Flowman). NOTE: A selection is not necessary if all the channels are inactive (greyed-out).

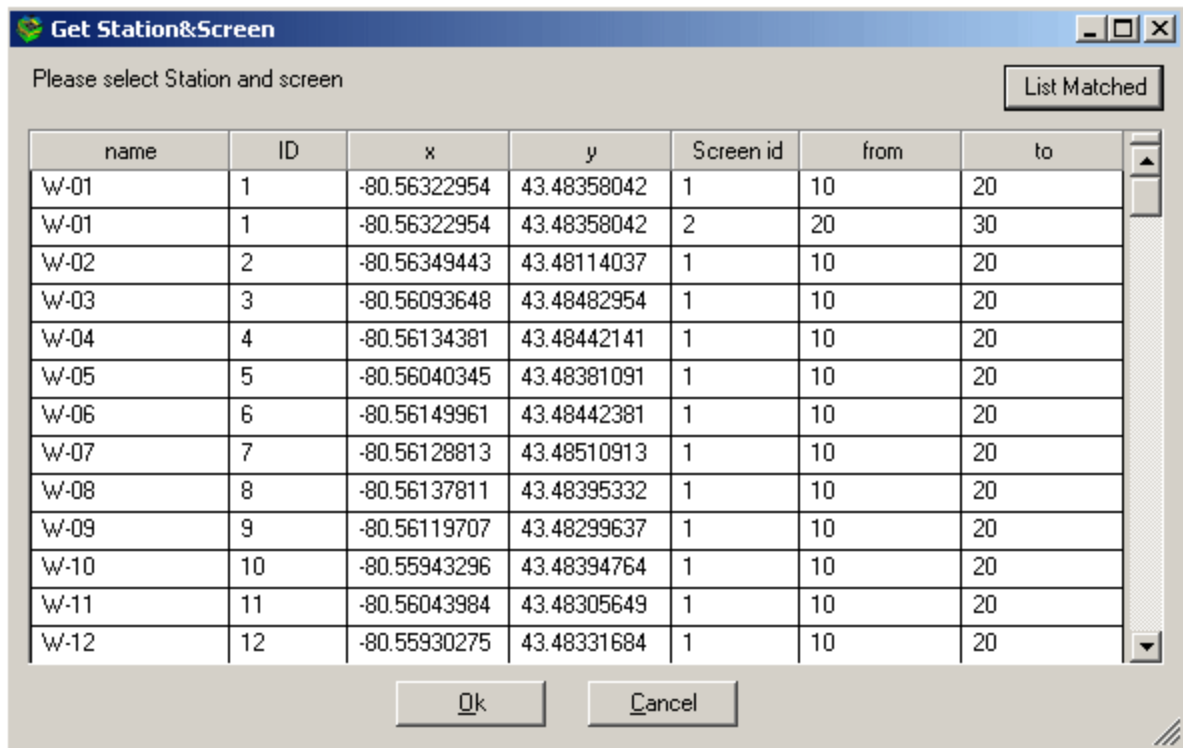
HGA will read the station name in each MON file, and attempt to find an appropriate station match in the current HGA project database. If one is found, you may proceed. Otherwise, the field will display a color and you must specify the appropriate destination station name.

The color displayed in the information table represents the number of station names that can be matched with the location information in the MON file.

- **White:** indicates that a single station name has been found.

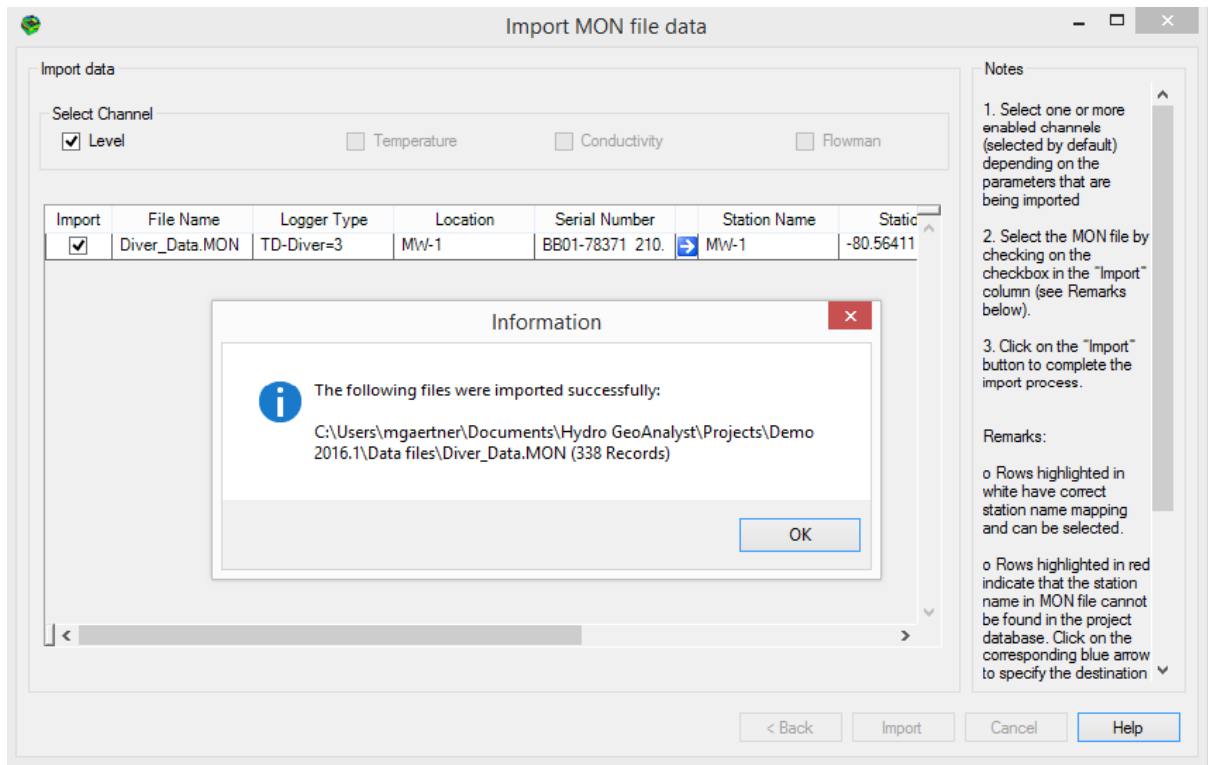
- **Red:** indicates that a matching station name could not be found.
- **Yellow:** indicates that two or more matching station names exist in the database.

If a row is either red or yellow, click the  button and manually specify a destination station name from the database.



From the Get Station&Screen dialog, select a destination station and a screen id. Click the List Matched button to open the List Matched dialog. This dialog will display all the possible station and screen\_id combinations that match the MON data. After selecting, click [Ok].

Click the [Import] button to finalize the data import. Selecting the OK button will close the import dialog.



## 8.6 LAS

This option allows for importing data from an LAS (Log ASCII Standard) file, a standard format introduced by the Canadian Well Logging Society in 1989.

The LAS file contains two types of sections:

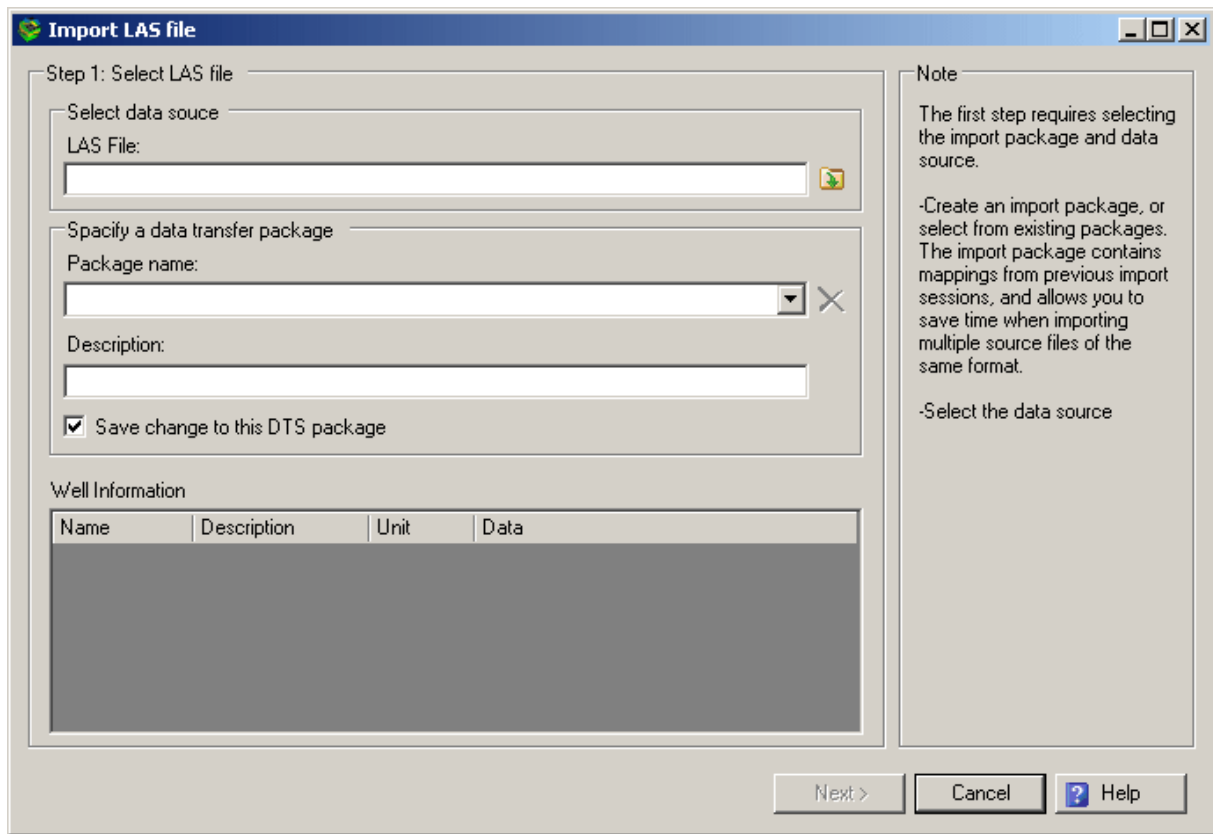
- **Well Information Section:** data related to the station (location, driller, etc.)
- **Parameter/Curve Information Sections:** descriptive and/or measured data for one or more down hole parameters.

When importing the LAS file in HGA, the following options are available:

Import the Well Sections and Parameter/Curve sections; use this option if you want to import a new station, and one or more measured parameters for this station. A new station will be added to the database, using station details (name, co-ordinates, etc.) in the LAS file. If the station already exists in HGA, you will be prompted to overwrite the details, using those in the LAS source. In addition, data from one or more parameters (Parameter Sections) may be imported to one or more tables in your database.

Import only Parameter sections; use this option if this station already exists in your project. HGA will read the station name in the LAS file, and attempt to find an appropriate match in the current project.

When you select this option, the following dialog will appear:



The first step requires selecting the data transfer package and data source.

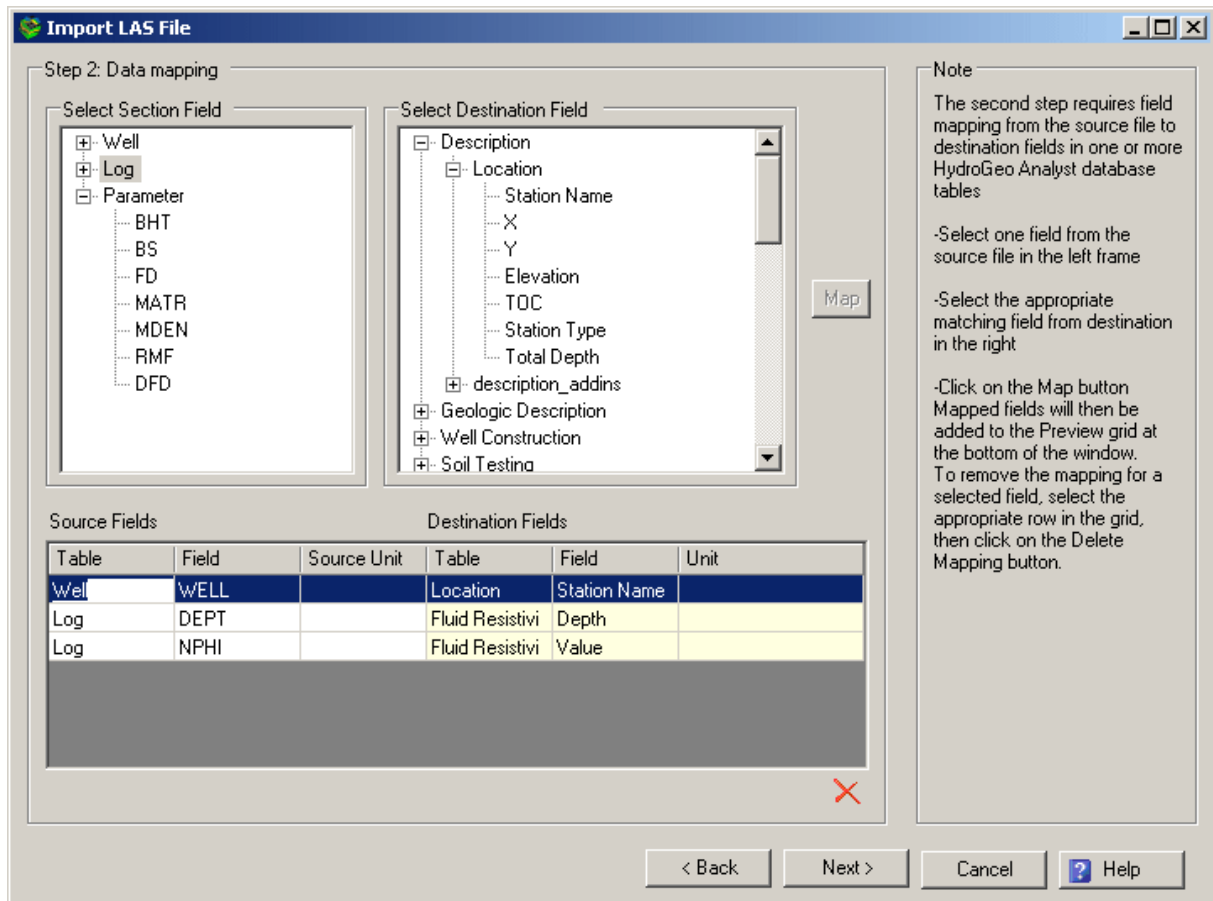
A Data Transfer Package (DTP) is designed to store all settings of desired import operations that may be repeated from time to time. For example, importing several LAS files containing the same measured parameters. The DTP contains information about the data source, the selected destination table(s), matching between source and destination tables and fields, source units, and a number of other settings. You may create an import package, or select from existing packages.

All Data Transfer Packages (if any) are listed for selection at the beginning of all data transfer operations. If an existing package is selected, the import routine loads all information stored in the package. The information can then be reviewed and updated as desired before as you move through the data transfer operation.

After selecting the package, select the Data Source; please note the following limitations:

- HGA currently supports LAS v.2.0.
- Third dimensional data array handling is currently not supported
- Multiple log runs is currently not supported

When you are finished, select the Next button in the lower right corner to proceed to the next step. The next step is Data Mapping.



The next step in the data transfer operation is to match a source table with a destination table.

You may map the entire LAS file (including the Well Section), or just down hole parameters; if you do not include the well section, you must have the appropriate station already created in your project. HGA will read the station name in the LAS file, and attempt to find an appropriate match in the current project. If one is found, you may proceed. Otherwise, you must include the well section, or terminate the import routine and return to HGA and create the appropriate station (using the same station name as found in the LAS source).

If duplicate station names are found in the database, there will be a prompt to select the appropriate station.

The Data Mapping window is divided into two frames:

- The Source well section, found on left side of the window; and
- The Destination tables and fields, on the right side of the window

The Source frame (which contains the data to be imported) can be expanded on the left side of the window. If the field names in the source are identical to those in the destination, then the fields will be matched automatically. For all others, you must map the fields using the procedure below.

The Destination frame contains the database schema: all tables and fields under their appropriate data categories. From this frame, select a Category, then a Table from this category, and a list of fields will be displayed in the grid on the right side of the window.

## Mapping

---

Mapping fields from the LAS file to the database is described below:

- Select one field from the source file in the left frame
- Select the appropriate matching field from destination in the right (by expanding the appropriate data category and table)
- Click on the Map button

Mapped fields will then be added to the Preview grid at the bottom of the window. Repeat these steps for additional fields.

To remove the mapping for a selected field,

- Select the appropriate row in the Preview grid
- Click on the Delete Mapping button

## Units

---

Due to the flexible nature of the LAS file, there may exist one or more parameters with units that are not supported in HGA; as such, unit conversion will not be possible during the import. Where the unit categories and units exist, HGA will attempt to do unit conversion, and import the data. If the destination field does not support the selected source units, there will be no conversion, and the data will not be imported. For this reason, it may be necessary to modify the field settings for your database schema, before proceeding with the import. For more details, see Chapter 13: Modifying Fields and View Settings.

When you are finished, click the [Next>] button in the lower right corner to proceed to the next step.

If the data to be imported contains the Well Section, then some additional information may be required in order to allow proper data transfer. The Station Related Settings window (as shown below) will only be displayed if data is imported to the Stations table.



### Projection Settings

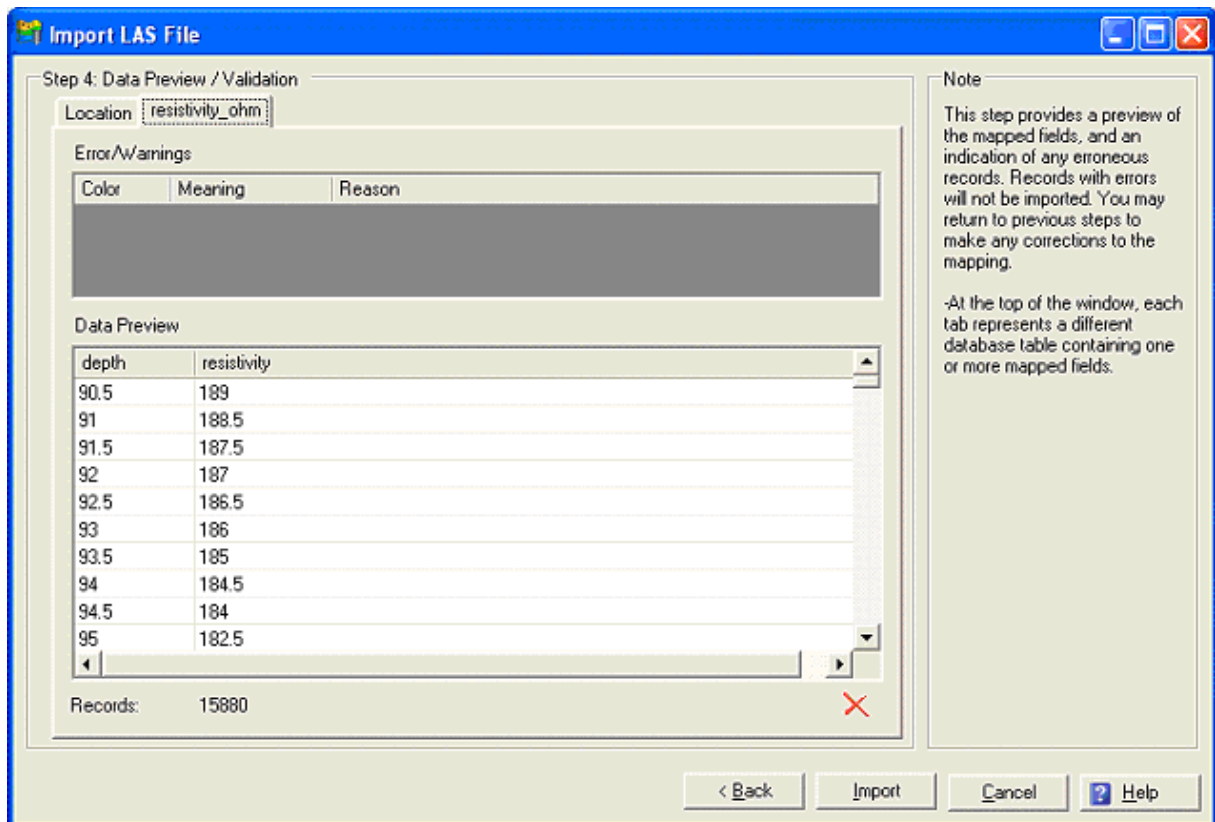
Define the coordinate system, the projection system, and the units for the stations in the source file. Following successful import, the new stations will be converted to the projection system and units defined in the HGA project. A detailed description of the coordinate and projection systems available in HGA is provided in Chapter 3.



**Please Note:** It is important to know and select the correct projection system during the import, to prevent erroneous station co-ordinates.

The LAS file allows to specify a place holder for NULL values (common examples are - 999.0000). Wherever this value is detected in the source, HGA will insert NULL in the destination, according to the field setting specified in the Template Manager.

When you are finished, select the Next button in the lower right corner to proceed to the next step.



The last step in the import involves previewing the data to be imported, and taking appropriate actions with regards to erroneous data. The Data Validation window (as shown below) displays all data ready to be imported. Errors or warnings, if any, will be listed along with the

data. Records with errors will not be imported. You may return to previous steps to make any corrections to the mapping.

The data is checked against the following conditions:

- Proper Station Locations
- Data type compatibility





**Please Note:** All coordinates in the database are stored in latitude-longitude format (WGS 1984) for internal use, regardless of the projection system in the source file and project. The Preview in this window displays the converted station co-ordinates. However the station co-ordinates may be displayed in HGA in any projection system desired.

At the top of the window, each tab represents a different database table containing one or more mapped fields.

### Accepting or Rejecting Records

Any of the records in the preview window may be accepted or rejected.

- To accept the selected records, click on the  (Accept) button.
- To reject the selected records, click on the  (Reject) button.

Once you have removed or verified the errors, press the [Import] button to import the data to the project.

After successfully importing the data, a confirmation window will appear, similar to the one shown below.



## 9 Query Builder

This section provides a detailed description of the Query Builder. Within an HGA project, it may be necessary to perform different types of queries for data filtering, reporting, and management. A few examples of data queries are provided below:

- Select wells drilled later than 1995 and earlier than 2000
- Select wells with discharge over 500 gpm
- Select boreholes deeper than 150 feet
- Select boreholes where the overburden thickness exceeds 20 feet
- Locate groundwater concentration exceedances for BTEX

In the Query Builder tab, the query display fields and conditions can be quickly defined. Once the queries have been created, they may be easily accessed from the Project Tree, where each new query will appear as a new branch.

### 9.1 Query Types

There are two types of Queries within HGA. A Standard Select Query which pulls data from the data for further analysis, and a Dynamic Station Group Query which uses a condition to group stations.

#### Standard Select Query

---

Data Queries can provide a more detailed look at your data, and can be used for quantifying and qualifying any field in the database.

In addition, many of the visualization and data analysis modules require data sources as data inputs.

Using the Query Builder, you can generate Select Queries that provide the data for:

- Map Layers
- Cross section interpretation results
- Quality Control Analysis
- Well Profiles
- Time Series Plots
- 3D Interpolation
- Reporting
- and more!

To create a Select Query, select the Standard Select Query radio button in the New Query dialog box. Then, define the necessary fields and conditions, and execute the query. Once the

query has been saved, the query will appear as a new branch in the project tree, under the Queries branch.

### Dynamic Station Group Query

---

Dynamic Station Group Queries can be created and executed for the purpose of organizing the stations into groups.


To create a Station Group Query, select the Dynamic Station Group Query. Then define the necessary conditions, and execute the query. Once the query has been saved, the query will appear as a new branch in the Project Tree, under the Station Groups branch. When selected from the Station Groups branch the query will be executed and the stations that meet the conditions set in the query will be displayed.



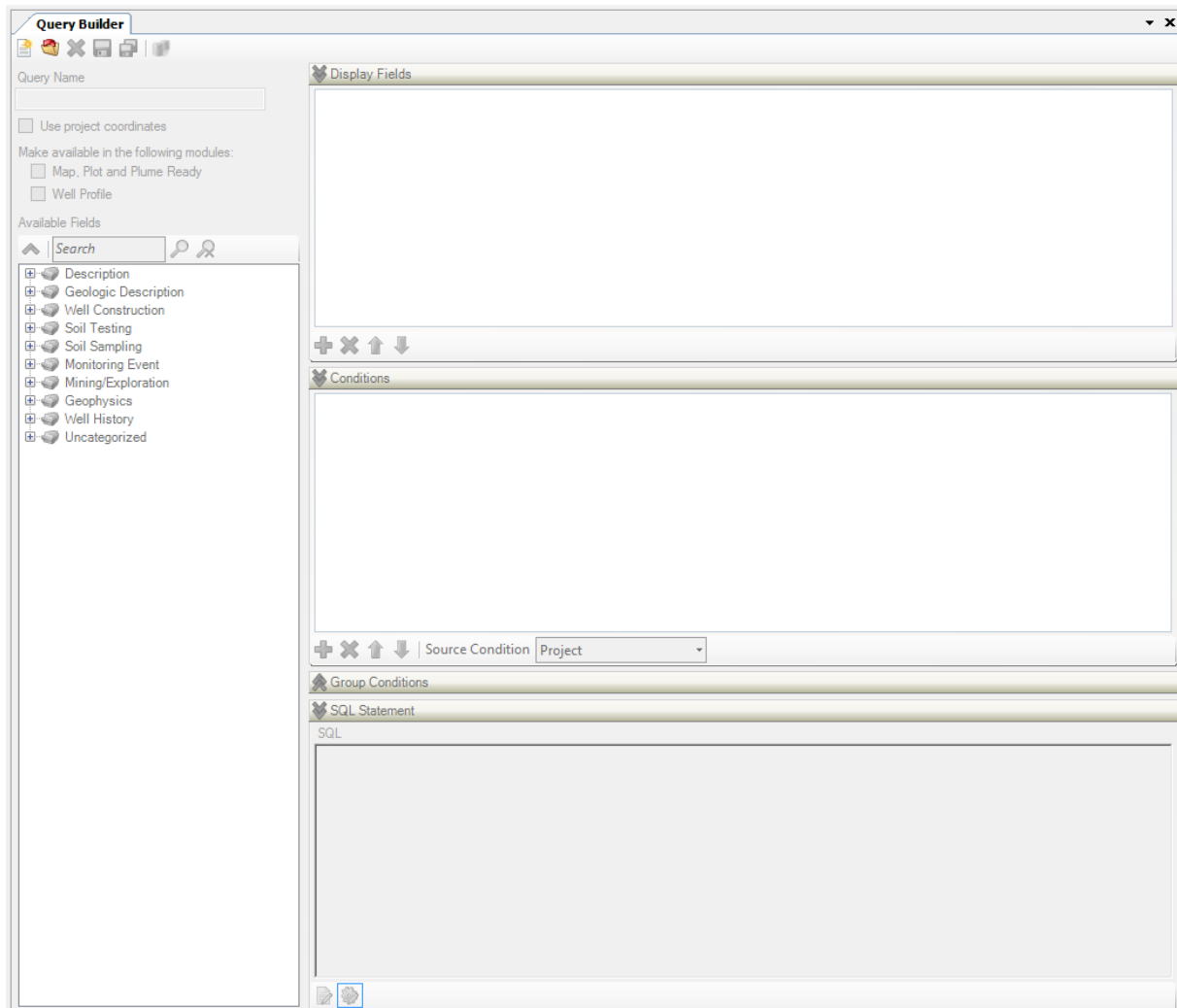
**Please Note:** Station Group Queries do not have options for modifying the display fields, or advanced grouping options.

## 9.2 About the Interface

The Query Builder may be loaded from within HGA in several ways:

- Select Modules / Query Builder from the menu bar
- Select the  icon from the Main Toolbar.
- Right-click on the Queries branch of the Project Tree (or any branch under it) you can select New Query... to launch the Query builder.
- Right-click on a query in the Project Tree and select Edit Query... the Query Builder will open displaying the selected query.

The Query Builder tab is shown below and displays the options available for a Select Query.



The Query Builder tab contains the following sections:

- **Available Fields:** Select fields for the query from the tables in the database shown in the tree.
- **Display Fields:** The fields in this section will be displayed when the query is executed.
- **Conditions:** The fields in this section are used to set conditions for the query.
- **Toolbar:** Contains buttons to most of the functions in the Query Builder.
- **Source Conditions:** Provides options for adjusting the source for the query.
- **Group Conditions:** Specifies grouping options when using an aggregate function.
- **SQL Statement:** Allows user to generate their own custom SQL Statement (other sections will become inactive).









**Please Note:** The Display Fields and the Group Conditions sections are not available when creating a Dynamic Station Group query.

### Toolbar Items


---


The toolbar provides access to most functions of the Query Builder. Toolbar buttons are context sensitive, if there a button is "greyed-out" this indicates that that functionality is not currently available (based on what has been selected).

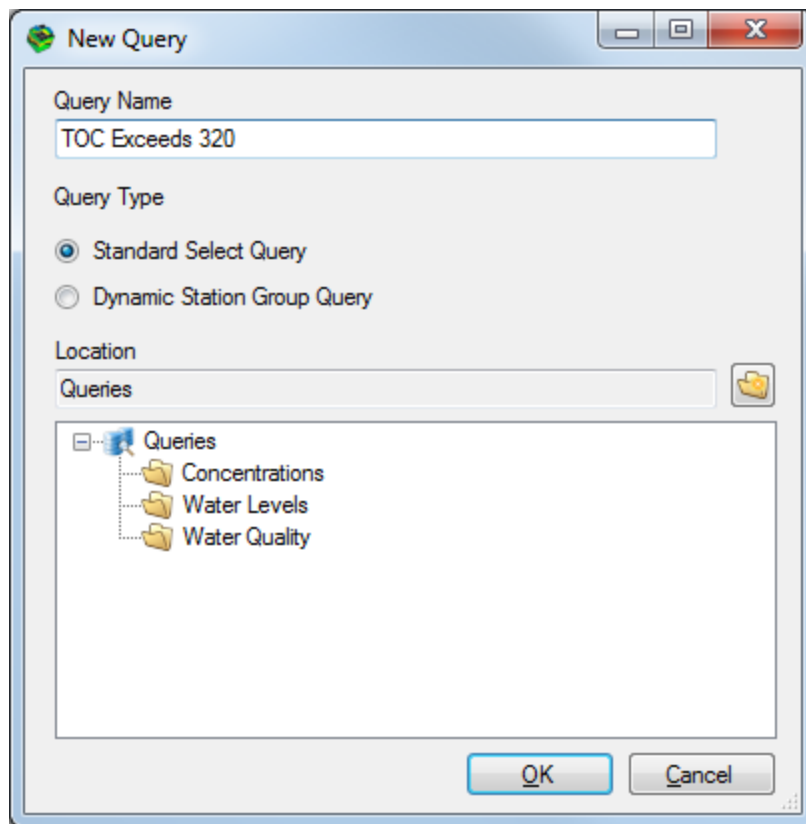
-  New button allows you to create a new query.
-  Open button allows you to open an existing query.
-  Delete button allows you to delete the currently open query.
-  Save Query button saves changes to the query.
-  Save As button saves the query under a new name.
-  Execute SQL Statement button executes (or runs) the query.

## 9.3 Standard Select Query - Example

Follow the steps below to create a Standard Select Query.

If the Query Builder tab is not yet opened, select the Query Builder icon  from the main toolbar.

In the Query Builder tab toolbar, select the New button , and the following dialog will appear:



Provide a Query Name: TOC Exceeds 320m for this example)

The default Query Type is the Standard Select Query - which is the query type for this example.

We also have the option to specify the location of the Query. The Select Queries will be stored in the Queries branch of the Project tree - however, you can create folders to organize your queries. You can select the folder where you wish to save your query.

For this example, we we will leave the default which will save the query to the main Queries branch (i.e. not in a folder).

Select OK to create the query.


By default the only field selected to be displayed in the query is the Station Name. We are going to add other fields to the display fields.

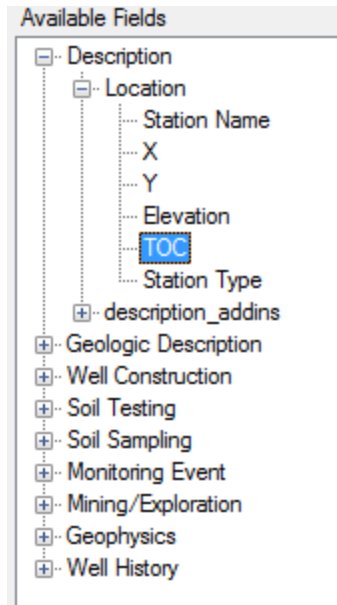
Let's select the Map, Plot and Plume Ready option as well as the Well Profile option - this will automatically add several fields to the Display Fields section and will make the query available in other modules within HGA.

Expand the tree in the Available Fields section to find the TOC field (under the Description category and the Location table).

Double-click on the TOC field - notice it has been added to the Display Fields section.

Now we will add a condition to the Query.

Click once on the TOC field (it will become highlighted blue), and drag this field into the blank Conditions field (under the Expression column). The TOC field will be added to the Query Conditions. (Alternately, you may use the  (Add) button (on the bottom half of the conditions section) to add conditions, then define them manually).



We need to set an operator and value for our Condition. You will notice there are several options in the Operator drop down list (>, >=, <, <=, =, <>, IS, IS NOT, and LIKE) providing you several options to query your data from the database. For this example:

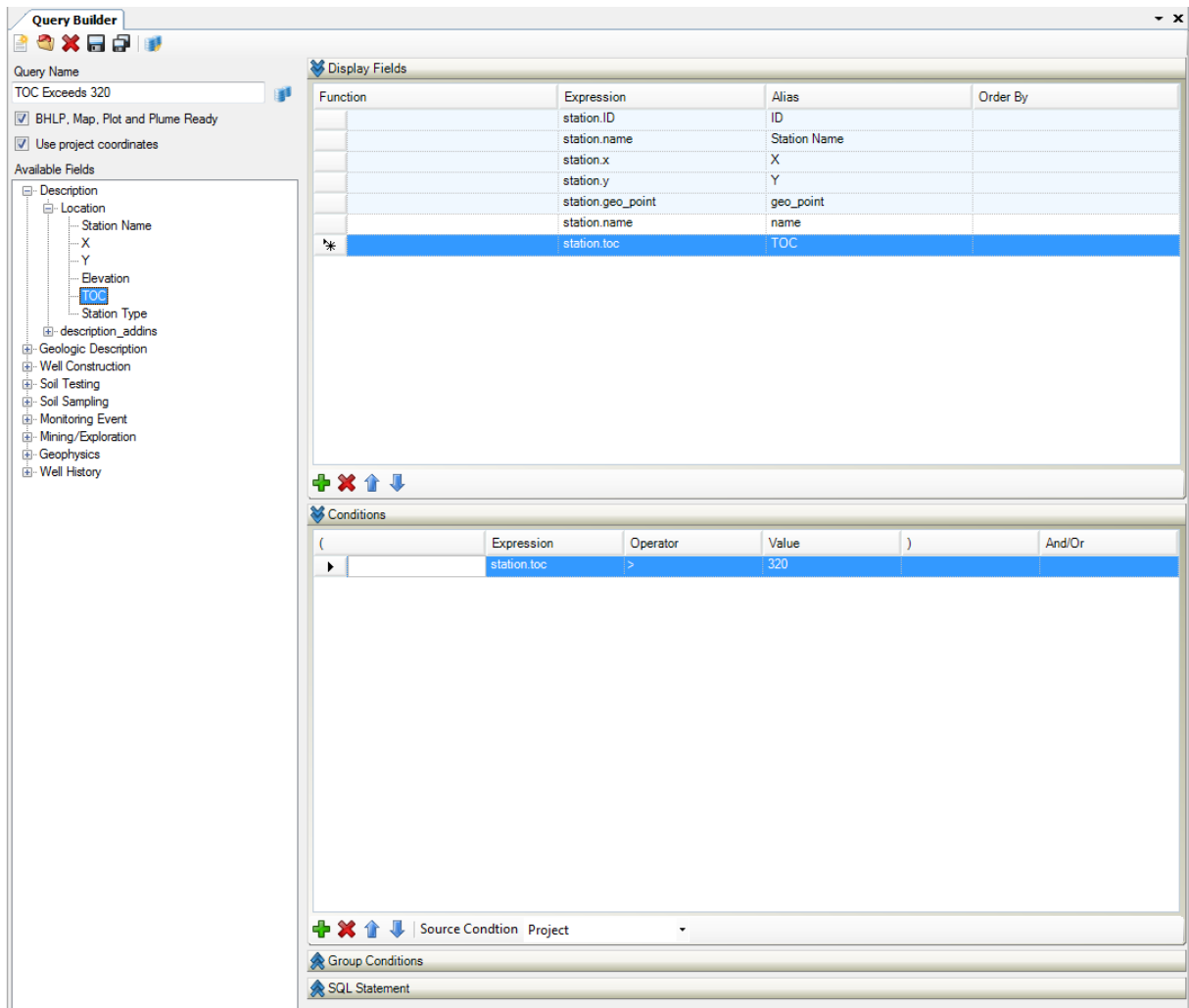
Select the > option from the drop down list in the Operator column.


Enter the number 320 in the Value field.

In the Conditions section, select the Source Conditions. The options are Project, Station Group, and Database. If Station Group is selected, then another combo box will become activated where you can select the appropriate Station Group to be the source for this query. If Project is selected, then all stations in the project will be queried. If Database is selected, then the query will be applied to the entire database. For this example we will use the default - Project.

The Query Builder should look similar to the image below:





Select the Execute Query button  and you will be moved to the Data Query tab to see the results of your query.



RowId	ID	Station Name	X (m)	Y (m)	geo_point	name	TOC
1	1	MW-1	535250.19	4814315.00	POINT (-8	MW-1	331.80
2	2	MW-3	536668.13	4814036.00	POINT (-8	MW-3	332.10
3	3	OW-2	535535.50	4814905.00	POINT (-8	OW-2	330.90
4	4	OW-4	536720.69	4814826.00	POINT (-8	OW-4	331.60
5	5	W-05	535548.40	4814637.30	POINT (-8	W-05	332.00
6	6	W-06	535459.40	4814704.90	POINT (-8	W-06	331.80
7	7	W-07	535476.10	4814781.10	POINT (-8	W-07	331.90
8	8	W-08	535469.50	4814652.70	POINT (-8	W-08	331.60
9	9	W-09	535484.70	4814546.50	POINT (-8	W-09	330.90
10	10	W-10	535626.80	4814652.90	POINT (-8	W-10	330.50
11	11	W-11	535545.90	4814553.50	POINT (-8	W-11	333.10
12	12	W-12	535637.70	4814582.90	POINT (-8	W-12	331.20
13	13	W-13	535800.00	4814637.50	POINT (-8	W-13	330.90
14	14	W-14	535674.60	4814800.00	POINT (-8	W-14	331.40
15	15	W-15	535687.40	4814665.30	POINT (-8	W-15	331.50
16	16	W-16	535390.00	4814741.90	POINT (-8	W-16	330.90
17	17	W-17	535577.40	4814477.10	POINT (-8	W-17	330.30
18	18	W-18	535677.10	4814416.20	POINT (-8	W-18	331.50
19	19	W-19	535584.50	4814300.00	POINT (-8	W-19	330.90
20	20	W-20	535599.70	4814371.80	POINT (-8	W-20	331.20
21	21	W-21	535492.90	4814477.20	POINT (-8	W-21	332.10
22	22	W-22	535635.20	4814503.80	POINT (-8	W-22	331.80
23	23	W-23	535588.40	4814667.30	POINT (-8	W-23	332.15
24	24	GB-01	536212.69	4814030.00	POINT (-8	GB-01	324.50
25	25	GB-02	536156.69	4814050.00	POINT (-8	GB-02	327.00
26	26	GB-03	536079.69	4814070.00	POINT (-8	GB-03	327.00
27	27	GB-04	535953.69	4814020.00	POINT (-8	GB-04	323.00
28	28	GB-05	535848.69	4814060.00	POINT (-8	GB-05	325.00
29	29	GB-06	535743.69	4814070.00	POINT (-8	GB-06	331.90
30	30	GB-07	535652.69	4814030.00	POINT (-8	GB-07	334.00
31	31	GB-08	535498.69	4814040.00	POINT (-8	GB-08	330.50
32	32	GB-09	535386.69	4814060.00	POINT (-8	GB-09	330.50
33	33	GB-10	535295.69	4814030.00	POINT (-8	GB-10	339.00
34	34	GB-11	535232.69	4814000.00	POINT (-8	GB-11	340.50
35	35	GB-12	536225.92	4814281.80	POINT (-8	GB-12	326.93
36	36	GB-13	536129.74	4814379.70	POINT (-8	GB-13	325.85
37	37	GB-14	536065.76	4814320.20	POINT (-8	GB-14	324.05
38	38	GB-15	535960.34	4814251.30	POINT (-8	GB-15	325.26
39	39	GB-16	535866.68	4814349.40	POINT (-8	GB-16	327.56
40	40	GB-17	535776.66	4814293.00	POINT (-8	GB-17	329.30
41	41	GB-18	535625.46	4814253.10	POINT (-8	GB-18	333.92
42	42	GB-19	535518.50	4814305.80	POINT (-8	GB-19	331.13
43	43	GB-20	535394.60	4814202.60	POINT (-8	GB-20	331.76

**Query Name:** TOC Exceeds 320 **Rows:** 71 **Time:** 00h:00m:00s

The new data query will now appear as a new branch under the Queries node in the Project Tree - if you do not see it right away right-click on the Queries branch and select Refresh.

This query can be executed/run at any time by selecting it from the Project Tree. The results will show on the Data Query tab.


If you need to make further changes to the query right click on the query in the Project Tree and select Edit Query... and the query will be opened in the Query Builder tab.


For further information on what can be done with the query once it has been executed and the results are being displayed - please see the section on the [Data Query Tab](#) section.

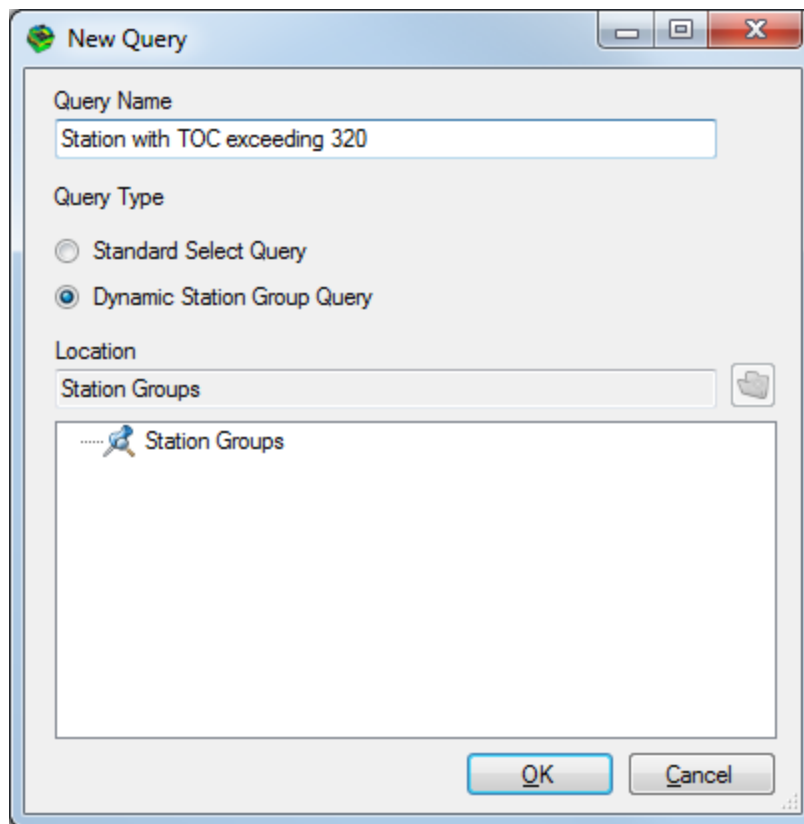
## 9.4 Dynamic Station Group Query - Example

A Dynamic Station Group query is used to group stations that meet specific conditions. The stations groups that are created this way are called "Dynamic" because the stations in the group may change as data is added/edited in the database. Alternatively, the Stations Groups that are user defined are referred to as "Static" because they do not change unless the user makes the changes manually.

Follow the steps below to create a Dynamic Station Group query.

If the Query Builder tab is not yet opened, select the Query Builder icon  from the main toolbar.

In the Query Builder tab toolbar, select the New button , and the following dialog will appear:



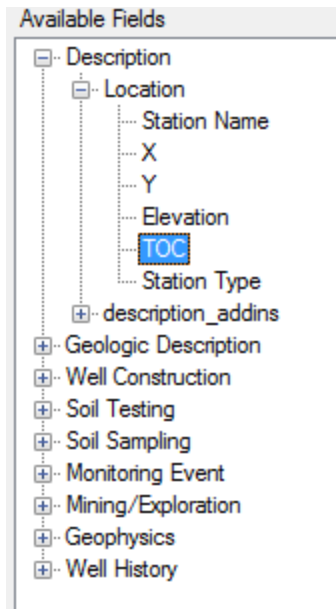
Provide a Query Name: Station with TOC exceeding 320 (for this example).

The default Query Type is the Standard Select Query - we need to change this by selecting the Dynamic Station Group option.

Select OK to create the query.

You will notice that the Display Fields and the Group Conditions sections have become disabled - these are not available for Dynamic Station Group Queries.

Click once on the TOC field (it will become highlighted blue), and drag this field into the blank Conditions field (under the Expression column). The TOC field will be added to the Query Conditions. (Alternately, you may use the **+** button (on the bottom half of the conditions section) to add conditions, then define them manually).



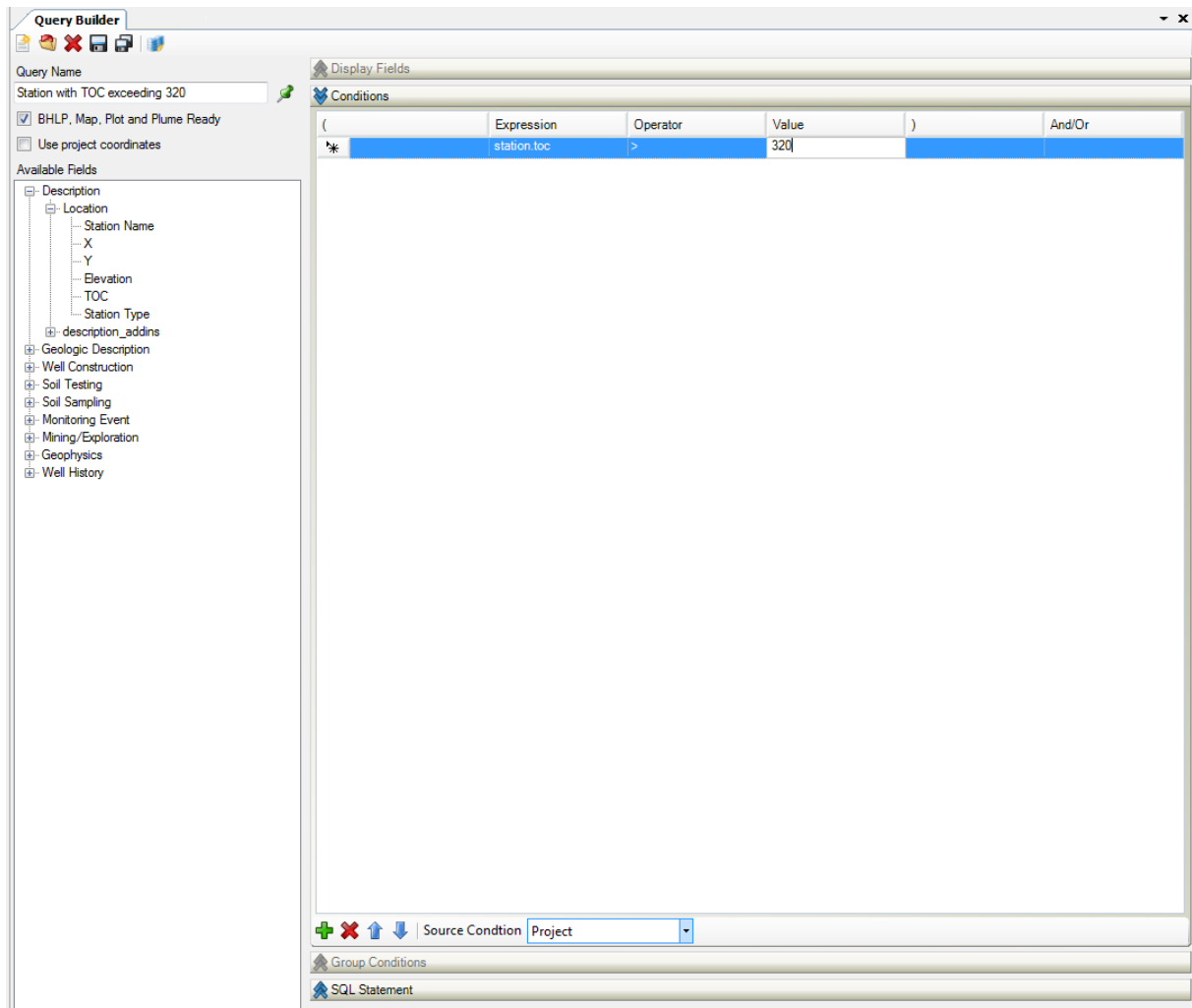
We need to set an operator and value for our Condition. You will notice there are several options in the Operator drop down list (>, >=, <, <=, =, <>, IS, IS NOT, and LIKE) providing you several options to query your data from the database.

For this example select the > option from the drop down list in the Operator column.


Enter the number 320 in the Value field.

In the Conditions section, select the Source Conditions. The options are Project, Station Group, and Database. If Station Group is selected, then another combo box will become activated where you can select the appropriate Station Group to be the source for this query. If Project is selected, then all stations in the project will be queried. If Database is selected, then the query will be applied to the entire database. For this example we will use the default - Project.

The Query Builder should look similar to the image below:

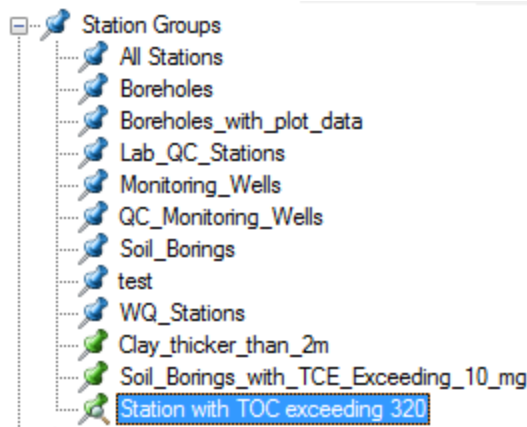


If you need you can add multiple conditions - these need be linked by specifying an additional Operator; choose from AND, OR. For this example we will only use one condition.

Select the Execute Query button  and you will be moved to the Data Query tab to see the results of your query. The results of a Dynamic Station Group query will have only 2 columns - the RowID and the Station ID.

More useful is the fact that the new query will now appear as a new branch under the Station Group branch in the Project Tree.

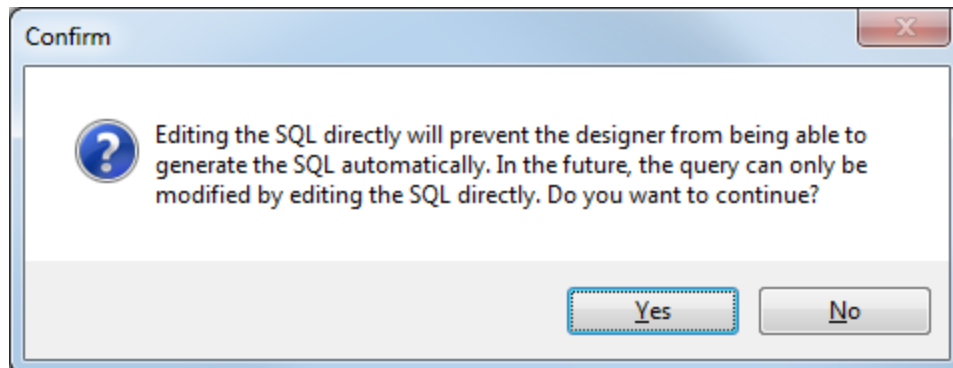
The Dynamic Station Group queries can be distinguished from a user-defined station group (static) by the color of the icon used to display in the Project Tree. Blue icons are Static Station Groups while green icons are Dynamic Station groups.



## 9.5 Using SQL Commands - Example

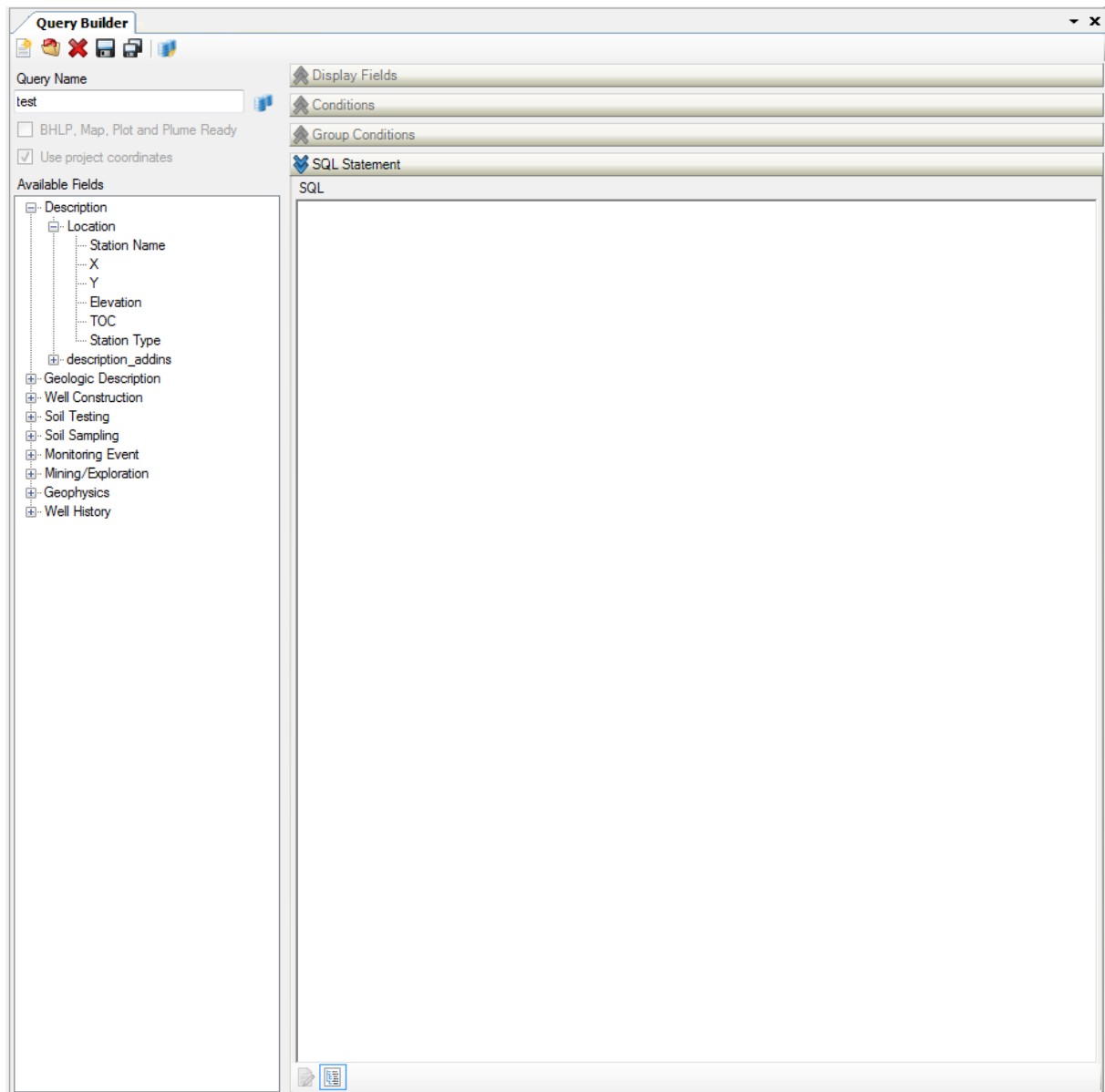
If you are familiar with MS SQL (Structured Query Language) syntax commands, you can retrieve, manage and manipulate your data through the SQL Statement section of the Query Builder.

As soon as you begin typing within the SQL Statement section you will be prompted to confirm that you wish only use the SQL Statement to create/edit the query.



When you select yes you will notice the Display Fields, Conditions and Group Conditions section will all become disabled. Moving forward you can only edit the query by directly editing the SQL Statement.





Two commands that are commonly used include the Select command and the Delete command. Both of these commands are described below. These queries are based on the HGA Demo Project.

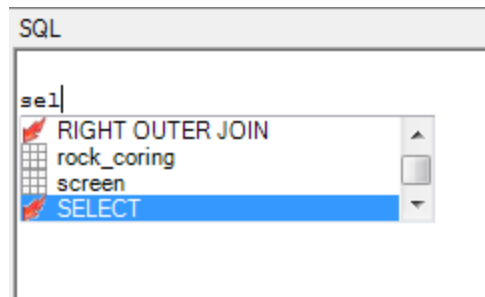
### Select Command

The Select Command retrieves data from tables in a database and is usually followed by a "where" clause. For example, if you want to create a query to show all chemistry results


where the chemical name is benzene, you would enter the following into the SQL Statement section:

```
SELECT * FROM parameter_result WHERE chemical_name = `Benzene`
```

As soon as you have entered a few characters you will see that the Query Builder autocomplete tool becomes available to help you write your SQL Statement.



Based on the first few letters of each word you enter the program will try and help you by suggesting SQL Commands (for example SELECT) or the names of tables or fields in your database.

Once you have completed entering the statement (ensure it is exactly as written above including the single brackets around the word Benzene) you can execute the the statement by selecting  button.

You will be moved to the Data Query tab to see the results of your query.

RowId	Station	sample_id	chemical_name	result_value	result_unit	reporting_detection_limit	sampling_precision	fraction_code	analy
1	1	1-2004-1	Benzene	0	mg/L	1	0		EPA 5
2	1	1-2004-31	Benzene	0	mg/L	1	0		EPA 5
3	1	1-2004-74	Benzene	2	mg/L	1	0		EPA 5
4	1	1-2005-2	Benzene	20	mg/L	1	0		EPA 5
5	1	1-2006-3	Benzene	10	mg/L	1	0		EPA 5
6	1	1-2007-4	Benzene	5	mg/L	1	0		EPA 5
7	1	1-2008-5	Benzene	0	mg/L	1	0		EPA 5
8	1	1-2009-6	Benzene	0	mg/L	1	0		EPA 5
9	1	1-2010-7	Benzene	0	mg/L	1	0		EPA 5
10	1	MW-1-92	Benzene	50		1	0		EPA 8
11	1	MW-1-93	Benzene	20		1	0		EPA 8
12	1	MW-1-94	Benzene	10		1	0		EPA 5
13	1	MW-1-95	Benzene	0		5	0		EPA 5
14	1	MW-1-96	Benzene	1		1	0		EPA 5
15	1	MW-1-97	Benzene	1		1	0		EPA 8
16	1	MW-1-98	Benzene	0		1	0		EPA 8
17	2	3-2004-75	Benzene	2	mg/L	1	0		EPA 8
18	2	3-2004-8	Benzene	2	mg/L	1	0		EPA 8
19	2	3-2005-9	Benzene	0	mg/L	1	0		EPA 8
20	2	3-2006-10	Benzene	0	mg/L	1	0		EPA 8
21	2	3-2007-11	Benzene	0	mg/L	1	0		EPA 8
22	2	3-2008-12	Benzene	0	mg/L	1	0		EPA 8
23	2	3-2009-13	Benzene	0	mg/L	1	0		EPA 8
24	2	3-2010-14	Benzene	0	mg/L	1	0		EPA 8
25	2	3-2010-81	Benzene	0	mg/L	1	0		EPA 8
26	2	MW-3-92	Benzene	0		0	0		EPA 8
27	2	MW-3-93	Benzene	0		0	0		EPA 8
28	2	MW-3-94	Benzene	0		0	0		EPA 8
29	2	MW-3-95	Benzene	0		0	0		EPA 8
30	2	MW-3-96	Benzene	0		0	0		EPA 8
31	2	MW-3-97	Benzene	0		0	0		EPA 8
32	2	MW-3-98	Benzene	0		0	0		EPA 8
33	3	2-2004-15	Benzene	50	mg/L	1	0		
34	3	2-2005-16	Benzene	20	mg/L	1	0		
35	3	2-2007-18	Benzene	5	mg/L	1	0		
36	3	2-2008-19	Benzene	2	mg/L	1	0		
37	3	2-2009-20	Benzene	0	mg/L	1	0		
38	3	2-2009-80	Benzene	1.1	mg/L	1	0		

Query Name: test Rows: 152 Time: 00h:00m:00s

Since we used the \* in the Select statement ALL fields in the parameter results table will be displayed - but only the records containing Benzene will be displayed.

### Delete Command

The Delete Command can be used to remove records from the database.

For example, if you want to delete all records from the Parameter Result table with the chemical name benzene that we just found using the above Select statement, enter the following SQL statement into the SQL Statement section:

```
DELETE FROM parameter_result WHERE chemical_name = `Benzene`
```

Then select the Execute Query  button to run the delete query.

You will be moved to the Data Query tab - but no records will be displayed (as your query has deleted the records).



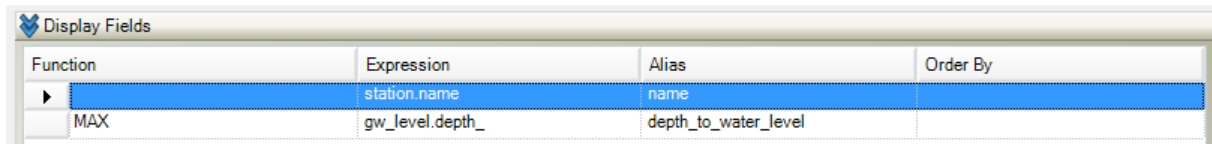
**Please Note:** Once you click the Execute Query button, all the data that is specified in the SQL statement will be permanently deleted from the database. Because there is no undo function, it is recommended that you use the select command before a delete command, to ensure that you have selected the correct records.

## 9.6 Aggregate Functions

Select queries within HGA may include an aggregate function. The following functions are available:

- **AVG:** Returns the average value of a numeric expression evaluated over a set.
- **COUNT:** Returns the number of items in a collection.
- **MAX:** Returns the maximum value of a numeric expression evaluated over a set.
- **MIN:** Returns the minimum value of a numeric expression evaluated over a set.
- **STDEV:** Returns the sample standard deviation of a numeric expression evaluated over a set.
- **STDDEVP:** Returns the population standard deviation of a numeric expression evaluated over a set.
- **SUM:** Returns the sum of a numeric expression evaluated over a set.
- **VAR:** Returns the sample variance of a numeric expression evaluated over a set, using the unbiased population formula.
- **VARP:** Returns the population variance of a numeric expression evaluated over a set, using the biased population formula.

You can specify the function within the Query Builder by selecting the appropriate function in the Display Fields section, in the Function column for the appropriate field.



Function	Expression	Alias	Order By
	station.name	name	
MAX	gw_level.depth_	depth_to_water_level	

When executing a query containing an aggregate function the query builder will automatically group all other fields in the Display Fields. . This is required in order to be able to determine/calculate the function for the selected field.


In the example above, the query will be grouped by the station name - so only one record per station name will be displayed - the record with the maximum depth to water level for each station.

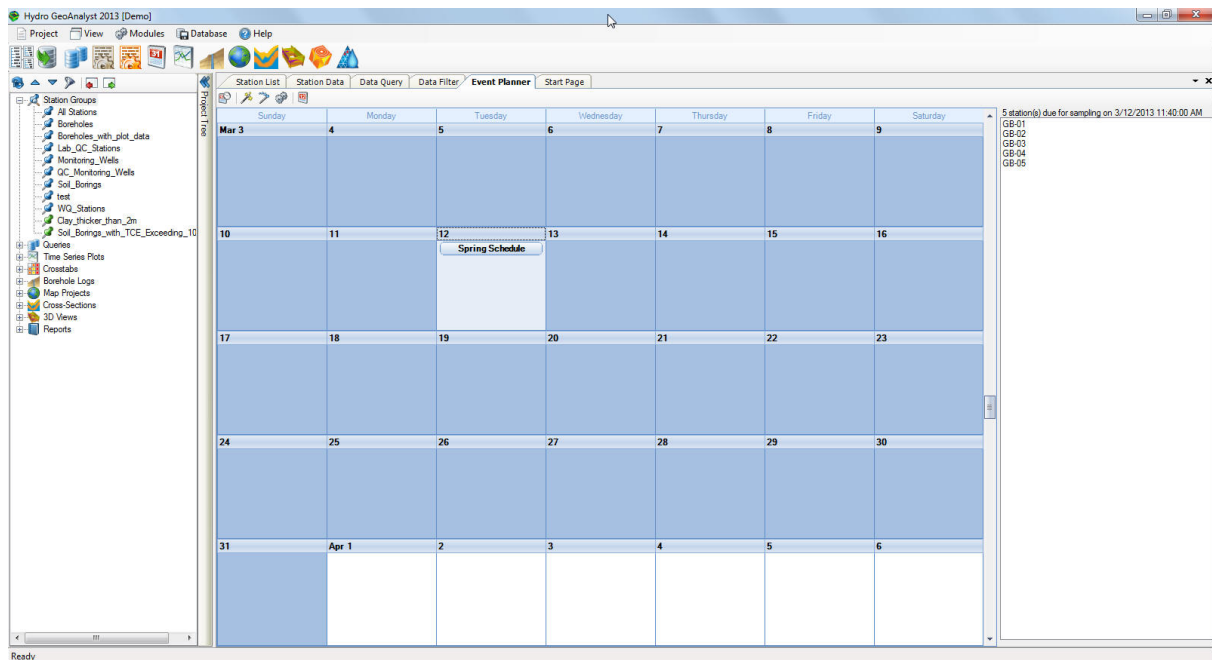
## 10 Event Planning

The Event Planning module ensures that your field activities are always completed correctly and on time. Easily create multiple schedules for various stations and then create event plans that outline the details of your field activities including stations to be sampled, data to be collected, field checklists and more. Event plans are automatically converted into reports which can be printed and given to field personnel. Hydro GeoAnalyst keeps track of all your event plans and automatically reminds you in advance when scheduled field activities are due.

- [About the Interface](#)
- [Schedule Stations](#)
- [Event Plan Wizard](#)
- [Event Plan Closure](#)
- [Manage Event Plans](#)

### 10.1 About the Interface

The Event Planning module can be launched by selecting the  icon from the main toolbar or by selecting Modules / Event Planning from the menu bar.



The module launches as a tab and displays as a calendar to allow you to see any upcoming schedules.

If you select a schedule in the calendar you will see the stations that are due to be sampled that are associated with the schedule on the right hand side.



allows you to schedule your stations for regular sampling



allows you to create an Event Plan



allows you to close any existing Event Plans




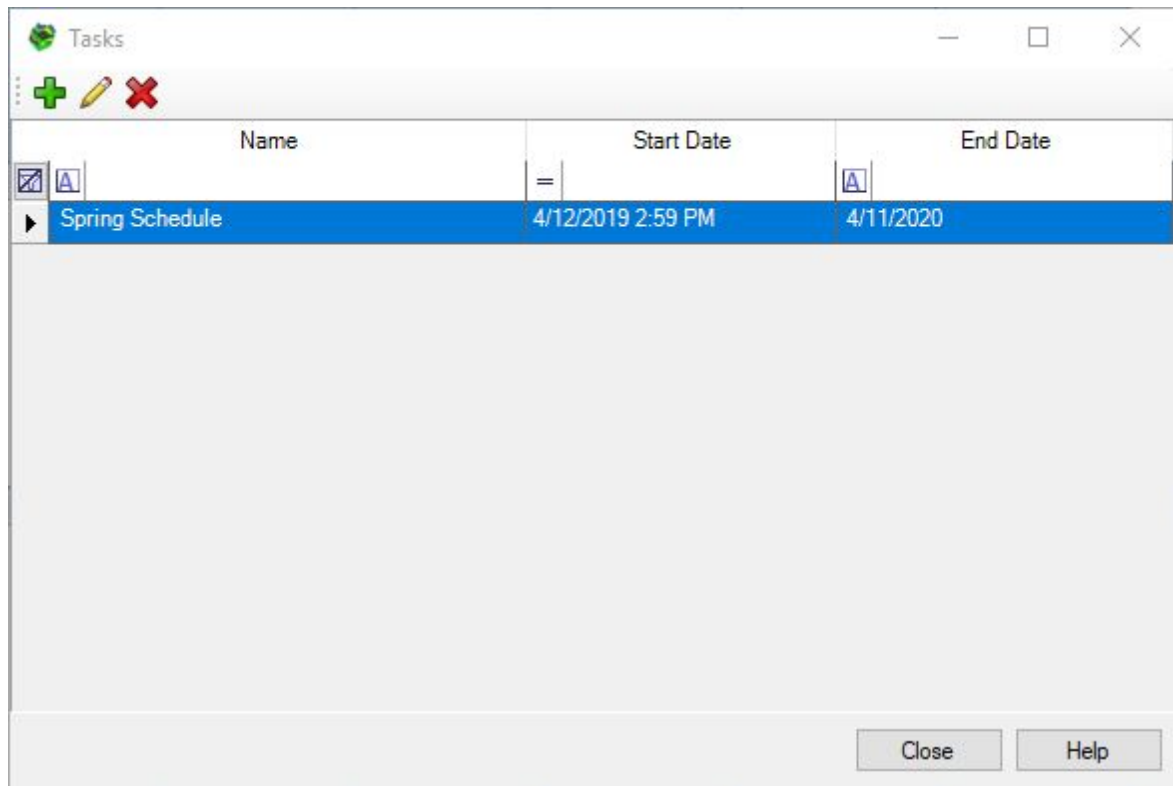
allows you to manage your Event Plans



allows you to go to today (current date) in the calendar (helpful if you have scrolled ahead or behind in the calendar).

## 10.2 Schedule Stations

You can schedule your stations for regular sampling by selecting the  icon and the Event Schedules dialog will appear.



Here you can see all current schedules for your project. You can create a new schedule, edit an existing schedule or delete a schedule.


To create a new schedule select the New... button and the New Schedule dialog will appear.




You must provide a name for the schedule in the Subject field and then you have the option of providing a description for the schedule.

Indicate the start and end date for the schedule.

Select the Stations you wish to schedule from the list of stations on the left hand side. You can reduce the list of all stations by selecting an appropriate Station Group.


Once you have selected the stations (will be highlighted blue). Select the  button to move the stations to the Selected Stations area (right hand side).

To move all stations from a Station Group to the Selected Stations area use the  button.

You also have the option to set the Recurrence for your your schedule (similar to the options found in Outlook) and the following dialog will appear.

Once you save and close your New Schedule you will find it in the list of Event Schedules. You can also find it in your calendar.

### 10.3 Event Plan Wizard

You can create your Event Plans by selecting the  button and the Event Plan wizard will appear.

#### [Event Plan Information](#)

The first step of the Event Plan wizard allows you to provide some basic information about the plan including the Name and the Start and End dates.

Additional optional information can also be provided including the Field Technician, the Primary Lab where the samples will be sent, the Plan Approver and Comments regarding the plan.

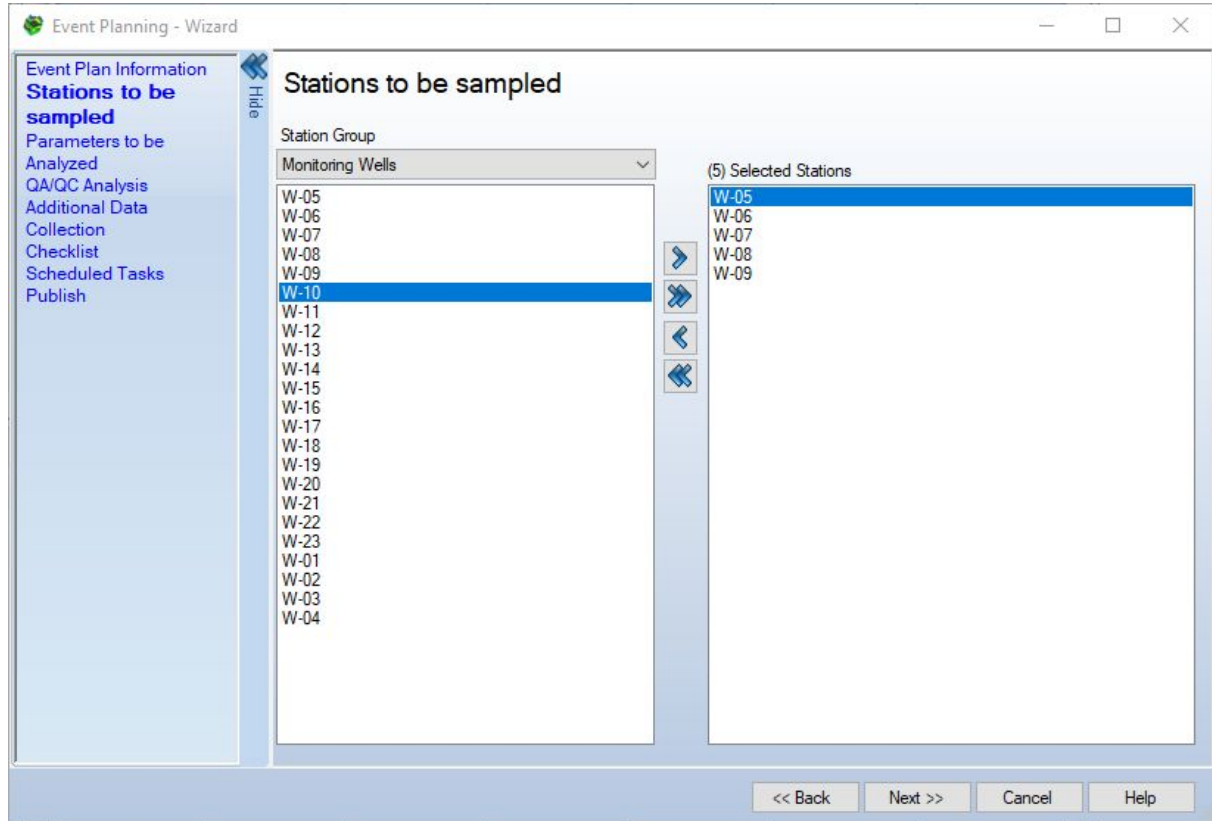
The screenshot shows a software window titled "Event Planning - Wizard". On the left is a vertical navigation pane with the following items: "Event Plan Information" (highlighted), "Stations to be sampled", "Parameters to be Analyzed", "QA/QC Analysis", "Additional Data Collection", "Checklist", "Scheduled Tasks", and "Publish". A "Hide" button is located between the navigation pane and the main content area. The main content area is titled "Event Plan Information" and contains the following fields:

- Event Plan:** A text box containing "Plan 1" with a folder icon and a plus sign icon to its right.
- Start Date:** A date picker showing "9/24/2018".
- End Date:** A date picker showing "9/24/2018".
- Field Technician:** A dropdown menu.
- Primary Lab:** A dropdown menu.
- Plan Approver:** A dropdown menu.
- Comments:** A large empty text area.


At the bottom of the window are four buttons: "<< Back", "Next >>", "Cancel", and "Help".


### Stations to be sampled

The next step of the Event Plan wizard indicates which stations will be sampled in the plan. If you had a schedule selected in the calendar when you selected the Event Plan wizard the stations that are due will already be populated.



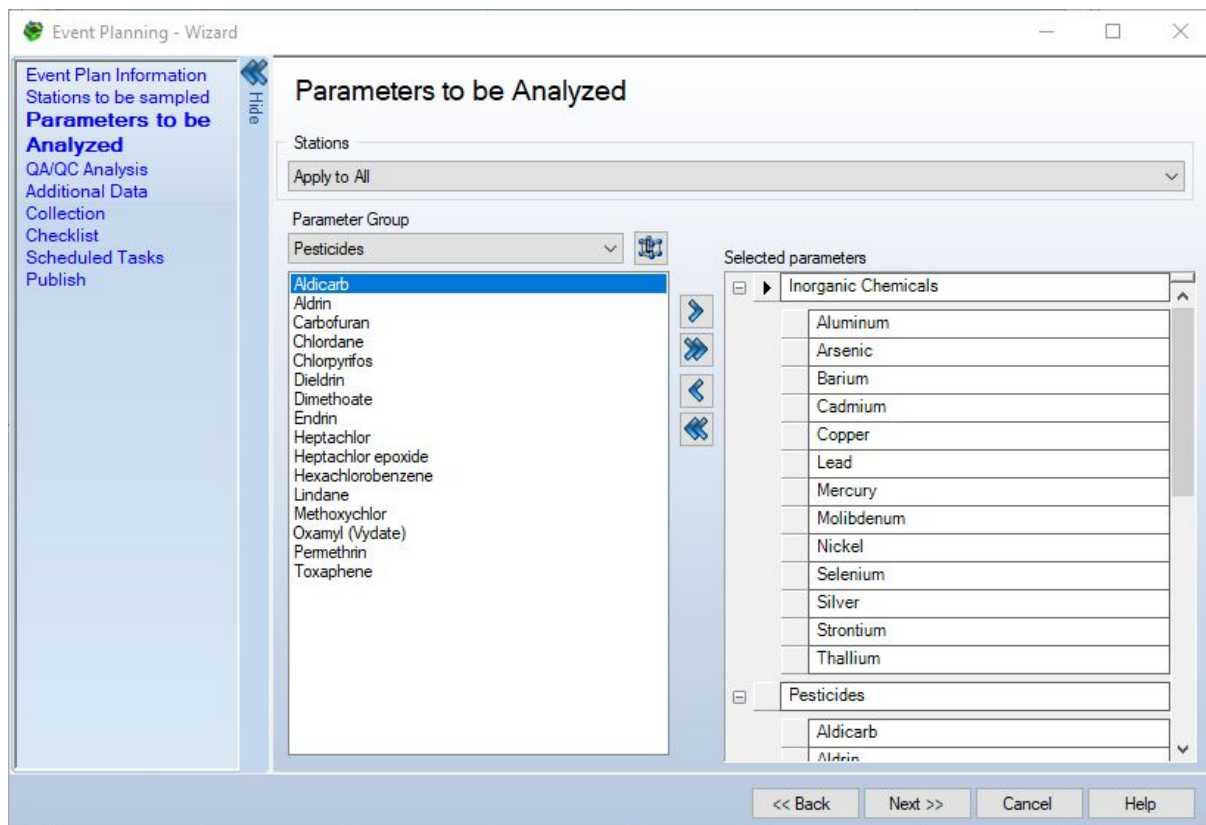
You can add more stations to the plan if you wish - select the Stations you wish to add from the list of stations on the left hand side. You can reduce the list of all stations by selecting an appropriate Station Group.

Once you have selected the stations (will be highlighted blue). Select the  button to move the station(s) to the Selected Stations area (right hand side).


To move all stations from a Station Group to the Selected Stations area use the  button.


### Parameters to be Analyzed


The next step of the Event Plan wizard allows you to indicate which parameters will be analyzed.

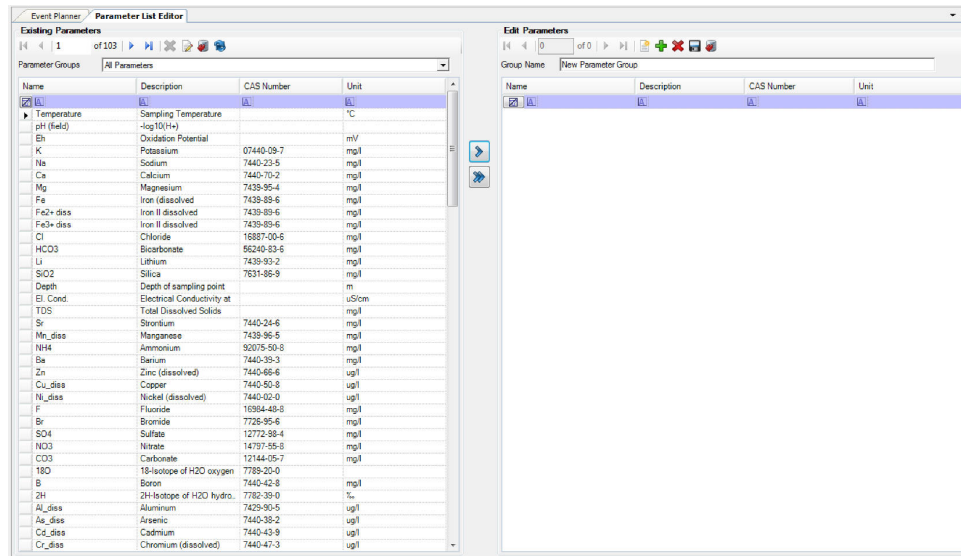




By default the parameters selected will be applied to all Stations - however if you wish you can select different parameters for each individual station.

Once you have selected the parameters (will be highlighted blue). Select the  button to move the parameters to the Selected Parameters area (right hand side).

To move all the parameters from a Station Group to the Selected Parameters area use the  button.

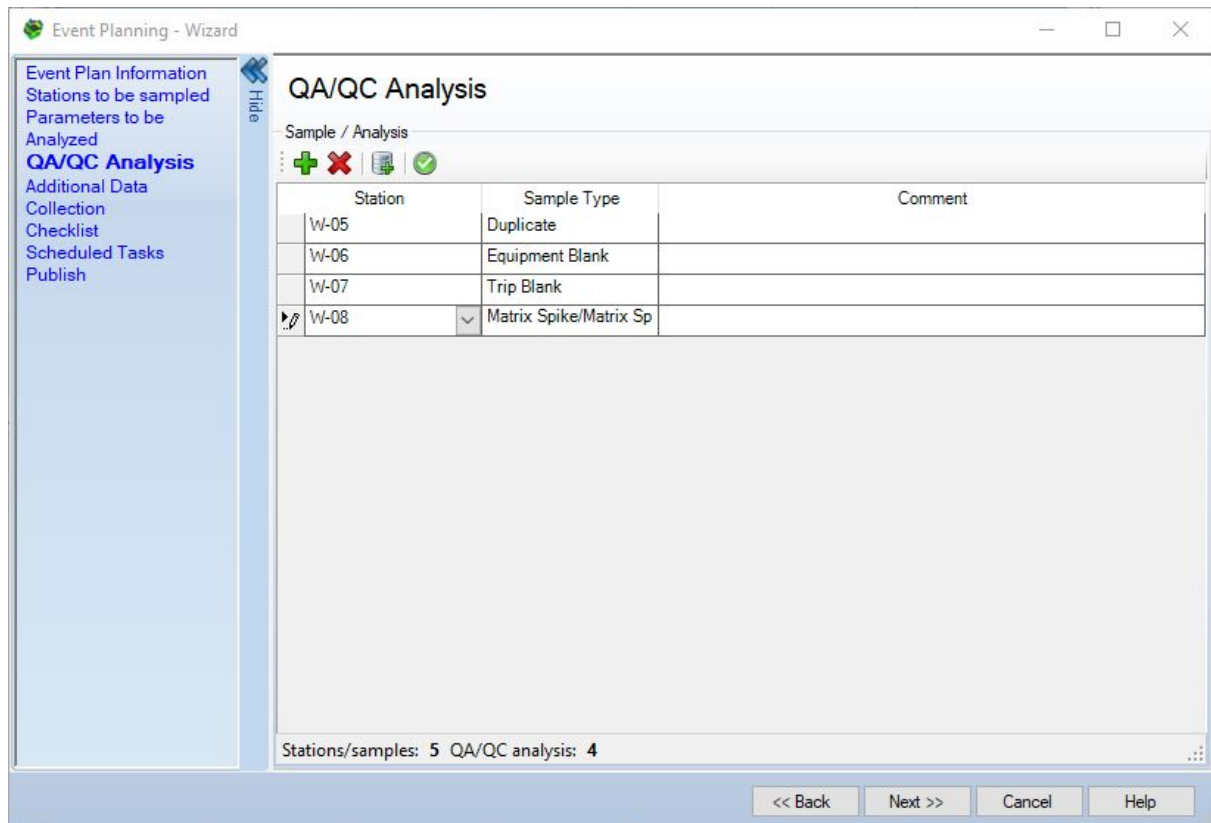
To make it easier to select parameters - since the list can be very long (the list is taken from the List Editor list for the Chemical Name field in the Parameter Results table) you can create Parameter groupings. Several groupings have been provided by default, but if you wish, you can create your own by selecting the  button. This will launch the Parameter List Editor.




This module is similar to the Material Specification Editor. Provide a New Group name on the right hand side and select the parameters you wish from the left hand side to be included in the new grouping. Once you have selected the parameters (will be highlighted blue). Select the  button to move the parameters to the Selected Parameters area (right hand side). To move all the parameters from a Station Group to the Selected Parameters area use the  button. Once you save the new grouping it will be available within the Event Planning wizard.


### QAQC Analysis


The next step of the Event Plan wizard allows you to indicate if you want QAQC analysis samples to be taken.



Select the  button to add a QAQC sample to be taken. Then you need to specify at which station the sample should be taken, and what kind of QAQC sample should be taken (options include duplicate, trip blank and equipment blank). You also have the option to provide a comment.

If you need to delete a QAQC sample highlight the sample and then select the  button.

To add QAQC samples based on the programmatic ratios, select the  Apply QAQC ratios button.

You can create entries for the correct number of QAQC samples based on programmatic QAQC sample ratios using the Manage QAQC Sample Type button (.

List Editor

1 of 4

Apply	QAQCSampleType	ForXStations	AddYSamples
<input checked="" type="checkbox"/>	<input type="checkbox"/>	=	=
<input type="checkbox"/>	<input checked="" type="checkbox"/> Duplicate	10	1
<input type="checkbox"/>	<input checked="" type="checkbox"/> Equipment Blank	10	1
<input type="checkbox"/>	<input checked="" type="checkbox"/> Trip Blank	1000	1
<input type="checkbox"/>	<input checked="" type="checkbox"/> Matrix Spike/Matrix Spike Dupli	20	1

OK Cancel Help

### Additional Data Collection

The next step of the Event Planning wizard allows you to indicate if any Additional Data needs to be collected while in the field.

Event Planning - Wizard

Additional Data Collection

Stations  
Apply to All

Search

- Description
- Geologic Description
- Well Construction
- Soil Testing
- Soil Sampling
- Monitoring Event
  - Parameter Sample
  - Parameter Result
  - Water Level
    - Screen\_ID
    - date
    - depth\_to\_water\_level
    - Dry Indicator
    - Comment
  - Meteorology
  - Divers
  - Diver Data
  - Field Measurements
    - Measurement Date
    - Total Organic Carbon
    - Dissolved Oxygen

gw_level			
screen_id	date_	depth_	dry_indic
fm_date			
fm_date	total_organic_carbon	dissolved_oxygen	

<< Back Next >> Cancel Help



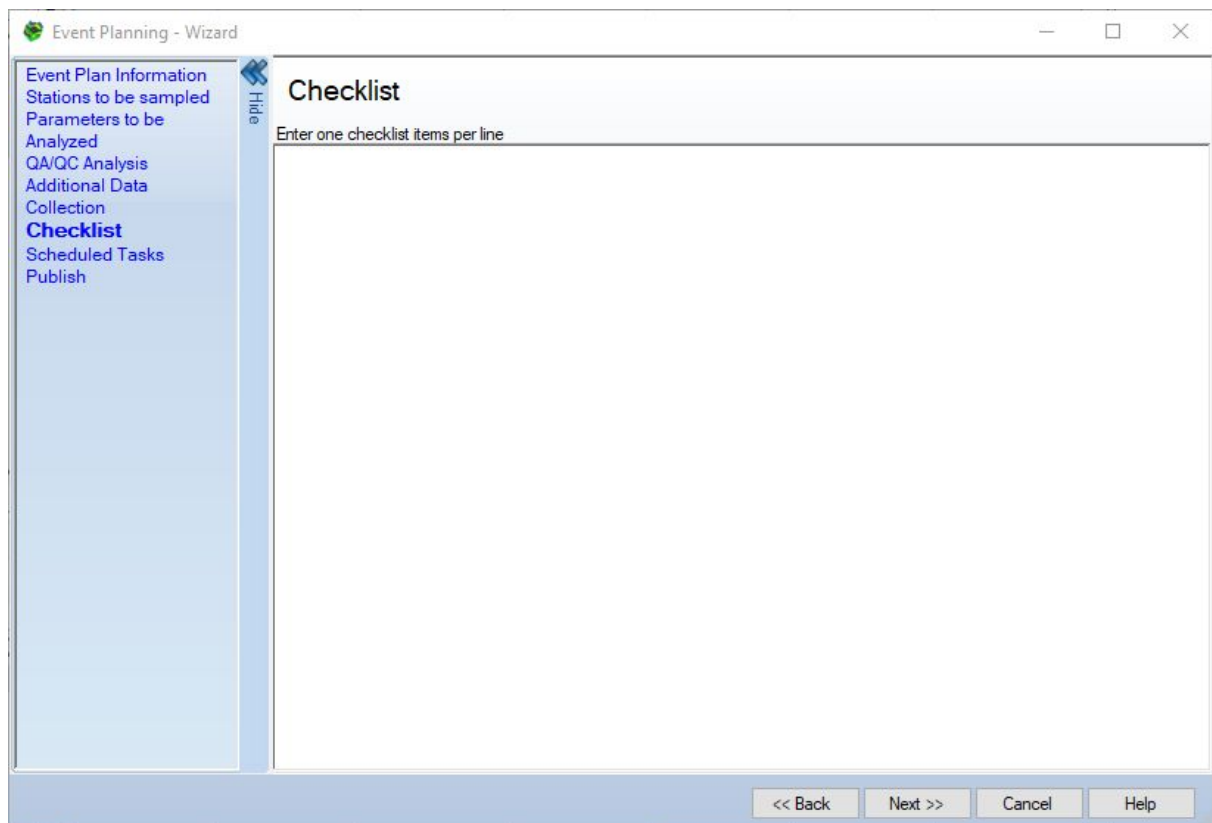
By default the additional data to be collected will be applied to all Stations - however if you wish you can select different data to be collected for each individual station.

The data fields to be collected can be selected from the datamodel tree on the left hand side.

Once you have selected the field (will be highlighted blue) select the  button to move the data field to the right hand side.


## Checklist

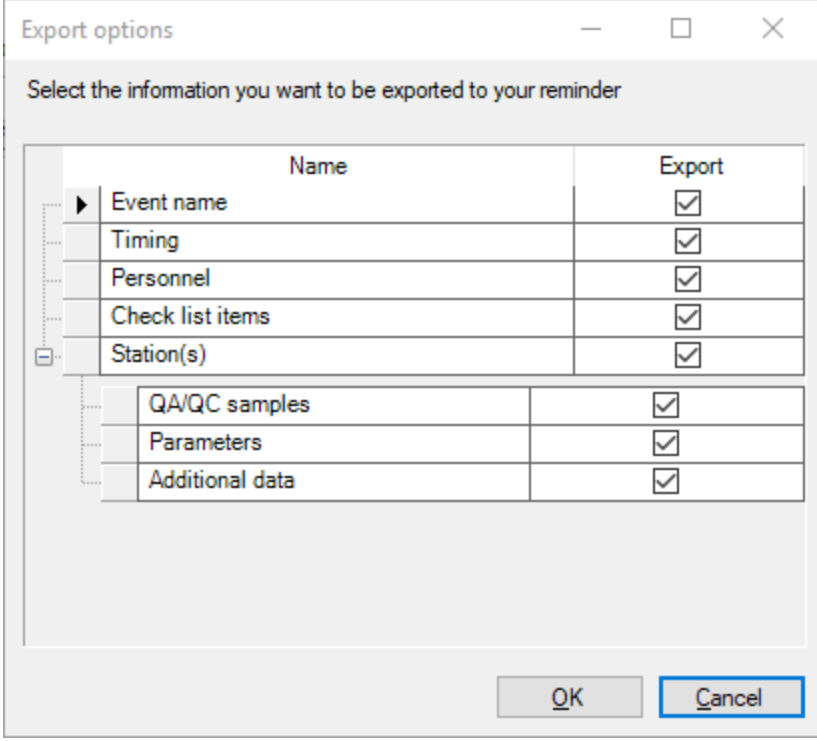
The next step of the Event Planning wizard allows you to prepare a checklist to help ensure all required items for performing the field activities are remembered. You can enter one item per line.



## Scheduled Tasks

The next step of the Event Planning wizard allows you to schedule tasks related to the Event Plan that can be saved to an iCalendar (.ics) file and shared to your Calendar or the Calendars of your project team members.

To schedule a new task click the  New Task button. A dialog will appear that allows you to select what information will appear in the description of the task:



The dialog box is titled "Export options" and contains the instruction "Select the information you want to be exported to your reminder". It features a table with two columns: "Name" and "Export". The table lists several categories, each with a tree view icon on the left and a checkbox in the "Export" column. All checkboxes are checked. At the bottom of the dialog are "OK" and "Cancel" buttons.

Name	Export
Event name	<input checked="" type="checkbox"/>
Timing	<input checked="" type="checkbox"/>
Personnel	<input checked="" type="checkbox"/>
Check list items	<input checked="" type="checkbox"/>
Station(s)	<input checked="" type="checkbox"/>
QA/QC samples	<input checked="" type="checkbox"/>
Parameters	<input checked="" type="checkbox"/>
Additional data	<input checked="" type="checkbox"/>

After selection the relevant information, you can edit the Task information, including Subject, Location, Start/End Time, Reminders, Recurrence, and description.

Task 2 - Plan 1

File Edit

Save and Close Delete Recurrence Refresh

Subject: Task 1 - Plan 1

Location:

Start Time: Mon 9/24/2018 All Day Event

End Time: Mon 9/24/2018

Reminder: 15 minutes before start Bar Color: Blue

Description

Plan 1

Start date: 9/24/2018 12:00:00 AM End date: 9/24/2018 12:00:00 AM

Field technician:  
Approved by:  
Primary lab:  
Comments:

Check list items:

Collect data from station(s):

->W-05  
QA/QC analysis:  
\* Duplicate

Parameters: Inorganic Chemicals( Aluminum, Arsenic, Barium, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium)  
Pesticides( Aldicarb, Aldrin, Carbofuran, Chlordane, Chlorpyrifos, Dieldrin, Dimethoate, Endrin, Heptachlor, Heptachlor epoxide, Hexachlorobenzene, Lindane, Methoxychlor, Oxamyl (Vydate), Permethrin, Toxaphene)

Additional data:  
gw\_level ( screen\_id, date\_, depth\_, dry\_indicator, comment)  
field\_measurements ( fm\_date, total\_organic\_carbon, dissolved\_oxygen, ph, eh, conductivity, temperature, colour,

Clicking Save and Close will close the item in HGA and open it in your default Calendar application (e.g. Outlook). Note that the entire sample plan will be included as a formatted Word Document.

You can also  Edit or  Remove Scheduled Tasks.




**Please Note:** Editing or Removing a scheduled task will not automatically update your Calendar application (e.g. Outlook). Edited Tasks will result in a new iCalendar file - existing events saved to your Calendar application (and the Calendars of project team mates) will need to be deleted and updated with the newly created item.

## Publish

The final step of the Event Planning wizard allows you to publish the Event Plan by several options. At this step, you can:

- **Save the plan:** saves the plan.
- **Create and EDD template:** allows you to create a new [EDD Template](#) based on the Event. From there you can create a [Mobile EDD](#).
- **Print to Word:** publishes the plan to a Word Document Template so that you can share it with Project Team Members.

Plan1	Start Date Feb 24 2013	End Date Feb 24 2013	
Field technician		Plan Approved By	
Primary Lab		Comments	

**Event Plan Summary**

**Stations to be sampled**


GB-01 (-80.552229, 43.478311)  
 GB-02 (-80.55292, 43.478494)  
 GB-03 (-80.553871, 43.478677)  
 GB-04 (-80.555432, 43.478233)  
 GB-05 (-80.556728, 43.478599)

**Check List**

To Bring	Returned	
<input type="checkbox"/>	<input type="checkbox"/>	3 Buckets
<input type="checkbox"/>	<input type="checkbox"/>	New pH meter
<input type="checkbox"/>	<input type="checkbox"/>	6 sample bottles

The first page of the Event Plan report is a summary including the list of stations to be sampled along with the coordinates as well as the checklist.

Each page thereafter contains the information for what needs to be collected at each station. Including the parameters that will be analyzed, any QAQC samples that should be taken, and any additional information that should be collected in the field while at that particular station.

Plan1	Start Date Feb 24 2013	End Date Feb 24 2013	
Field technician		Plan Approved By	
Primary Lab		Comments	

**GB-02 (-80.55292, 43.478494)**

**Parameters to be analyzed:** Overview(Temperature, pH (field), K, Na, Ca, Mg, Cl, HCO3, F, SO4, NO3, CO3)


Duplicate

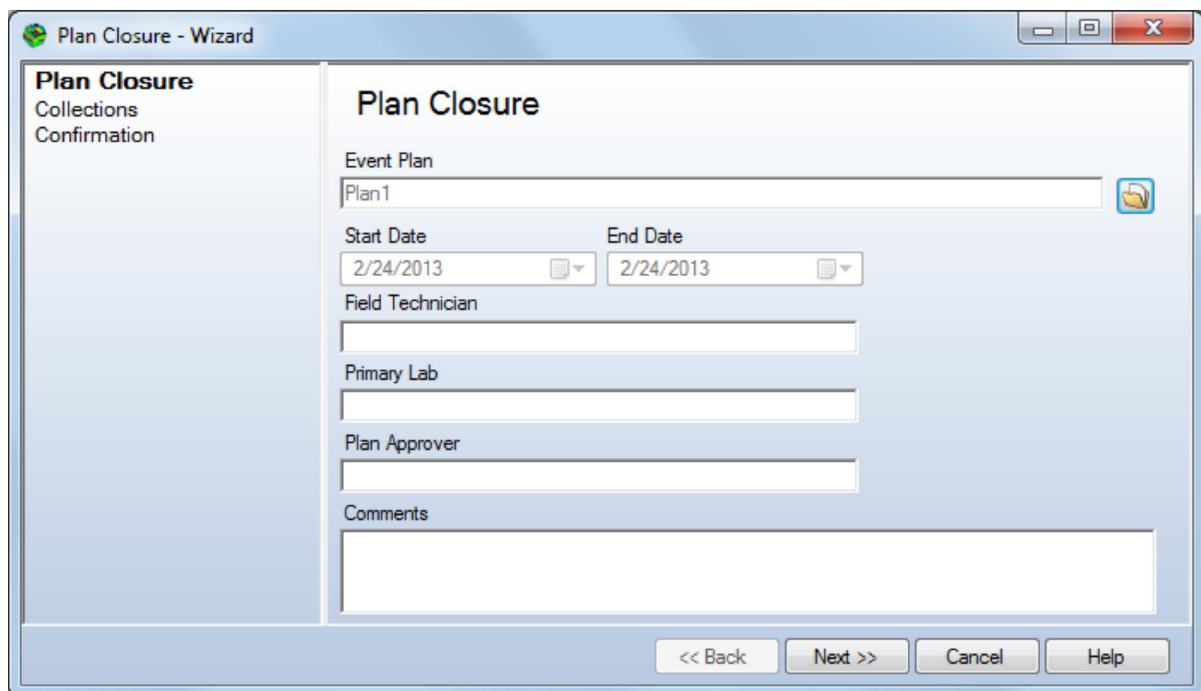
Field Measurements	Value
Measurement Date	
Temperature	
pH	

These plans can be saved and printed out for field personnel. The templates used to generate the plan reports can be modified if for example you wish to change the logo. The template can be found in the Templates folder - the location can be found in the [HGA Settings](#).

## 10.4 Event Plan Closure

The Event Planning module will remind you to close an Event Plan 7 days after the plan was scheduled to be completed. This can be adjusted in the [HGA Settings](#).

The Event Plan Closure wizard allows you to close an Event Plan. In the first step you need to select the Event Plan you wish to close by selecting the  browse button. Once the plan is selected you will see the basic information of the Event Plan displayed.



Plan Closure - Wizard

**Plan Closure**  
Collections  
Confirmation

**Plan Closure**

Event Plan  
Plan1

Start Date 2/24/2013 End Date 2/24/2013

Field Technician

Primary Lab

Plan Approver

Comments

<< Back Next >> Cancel Help

The Next step allows you to indicate what was collected during the field activities.

Plan Closure - Wizard

Plan Closure  
**Collections**  
Confirmation

### Collections

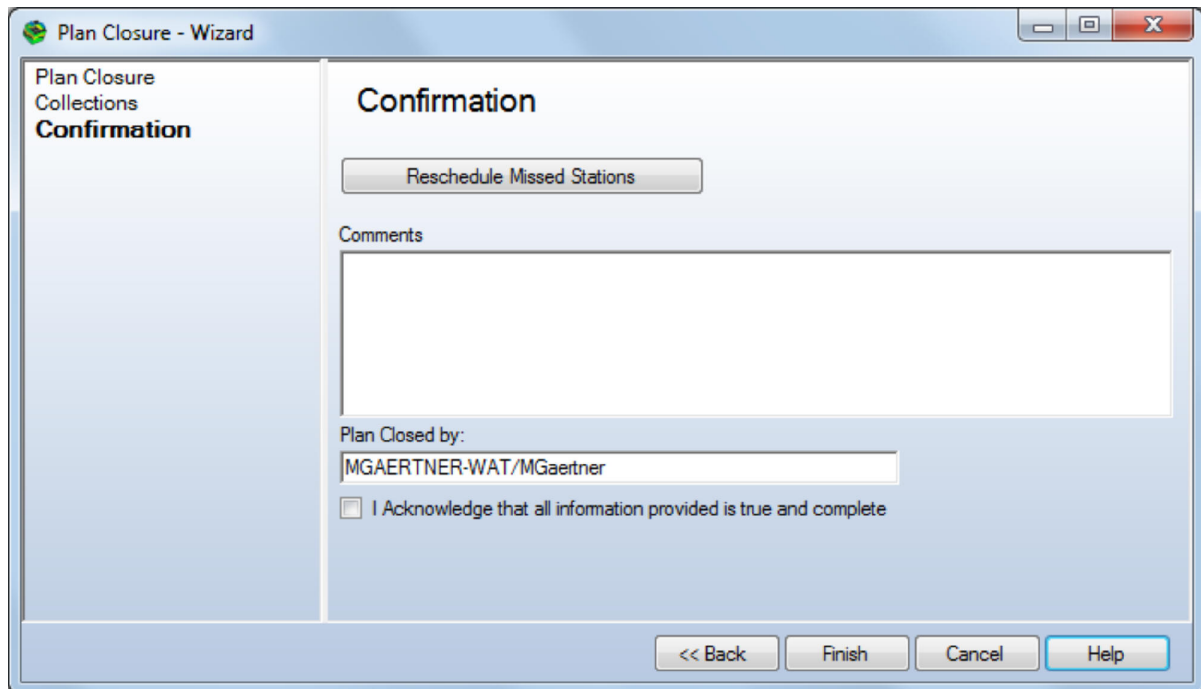
Have you collected at the following stations?  Select All

Station	Collected	Comment
GB-01	<input checked="" type="checkbox"/>	
Table	Collected	Comment
Field Measureme	<input checked="" type="checkbox"/>	
GB-02	<input checked="" type="checkbox"/>	
GB-03	<input checked="" type="checkbox"/>	
GB-04	<input checked="" type="checkbox"/>	
GB-05	<input checked="" type="checkbox"/>	

<< Back    Next >>    Cancel    Help

If all the required collections (Station samples, QAQC samples, and Additional Data) were made you can simply select the Select All option to indicate that everything was collected. If however some items were not collected during the field activities they should remain unchecked and a comment indicating why must be provided.

The next step confirms your collections.



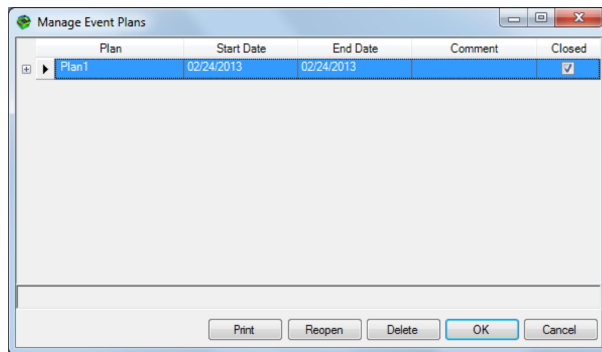
You have the option to reschedule any Stations that may have been missed during the field activities as well as entering comments regarding the plan.

You must select the Acknowledge button in order to select the Finish button the Event Plan (which will then be considered closed).

## 10.5 Manage Event Plans

When you select the Manage Event Plans icon the list of all Event Plans will be displayed indicating the Name, Start and End dates as well as whether the plan has been closed.





Here you have the option to re-print the plan if necessary as well as the option to re-open a plan if it was mistakenly closed. You also have the option to delete Event Plans in this dialog.

## 11 Lab Quality Control

When collecting, analyzing, and interpreting environmental data, Quality Control (QC) can come in many forms and fashions. Hydro GeoAnalyst supports a Lab Quality Control component, that allows users to verify the accuracy of the analysis results reported by a laboratory.

As part of a data collection process, duplicate samples, blank (control) samples, and spiked samples are added to sample sets; these samples are sent to a laboratory, along with the original field samples, to be analyzed in a controlled environment, using constant techniques, instruments, and personnel. The objective is to identify any sources of contamination that may originate from the lab analysis, and provide some assurance to the client, that the data is valid, and representative of your site conditions.

HGA has integrated a Lab Quality Analysis component that allows users to:

- Define one or more lab quality assessment templates
- Analyze Duplicate, Spiked and Blank samples
- Compare Relative Percent Difference and Coefficient of Variation for Duplicate samples (for more details, see [Check Duplicates Settings](#) ).
- Analyze Percent Recovery for Spiked samples (for more details, see [Check Spiked Settings](#) ).
- Compare Blank samples to method detection limits (for more details, see [Check Blanks Settings](#) ).
- Analyze Dilution Factor, Detection Limit, and Holding Time
- Compare the dilution factor in your results with the maximum allowed dilution factor that you set in your template (for more details, see [Check Dilution Factor Settings](#) ).
- Compare the detection limit in your results with the standard detection limit (for more details, see [Check Detection Limit Settings](#) ).
- Compare the holding time in your results with the standard holding time (for more details, see [Check Holding Time Settings](#) ).
- Execute a Quality analysis on a selected dataset
- Display and retrieve assessment results; records not meeting assessment criteria will be highlighted
- Save assessment results to a MS Excel spreadsheet

### 11.1 Preparing Your Data for QC Analysis

Your QC Blank, duplicate, and spiked samples should be entered in the same table and fields as your original samples.

If a Duplicate sample was collected at an existing station, then create a new sample ID, and assign the appropriate Quality Code (D). You must also define a common batch ID for duplicates to indicate that they belong together. If you want to compare the duplicate to its original sample, you must add the appropriate Original Sample Quality Code (O), to each original sample.

If a Blank sample was collected, it can be added as a new station and sample, or as a new sample, to an existing station. Create a new sample ID, and assign the appropriate Quality Code (B).

For Spiked samples, you must add two types of samples codes and results:

The first will be a sample that contains the known spiked concentration, for each parameter. Create a new sample ID, and assign the appropriate Quality Code, ST (for Theoretical Spiked concentration). Create a new sample for every spiked sample and enter the amount of constituent that has been added for every spiked parameter.

Next, add the analyzed spiked sample as a new sample. Create a new sample ID, and assign the appropriate Quality Code, SM (for Measured Spiked concentration). Create a new sample for every spiked sample and enter the measure amount of constituent that was recovered, for every spiked parameter.

Both the measured sample and the sample holding the theoretical concentrations should be assigned a common batch # (Batch ID), which relates the samples to each other.

### Defining Quality Codes for Data

When importing/adding sample data, quality codes need to be added to indicate the type of sample, in order to be used in a Lab Quality Analysis. The following are the codes required by HGA:

Sample Type	Quality Code
Duplicate Original	O
Duplicate Measured	D
Spiked Theoretical	ST
Spiked Measured	SM
Blank measured	B

Using the Template Manager, you can create a field that will store the quality codes. This field may be added to any table, but typically it is found in the Parameter Sample table, with the Sample ID.

These quality codes are saved in the file: *...\\Program Files\\HGAnalyst\\Whi.QualityAC.dll.config*

If necessary, the codes may be changed to reflect the codes used in your data. Simply use a text editor to open the .config file, and modify the quality codes under the section: <QualityCodes>.

## Data Requirements

---

Quality Control starts with a data set; before you can apply a quality control template, you must generate a data set, by building and executing a data query with the Query Builder. The data query should contain the data set you are interested in analyzing, along with the fields required by the Quality Control component.

The following are required fields for the Lab Quality validation, and as such, must be fields that are present in your data query:

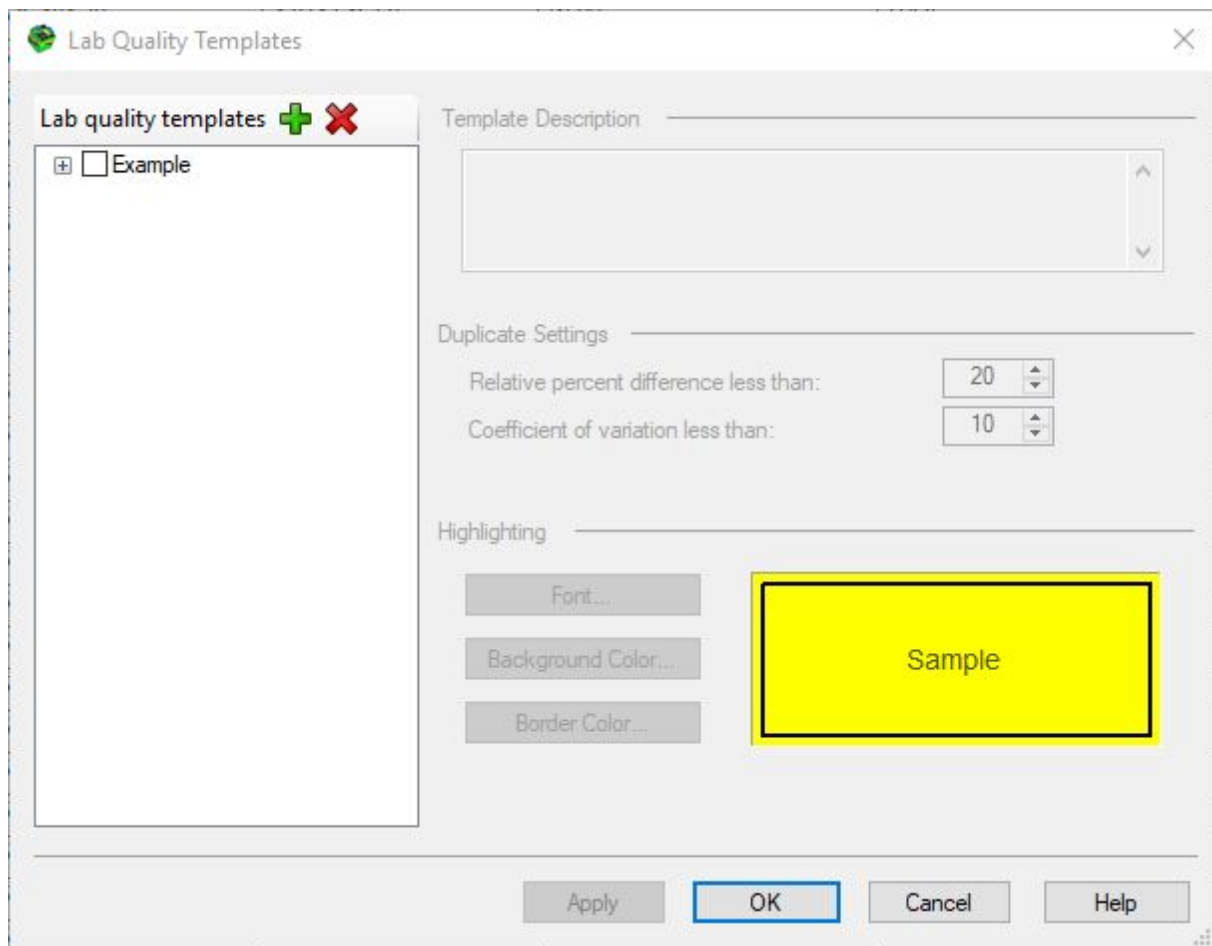
- **Station ID:** located in the Station table
- **Sample ID:** this is typically found in the Monitoring Event > Parameter Sample table, or the Soil Sampling > Soil Sample table.
- **Batch Identifiers:** Samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents, within a specified time period, should be assigned the same Batch ID. Both the measured sample and the sample holding the theoretical concentrations should be assigned a common batch number, which relates the samples to each other.
- **Detection Limit:** Method detection limit, typically found in the Chemistry\_Results or Soil\_Chemistry table.
- **Parameter Name:** contains the parameter being analyzed; typically found in the Chemistry\_Results or Soil\_Chemistry table with the results
- **Parameter Identification Information:** contains meta data about the parameter; typically found in the same table as the parameter name
- **Parameter Values:** The measured or observed value for the selected chemical or parameter. Typically found in the Chemistry\_Results or Soil\_Chemistry table
- **Quality Code Identifiers:** Used to identify the sample type. Typically found with the Sample ID, in the Monitoring Event > Chem Sample table, or the Soil Sampling > Soil Sample table.

The following fields are not required, but are helpful for easily identifying samples in the results page:

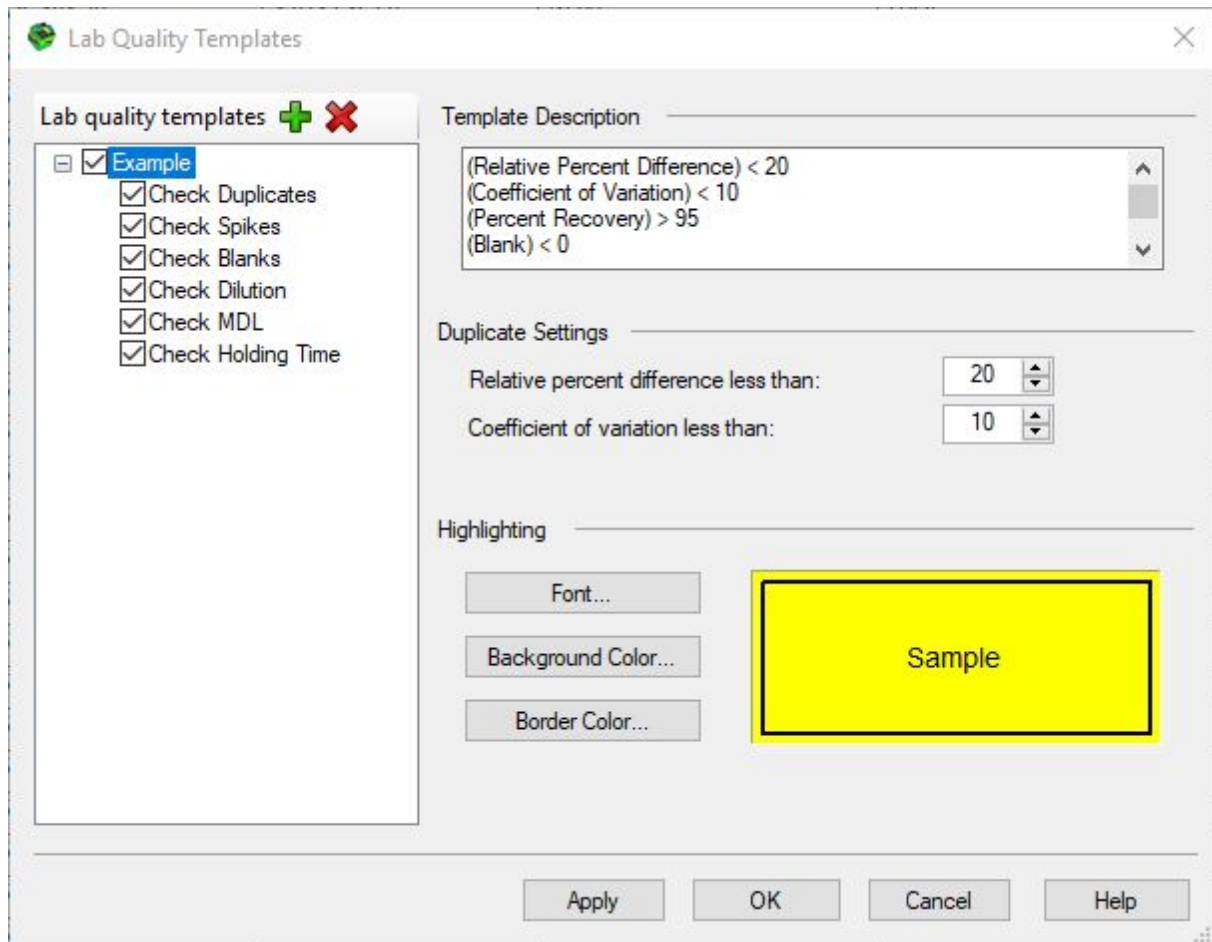
- **Station Name:** located in the Station table
- **Sample Name:** this is typically found in the Monitoring Event > Chem Sample table, or the Soil Sampling > Soil Sample table.
- **Sample Date**
- **Units**
- **Unit conversion factors**

## 11.2 Define A New Lab Quality Template

To create a new lab quality analysis template, click **Module > Quality Control > Manage Lab QC Templates** from the Main Menu bar. The Lab Quality window will open, as shown in the following figure:



To create a new template, click the [Add] button, and enter a name for the template. The newly created template will then appear in the Lab Quality Templates list. To configure your template, click on the [+] to expand the template tree. As shown in the following example screenshot, the three Check types (Duplicate, Spikes, and Blanks) will be listed. To activate a Check type, click in the checkbox beside it.



The Template Description field is filled in by default with a verbal description of the Settings used for the template. You can modify the Template Description with any text you would like to use by simply typing over the existing text.

Each Check type has its own Settings, which can be adjusted by clicking on the Check type to highlight it. The Settings will then appear to the right. Settings for each Check type are described in the following sections.

### 11.2.1 Check Duplicates Settings

A field duplicate is a QC sample which is used to determine the precision associated with all or part of the sample collection and measurement process. Field duplicates are two independent samples which are collected, as nearly as possible, from the same point in space and time. The two field duplicate samples are collected from the same source, using the same type of sampling equipment. Ideally, analyte concentrations in the duplicate sample should be identical, or very close, to the original sample to which it is being compared. The following settings are available:

Duplicate Settings

Relative percent difference less than: 20

Coefficient of variation less than: 10

Highlighting

Font...

Background Color...

Border Color...

Sample

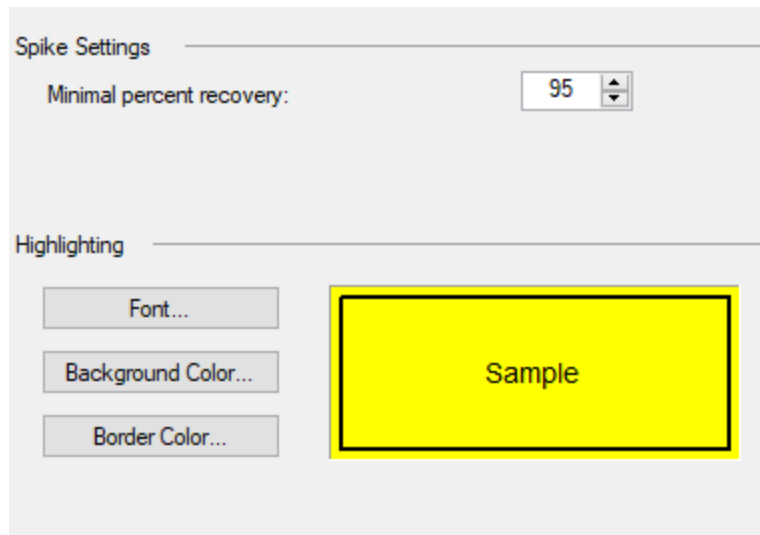
**Relative percent difference less than:** This criteria is used to compare how close the result from a duplicate sample (D) is to the true, original field sample (O). It is expressed as either a positive difference (the sample result is higher than the true value) or negative difference (the sample result is lower than the true value). When used with duplicate samples, the Relative Percent Difference measures precision - the lower the value, the more precise the results must be to be considered acceptable. It can also measure accuracy, when one of your results is the true value (such as the quality control lab results for a split sample), or the actual concentration of a known or unknown sample.

**Coefficient of Variation (CV) less than:** The standard deviation as a percentage of the average. The CV is a unitless quantity indicating the variability around the mean, in relation to the size of the mean. When used with duplicate samples, the CV measures precision - the lower the value, the more precise the results.

**Highlighting:** If a record is identified as not meeting the Template criteria specified above, it will be highlighted according to the settings entered in this frame. By default, the record's Background Color will be changed to yellow. However, the user has the option to modify the **Font**, the **Background Color**, and the **Border Color** of the record by clicking on the appropriate button(s).

### 11.2.2 Check Spiked Settings

A matrix spike is an aliquot of sample that is spiked with a known concentration of target analyte(s) prior to sample preparation. Ideally, there should be 100% recovery of the spiked concentration (or very close to this). The following settings are available.



**Minimal Percent Recovery:** You can find this option by selecting Project / Export. In this first step of the workflow you can create a template (which can be opened in Excel) for others to use to validate their data. In the EDD Template Designer you select which fields you wish to have in your template by simply dragging and dropping them onto the Template Format.



**Please Note:** The analysis assumes that the sample that is being spiked is a blank, and does not contain any detectable concentrations of any of the contaminants. You may not use a field original sample for a spiked sample analysis.

**Highlighting:** If a record is identified as not meeting the Template criteria specified above, it will be highlighted according to the settings entered in this frame. By default, the record's Background Color will be changed to yellow. However, the user has the option to modify the **Font**, the **Background Color**, and the **Border Color** of the record by clicking on the appropriate button(s).

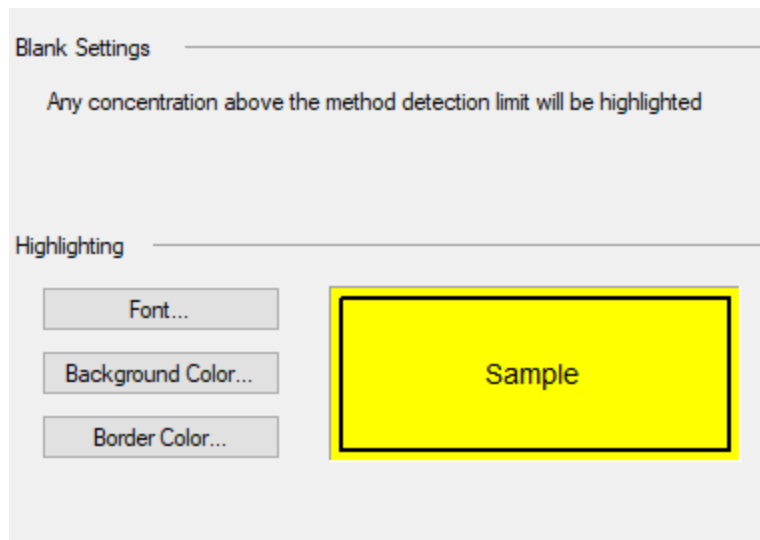
### 11.2.3 Check Blanks Settings

A blank is a quality control sample used to detect and identify contaminants introduced to samples during the measurement process. A laboratory blank is an analyte-free matrix that is carried through all or part of the analytical process for identifying contamination introduced during analysis. Types of laboratory blanks include method blanks (carried through the entire preparation and analysis sequence), calibration blanks (matrix-matched reagent water used for calibration), and storage blanks (placed in sample storage areas). In the field, an analyte-free matrix is carried through a portion of the field process to identify contamination introduced



during field or transportation operations. Types of blanks associated with the field are trip blanks (these accompany samples through the transportation process), equipment rinsates (collected after decontamination), and field blanks (collected on-site during the sampling event).

Ideally, analysis of the blank samples should return no detectable concentrations of any of the analytes; i.e. concentrations are below the method detection limit (MDL).



The detection limit for contaminants can be specified in HGA, and must be added to your data query.

**Highlighting:** If a record is identified as not meeting the Template criteria specified above, it will be highlighted according to the settings entered in this frame. By default, the record's Background Color will be changed to yellow. However, the user has the option to modify the **Font**, the **Background Color**, and the **Border Color** of the record by clicking on the appropriate button(s).

#### 11.2.4 Check Dilution Factor Settings

A dilution factor is calculated by dividing the final volume by the aliquot volume. An aliquot volume is the measure of sub-volume of original sample.

Final volume is the total volume.

This QA/QC check will look for exceedances in the dilution factors in your result records. You simply need to set the Maximum allowed dilution factor. Any reported Dilution Factors above what you have specified as the maximum will fail this check.

Dilution Settings

Maximum dilution factor: 1

Highlighting

Font...

Background Color...

Border Color...

Sample

**Highlighting:** If a record is identified as not meeting the Template criteria specified above, it will be highlighted according to the settings entered in this frame. By default, the record's Background Color will be changed to yellow. However, the user has the option to modify the **Font**, the **Background Color**, and the **Border Color** of the record by clicking on the appropriate button(s).

### 11.2.5 Check Method Detection Limit Settings

This QA/QC check will compare the Standard Detection Limit in the QA/QC reference table with your detection limits reported within your results. If your reported detection limits are greater than the Standard Detection Limit in the reference table they will fail this check and samples will be formatted according to the Highlighting options.

MDL Settings

Any detection limit above the Standard Detection Limit will be highlighted.  
You can configure Standard Detection Limit from the Modules\Quality Control\QAQC References menu.

Highlighting

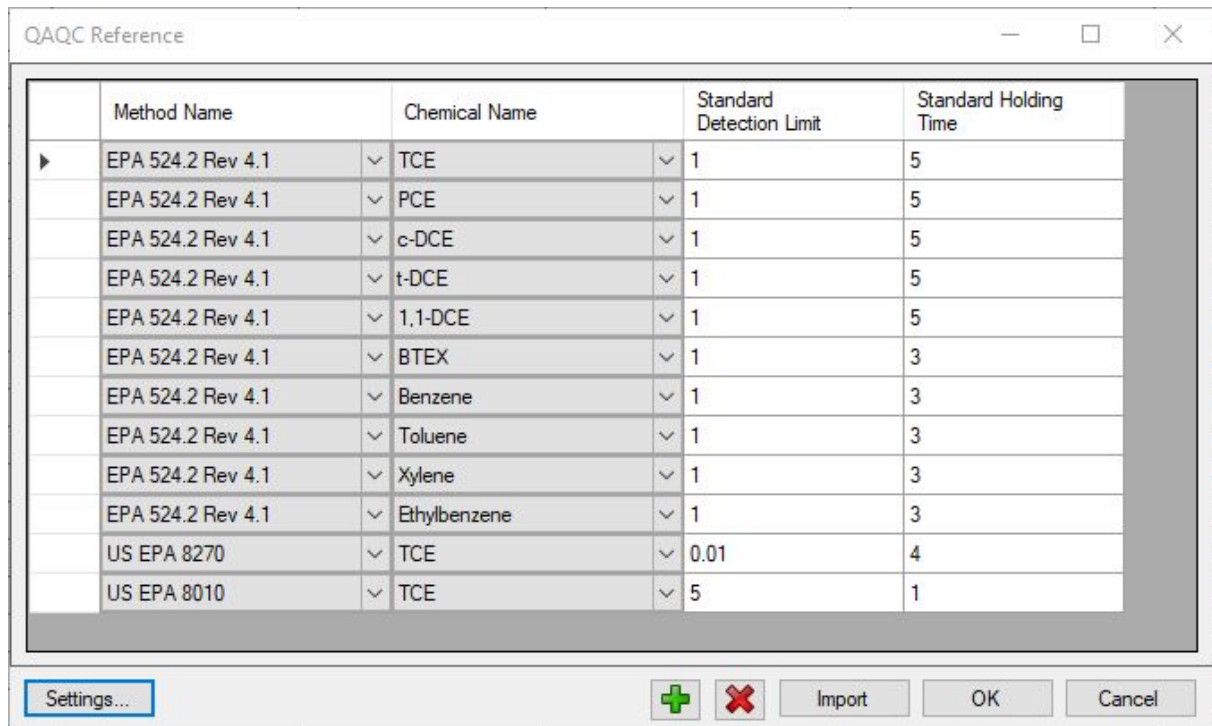
Font...

Background Color...

Border Color...

Sample

You can enter your QAQC references (Standards) by selecting **Modules > Quality Control > QAQC References** from the Menu bar:

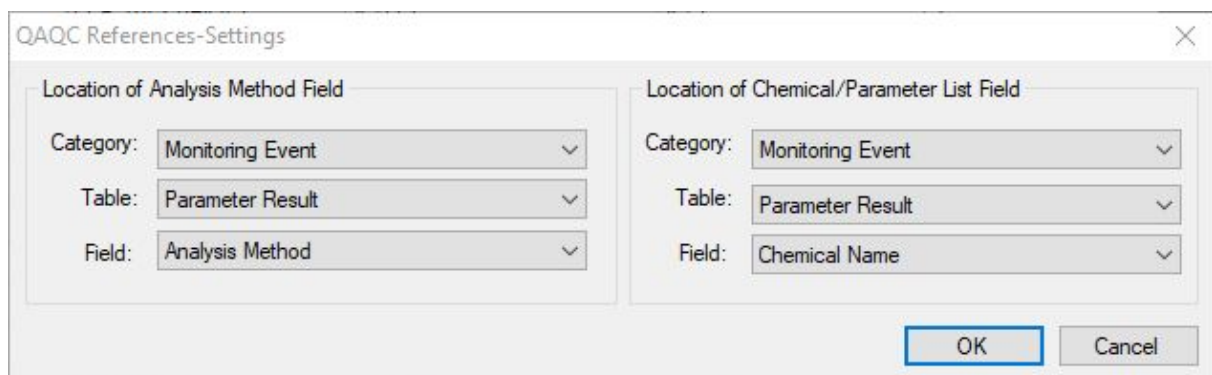


The QAQC Reference dialog box displays a table with the following columns: Method Name, Chemical Name, Standard Detection Limit, and Standard Holding Time. The table contains 13 rows of data, including EPA 524.2 Rev 4.1 standards for various chemicals and US EPA standards for TCE.

	Method Name	Chemical Name	Standard Detection Limit	Standard Holding Time
▶	EPA 524.2 Rev 4.1	TCE	1	5
	EPA 524.2 Rev 4.1	PCE	1	5
	EPA 524.2 Rev 4.1	c-DCE	1	5
	EPA 524.2 Rev 4.1	t-DCE	1	5
	EPA 524.2 Rev 4.1	1,1-DCE	1	5
	EPA 524.2 Rev 4.1	BTEX	1	3
	EPA 524.2 Rev 4.1	Benzene	1	3
	EPA 524.2 Rev 4.1	Toluene	1	3
	EPA 524.2 Rev 4.1	Xylene	1	3
	EPA 524.2 Rev 4.1	Ethylbenzene	1	3
	US EPA 8270	TCE	0.01	4
	US EPA 8010	TCE	5	1

At the bottom of the dialog box, there are buttons for Settings..., a green plus icon, a red minus icon, Import, OK, and Cancel.

Here you can manually enter or import the reference values used for running the associated checks. You will notice that the Method Name and Chemical Name have drop down lists you can pick from - this is based on your selections from the Settings:



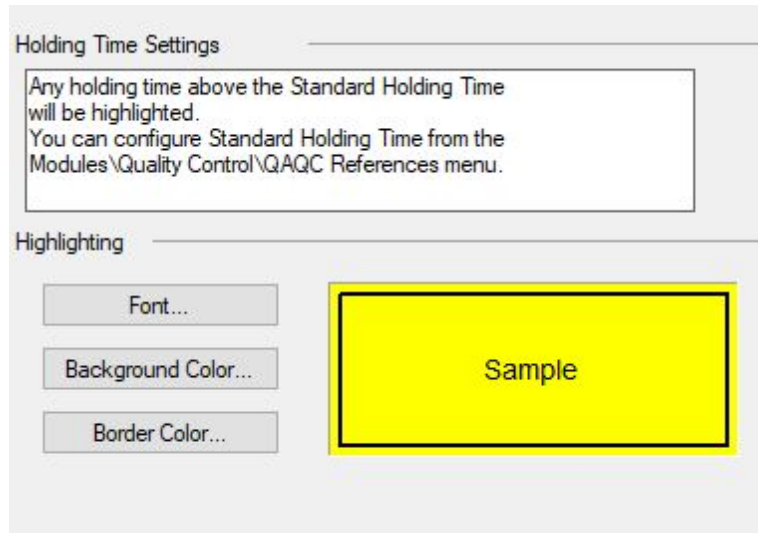
The QAQC References-Settings dialog box is used to configure the location of analysis method and chemical/parameter list fields. It contains two sections: Location of Analysis Method Field and Location of Chemical/Parameter List Field. Each section has three dropdown menus for Category, Table, and Field.

Section	Category	Table	Field
Location of Analysis Method Field	Monitoring Event	Parameter Result	Analysis Method
Location of Chemical/Parameter List Field	Monitoring Event	Parameter Result	Chemical Name

At the bottom right of the dialog box, there are buttons for OK and Cancel.

### 11.2.6 Check Holding Time Settings

Holding time is the length of time a sample can be stored after collection and prior to analysis without significantly affecting the analytical results. This QA/QC check will compare the Standard holding time with the holding times of your results. The holding time of your results will be calculated by comparing the difference between the Sample Date and the Analysis date. Any results that have a holding time greater than what is specified in the QAQC Reference table will fail this check.



You can enter your QAQC references (Standards) by selecting Project/Properties/QAQC References

	Method Name	Chemical Name	Standard Detection Limit	Standard Holding Time
▶	EPA 524.2 Rev 4.1	TCE	1	5
	EPA 524.2 Rev 4.1	PCE	1	5
	EPA 524.2 Rev 4.1	c-DCE	1	5
	EPA 524.2 Rev 4.1	t-DCE	1	5
	EPA 524.2 Rev 4.1	1,1-DCE	1	5
	EPA 524.2 Rev 4.1	BTEX	1	3
	EPA 524.2 Rev 4.1	Benzene	1	3
	EPA 524.2 Rev 4.1	Toluene	1	3
	EPA 524.2 Rev 4.1	Xylene	1	3
	EPA 524.2 Rev 4.1	Ethylbenzene	1	3
	US EPA 8270	TCE	0.01	4
	US EPA 8010	TCE	5	1

Here you can manually enter or import the reference values used for running the associated checks. You will notice that the Method Name and Chemical Name have drop down lists you can pick from - this is based on your selections from the Settings:

QAQC References-Settings

Location of Analysis Method Field

Category: Monitoring Event

Table: Parameter Result

Field: Analysis Method

Location of Chemical/Parameter List Field

Category: Monitoring Event

Table: Parameter Result

Field: Chemical Name

OK Cancel

Once you have defined the settings for your Template, you can create another template by clicking the [Add] button, delete an existing template by clicking the [Remove] button, or accept/reject your changes and return to the HGA main program window.

You are now ready to apply the lab quality template to your data.

### 11.3 Perform Lab Quality Assessment



**Please Note:** An example of a Lab Quality Data query is available in the Demo project; select the QC\_Lab\_Analysis query in the Queries node, and feel free to follow along with the instructions below.

To apply a Lab Quality Template, follow the instructions below:

- Select and highlight the appropriate Data Query from the Queries node in the HGA Browser.
- From the main menu, click Tools > Quality Control and select the Perform Lab QC Assessment option; the following dialog will appear:

**Select and configure a template for lab quality validation**

Lab Quality Templates: Example

Template Description:  
 (Relative Percent Difference) < 20  
 (Coefficient of Variation) < 10  
 (Percent Recovery) > 95  
 (Blank) < 0

Mapping

Field	Query Alias
Station Name*	name
Sample ID*	Sample_ID
Batch ID*	Batch_ID
Sample Date*	Sample_Date
Chemical Name*	Chemical_Name
Result Value*	Result_Value
Result Units	Result_Unit
Quality Code*	Quality_Code
Detection Limit*	Detection_Limit
Dilution Factor*	Dilution_Factor
Method Name*	Method_Name
Analysis Date*	Analysis_Date_

\* Required for Lab Quality validation

OK Cancel Help

From the Select and configure a template window select from the list of Lab Quality Templates.

Once a template has been selected, the Template Description field will be completed with the description entered when the template was created. The next step is to map the fields in your data query, to the fields required by the QC component.

### Mapping Fields

---

In the Mapping frame, the Field must be matched to the Query Alias for all required fields; required fields are marked with a "\*", and are also listed in previous section. In most cases, HGA will be able to automatically detect and map the fields, however if you have created custom fields, or renamed existing fields in your database structure, you may need to browse through the list and select the appropriate Query Alias in your project (using the pull-down menus) that corresponds with a Field.

NOTE: A field in your query must be mapped to each of the required fields, as listed above.

### Generate QC Results

---

The results for an example analysis including all six checks is displayed in the screenshot below:

Lab Quality Validation

Spike results
  Blank results
  Duplicate results
  Dilution results
  MDL results
  Holding Time results

name	Sample_ID	Sample_Date	Batch_ID	Chemical_Name	Result_Value	Result
W-01	W-01_1/2/1996_s	1/2/1996 12:00:00	2	Benzene	70	
W-01	W-01_1/8/1996_s	1/8/1996 12:00:00	2	Benzene	100	
W-01	W-01_2/12/1996_s	2/12/1996 12:00:00	2	Benzene	120	
W-01	W-01_4/16/1996_s	4/16/1996 12:00:00	2	Benzene	100	
W-01	W-01_8/9/1996_s	8/9/1996 12:00:00	2	Benzene	100	
W-01	W-01_1/2/1996_s	1/2/1996 12:00:00	2	Ethylbenzene	130	
W-01	W-01_1/8/1996_s	1/8/1996 12:00:00	2	Ethylbenzene	100	
W-01	W-01_2/12/1996_s	2/12/1996 12:00:00	2	Ethylbenzene	100	
W-01	W-01_4/16/1996_s	4/16/1996 12:00:00	2	Ethylbenzene	100	
W-01	W-01_8/9/1996_s	8/9/1996 12:00:00	2	Ethylbenzene	100	
W-01	W-01_1/2/1996_s	1/2/1996 12:00:00	2	Toluene	70	
W-01	W-01_1/8/1996_s	1/8/1996 12:00:00	2	Toluene	100	
W-01	W-01_2/12/1996_s	2/12/1996 12:00:00	2	Toluene	105	
W-01	W-01_4/16/1996_s	4/16/1996 12:00:00	2	Toluene	100	
W-01	W-01_8/9/1996_s	8/9/1996 12:00:00	2	Toluene	100	
W-01	W-01_1/2/1996_s	1/2/1996 12:00:00	2	Vinyl Chloride	180	
W-01	W-01_1/8/1996_s	1/8/1996 12:00:00	2	Vinyl Chloride	200	

Write Flags to Database... View Log File Export Results... Close Help



Indicates that all records have passed this check.



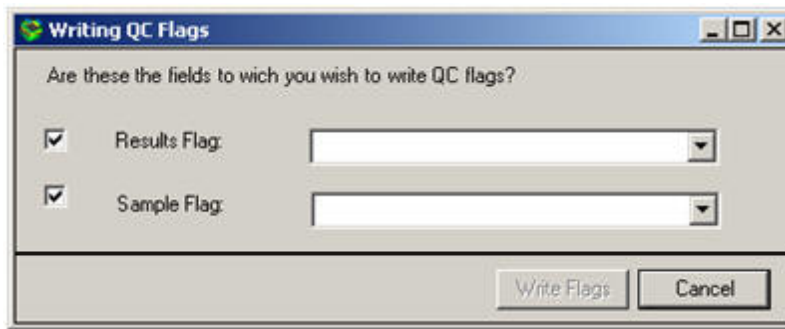
Indicates that one or more record(s) has failed this check.

If any records failed the check you will also find the record is highlighted as per your settings from your template.

You will also find an option to write flags to the database indicating the results of the Validation. You must select which field in the database to write the Results Flag (should be in the results table). The name of each check that was failed will be appended to the field you select.

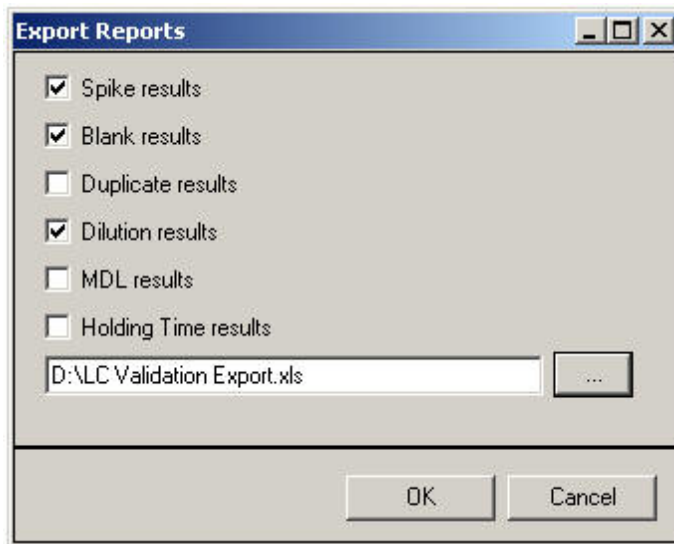
You must also select which field in the database to write the Sample Flag (should be in the sample table). The name of the Template that was run on the sample will be appended to the field you select.





### Export Quality Control Analysis Results

To export the results of your Lab Quality Analysis to a MS Excel spreadsheet, click the [Export Results] button, select the check results you wish to export and provide a name for your spreadsheet.



If more than one check result is selected you will find multiple worksheets within your spreadsheet (one for each check) see below for an example.

Name	Sample_ID	Sample_Date	Batch_ID	Chemical_Name	Result_Value	Result_Unit	Detection_Limit	Quality_Code	System_Concentration	Percent_Recovery
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Benzene	75	µg/L	5	SM	100	70
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Ethylbenzene	120	µg/L	5	SM	100	115
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Toluene	70	µg/L	5	SM	100	70
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Vapor Disinfectant	100	µg/L	10	SM	200	90
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Xylene	113	µg/L	10	SM	100	113
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Benzene	100	µg/L	5	SM	100	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Ethylbenzene	100	µg/L	5	SM	100	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Toluene	100	µg/L	5	SM	100	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Vapor Disinfectant	200	µg/L	10	SM	200	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Xylene	100	µg/L	10	SM	100	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Benzene	120	µg/L	5	SM	100	120
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Ethylbenzene	100	µg/L	5	SM	100	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Toluene	100	µg/L	5	SM	100	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Vapor Disinfectant	200	µg/L	10	SM	200	100
W-01	W-01_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Xylene	100	µg/L	10	SM	100	100
W-01	W-01_4101996_Apt_mesa	10/04/1996 12:00:00 AM	1	Benzene	100	µg/L	5	SM	100	100
W-01	W-01_4101996_Apt_mesa	10/04/1996 12:00:00 AM	1	Ethylbenzene	100	µg/L	5	SM	100	100
W-01	W-01_4101996_Apt_mesa	10/04/1996 12:00:00 AM	1	Toluene	100	µg/L	5	SM	100	100
W-01	W-01_4101996_Apt_mesa	10/04/1996 12:00:00 AM	1	Vapor Disinfectant	200	µg/L	10	SM	200	100
W-01	W-01_4101996_Apt_mesa	10/04/1996 12:00:00 AM	1	Xylene	100	µg/L	10	SM	100	100
W-01	W-01_0901996_Apt_mesa	09/00/1996 12:00:00 AM	1	Benzene	100	µg/L	5	SM	100	100
W-01	W-01_0901996_Apt_mesa	09/00/1996 12:00:00 AM	1	Ethylbenzene	100	µg/L	5	SM	100	100
W-01	W-01_0901996_Apt_mesa	09/00/1996 12:00:00 AM	1	Toluene	100	µg/L	5	SM	100	100
W-01	W-01_0901996_Apt_mesa	09/00/1996 12:00:00 AM	1	Vapor Disinfectant	200	µg/L	10	SM	200	100
W-01	W-01_0901996_Apt_mesa	09/00/1996 12:00:00 AM	1	Xylene	100	µg/L	10	SM	100	100
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Benzene	80	µg/L	5	SM	100	80
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Ethylbenzene	113	µg/L	5	SM	100	113
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Toluene	133	µg/L	5	SM	100	133
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Vapor Disinfectant	100	µg/L	10	SM	200	52.5
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Xylene	100	µg/L	10	SM	100	101
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Benzene	100	µg/L	5	SM	100	100
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Ethylbenzene	100	µg/L	5	SM	100	100
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Toluene	100	µg/L	5	SM	100	100
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Vapor Disinfectant	200	µg/L	10	SM	200	100
W-02	W-02_101996_Apt_mesa	10/01/1996 12:00:00 AM	1	Xylene	100	µg/L	10	SM	100	100
W-02	W-02_0101996_Apt_mesa	12/00/1996 12:00:00 AM	1	Benzene	100	µg/L	5	SM	100	100
W-02	W-02_0101996_Apt_mesa	12/00/1996 12:00:00 AM	1	Ethylbenzene	100	µg/L	5	SM	100	100
W-02	W-02_0101996_Apt_mesa	12/00/1996 12:00:00 AM	1	Toluene	100	µg/L	5	SM	100	100
W-02	W-02_0101996_Apt_mesa	12/00/1996 12:00:00 AM	1	Vapor Disinfectant	200	µg/L	10	SM	200	100

## 12 Time Series Plotting

The plotting component in Hydro GeoAnalyst allows users to create time series plots of data stored in the HGA database. The plotting provides the following features:

- Create Time Series X-Y plots using data from data queries.
- Display X-Y plots as a line or bar chart.
- Add legends and data marker labels to plots
- Add best fit, trend, formula, or statistical lines to the plot
- Interact with plots, and display multiple plot windows in the viewer window simultaneously
- Display non-detect, uncertainty, or detection limits on the plot, as lines or symbols
- Define data series ranges, and modify display properties for different data ranges (e.g. define a data range where the data exceeds the water quality standard values, and assign unique symbol, line, and display properties for this data)
- Select fields for plot grouping or data series grouping
- Modify display properties, including axis, labels, symbols, legends, and intervals
- Print plots to a single or multiple pages
- Save plot settings as templates for re-use
- Export plots to graphics format
- Copy plots to Windows clipboard

### 12.1 About the Interface

Once you have created and selected a data query, you may create a plot with the data set. The plot component may be launched from HGA in several ways:

To create a new Plot Page Design, right-click on the Plots node (on the Project Tree) and select New from the pop-up menu

Existing plots can be opened from the Plots node in the Project Tree by either double-clicking on the desired plot in the available list, or by right-clicking and selecting the Open pop-up menu option.



**Please Note:** A data query containing the required fields (see below) must be selected in order to launch the plots mode from the HGA main interface.

A typical plot window is shown in the following figure.

The screenshot shows the software interface with the following components:

- Plot Page Design:** A tree view on the left showing a hierarchy of 'waterquality\_multipleplots' containing 'Calcium', 'Sodium', 'Chloride', and 'Sulfate'.
- Designer Toolbar:** A set of icons for plot manipulation, including a save icon, a plus sign, a minus sign, a refresh icon, a zoom in icon, a zoom out icon, and a grid icon.
- Plot Settings and Data Source:** A table with the following data:
 

Settings	Data Source
Name	waterquality_multipleplots
Number of Columns	2
Number of Rows	2
Spacing Width	10
Spacing Height	10
- Viewer Window:** Four time series plots:
  - Calcium Time Series Plot:** Shows Calcium concentration (Ca) on the y-axis (0 to 120) against Sampling Date on the x-axis (12/7/1995 to 12/5/2001). The data is represented by a blue line with square markers.
  - Sodium Time Series Plot:** Shows Sodium concentration (Na) on the y-axis (2 to 6) against Sampling Date on the x-axis. The data is represented by a red dashed line with triangle markers.
  - Chloride Time Series Plot:** Shows Chloride concentration (Cl) on the y-axis (20 to 240) against Sampling Date on the x-axis. The data is represented by a red solid line with triangle markers.
  - Sulfate Time Series Plot:** Shows Sulfate concentration (SO4) on the y-axis (0 to 20) against Sampling Date on the x-axis. The data is represented by a green solid line with asterisk markers.

The plot window contains the following items:








- Plot Page Design Tree:** A list of all available plot page designs, plots, and series such as Lines and Standards
- Designer Toolbar:** Toolbar buttons used for modifying the plot design
- Plot Settings and Data Source:** Contains the settings for the selected entity, and data mappings
- Viewer Window:** Contains a real time view of the plot page design



### Description of Designer Toolbar Items

The plot designer toolbar provides the controls for designing the plot page. The following buttons are available.



Save button saves the current plot design

-  Save As button saves the current plot design as a new name
-  Add button provides two options: Add Plot will prompt you to select a template to be used; Add Default Plot will create a new plot using the default plot template
-  Delete button deletes the selected plot or line series
-  Refresh button refreshes the design with new settings or data
-  Zoom in button allows you to zoom into the selected plot page; to zoom in on selected plot data within an individual plot
-  Zoom out button returns to the original zoom view
-  Fit to Page button fits all plots to the current viewer window size

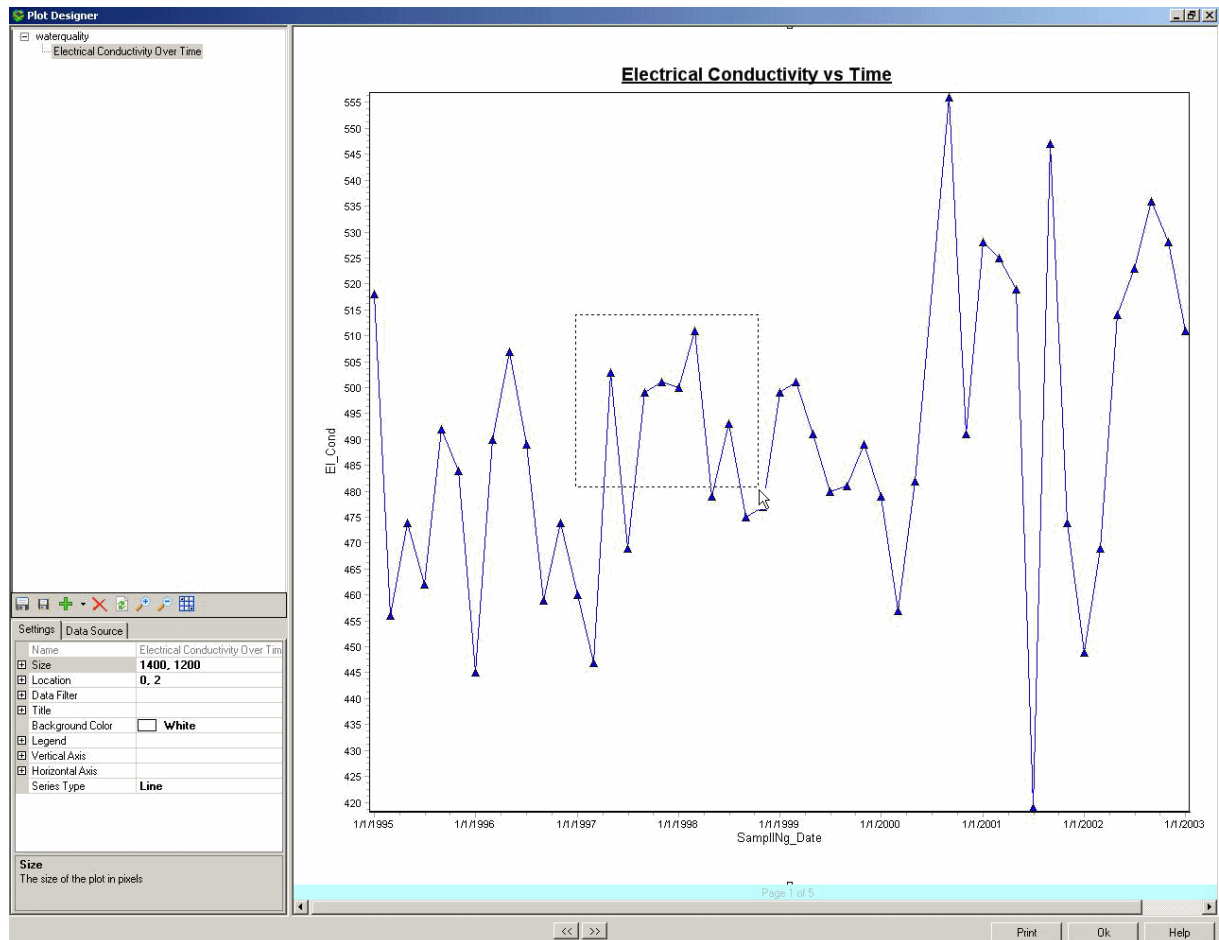
At the bottom of the window, you will find the following buttons:   . The function of these buttons, from left to right, is:

Previous Page: scroll to the previous page in the plot design

Next Page: scroll to the next page in the plot design

Zoom

To zoom in on plot data in an individual plot, use the mouse cursor to draw box around the desired data; a sample is shown in the screen shot below:



To zoom out to the original extents, right-mouse click on the plot area, and select Zoom Out from the menu.

### Viewer Window Settings

Under the Settings tab, you can define the settings for the plot page design:

Settings   Data Source	
Name	waterquality_multipleplots
Number of Columns	2
Number of Rows	2
Spacing Width	10
Spacing Height	10

Name controls the name of the selected plot series; this is read-only, and cannot be modified.

The plotting component supports display and manipulation of multiple plot windows in the viewer window.

Number of columns controls how many columns will be displayed in the viewing window for displaying plots.

Number of rows controls how many rows will be displayed in the viewing window for displaying plots.

For example, 2 columns X 2 rows means that 4 plots may be displayed simultaneously in the viewer window.

Spacing width controls the amount of space between each plot, in the horizontal direction.

Spacing height controls the amount of space between each plot, in the vertical direction.

## 12.2 Adding Plots

The data source for the plots must originate from a Data Query; before you create a plot, you must build and execute a data query using the Query Builder. The data query should contain the data set you are interested in analyzing, along with the fields for a time series plot.



**Please Note:** If you are plotting a large water level dataset which was logged using a small time interval, e.g., 1 sample per hour over many days, use the average aggregate function in the query builder to query the daily average water level. By doing this, you will lower the number of data points in your query and thus lower the drawing time when displaying the time series plot.


The following are required fields for the Time Series plots, and as such, must be present in your data query:

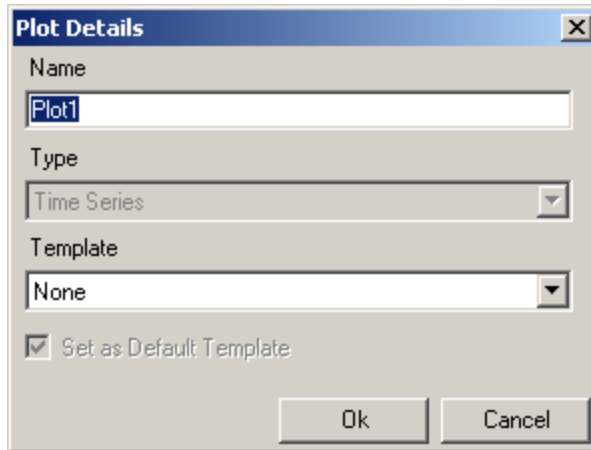
- Sample Date or Time
- Value for the parameter of interest (e.g. water level, chemical concentrations, temperature, pH, conductivity, etc.)

The following fields are not required, but are available for plot and series grouping, and to take advantage of additional plot options:

- Station ID
- Station Name
- Chemical (Parameter) name
- Measured parameter units
- Non detect (ND) factor
- Method detection limit (MDL)
- Uncertainly factor

### 12.2.1 Add Plot

To add a new plot to the design, click the  (Add) button in the toolbar, or right-click on the Plot Page Design node in the tree view, and select the Add plot menu option. The following Add plot dialog will appear:



In the Name field enter the name of the plot.

The Type combo box contains the supported plot type; currently only Time-Series scatter plots are supported.

In the Template combo box, select the desired plot template that should be applied to the new plot. The plot template contains numerous pre-defined settings for axis, data series, style settings, etc. If you want to re-use the same template again in the future, select the Set as the default template check box. For details on creating plot templates, see [Managing Plot Templates](#) section.

Click [OK] when you are finished, to display the new plot in the viewer window. The next step is to map the fields.

### 12.2.2 Field Mappings

Under the Data Source tab, you can define the field mappings for the plot, as shown in the screenshot below:



Settings	Data Source
Query	
Plot Grouping	
Series Grouping	
Time	
Value	
Units	
Label	
ND_factor	
Detection Limit	
Uncertainty	
Standards	
Multiplier	
Bar Color Schema	

**Query:** select the data source for the plot from the combo box; currently the data must come from data queries.

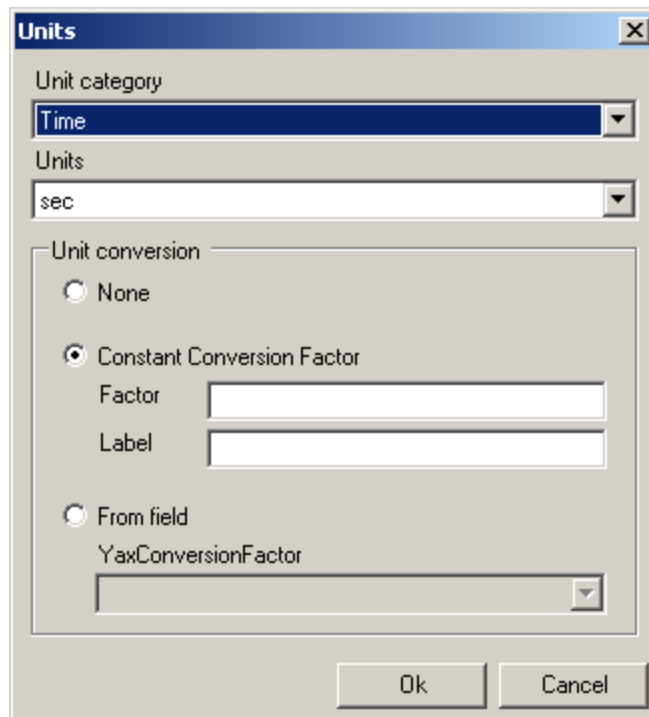
**Plot Grouping:** specify a field to be used for grouping plots

**Series Grouping:** specify a field to be used for grouping series; at least one field must be selected for grouping the plot series.

**Time Axis:** specify a field to be used for the Time (X) axis. This should be the date field from your query.

**Value Axis:** specify a field to be used for the Value (Y) axis. This will be observed result value for the parameter(s) of interest.

**Units:** loads the following dialog, allowing you to make unit conversions:



Select the unit category, then the units from this category. If the units' categories are not compatible (for instance Time and Length) then the buttons are disabled.

You may also select a field to be used for the unit conversion, or create constant conversion factor; in this case, enter the factor, and an appropriate field.

The units conversion component implements full SI units including temperature, electric current and luminous intensity.

**Label:** select a field to be used for the symbol label.

The next two fields are used to control non-detect results. When the query returns null records for the result value, the method detection limit (if available and if selected) can be displayed on the plot. Optionally, the method detection limit multiplied by the non-detect factor (ND\_Factor) can be used instead of the method detection limit. For example if an ND\_Factor of 0.5 is provided, and a column containing method detection limit values is provided, then the plot will display the method Detection Limit (DL) value multiplied by 0.5 (the ND\_Factor). If ND\_Factor is left empty, then the DL will be displayed.

**ND\_Factor:** specify a field that contains the factor for non-detects.

**Detection Limit:** select a field that contains the detection limit value

**Uncertainty:** select a field that contains a value for the uncertainty for the plotted series.

This will plot uncertainty bars directly on the plot

**Standard:** This option allows you to display water quality standards as a plot series on the plot. This is useful for quickly identifying which values exceed the standard. When you load the options for standards, the following dialog will appear:

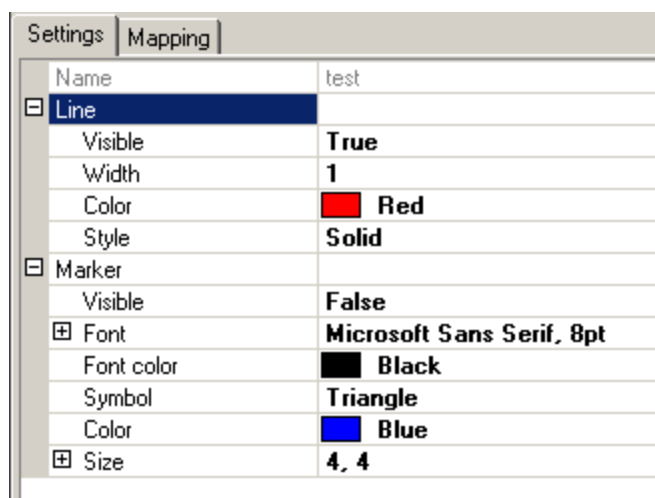


Click on the [Add] button to add a standard value and select a field that contains the standard value

Click on the [Delete] button to remove existing list items from the list.

When you are finished, click on the [Close] button.

The new standards will appear as a plot series, under the Plots node in the tree. You can then modify the line, symbol and label properties, as shown below:



## Line

---

**Visible:** show/hide the line

**Width:** set the line width

**Color:** specify the line color

**Style:** specify the line style (Solid, Dashed, etc.)

## Marker

---

**Visible:** show/hide the markers

**Font:** Set the font for labels for the line markers

**Color:** specify the color

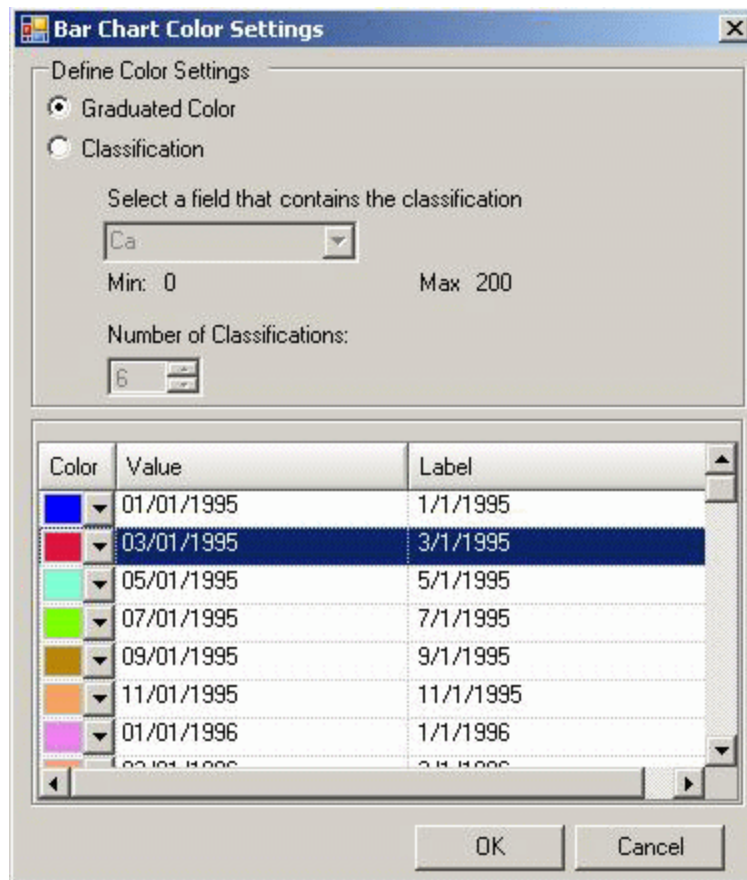
**Size:** Set the size of the markers along the line

**Multiplier:** select a field that contains a multiplier value; use this to apply a multiplier factor to all result values on the plot

**Bar Color Schema:** This option allows you to define advanced bar color settings for bar chart plots. When this option is loaded, the Bar Chart Color Settings dialog will display (shown below).



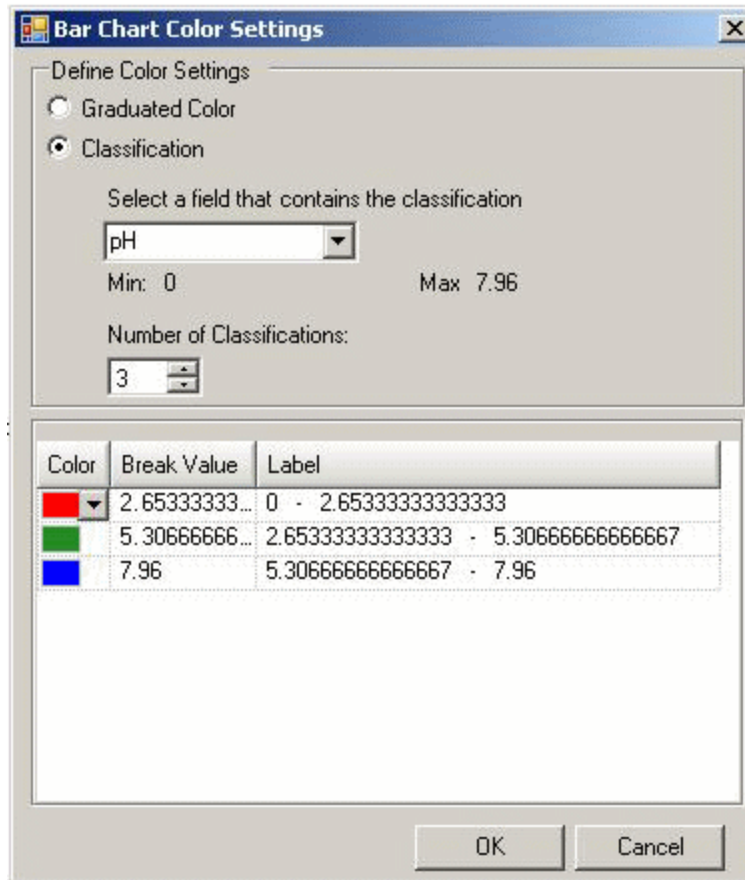
**Please Note:** This dialog will only be available after you have specified Bar as the Series Type in the Settings tab.



In this dialog you may define the color scheme by selecting the Graduated Color radio button or the Classification radio button. These options are most useful when displaying the charts on a map, in order to see both the trends in the data over time at a single sample location, and the spatial distribution/trends of all sample locations.

**Graduated Color:** This option allows for coloring bars from the same sample date, the same color on all bar charts. For example, if your plot data contains sample data from three seasonal sampling rounds (spring, summer, fall), you will see 3 instances in the grid at the bottom. A different color can be assigned to each sample date. Upon clicking [OK], each bar in the bar chart will be colored with the specified color, and all bar charts in the series will share the same color (where the sample date exists).

**Classification:** This option allows for coloring the entire bar chart a certain color, based on where it lies within a specified criteria. For this, you must provide a query that contains a field that will be used for the criteria identification. When you select this option, you must map to this field, and you will then see the min and max available for this field (as shown below). You can then define the number of classifications (default is 3), and the data range will be separated into equal number of parts. At this point, you can specify the color and the label.



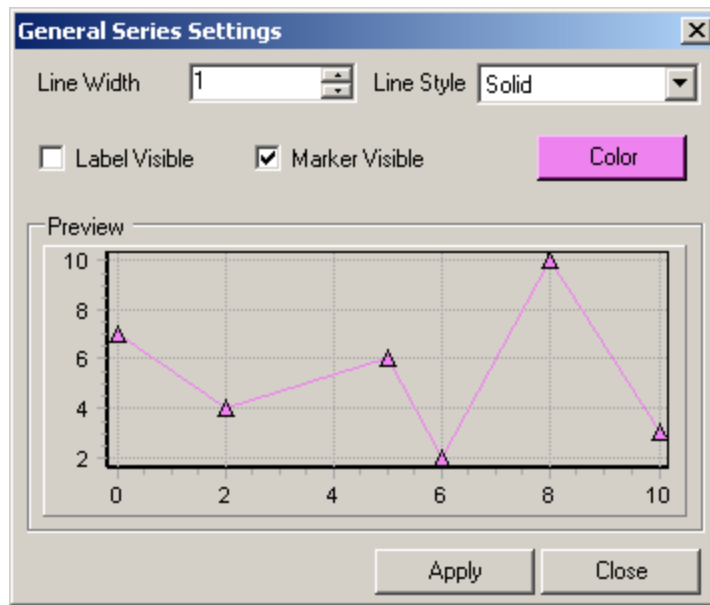
Upon clicking [OK], the entire bar chart will be colored with the appropriate color, based on where it lies in this criteria

### 12.3 Plot Settings

Once a plot is selected and visible, there are several settings that can be modified. These settings are sorted into several groups explained below.

#### General Series Settings

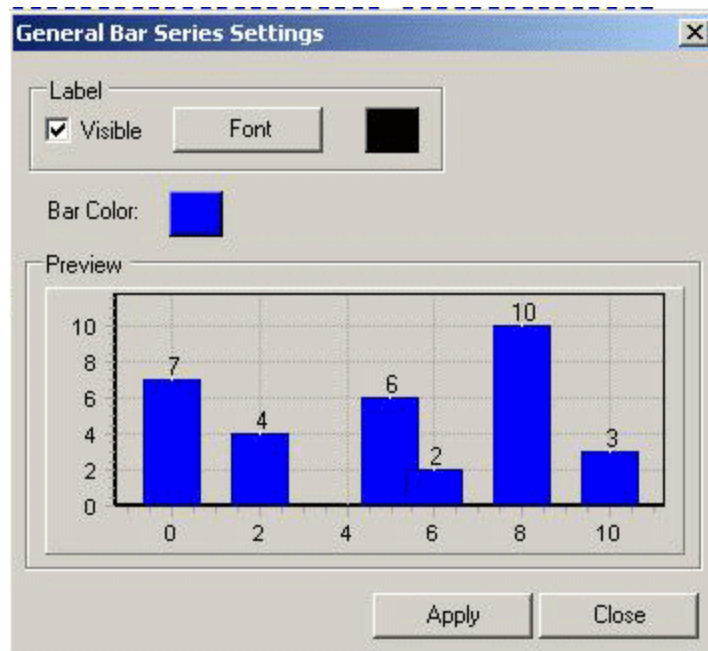
Some of the most-frequently used, general plot settings are available when you right-mouse click on a plot window (that contains a data series), and select Edit General Settings. The following dialog will appear for line chart:



The following settings are available:

- **Line Width:** specify the line width
- **Line Style:** select the line style
- **Labels Visible:** show/hide the data marker labels
- **Markers Visible:** show/hide the data markers
- **Color:** specify the color for the line

As you define the series options, the Preview frame at the bottom of the dialog provides a live-update preview of how the data series will appear using the selected settings. If you have selected Bar as the series type, the following dialog will appear:

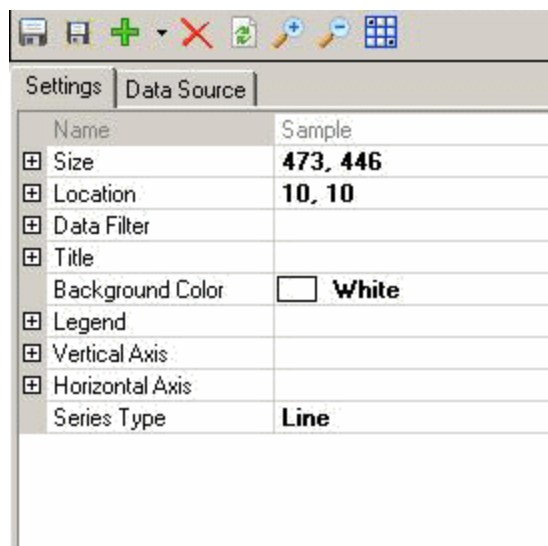


In this dialog, you can modify the following settings:

- **Font:** Specify the label font style, size and effects
- **Visible:** Show/Hide labels
- **Font Color:** Specify the color of the label text
- **Bar Color:** Specify the color of the bars

### 12.3.1 Style and Display Settings

Settings such as Axis, Line, and Legend can be modified in the Settings tab as shown below:





The following settings are available:

### Common

---

The following common settings are available:

- **Name:** Enter the Plot name, and optionally specify a Background color
- **Size:** Specify the Height and Width for the plot
- **Location (Origin):** Specify the X, Y origin for the plot. The origin (0,0) is located in the upper left corner of the plot window.
- **Data Filter:** Set a data filter for the plot data; this is useful when the plot contains a large number of data points, and you want to filter out repetitive or unnecessary data, or values where this is no significant change.
- **Active:** Use this option to enable/disable the filter
- **Value:** Set the filter value. Any consecutive plotted data points with a value less than this specified filter value will be hidden from the plots, when the filter is active.
- **Title:** Enter a Title for the plot.

### Legend

---

The following Legend settings are available:

- **Visible:** Show/hide the legend
- **Alignment:** Set the Legend position; choose from the following options: Top, Bottom, Left, Right
- **Style:** Controls what data elements or series appear in the Legend; choose from the following options: Automatic, Series Names, Series Values, Last Values, Palette
- **Vertical space:** Controls the amount of vertical space between each data element in the legend; higher values will result in more space between each item in the legend.
- **Inverted Legend:** Use this property to reverse the order of items in the legend. For example, items in the order A, B, C, will be inverted to the order C, B, A, when this property is selected.
- **Check boxes visible:** Use this property to display a check-box beside each item in the legend; when active, you can then use the Legend check boxes to show/hide which data series are visible on the plot.
- **Font series color visible:** Controls the font color for the text in the legend.

### Vertical (Y) Axis

---

The following settings are available for the Vertical (Y) axis:

- **Pen width:** Controls the thickness of the axis line
- **Visible:** Shows/hides the axis on the plot
- **Log scale:** Plots the axis values using a logarithmic scale

- **Max value:** Controls the maximum value for the axis. By default, this value will be calculated from the selected data set
- **Min value:** Controls the minimum value for the axis. By default, this value will be calculated from the selected data set
- **Auto max value:** Restores the default automatic maximum value, which is calculated from the selected data set.
- **Auto min value:** Restores the default automatic minimum value, which is calculated from the selected data set

### Grid

- **Visible:** Shows/hides gridlines on the plot
- **Style:** Controls the grid line style; select from Solid, Dash, Dot, DashDot, or DashDotDot

### Title

- **Text:** Sets the title for the axis
- **Visible:** Shows/hides the axis title
- **Angle:** Controls the angle for the axis title; for the Y axis, it may be useful to have the angle set at 90 degrees.
- **Font:** Controls the font for the axis title

### Tick Label

- **Format:** Controls the decimal format for the labeled tics; enter #.00 to display 2 decimal places, to display no decimal places, simply enter 0
- **Angle:** Controls the angle for the tick labels; for date labels, it may be useful to select an angle of 45 or 90 degrees for improved display
- **Font:** Controls the font for the tick labels

## Horizontal (X) Axis

---

The Settings for the X Axis are identical to the Y axis, with the following exceptions:

- Log Scale is not available
- **Min and Max values:** when you define the min and max format, you must select these values from a calendar
- You can specify a Date/Time format from the following options:
  - m/d/yyyy
  - MMM/yyyy
  - MM/yyyy
  - yyyy
  - MMM
  - hh:mm:ss tt (tt = AM/PM)
  - hh:mm:ss
- You can set the Tick Interval by selecting one of the following options: Min, Hour, Day, Month, Year

## Series Type

The following settings are available for the Series Type:

- **Line**: displays the plot as a line chart.
- **Bar**: displays the plot as a bar chart.



**Please Note:** You can also change the Series Type by right-clicking on any data point on and plot, and selecting Change Series Type.

### 12.3.2 Data Series Settings

Data Series (Range) settings can be accessed by right-mouse clicking on any data point on the plot, and selecting Edit Range Settings from the pop-up menu. The following Series Settings dialog will appear:

Name	Breaking value
Within guidelin...	100
Exceedences	120

Min: 0      Max: 120

Font...      Color...      Alignment [Dropdown]

Custom

Use Different Label Source  
Label Source [Dropdown]

Include Pre-fix  
Pre-fix [Text Field]



Include Post-fix  
Post-fix [-Exceedence]

Preview

Sample/Preview -Exceedence

Apply      Close

On the left side of this dialog, there is a list of available data series for the selected plot. You may also Add Data Range series, and specify Data Series options for this Series. This is useful if you want to identify data on the plot that exceeds a guideline or standard value, and assign unique symbol or label properties to this data set only.

- Click on the  (Add) button to add a new range
- Click on the  (Delete) button to delete the selected range

When you add a new Range, enter the Breaking Value; this is the upper limit for the range. For the example shown in the screenshot above, there will be two ranges:

- **Within guidelines:** Values 0 - 100 (inclusive) will have unique symbol and label properties
- **Exceedences:** Values greater than 100 to 120 (inclusive) will have a different set of symbol and label properties, so they can easily be distinguished on the plot

The Labels provides options for the data series labels:

- **Text:** Select the Font, Color and Alignment options for the text.
- **Custom:** There are several options available for defining custom label.

Use different label source allows you to select a field from the list, for the labels from a list.

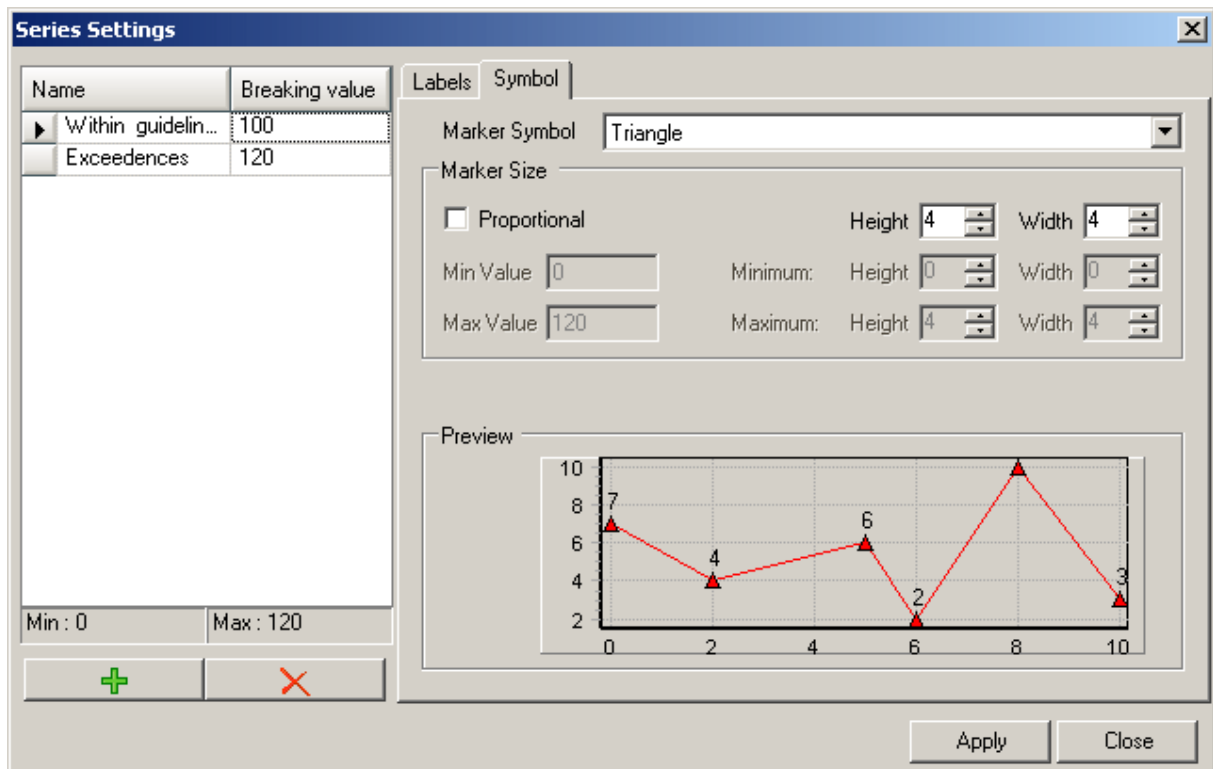
- **Include pre-fix** provides the option to attach a text string in front of each label
- **Include post-fix** provides the option to attach a text string at the end of each label



**Please Note:** If the Label options are inactive, you must set the Labels to Visible; load the General Series Settings, and enable the Labels Visible option.

As you define the label options, the Preview frame at the bottom of the dialog provides a live-update preview of how the data series labels will appear using the selected settings.

When you are finished with the Label options, you can click on the Symbol tab to modify the symbol options as shown in the screenshot below:



The following settings are available:

- **Symbol marker:** select the symbol marker type from the combo box

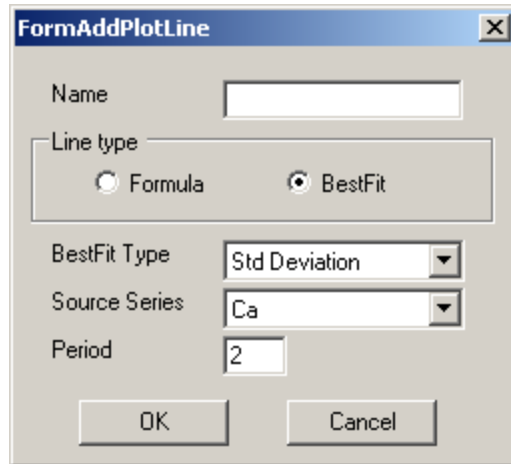
#### Marker Size

- **Height:** specify the symbol height
- **Width:** specify the symbol width
- **Proportional:** use this option to create proportionally sized symbols, dependent upon the result value
- **Min value:** specify the min value for the smallest symbol size; then specify the marker size (Height and Width) that should correspond to this value
- **Max value:** specify the max value for the largest symbol size; then specify the marker size (Height and Width) that should correspond to this value

As you define the label options, the Preview frame at the bottom of the dialog provides a live-update preview of how the data series symbols will appear using the selected settings.

## 12.4 Adding Lines to a Plot

Best fit lines, or lines calculated with user-defined formulas, can be displayed on any plot; to do so, right-mouse clicking on any data point on the plot, and selecting Add Line from the pop-up menu. The following Add Line dialog will appear:



Enter a line Name at the top of the dialog; this name will appear on the plot.

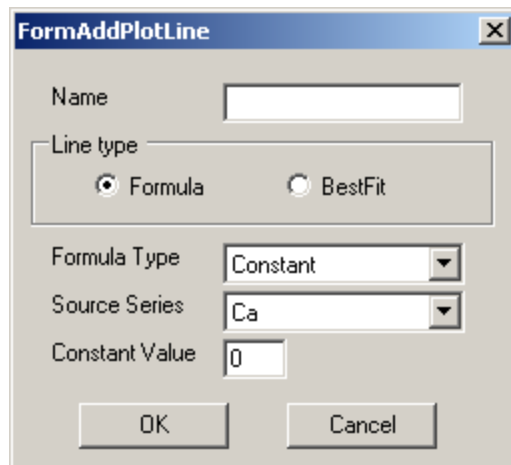
The following Line Types are available:

- Formula
- Best Fit

Best Fit is the default line type; when selected, the following settings are available:

- **Best Fit type:** select from Std Deviation, Moving Average, or Exponential Moving Average
- **Source Series:** select the data source series to which the line should be applied
- **Period:** enter a period value

When the Formula line type is selected, the following settings will be available:



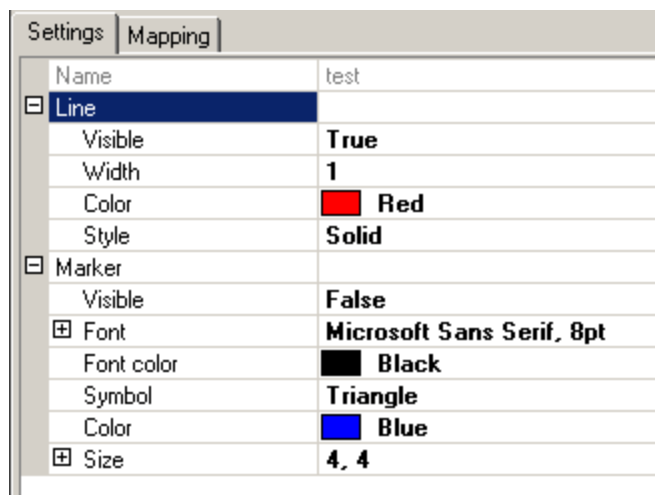
The FormAddPlotLine dialog box is used to configure a new plot line. It includes a Name field, a Line type section with radio buttons for Formula (selected) and BestFit, a Formula Type dropdown menu set to Constant, a Source Series dropdown menu set to Ca, and a Constant Value text box set to 0. OK and Cancel buttons are at the bottom.

- **Formula type:** select from Constant, Exponential, Logarithmic, or Inverse
- **Source Series:** select the data source series to which the line should be applied
- **Constant Value:** When a Constant Formula Type is selected, enter a constant value for the location of the line. This will result in a straight line drawn on the plot.

Click [OK] when you are finished, to draw the new line on the plot. The line series will appear in the tree under the selected plot. The line settings can be modified as described below.

### Line Settings

When a line is selected for a plot, the Settings tab will display the appropriate Line Settings as shown below:



The Line Settings dialog box shows the configuration for a selected line. The Settings tab is active, and the Mapping tab is also visible. The Name is 'test'. The Line section is expanded, showing Visible (True), Width (1), Color (Red), and Style (Solid). The Marker section is also expanded, showing Visible (False), Font (Microsoft Sans Serif, 8pt), Font color (Black), Symbol (Triangle), Color (Blue), and Size (4, 4).

Property	Value
Name	test
Line	
Visible	True
Width	1
Color	Red
Style	Solid
Marker	
Visible	False
Font	Microsoft Sans Serif, 8pt
Font color	Black
Symbol	Triangle
Color	Blue
Size	4, 4

- **Name:** set the line name

### Line

- **Visible:** show/hide the line
- **Width:** set the line width
- **Color:** specify the line color
- **Style:** specify the line style (Solid, Dashed, etc.)

### Marker


- **Visible:** Show / hide markers on the line using the Visible option
- **Font:** Set the font for labels for the line markers
- **Color:** specify the color
- **Size:** Set the size of the markers along the line

## 12.5 Saving, Exporting, and Printing

There are several options available for saving, exporting, and printing your plot page design.

### Saving

---

Once you are satisfied with the current plot page design, click on the  (Save) button on the toolbar. The new plot will appear under the Plots node in the HGA tree.

### Exporting

---

To export the current plot page design, right-mouse click on the plot page design node in the tree, and select Export Plot Page to Image from the pop-up menu. The image can be saved to the following graphics file formats: .BMP, .JPG, .TIF, .EMF, .GIF, .PNG. Enter a filename, and choose the file format, and click Save.

### Copy Plot to Clipboard

---

This option is available for individual plots in the design. To copy the selected plot, to the windows clipboard, right-mouse click on the plot name in the tree, or right-mouse click on the plot in the viewer, and select Copy to Windows Clipboard from the pop-up menu. You can then insert the plot into a graphics or word processing application for further modifications.



## Printing

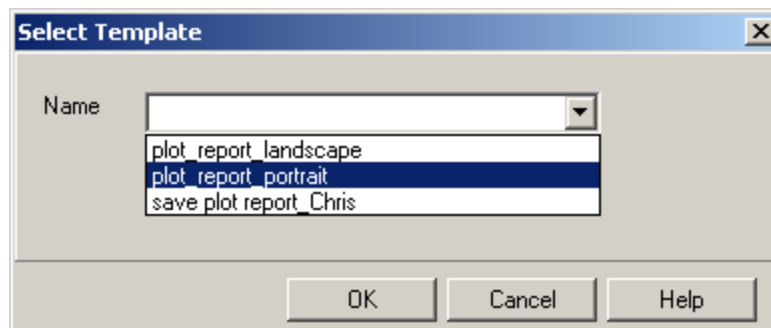
A plot report may be generated from within the Plot Designer, and either printed or saved to an external file.

With the Plot Designer window open, click on the Print button at the bottom of the Plot Designer window, and select from one of the print options, as shown in the following screen shots.






**Please Note:** If you select Send all plots to report, a report will be generated for each station in the current selection; please be aware that this may take some time. If you want to print a plot for just the selected station, use the Send current plot to report option.

You will be prompted to Select a Template for generating your report, as shown in the following screenshot. You can either select from the existing templates, or leave the selection blank and create a new report template for yourself.



Click the [OK] button to load the plot(s) in the Report viewer.

The Report may be printed directly by clicking on the  (Print) button, saved to a report archive file by clicking on the  (Save) button, or exported to one of several file formats, including .RTF, .PDF, .HTML, .XLS, and .TIF, by clicking the  (Export) button.

If you would like to modify an existing report template, or if you did not select an existing template and are creating your own report, you can modify the report design to suit your needs.

## 12.6 Managing Plot Templates

### Saving Plot as Template

Once you have designed the current plot to your style and data needs, you can save the design as a template for re-use in future plots. To do so:

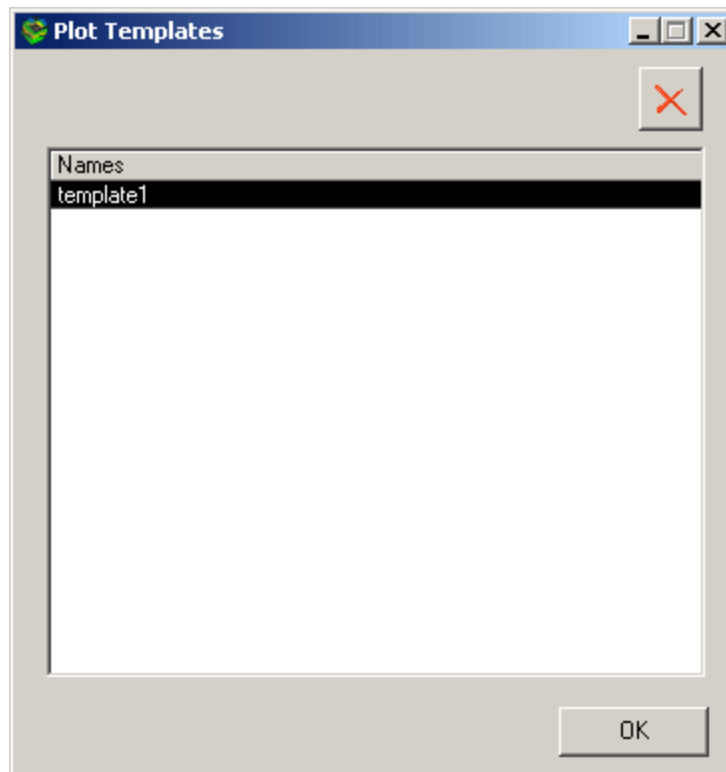
- Right-mouse click on Plots, and select Save as a plot template from the menu
- Enter a name for the plot template and [OK]

The template will be available next time you create a new plot, in the Add Plot dialog under the Templates combo box.


### Deleting Plot Templates

Plot templates can be deleted from the main HGA window.

Right-mouse click on Plots in the HGA Project Tree and select Plot Templates. The following dialog will appear:



---

Select the template you want to remove, then click on the  (Delete) button at the top of the window.

## 13 Well Profile

The Well Profile module can be used to display detailed information pertaining to a single station or well including:

- Well construction details (casing, screens, annular fill)
- Geophysical data plots
- Lithology information for each formation
- Description of the geologic formation
- The depth and or elevation of each layer
- many others...


In a typical profile report, there may be one or more instances of the items listed above. The number of columns, and their order of display, is flexible and can be set at the time of designing the template and edited at any point thereafter. Templates can be created for one or more stations at once based on a desired design. You can create as many different templates as you need to suit your project needs.

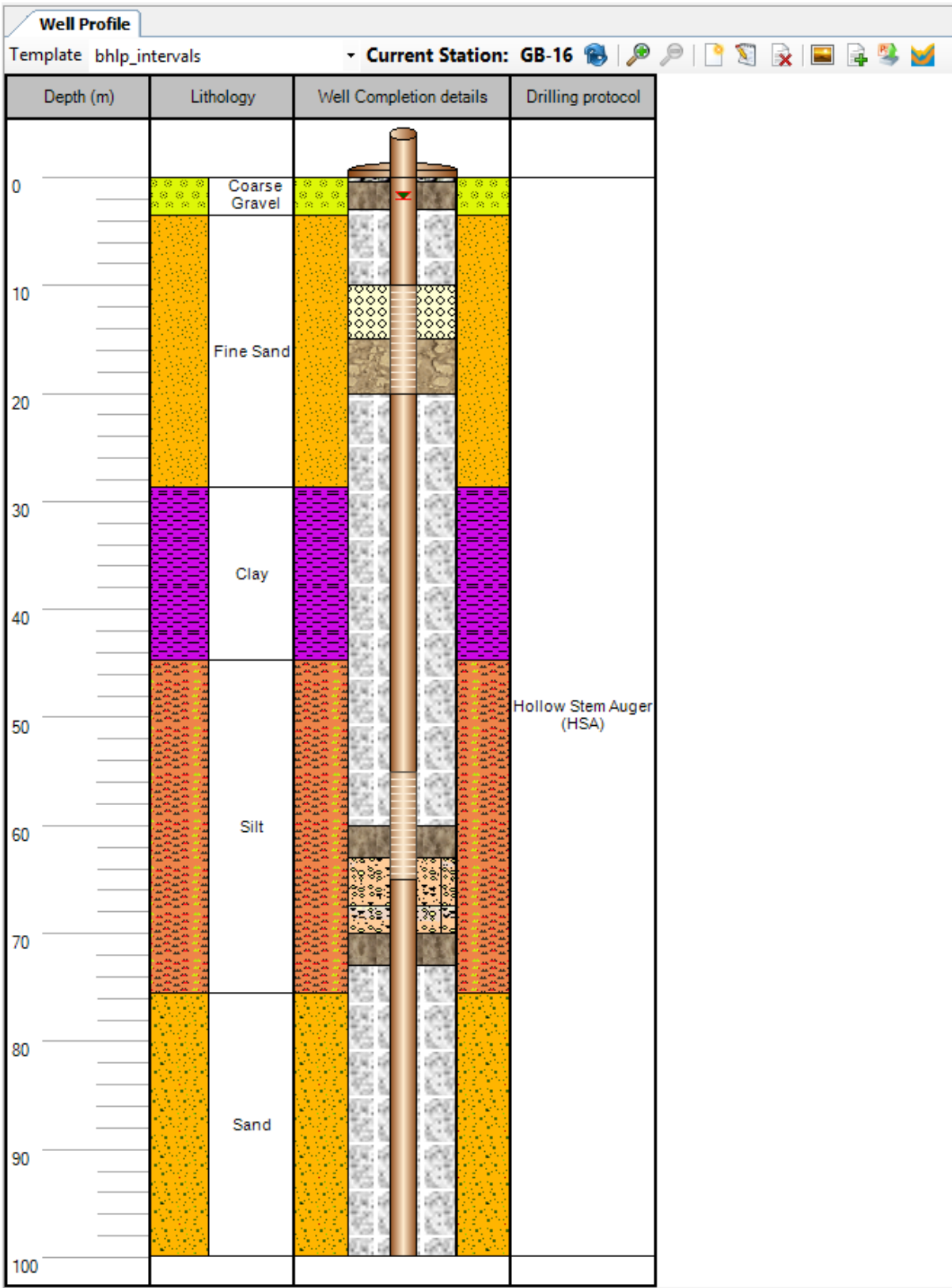
The Well Profile module can also be used as a data entry assistant in HGA, by displaying for example well construction details as data is entered in tables on the Station Data tab.

Please refer to the following sections for more information on how to set up a Well Profile:

- [Well Profile Interface](#)
- [Scale Column](#)
- [Lithology Column](#)
- [Interval Column](#)
- [Depth Column](#)
- [Well Construction](#)
- [Plot Column](#)
- [Display on Cross Section](#)











### 13.1 Well Profile Interface

The Well Profile can be launched by selecting the  icon from the main toolbar or by selecting Modules/Well Profile or by simply double clicking on an existing Well Profile template found in the Project tree. It will be loaded with the last template that was used.














You can change the template you are viewing by selecting from the list of templates available in the drop down. The current station displayed is presented in the toolbar - you can change stations by selecting another one from the Station Picker in the Project Tree.

The following options are available on the Well Profile toolbar:

-  **Refresh data:** refreshes the display with latest data from database
-  **Zoom In:** this will give you an option to enter top and bottom values of the interval you wish to view
-  **Zoom Out:** this will zoom out the display to full extents
-  **Create a new template:** will prompt you for the name of your new template and then open the editor options
-  **Edit:** will open the editor options
-  **Delete selected template:** will delete the currently select template
-  **Save Image As:** allows you to save your well profile as a .bmp or .emf file format
-  **Create new PowerPoint template:** allows user to create a new PowerPoint™ template using a query to have fields from query appear on the template
-  **Print to PowerPoint:** allows user to push well profiles for one or more stations to a PowerPoint template
-  **Export to cross section:** allows you to save images that can then be used to display on a Cross Section

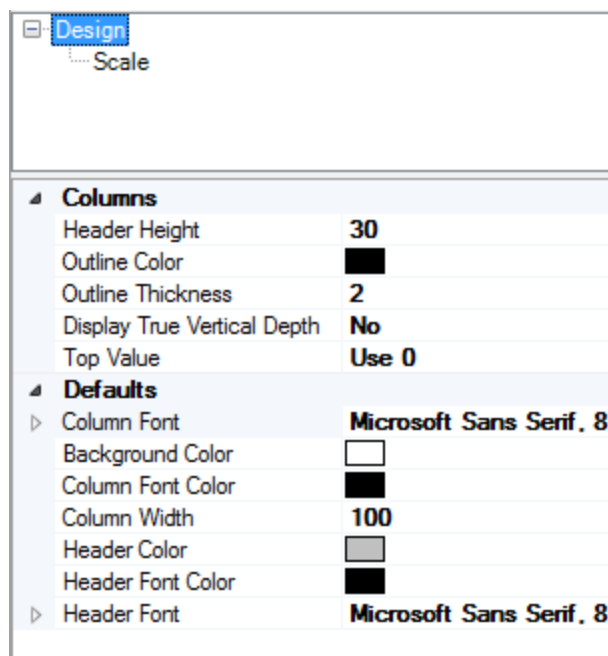
The editor portion of the toolbar becomes available when you select the Create a new template or Edit button. You will notice it opens a new set of options on the left side of the toolbar.

-  **Save:** saves any edits done to the current template
-  **Save As:** allows you to save the current template with a new name
-  **Rename template:** allows you to rename the current template
-  **Add column:** adds a new column
-  **Delete column:** deletes the selected column
-  **Move column up:** moves the selected column up in the design
-  **Move column down:** moves the selected column down in the design
-  **Reset to column defaults:** restores the settings for the selected column back to default values

-  **Add annotation:** adds an annotation anywhere on the Well Profile template
-  **Delete annotation:** deletes selected annotation
-  **Close editor:** this will close the editor portion of the Well Profile

The editor portion of the Well Profile provides you the ability to add several different column types to the template as well as adjusting the settings for the columns.

The overall settings for the design of the template (like header height, outline colour and thickness as well as column defaults) can be found by selecting the Design node.

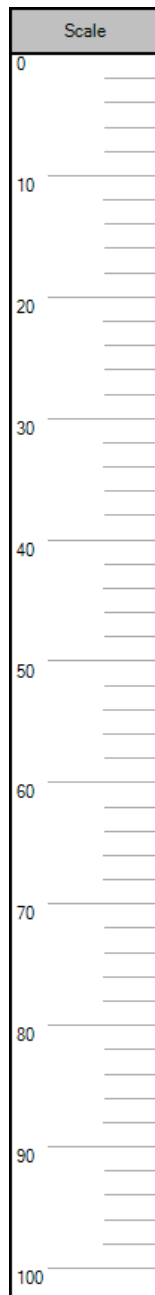


Here you can find the option to display your template as True Vertical Depth by selecting Yes for this option. All data will be calculated as true vertical depth based on the inclination angle entered into the Drilling Protocol table.

You also have the option to use 0 (zero) as your top value or the minimal measured value.

## 13.2 Scale Column

The scale column displays a vertical scale on the Well Profile template.



The following settings are available:



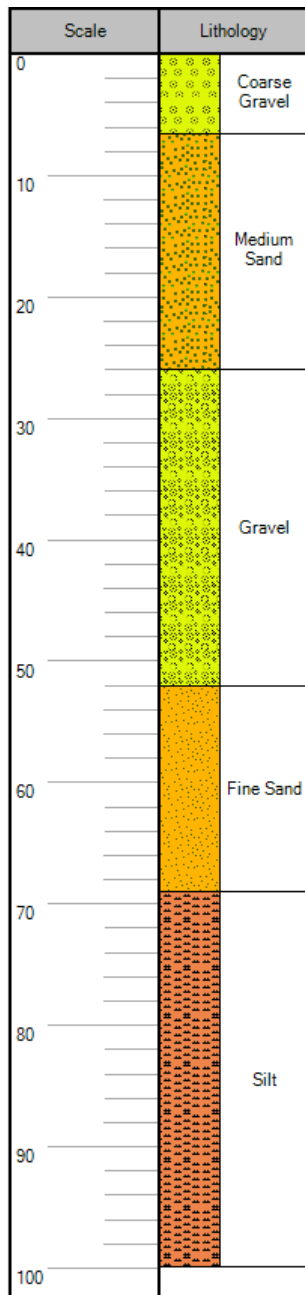
▾ <b>Column</b>	
Column color	<input type="checkbox"/>
▸ Header	Scale
Visible	<b>Yes</b>
Width	<b>100</b>
▾ <b>Labels</b>	
Decimal places	<b>0</b>
Display Unit	<b>m</b>
▸ Font	<b>Microsoft Sans Serif, 8</b>
Label Position	<b>Left</b>
Show Elevation	<b>No</b>
Show Labels	<b>Yes</b>
Text color	<input type="checkbox"/>
▾ <b>Ticks</b>	
Auto	<b>Yes</b>
Major Tick Color	<input type="checkbox"/>
Major Tick Interval	<b>10</b>
Minor Tick Color	<input type="checkbox"/>
Minor Tick Interval	<b>2</b>

Here you will find the option to Show Elevation values instead of depth values on the scale column - this will automatically be calculated by using the elevation value in the Station table and subtracting the depth values.

You also have the option to change the Display Unit - this allows you to display multiple scale columns within a template showing different units.

### 13.3 Lithology Column

The Lithology column displays the intervals of data from the Lithology table. Displaying both the images from the project Material Specification as well as the name of the soil type entered in the Lithology table.



The following settings are available:

▲ <b>Column</b>	
Column color	<input type="checkbox"/>
▷ Header	Lithology
Visible	<b>Yes</b>
Width	<b>100</b>
▲ <b>Data</b>	
Data source type	<b>Table</b>
Data source	<b>Lithology</b>
▲ <b>Entities</b>	
From	<b>From</b>
From unit	<b>m</b>
To	<b>To</b>
To unit	<b>m</b>
Image	<b>Soil Type</b>
Text	<b>Soil Type</b>
▲ <b>Settings</b>	
▷ Font	<b>Microsoft Sans Serif, 8</b>
Show text	<b>Yes</b>
Text color	<input type="checkbox"/>
Use numeric format	<b>No</b>
Numeric format	<b>0.00</b>
Show images	<b>Yes</b>
Image percentage	<b>40</b>

By default the Data settings are mapped to the Lithology table and the Entities are mapped to from, to, and soil type for both the text and the image however you can adjust these.

## 13.4 Interval Column

The Interval column is meant to display data that has been stored as from and to measurements. You can display descriptive text, values or images associated with the interval.

Scale	Interval	
0	GB-01-1	
4		
9		
13		
17		
22		
26		GB-01-2
30		
35		
39		GB-01-3
44		

The following Settings are available:

<b>Column</b>	
Column color	<input type="text"/>
Header	Interval
Visible	<b>Yes</b>
Width	<b>120</b>
<b>Data</b>	
Data source type	<b>Table</b>
Data source	<b>Soil Sample</b>
<b>Entities</b>	
From	<b>From</b>
From unit	<b>m</b>
To	<b>To</b>
To unit	<b>m</b>
Image	
Text	<b>Sample ID</b>
<b>Settings</b>	
Show text	<b>Yes</b>
Font	<b>Microsoft Sans Serif, 8.25pt</b>
Text color	<input type="text" value="Black"/>
Use numeric format	<b>No</b>
Numeric format	<b>0.00</b>
Show images	<b>No</b>
Image style	<b>Tile</b>
Image percentage	<b>40</b>

You can choose to display data from a table or from a query in the Data settings.

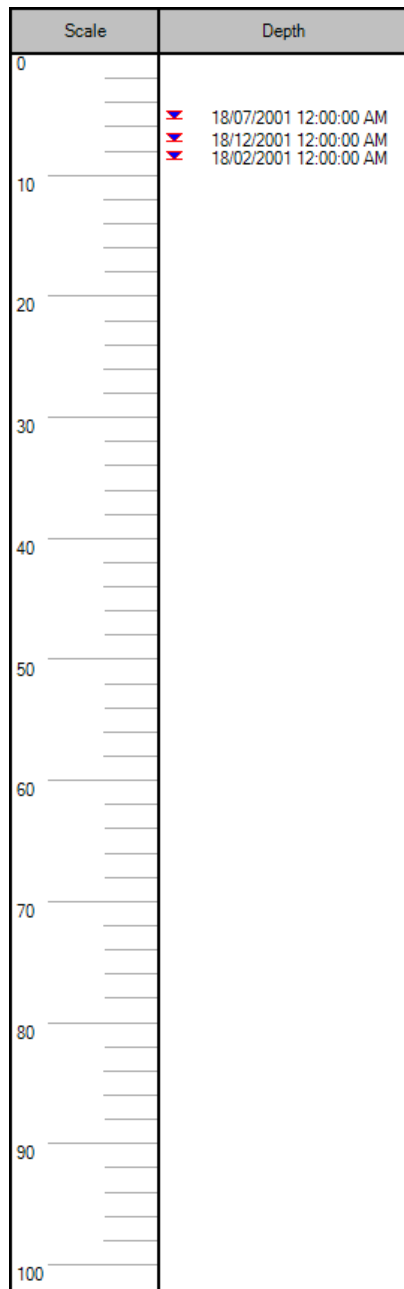
Then you can select the from, to, text and image fields from the drop down options in the Entities settings.

The settings also allow for user to show text or image or both, also options are available to select the style of images and the percentage of the column the images should fill.


## 13.5 Depth Column

The depth column is meant to display data related to a specific depth. You can display text or values associated with the depth.

A typical use might be to display water levels displaying the date of the water level.



The following settings are available:

▲ <b>Column</b>	
Column color	<input type="checkbox"/>
▷ Header	Depth
Visible	<b>Yes</b>
Width	<b>168</b>
▲ <b>Data</b>	
Data source type	<b>Table</b>
Data source	<b>Water Level</b>
▲ <b>Entities</b>	
Depth	<b>depth_to_water_level</b>
Text	<b>date</b>
Image	<b>depth_to_water_level</b>
Depth unit	<b>m</b>
▲ <b>Settings</b>	
▷ Font	<b>Microsoft Sans Serif, 8.25p</b>
Show text	<b>Yes</b>
Text color	<input type="checkbox"/>
Image style	<b>Show symbol</b>
Use numeric format	<b>No</b>
Decimal places	<b>0</b>
▲ <b>Symbol</b>	
Symbol Outline Color	<input type="checkbox"/>
Symbol color	<input type="checkbox"/>
Symbol size	<b>5</b>
Symbol	 <b>Water Level Down</b>

The Data options allows you to select either a table or a query and the Entities options allows you to select the associated fields.

The settings options allows you to display no image, show image or show symbol.

The show symbol allows you to display the water level symbol and the Symbol options allows you to adjust the look of the symbol.

## 13.6 Well Construction

The Well Construction column is the most comprehensive data column in the Well Profile. It displays data from various sources in your database including:

- Drilling details
- Lithology
- Annular filling
- Casing
- Screen
- Water Level





<b>Column</b>	
Column color	<input type="text"/>
Header	Well Construction
Visible	<b>Yes</b>
Width	<b>215</b>
<b>Data</b>	
Casing	
Cluster wells	
Lithology	
Scale	
Screen	
Water level	
<b>Settings</b>	
Scale percentage	<b>40</b>
Show casing	<b>Yes</b>
Show filling	<b>Yes</b>
Show lithology	<b>Yes</b>
Show scale	<b>No</b>
Show screen	<b>Yes</b>
Show stickup	<b>Yes</b>
Show water levels	<b>Yes</b>
Font	<b>Microsoft Sans Serif, 8.25pt</b>
Text color	<input type="text"/>

The Settings options allow you to customize the well construction column to show or hide various components.

The Data options allows you to further adjust the column.

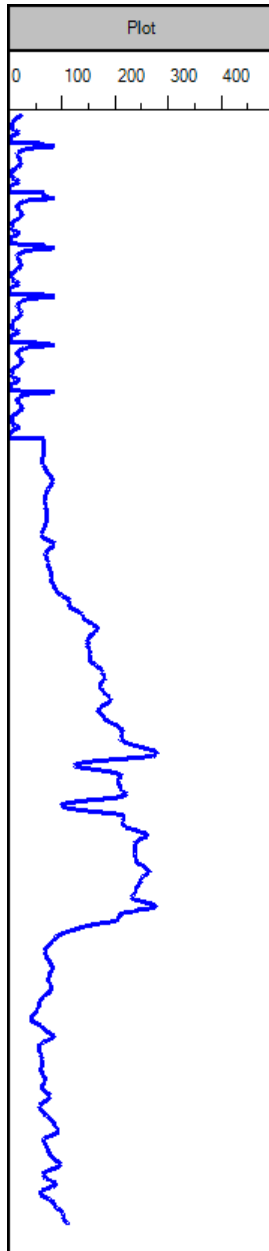
- Casing options include color, or use of an image, and stick up and reducer options
- Cluster Wells options include layout (stacked or side by side), order to allow for displaying your cluster (or nested) wells
- Lithology option includes which side (left, right or both) to display the lithology images
- Scale options include similar options to a scale column like major and minor tick marks, unit, using elevation etc.
- Screen options include color, or use of an image and labels
- Water Level options include which ones to display (All, Earliest, Latest, Minimum, Maximum, or Average) as well as label options and location of symbol

## 13.7 Plot Column

The Plot column is designed to display various types of depth dependent graphs. It supports both the Interval as well as the Depth based data types. The following are some example data that may be displayed using this column type:

- Geophysical investigation results
- Analytical results (chemical concentration)

- Analytical results for soil physics (moisture content, bulk density, etc.)
- Soil testing results (pocket Penetrometer, SPT)



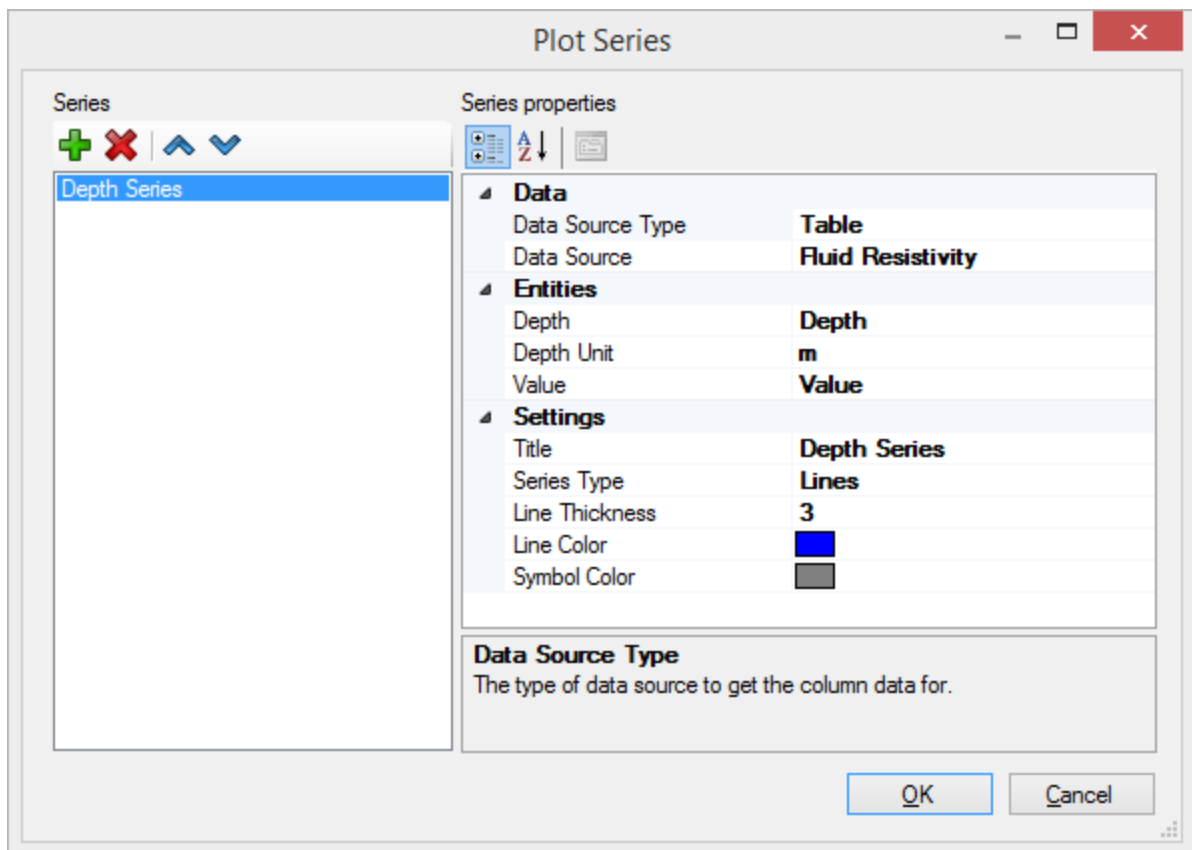
The following settings are available:

<b>Axis - Horizontal</b>	
Auto	No
Maximum	500
Minimum	0
Format	0.
Logarithmic	No
Major tick interval	100
Minor tick interval	50
Show grid lines	No
Grid line color	■
<b>Axis - Vertical</b>	
Auto	Yes
Decimal places	0
Grid line color	■
Major tick interval	10
Minor tick interval	2
Axis percentage	20
Show grid lines	No
Show	No
Display unit	m
<b>Column</b>	
Column color	□
Header	Plot
Visible	Yes
Width	177
<b>Data</b>	
Series	Edit Series
<b>Legend</b>	
Visible	No
Horizontal position	5
Vertical position	5
Background color	□
Outline color	■
<b>Settings</b>	
Font	Microsoft Sans Serif, 8.25p
Text color	■
<b>Axis - Horizontal</b>	

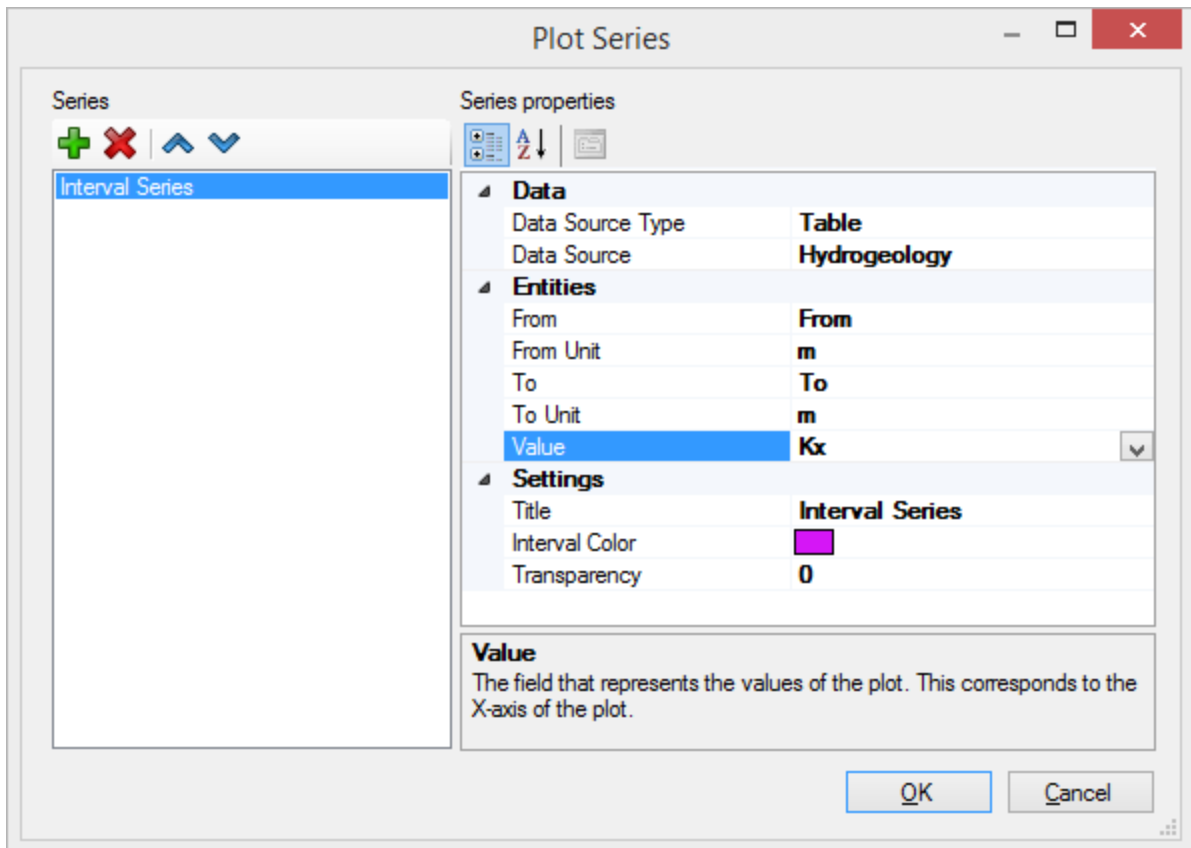
The data section provides you with the option to add one or more series to the plot by selecting the ... button beside the Edit Series.

You can add either depth or interval series to the plot.

The following options are available for a depth series:

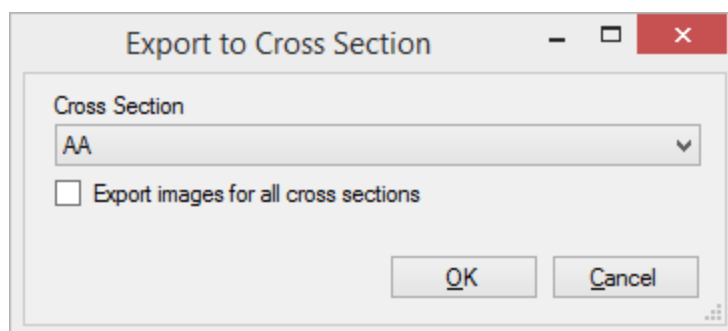


While the following options are available for an interval series:



### 13.8 Display on Cross Section

The Well Profile tab provides the option to export images to be used on the Cross Section Editor. This option will let you choose which Cross Section you wish to generate images for. There is also an option to generate images for all Cross Sections.



Images for each station within the selected cross section will be generated based on the currently selected template. A common template to use is the resistivity\_plot\_only as it is a simple plot column. The images that are generated have a transparent background so that you can visualize them over the cross section interpretations.

## 14 Map Manager

The Map Manager is built on ESRI™ Map Objects technology and is packed with an abundance of mapping features that seamlessly connect your project maps with the Hydro GeoAnalyst database. However, the Map Manager goes far beyond simple mapping, it also acts as a fundamental source for producing cross sections, accessing borehole logs and well construction details, and developing contour maps (elevations, concentrations, water table, etc.). The Map Manager is an integral part of Hydro GeoAnalyst and is ideally suited for analyzing and presenting the spatial orientation of your groundwater or borehole project data.


Some of the key features of the Map Manager include:

- Import vector maps into a map project
- Import BaseMap Layers to the Map Project (DXF, Raster and Shapefile formats), including high resolution MrSid image files.
- Georeference and import raster image maps
- Display Station Groups or Data Queries from the Hydro GeoAnalyst project as a Map Layer in the Map Project
- Edit map layers (labels, order, style, visibility)
- Draw and edit a point, line, polygon, or text on a map with Annotation tools
- Create contour, color shade and zebra maps of a desired data set
- Create Thematic Maps: Bar and Pie Charts of selected fields
- Select stations using a rectangle, polygon, circle, line, or a single point
- Create new station groups with stations selected in the map project
- Send a Map view to the Report Editor
- Export Map view as Raster images
- Create a legend for the Map Project
- Turn layers on/off and set their properties using Layer Manager
- Define locations for cross section lines
- View statistics for selected data or station group layers (Min, Max, Sum, Standard Deviation, Mean)
- Label and symbol renderer allows for creating color ramps, gradients, shading, etc., based on specified station data
- Line measurement tool allows for measuring the distance between two points on the map project

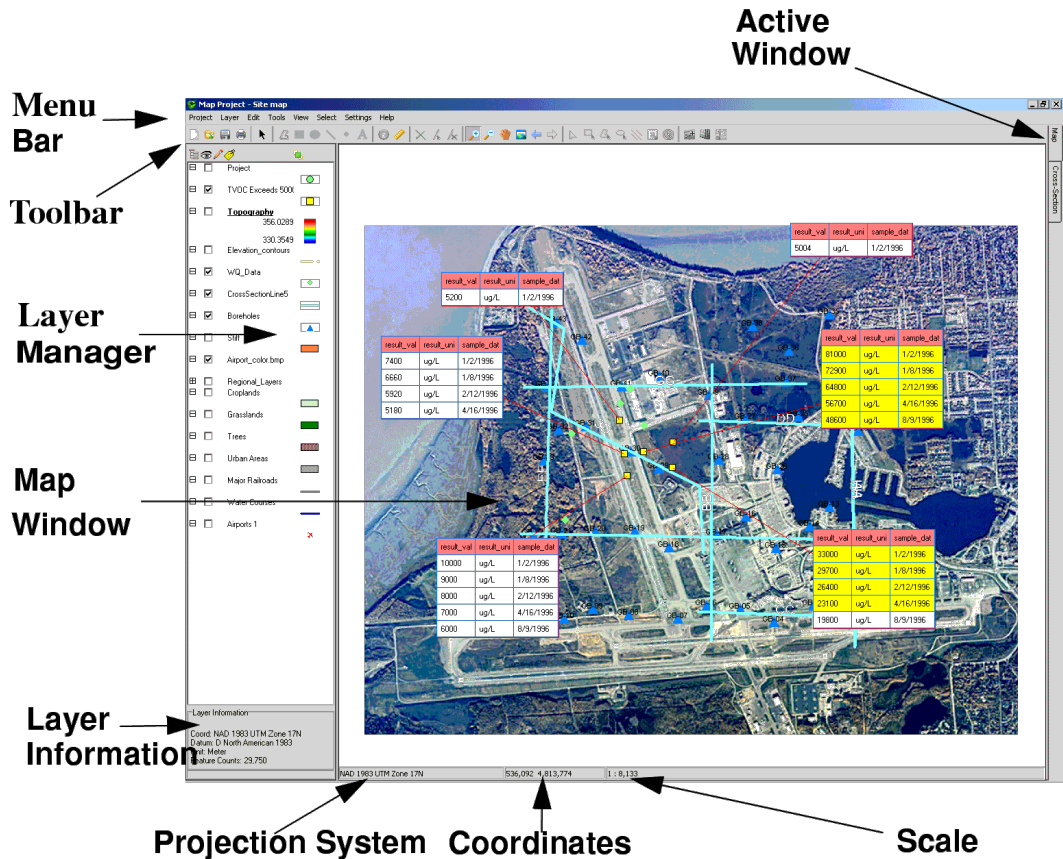
### 14.1 About the Interface

Map projects are created and modified within the Map Manager application linked to Hydro GeoAnalyst. The Map Manager can view and modify one map project at a time. In addition, the map projects should be modified by only one user at a time. A map project may have an unlimited number of map layers.

The Map Manager may be loaded from Hydro GeoAnalyst in several ways:

- Select Tools / Map Manager from the Main Menu of Hydro GeoAnalyst
- In the Hydro GeoAnalyst toolbar, click on the  (Map) button
- From the Hydro GeoAnalyst Project Tree, double click a map from the Map Projects branch

Once the Map Manager window is loaded, the display should be similar to the one shown below.



The Map Manager window contains the following elements:

**Menu Bar:** Contains program menu commands

**Toolbar:** Contains short cut buttons to some of the most commonly used features in the Map Manager

**Layer Manager:** Manages activating a layer, visualizing, and/or editing layers.

**Map Window:** Contains the visible layers for the map project.

**Layer Information:** Displays the system for the selected layer.

**Coordinates:** Displays the X,Y coordinates for the current mouse cursor location, and the Map Projection system.






**Scale:** Displays the scale for the map window.

**Active Window:** Select between the Map Manager window and the Cross Section Editor window.



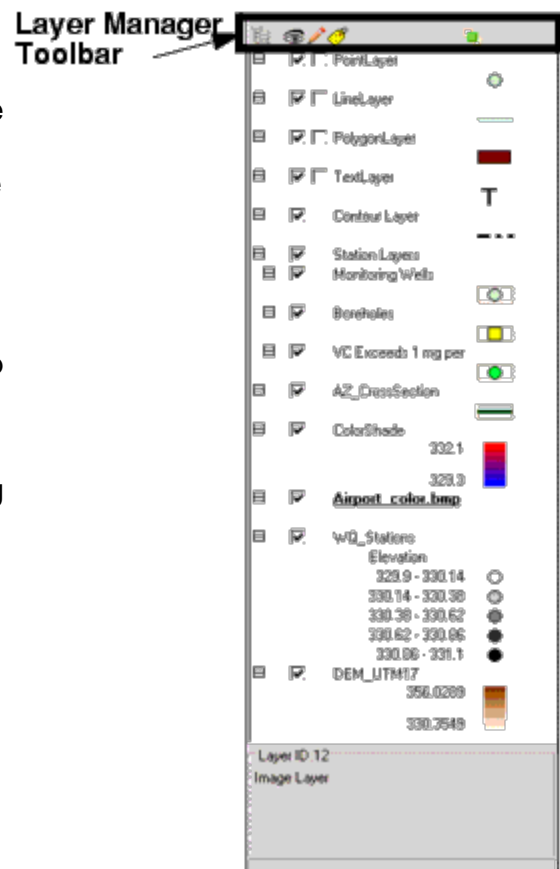
The Layer Manager allows you to manage the layers in the map project. The icons at the top of the Layer Manager provide some insight into the functionality.

These features include:

-  **Group Control:** Expand and collapse group layers.
-  **Visible:** Set the visibility status of the selected layer.
-  **Editable:** Make the selected layer editable (or not) by checking (or unchecking) the check box. Currently, only those shapefiles created in the Map Manager are editable.
-  **Label:** Displays the Layer name.
-  **Symbol:** Edit the symbol identifying the layer on the map.

The Layer Manager will contain numerous types of layers, each represented by a different symbol type. In the example shown here, the layer types, from top to bottom, are as follows:

- PointLayer:** Point shapefile, represented by a point symbol. These include station groups and data query layers imported into the map project.
- LineLayer:** A line symbol indicates a cross section line, contour line layer, or annotation line
- PolygonLayer:** Polygon shapefile, represented by a polygon symbol
- TextLayer:** Text annotation layer, represented by a T symbol
- Contour Layer:** Contour line layer
- Station Layers:** A group layer containing several component layers
- Boreholes and Monitoring Wells:** Station group layers
- vc\_exceeds\_1 mg per:** A data query
- CrossSectionLine2:** Cross section line layer
- Color Shade:** A color shade layer
- Airport\_color.bmp:** Georeferenced raster image
- WQ Stations:** A station group layer with graduated rendering
- DEM\_UTM17:** A surface (DEM) layer



### 14.1.1 Grouping Layers

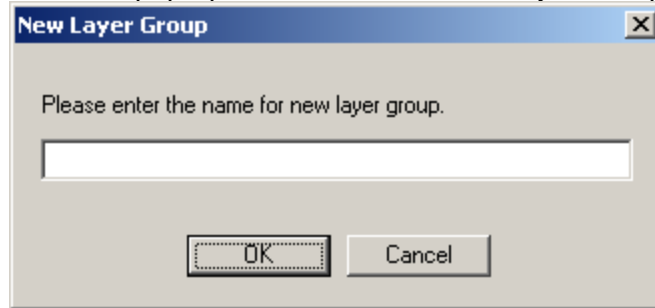
Group Layers help organize map layers that share similar characteristics, in a map project. For example, if your map contains a railroad layer and a highway layer, you

may choose to group these layers into a single group layer called Transportation Network.

Group Layers behave similarly to other layers within the Layer Manager panel. If you turn off the visibility for a group layer, the component layers will also turn off. You can also move a group layer up or down the layer list, change its draw order and ungroup layers as needed.

### Creating a Group Layer

To create a Layer Group, follow the steps below:  
Right-click anywhere within the Layer Manager panel.  
From the pop-up menu, select Create Layer Group.



Enter a name for the layer group.

Click [Ok]

The new layer group will now appear in the Layer Manager panel.

### Adding Layers to a Group

To add a layer to a layer group, simply drag and drop the desired layer onto the layer group.

### Removing Layers from a Group

To remove a layer from a layer group, simply drag and drop the desired layer out of the layer group.

### Removing Layer Groups

To remove a layer group, follow the steps below:

Right-click on the desired layer group.



















From the pop-up menu, select Delete.














The component layers will ungroup and return to the root of the layer list.

All layer types, including layer groups, can be moved up and down within the Layer Manager panel, by simply dragging and dropping the layer into a new position.

## 14.1.2 Description of Toolbar Items

The toolbar in the Map Manager provides access to most of the same features available in the Main Menu. Most toolbar buttons are context sensitive, and react according to the active layer, window, or dialog. If there are no options for the selected layer, the respective toolbar button(s) will become inactive, indicated by a "greyed-out" appearance.

-  New button creates a new map project.
-  Open button opens an existing map project.
-  Save button saves the current map project.
-  Print button sends the current map view to the report editor.
-  Selection Pointer button allows objects in the active layer to be selected.
-  Draw Polygon button allows a polygon to be drawn in the active layer. This feature is active only when a polygon shapefile layer is selected and set to be editable.
-  Draw Rectangle button allows a rectangle to be drawn in the selected layer. This feature is active only when a polygon shapefile layer is visible and set to be editable.
-  Draw Circle button allows a circle to be drawn in the selected layer. This feature is active only when a polygon shapefile layer is selected and set to be editable.
-  Draw Line button allows a line to be drawn in the selected layer. This feature is active only when a line shapefile layer is selected and set to be editable.
-  Draw a Point button allows a point to be inserted in the selected layer. This feature is active only when a point shapefile layer is selected and set to be editable.
-  Insert Text button allows for text to be inserted on the selected layer. This feature is active only when a text file layer is selected and set to be editable.
-  Information button allows the information for the selected station, or any other object such as contour lines, to be viewed.
-  Measure button allows the distance between two points on the map to be measured.
-  Delete Selected Object button allows the selected object (polygon, rectangle, circle, line, point, or text) to be deleted from the active layer. This feature is active only when an object is selected.
-  Add Vertex button allows a vertex to be added to the selected object (polygon, rectangle, circle, or line). This feature is active only when an applicable object type is selected.
-  Delete Vertex button allows a vertex to be deleted from the selected object (polygon, rectangle, circle, or line). This feature is active only when an applicable object type is selected.
-  Zoom In button allows zooming in on the map window. Draw a rectangle in any direction around the area you wish to zoom in to.
-  Zoom Out button allows zooming out from the map window.

-  Pan button allows panning the current map view left, right, up, or down.
-  Full Extent button restores the map view to the full extent of the map's coordinates.
-  Previous Extent button allows restoring the map view to the previous zoom extent.
-  Next Extent button advances the map view to the next zoom extent.
-  Select Single button allows individual objects such as stations to be selected. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager.
-  Select In Rectangle button allows selecting all stations within a rectangle that is drawn by the user. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager.
-  Select In Polygon button allows selecting all stations within a polygon that is drawn by the user. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager.
-  Select In Ellipse button allows for selecting all stations within an ellipse that is drawn by the user. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager.
-  Select Along Line button allows for selecting all stations within a buffer distance of a line that is drawn by the user. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager.
-  Select All button selects all stations in the current map layer. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager.
-  Select None button de-selects all stations in the current map layer. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager, and at least one station has been selected.
-  Cross Section Line button allows the location and buffer distance for cross section lines to be defined. This feature is active only when a layer containing Hydro GeoAnalyst stations is visible, and selected from the Layer Manager.
-  Show/Create Cross Section button allows a cross section corresponding to a selected cross section line on the map to be created or viewed. This feature is active only after a cross section line has been selected or drawn in the map window.

---

## 14.2 Description of Menu Items

### New

The New item provides options for creating a new map project file. Map projects are saved with the extension \*.VMP in the project sub-directory "Map". The new map project will use the same projection system and extents as defined in the current Hydro GeoAnalyst project.

NOTE: Each Map Project has required fields which must be present in your database structure, as defined in the Profile Settings. For more details, see [Chapter 4: Template Manager - Profile Settings](#).

### **Open**

Provides options for opening an existing Map Project; only files with the (\*.VMP) extension can be opened using the Map Manager.

### **Save**

Provides an option to save the current map project file. All current Map Layers that are displayed will be saved to the current Map Project file.

### **Save As**

Provides the option to save a copy of the current Map Project with a different name.

### **Close**

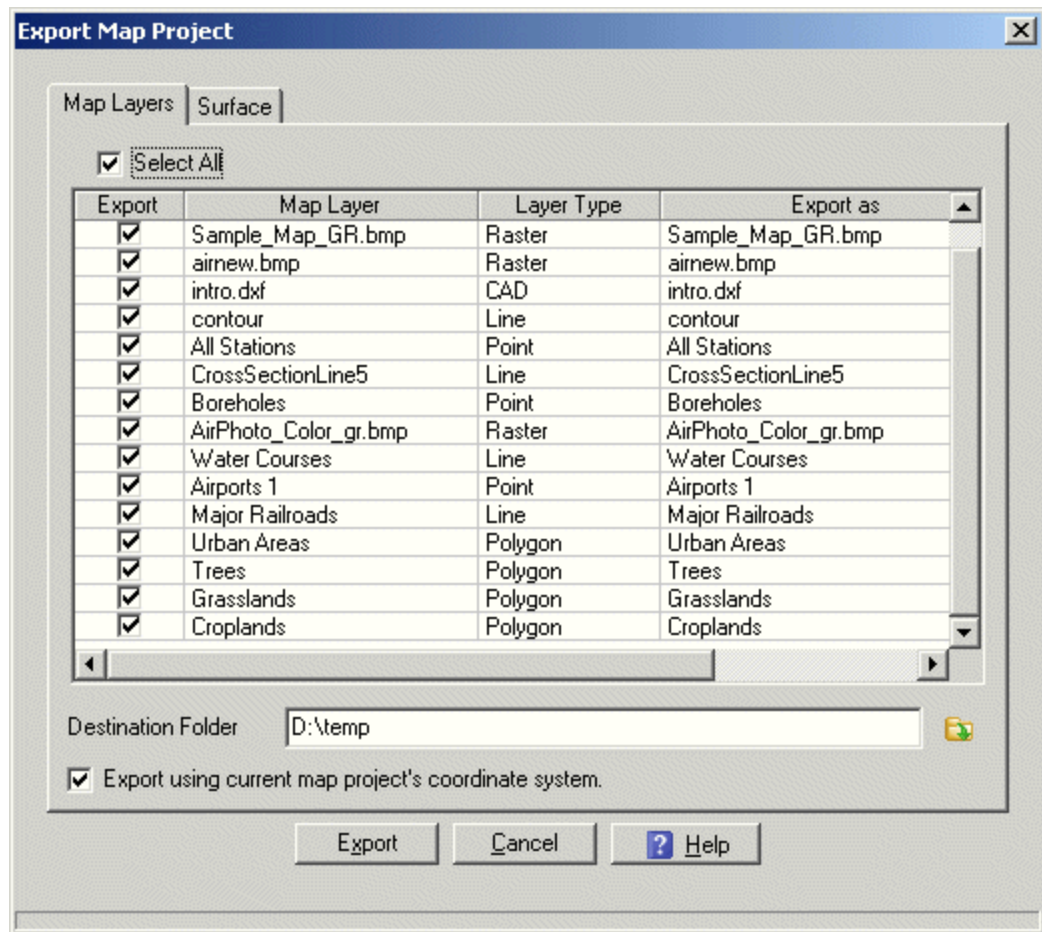
This will close the current Map Project. If there are unsaved edits, there will be a prompt to save changes before closing.

### **Reopen**

A list of recently accessed map projects will be displayed beside the Reopen item. This is an alternate method of opening map project files, instead of using the Open command.

### **Export Project**

Creates a copy of all layers in the current map project, for use in other applications.



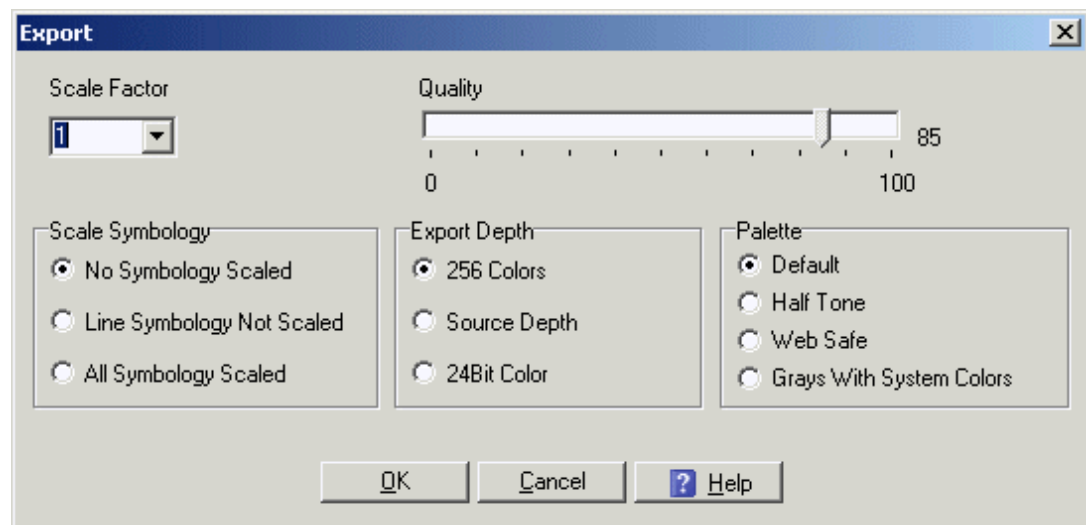
In this dialog, select the layers you wish to export, and define names for the layers; the same can be done for Surfaces (if any are available). Finally, specify the Destination Folder for the copy of the map files.

On exporting a map project, selected shapefiles will be exported in the current projection system if selected by the user. Raster images will use the projection system at the time the image was georeferenced.

### Export Map

Provides options for exporting the current map view to a Raster Image file.

Supported file types include: Bitmaps (\*.BMP), JPEGs (\*.jpg), and Enhanced Meta Files (\*.EMF). Enter a filename, and choose the file format, and click Save. An Export dialog will appear with settings for the image file, as shown in the following figure:



There are several options for modifying the image:

**Scale Factor:** Choose a scale factor from the combo box. This factor will determine the resolution of the exported image. The greater the factor the better the resolution will be.

**Quality:** Using the scroll bar, define the image quality. This option is available only if the JPEG export format is selected. The greater the percentage the higher the quality will be. The image size is also directly proportional to this value.

**Scale Symbology:** Determines if the scale factor will be applied to symbols and lines.

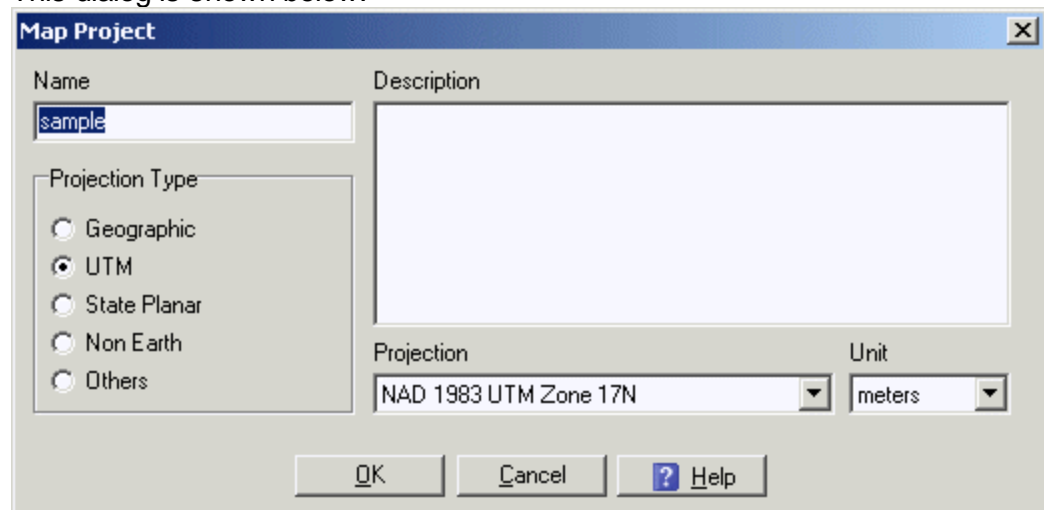
**Export Depth:** Choose the color quality for the exported image.

**Palette:** Determines the color palette to be applied to the exported image.

The Palette and Color Depth options are available only for bitmaps (\*.BMP) and enhanced Meta File (\*.EMF).

## Properties

The Map Project Properties dialog contains general settings for the map project. This dialog is shown below:



In this dialog, there are options for editing the Projection System, units, and description.

In the Name field, a new name may be defined for the map project.

In the Projection Type frame, there will be a list of Projection Systems supported by Map Manager and stored in the Database. For each Projection Type, a Projection must be defined, along with a corresponding Unit. The default unit for each projection will be displayed. If your HGA project uses a local coordinate system, all map projects must also use the local coordinate system. In this case, this setting cannot be modified and will be disabled.

In the Description text box, you may define a brief description of the project.

**IMPORTANT:** Currently, cross sections cannot be displayed in the Scene Viewer if they have been created in a map project that uses a geographic coordinate system (latitude, longitude). If you wish to display your cross section(s) in the Scene Viewer, please be sure to create your map project using a projected coordinate system, e.g., UTM.

**NOTE:** Projects in the Map Manager can use co-ordinate systems that differ from those used for displaying stations in the main HGA window.

**NOTE:** Changing the projection of a map will affect any existing georeferenced raster image layers in the map project. If the projection of a map is changed, all georeferenced raster images must be georeferenced again in the new coordinate system.

### Print

Loads the map view into the Report Editor, where the report may be printed and/or saved for later retrieval. For more information please see [The Report Editor](#).

### Exit

Exit the Map Manager and return to Hydro GeoAnalyst.

---

## 14.2.2 Layer

A Map Layer is a set of points, lines, polygons or a raster image that have geographic coordinates attached to it. A Map Layer may be imported into any Map Project.

---

### 14.2.2.1 New

Provides options for creating a new map layer. A new layer may be created as one of the following file types:

- ESRI Polygon shapefile (\*.shp)



- ESRI Line shapefile (\*.shp)
- ESRI Point shapefile (\*.shp)
- ESRI Text shapefile (\*.shp)

These are Annotation Layers, meaning that they can be used to draw various shapes or labels (text) on your map project.

The new map layer will use the projection system of the current map project. After entering a filename for the layer, the new map layer will be created, then placed in the Layer Manager and added to the current Map Window.

**HINT:** For easy maintenance, it is suggested that the shapefiles be kept in the same folder as the current map project. By default, Map projects are created in the Map sub-folder of the current Project folder.

---

#### 14.2.2.2 Open

##### Shapefile

Provides options for opening a map layer. The Map Manager is able to open any shapefile that has a projection system already assigned to it. These shapefiles include all types of ESRI shapefiles (polygons, lines, points, and text). Once a map layer is opened, it will appear in the Layer Manager, and is added to the current Map Window.

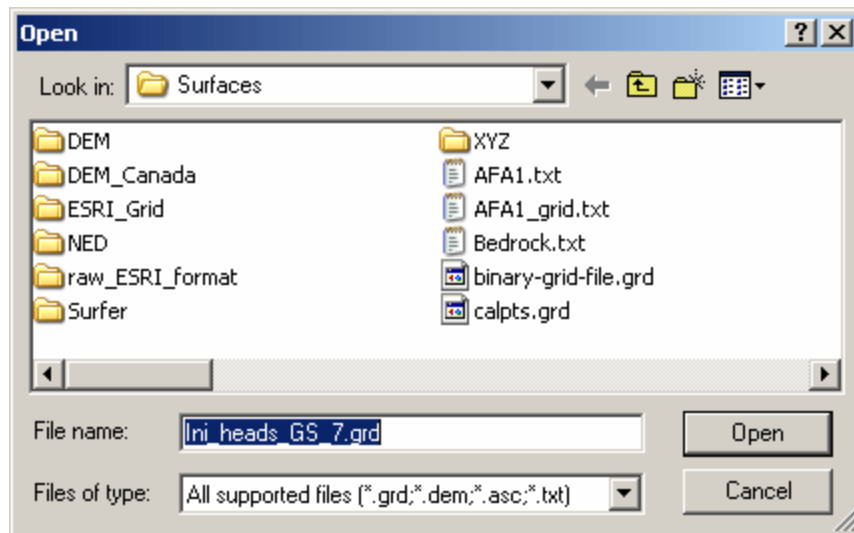
If the selected shapefile contains numeric attribute data, the Set Field Precision data will appear on your screen.

##### Surface

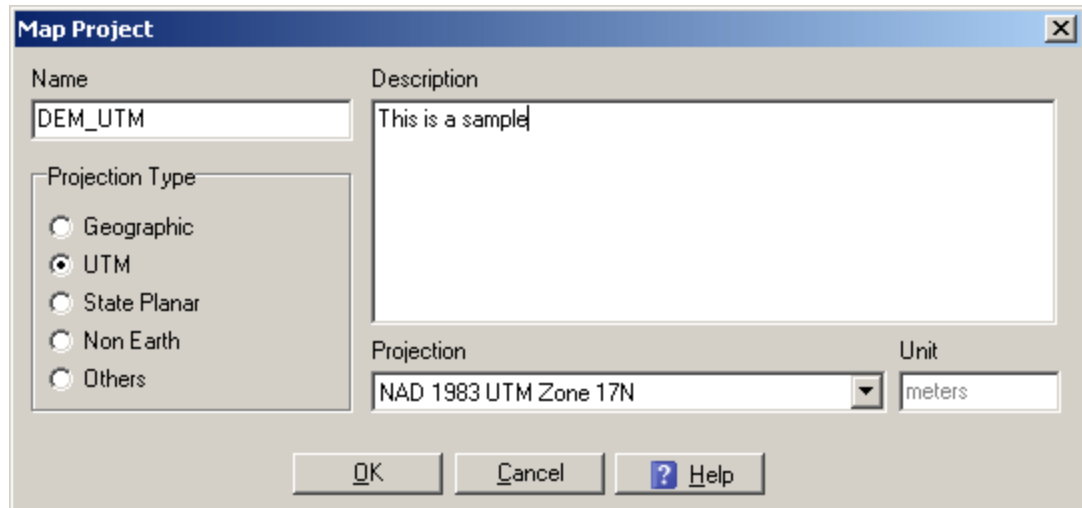
Provides options for importing 3D surface layers. The following surface files are supported:

- Surfer grid (.grd) version 6 and 7
- DEM (.DEM)
- ESRI ASCII (.asc)
- Text (.txt)

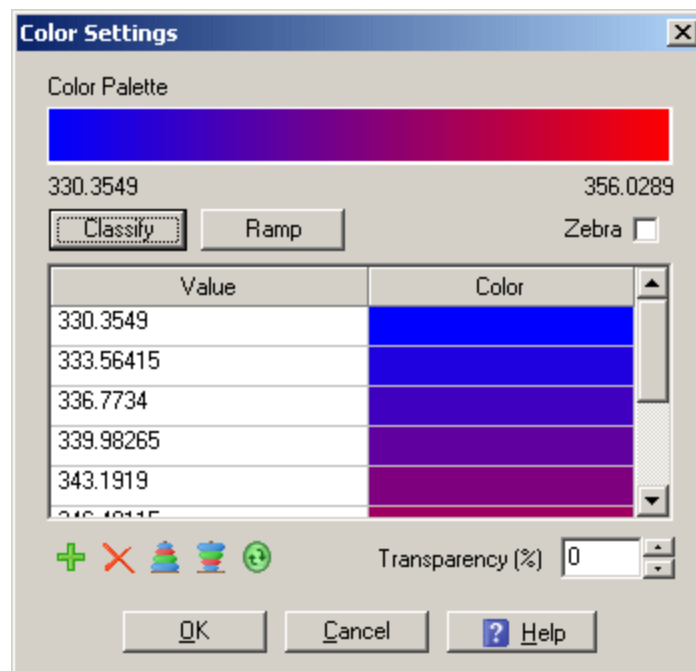
Upon selecting this option, an Open dialog will display (shown below).



Locate and select a surface file, and select [Open]. The following dialog will display where you can specify a Name, Projection Type, Projection system and Description. The surface projection system must be the same as the projection system defined for the Map Project. For example, if your Map Project is set to the NAD83 projection system, you must select NAD83 for the surface layer.



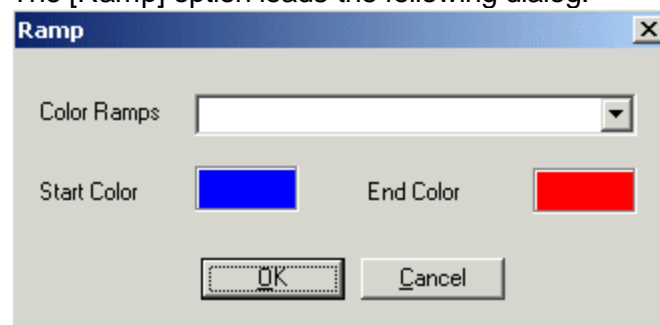
Once the surface layer settings have been defined, click [OK]. The Color Settings dialog (shown below) will appear.



The Color Settings dialog allows you to define different colored zones/ranges according to their specific interval of elevation values.

The [Classify] button allows you to decide how many intervals you wish to have, and HGA automatically divides the available range of values into that number of equal intervals.

The [Ramp] option loads the following dialog.

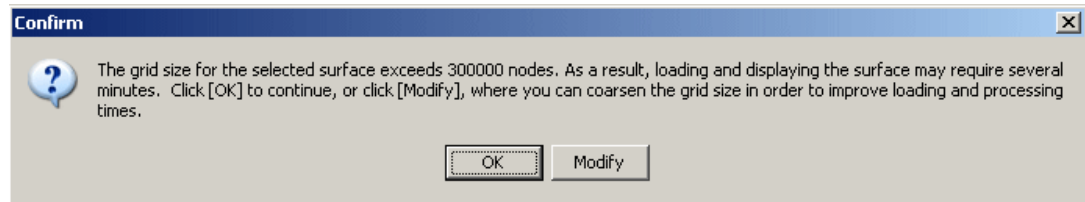


You can choose a monochromatic ramp that provides a range of the same color, but with varying degrees of darkness, a dichromatic ramp that provides a spectrum between two different colors, or a custom ramp by choosing colors for the Start Color and End Color boxes (to load the color dialogue, click on the colored box). Click [OK] to return to the renderer screen.

Alternatively, you may set the color for each value; simply click on the Color box under the Color column, and the Windows Color palette will display. Select the desired color, and click [OK] to continue. Repeat this for other values, as desired. Adjust the Transparency option to make it possible to see layers under the color shading/zones. The higher the value, the more transparent the layer will be. The value must be within the range 0-100.

To display the value intervals in discrete color zones, rather than continuous shading, select the Zebra checkbox.

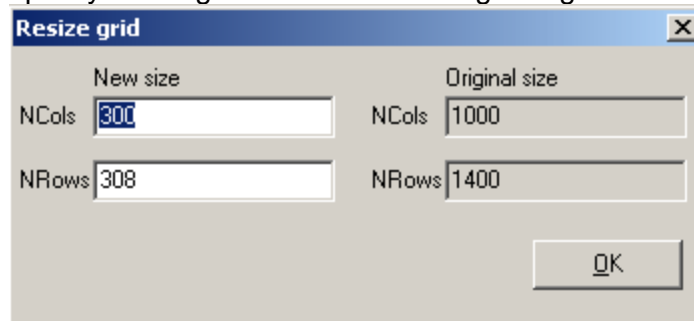
Once the color settings have been defined, click the [Ok] button.



A surface file with a large grid size may take several minutes to load depending on the performance capabilities of your computer. For example, a DEM surface file that is approximately 9mb, may take up to 10 minutes to load.

If the grid size for the selected surface file exceeds 300,000 nodes, the message shown above will display, and you can choose to accept the original grid size or modify its dimensions to lower the resolution and decrease the loading time.

To accept the original grid size, click [Ok]. Otherwise, click the [Modify] button to specify a new grid size. The following dialog will be shown:



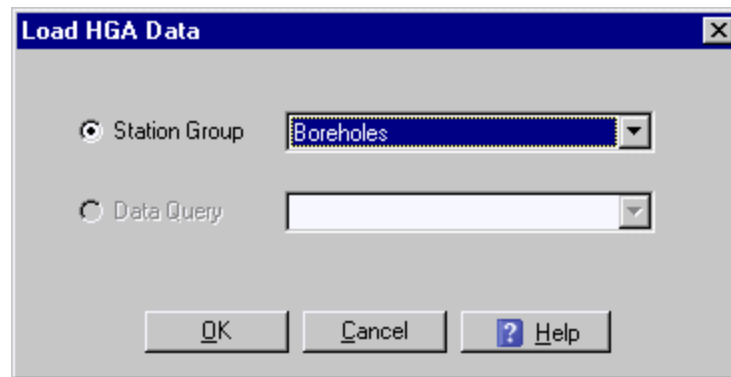
The NCols and NRows fields represent the number of columns and number of rows for the surface file, respectively. These fields will contain recommended values for the new grid size. However, you can manually define a new grid size by entering the desired values for these fields.

Click [Ok] once the new grid size has been defined.

The surface layer will then be generated and added to the Layer Manager panel.

### 14.2.2.3 Load HGA Data

This menu item provides options for loading Hydro GeoAnalyst data as a new map layer. The data source may be a list of stations from a Hydro GeoAnalyst Station Group or those resulting from a Data Query. Upon clicking on this menu item, the following dialog will appear:

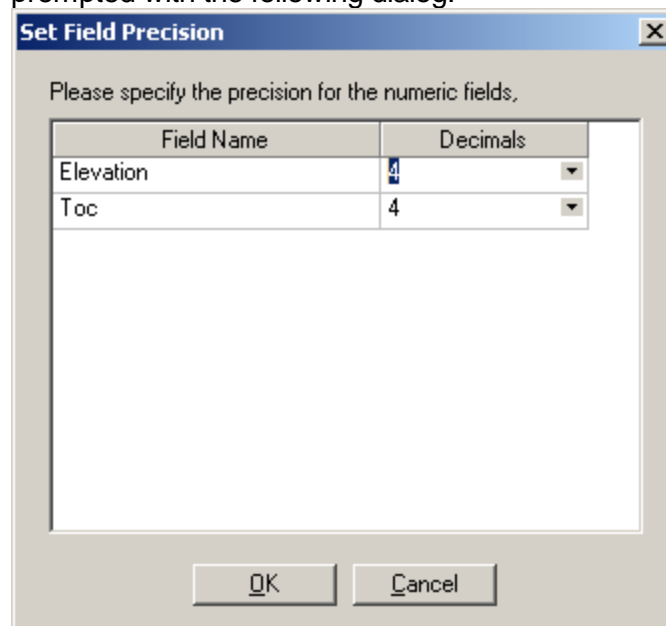


In this dialog, select the data source type and choose (from the appropriate combo box), the desired Station Group or Data Query. The data will be used to create a new Map Layer, and the layer will be displayed in the Layer Manager as well as in the map window. This option is available only if a map project is open. The resulting shapefiles will be saved as follows:

- for Station groups, the shapefiles (and supporting files), will be saved to the sub-directory Map\Selection
- for Data Queries, the shapefiles (and supporting files), will be saved to the sub-directory Map\Data

### Setting Field Precision

If the selected station group or query contains numeric data fields, you will be prompted with the following dialog:



The Set Field Precision dialog box lists all the numeric fields in the selected station group or query. For each numeric field, you can specify the number of decimal places to include when generating the layer's shapefile. Enter the desired number

of decimal places under the Decimals column for each numeric field, and then click the [OK] button.

Please note that all contouring of numeric values is performed using the precision specified in this dialog. Moreover, the label renderer will display all numeric values on the map using the specified precision. If you wish to change the precision after the layer has been created, you must reload the HGA data into the map project.

#### 14.2.2.4 Import

This menu item provides options for importing basemap layers to the current Map Project. Basemap images may be Raster Images (\*.bmp, \*.jpg, \*.tif, \*.sid, and others) or AutoCAD files (\*.dxf). Each format is explained below.

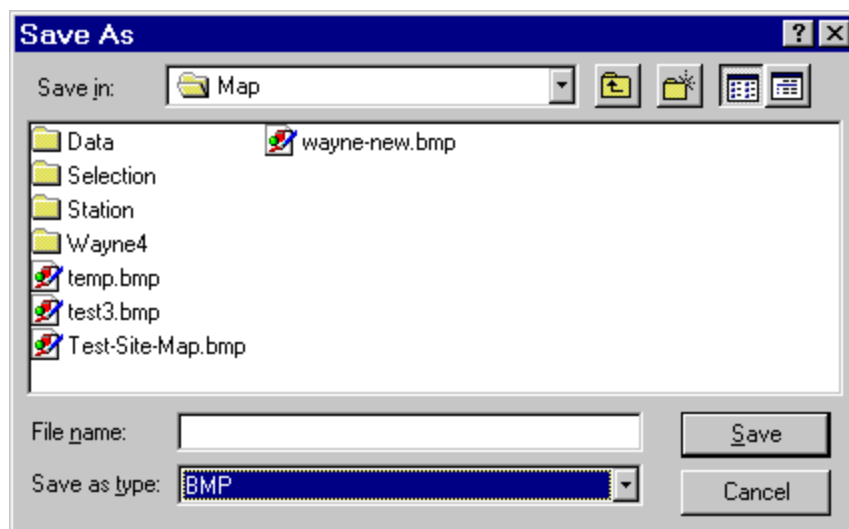
##### Raster Image

A critical element of any Map Project is registering the image map with the correct real world coordinates. This procedure is called Georeferencing. Since raster images do not contain information on the site's projection system or length units, these details must be manually added using Georeferencing. Georeferencing assigns points with known coordinates to the image; the image is then scaled and the map extents are calculated.

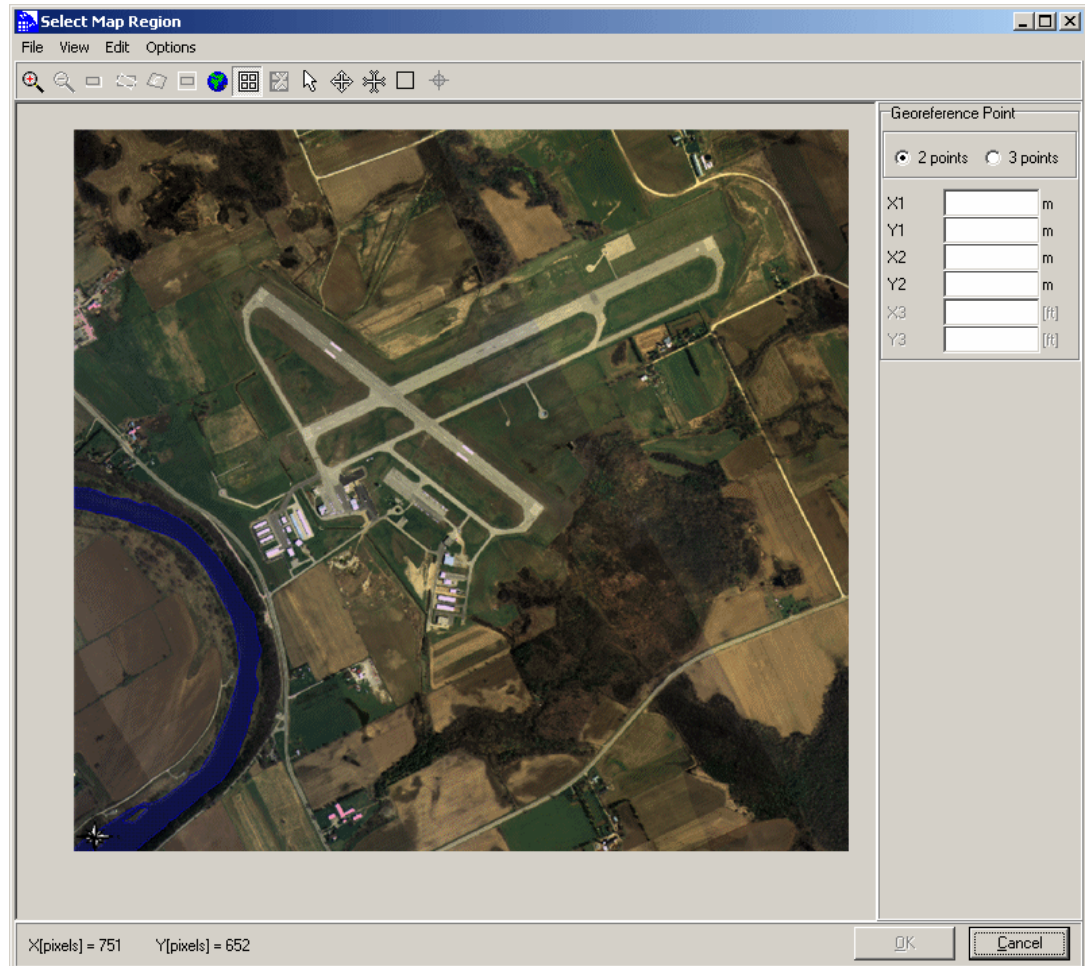
**NOTE:** The Map Manager does not provide an error trap for invalid georeferencing points.

##### Georeferencing Raster Images

If a Raster image is selected from the Layer / Import menu, a message will appear stating that the image must be georeferenced. Click [Yes] to continue, and you will be prompted to save the georeferenced image as a new file:



Enter a name for the new image. The file will be converted and saved as a bitmap (\*.BMP). This new name will be used as the map layer name in the Map Manager. Click [Save] to continue, and the Georeference window will appear as shown in the following figure.



In order to map the pixels of the image to a coordinate system, the image must have at least two georeference points with known coordinates. These georeference points can be defined using the procedure described below.

**Note:** The real world georeference points must have coordinates that are in the same projection system as the Map Project. Map Manager will not make adjustments or conversions for georeference coordinates that are in a different projection system.

To set a georeference point, Click on the first map location where the X and Y world coordinates are known. A Georeference point dialog will appear prompting for the X1 and Y1 world coordinates of the selected location:

Georeference point			
X1	<input type="text" value="535122"/>	Y1	<input type="text" value="4812839"/>
Xp	<input type="text" value="220"/>	Yp	<input type="text" value="393"/>
<input type="button" value="OK"/>		<input type="button" value="Cancel"/>	

Enter the X1 and Y1 coordinates for this point.

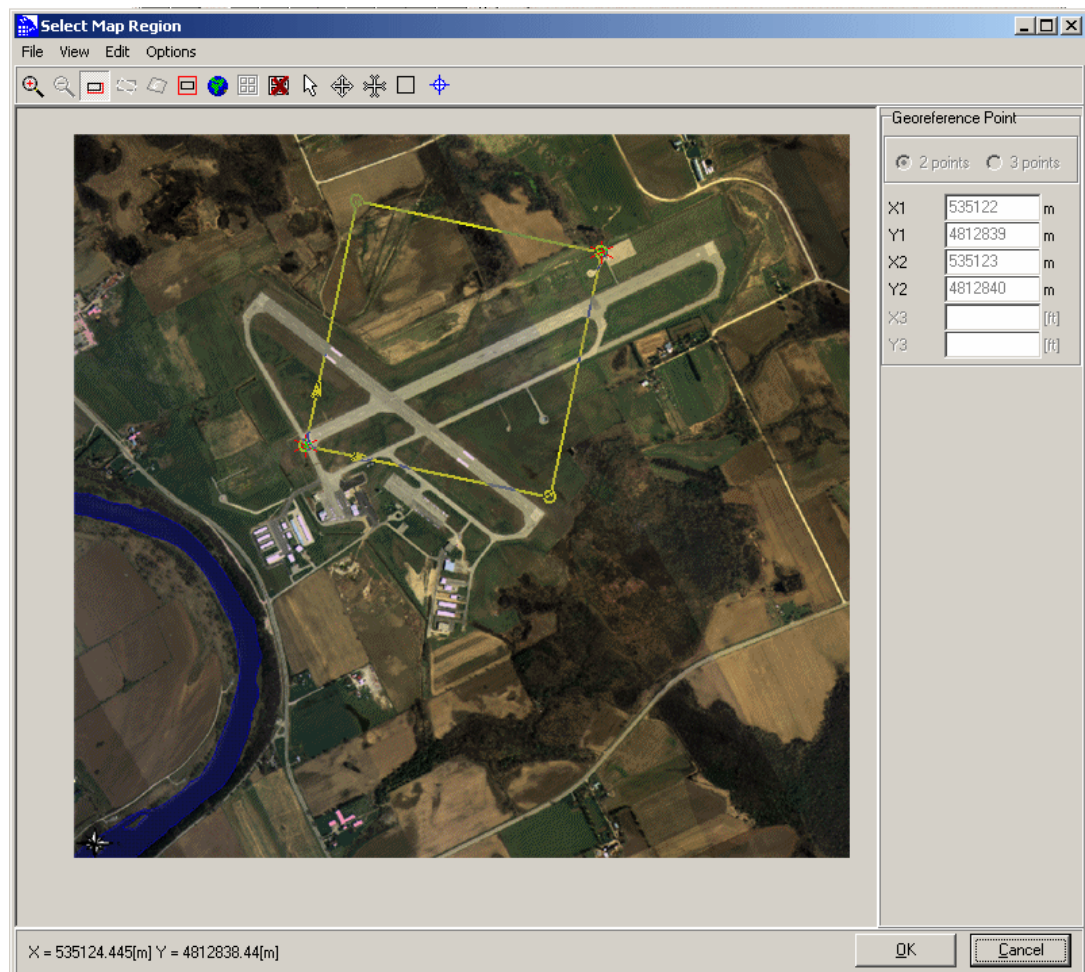
Click [OK]

Click on the second map location where the world coordinates are known.

Enter the X2 and Y2 coordinates for this point.

Click [OK]

A box will appear around the map region, similar to the window shown below.



The Georeference utility will convert the Raster Image to project coordinates; in the top right corner of the window, the two Georeference Points will be displayed.

These values cannot be modified unless one of the georeference points is deleted and a new georeference point is assigned.



A box will appear in the map window, defining the image corners. The image region can be modified as explained below.


To delete a georeference point,


Click the  (Delete Point) button in the toolbar


Select one of the georeference points to delete it.


**NOTE:** When a georeference point is deleted, a new georeference point must be added, since two georeference points are required to create a coordinate system.

Once the Georeference points have been defined, the map region may be modified. In the Select Map Region window, the map region is represented by an outline of a box with circular nodes at each corner and with arrows pointing along the X and Y axes. The map region box can be shifted or expanded to any alignment on the site map using the toolbar options described below. These options may also be accessed from the Options menu on the Main Menu bar.

 **Resize Region** Click-and-drag a corner of the map region box to stretch or shrink the size of the map region. The new map coordinates will be updated to display the new map region.

 **Rotate Region** Rotate the map region

 **Align Rectangle** Align the map region with the x-axis.


 **Maximize** Enlarge the map region to the full extents of the basemap.

**HINT:** If it is desirable to use the entire image for the map, use the Maximize option to expand the map region to the full extents.

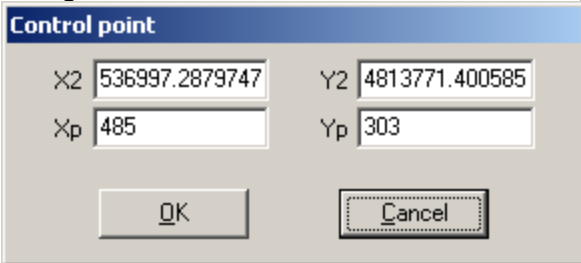
### Adding Control Points

You can validate the accuracy of the georeferenced raster using Control Points. Control points are simply locations on the raster image of which real-world coordinates are known. Real-world coordinates can be derived from geographic sources such as topographical maps or GPS units. By comparing the georeferenced raster coordinates with their corresponding real-world coordinates, you can determine if the raster has been georeferenced accurately.

To add a control point,

Click the  button from the toolbar.

Click a location on the raster image where the real-world coordinates are known. A dialog similar to the one shown below will display.



The dialog box titled "Control point" contains four input fields for coordinates and two buttons at the bottom.

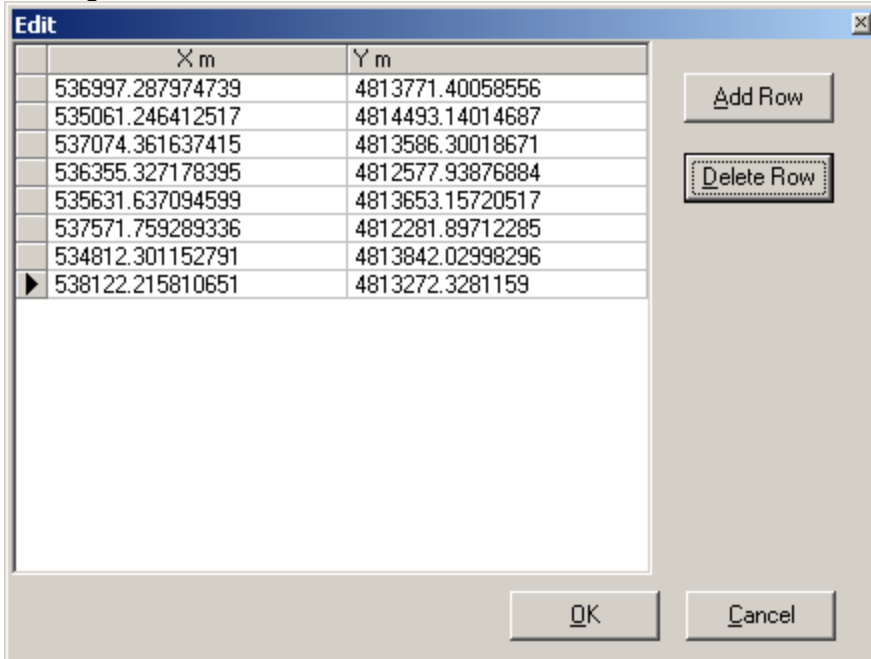
Field	Value
X2	536997.2879747
Y2	4813771.400585
Xp	485
Yp	303

Buttons: OK, Cancel

Coordinates shown in the above dialog (X2, Y2) represent the interpolated coordinates derived from the two or three specified georeference points, for that particular location on the image. You can validate the accuracy of these coordinates by comparing them to the real-world coordinates of that location. Note: To improve precision, you may want to Zoom In directly on the location, before adding the control point.

Click [Ok] to accept the Control point. You can add additional control points by simply clicking on a different location on the raster image.

All control points are stored in a table (shown below) which can be accessed by clicking Edit / Control Points from the menu bar.

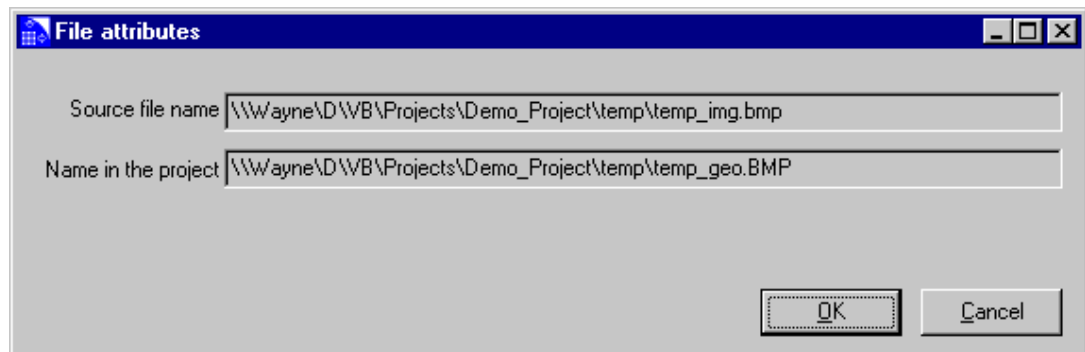


	X m	Y m
	536997.287974739	4813771.40058556
	535061.246412517	4814493.14014687
	537074.361637415	4813586.30018671
	536355.327178395	4812577.93876884
	535631.637094599	4813653.15720517
	537571.759289336	4812281.89712285
	534812.301152791	4813842.02998296
▶	538122.215810651	4813272.3281159

Here you can review all of the control points. To delete a control point, simply click the appropriate row in the table and click the [Delete Row] button. Click [Ok] to close the table.

If there is a significant difference between the georeferenced coordinates and real-world coordinates, check the precision of the georeference points, and reassign if necessary.

Once the georeferencing is completed, click [OK] in the Georeference window. A confirmation dialog will appear as shown below:



Click [OK] to continue. The Raster Image will then appear as a new Map Layer in the Map Project.

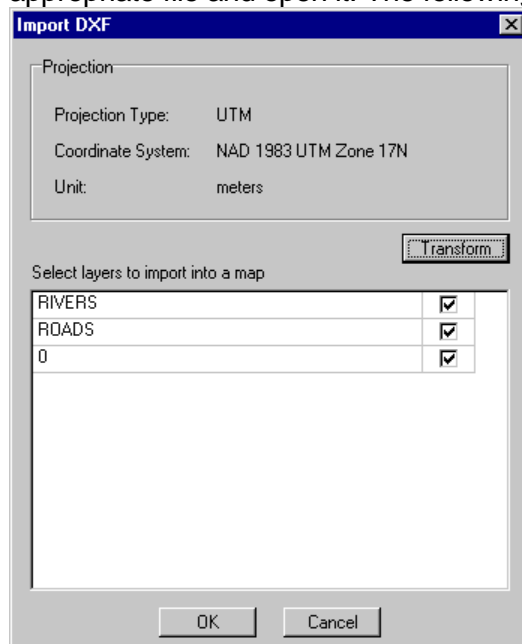
## CAD

The Map Manager also allows you to import AutoCAD files (\*.dxf) into a map project. CAD layers may be built in a Projection that is different from that used for the current map project; therefore, when a CAD file is selected, the projection system and units may need to be converted to the current projection system and units. In addition, CAD files may contain graphic features on different layers; as such, there are options to select the layer to import. These options are explained below.

HINT: If you are having difficulties importing your CAD drawing please try exploding all blocks and re-saving as a dxf file before attempting to import into HGA.

## Selecting Layers

When a CAD format is selected using the Layer / Import menu, navigate to the appropriate file and open it. The following dialogue will load:



The top portion of the dialogue lists the projection system properties of the current map project. Below this frame is a [Transform] button. This option is required only if

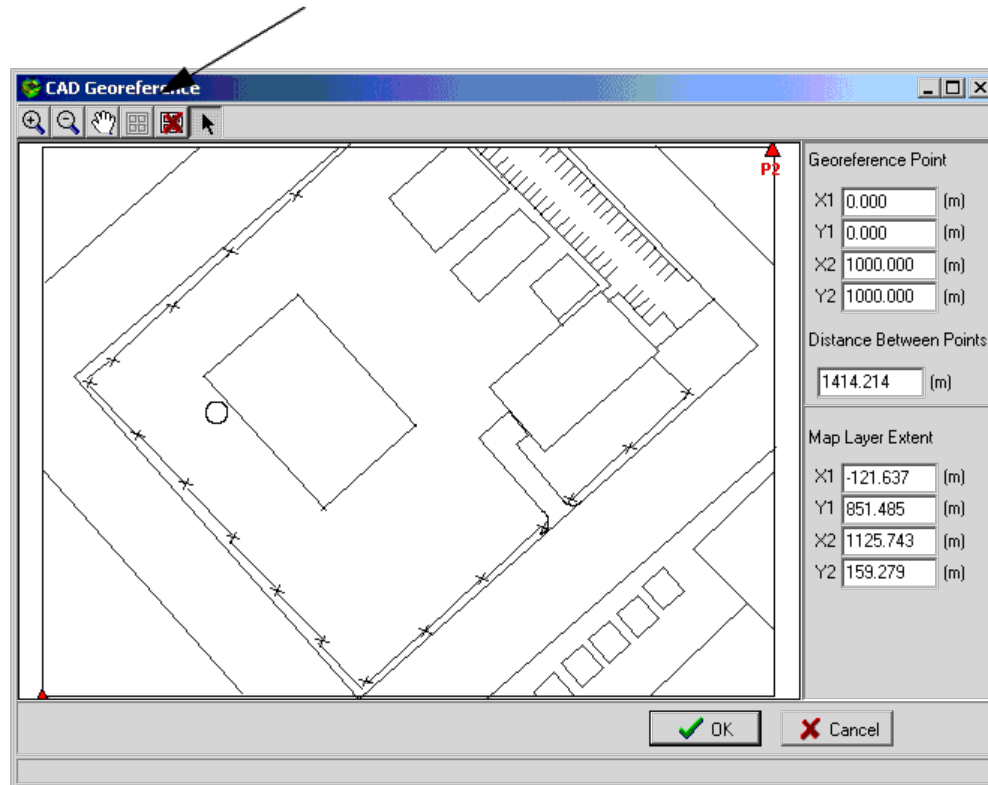
you are not sure that the CAD file has the same projection system as the current map project. In this case, click [Transform] to georeference the CAD image. Once you are done, click [OK] to return to the Import DXF dialogue.

In this dialogue, select which layers you wish to import into the map and click [OK].  
Transforming Coordinates

The CAD file must contain the same units and projection system as the current map project in order for it to be displayed properly. If there are differences, then the CAD file can be Transformed to the map project's projection and coordinate system.

From the Import DXF dialog, click on the [Transform] button. This will launch the Map Georeference window as shown below.

### Georeference

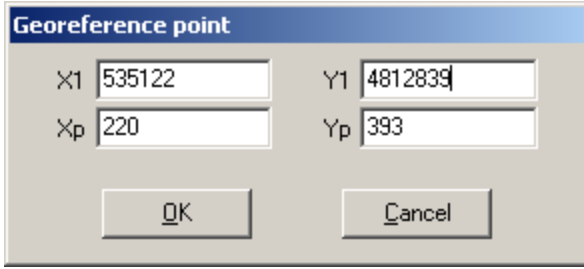


Transformation is performed using two points on the DXF file, with known coordinates. The Map Manager does not provide an error trap for invalid transformations.

Follow the procedure below to import a DXF file, and use the coordinate Transformation option:

To set the georeference point, click the Georeference button

Click on the first map location where the world coordinates are known. A Georeference point dialog will appear prompting for the X1 and Y1 world coordinates of the selected location:



The dialog box titled "Georeference point" contains four input fields arranged in a 2x2 grid. The top row has "X1" with the value "535122" and "Y1" with the value "4812839". The bottom row has "Xp" with the value "220" and "Yp" with the value "393". Below the input fields are two buttons: "OK" and "Cancel".

Enter the X1 and Y1 coordinates for this point.

Click [OK]

Click the Georeference button again

Click on the second map location where the world coordinates are known.

Enter the X2 and Y2 coordinates for this point.

Click [OK]

The coordinates will be entered into the corresponding Georeference fields on the right-hand side of the window.

Once this is complete, click [OK] to continue, and the CAD file will be loaded as a new layer into the map project.

---

#### 14.2.2.5 Save

Saves the selected layer.

---

#### 14.2.2.6 Delete

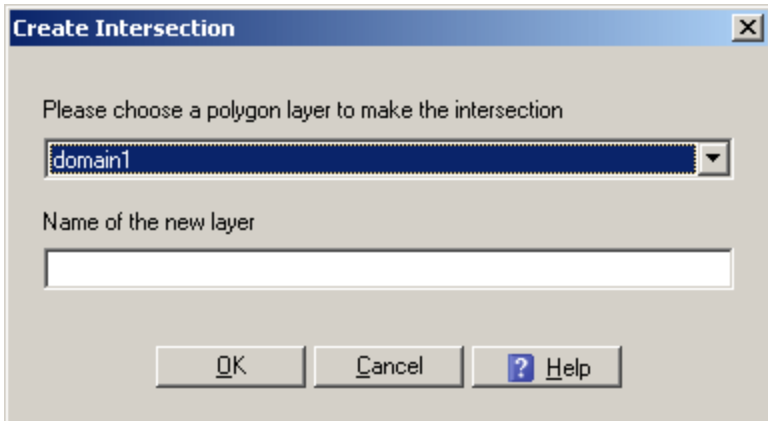
Deletes the selected layer. A layer cannot be deleted while it is in Edit mode.

---

#### 14.2.2.7 Create Intersection

With this option, you can create a new map layer from the intersection of any station (points), polyline, polygon layer, surface layer or color shade/zebra layer, with another polygon layer.

First, select the map layer that will be intersected, from the Layer Manager Toolbar. Next, select the Create Intersection option from the Layer menu. The following dialog will appear:



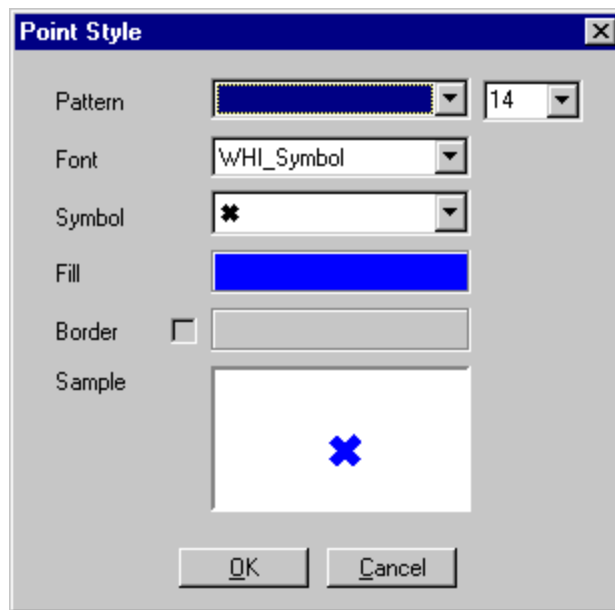
The dialog box titled "Create Intersection" has a close button (X) in the top right corner. It contains the text "Please choose a polygon layer to make the intersection" above a dropdown menu showing "domain1". Below this is the text "Name of the new layer" above an empty text input field. At the bottom are three buttons: "OK", "Cancel", and "Help".

Select the desired layer from the combo box, and enter a name for the new layer. Click [OK] when you are finished, and the new layer will be added to the Layer Manager panel.

**Note:** When clipping color shade and surface layers, the Name of the new layer field will be greyed-out as it is not required

#### 14.2.2.8 Properties

Provides options for modifying the symbol for the shapes (point, line, polygon) on the current (active) layer in the Layer Manager. The options dialog is shown below:

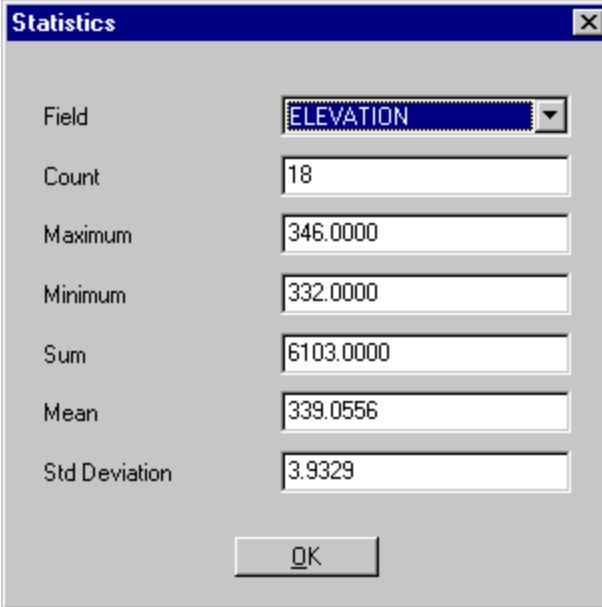


The dialog shown here is for point shapes. There are similar dialogs for line and polygon shapes.

The available symbol Patterns include circle, square, triangle, cross or any symbol from all true type fonts that may be available on your system. If the latter is selected, you will have to select the desired font from the Font combo box and the desired symbol from the Symbol combo box. Choose a symbol size from the combo box in the upper right corner. Finally, the symbol Fill color may be chosen from a color palette. If a border around the symbol is desired, select the check box beside Border and provide a border color.

#### 14.2.2.9 Statistics

Displays statistics for the selected data field of a selected layer. These include: Count, Maximum, Minimum, Sum, Mean, and Standard Deviation, as shown in the figure below.



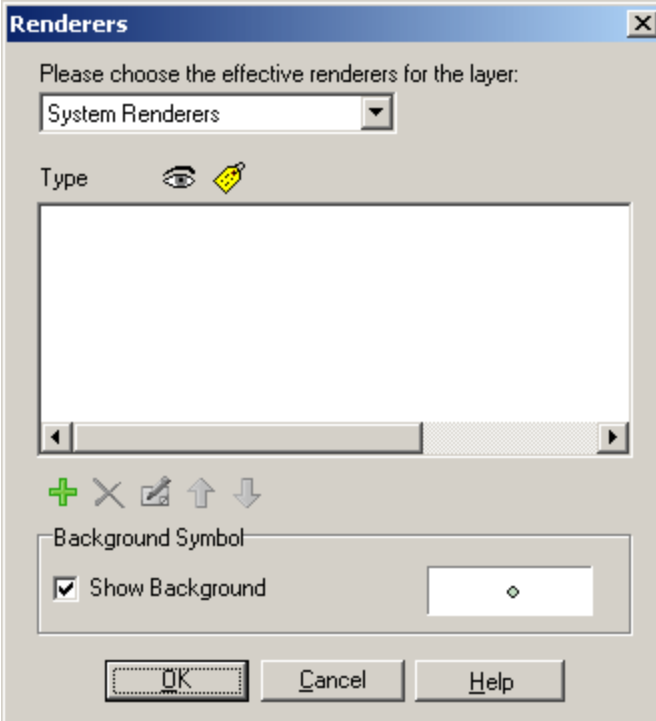
The Statistics dialog box displays the following data for the field 'ELEVATION':

Field	Value
Count	18
Maximum	346.0000
Minimum	332.0000
Sum	6103.0000
Mean	339.0556
Std Deviation	3.9329

Buttons: OK



#### 14.2.2.10 Renderer

Provides options for a Map Renderer. The Map Renderer allows assigning labels to objects on the map layers.



Please choose the effective renderers for the layer:

System Renderers

Type  

Background Symbol


Show Background

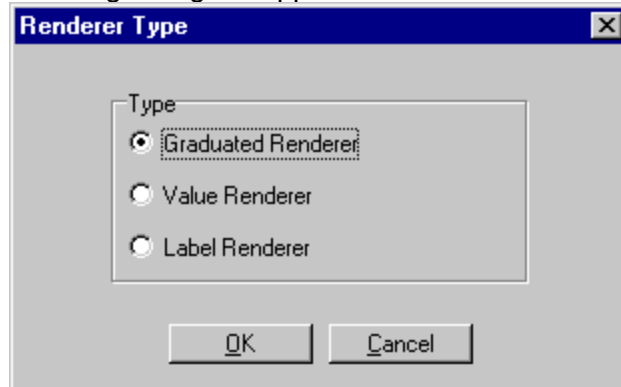
Buttons: OK, Cancel, Help

There are two types of renderers: **System Renderers** and **Custom Renderers**. The System Renderers are renderers provided by MapObjects and include label, value and graduated rendering.

Custom Renderers are renderers developed by Waterloo Hydrogeologic. These renderers may provide the same functionality as the MapObjects renderer, i.e., label renderer, but with additional options.

### **System Renderers**

A new System Renderer may be added by clicking on the  (Add) button. The following dialog will appear with the available Renderers from which you can select.




The Graduated Renderer provides a way of classifying features into categories or classes, by drawing different symbols for features based on numeric attribute values and their ranges.

The Value Renderer provides a means of representing features of a map layer by drawing a symbol for each unique data value.


The Label Renderer: can be used to display labels on contour maps, or to place labels on stations or any other object.

Select the desired type, and click [OK].

For each Renderer type, there is a corresponding settings dialog, which is launched automatically when you create a new renderer; this can also be loaded by selecting the  (Edit) button after selecting the renderer you wish to change.

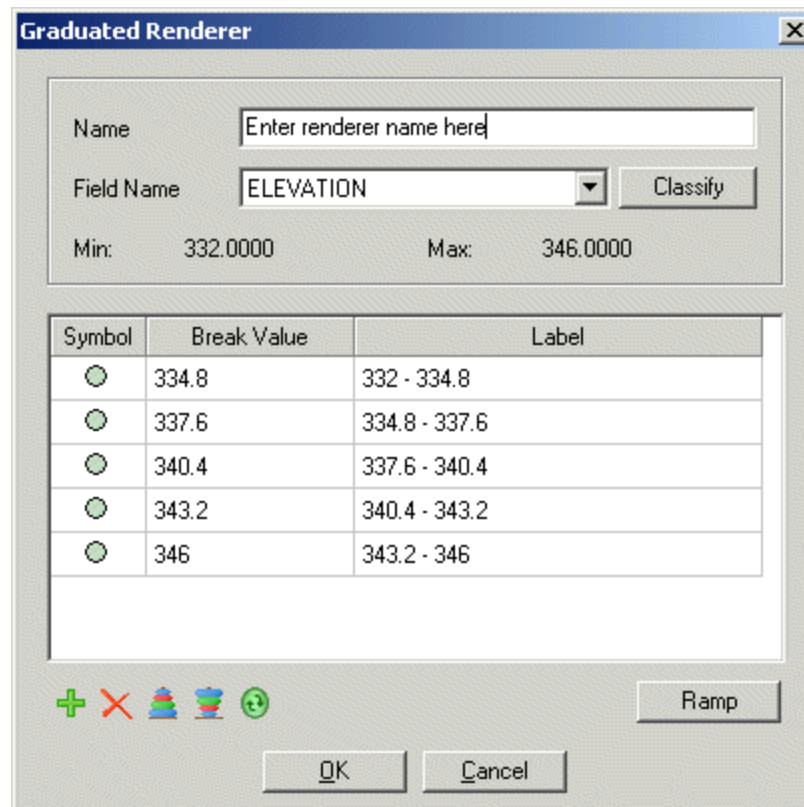
### **Graduated Renderer**

Graduated Renderer allows you to graphically display station data according to their specific interval of values. You have the option of specifying the color scheme and/or the symbol that represents the station. To use the Graduated Renderer, select Renderer from the

Layer menu, click the  (Add) button, and choose Graduated renderer from the available list.

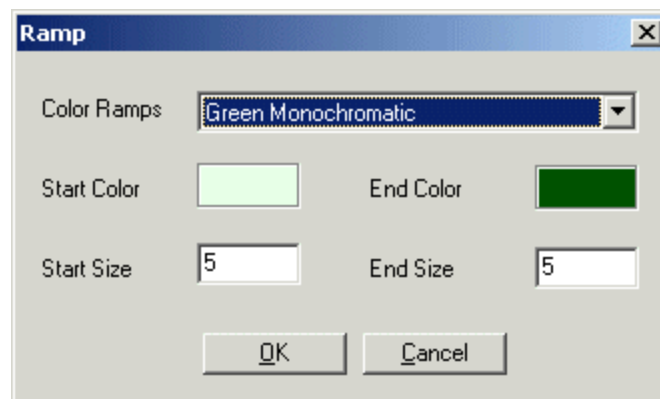
The following dialogue will allow you to compose a set of symbols for different value intervals:





Enter the Name for the renderer and choose the Field based on the values from which you want to classify your data. [Classify] button allows you to decide how many intervals you wish to have, and HGA automatically divides the available range of values into that number of equal intervals.

Clicking on the symbol beside each interval will load the standard "Point Style" dialog allowing you to choose a specific symbol and/or color for each interval. Color may also be specified as a spectrum using the Ramp function.



You can choose a monochromatic ramp that provides a range of the same color, but with varying degrees of darkness, a dichromatic ramp that provides a spectrum

between two different colors, or a custom ramp by choosing colors for the Start Color and End Color boxes (to load the color dialogue, click on the colored box).

This dialogue also allows you to specify the size of the symbols or, if you wish, the start and end size for a range.

Click [OK] to return to the renderer screen. At the bottom of the Renderer dialog, there is a toolbar with additional options. These are described below:



From left to right, the function of these buttons are:

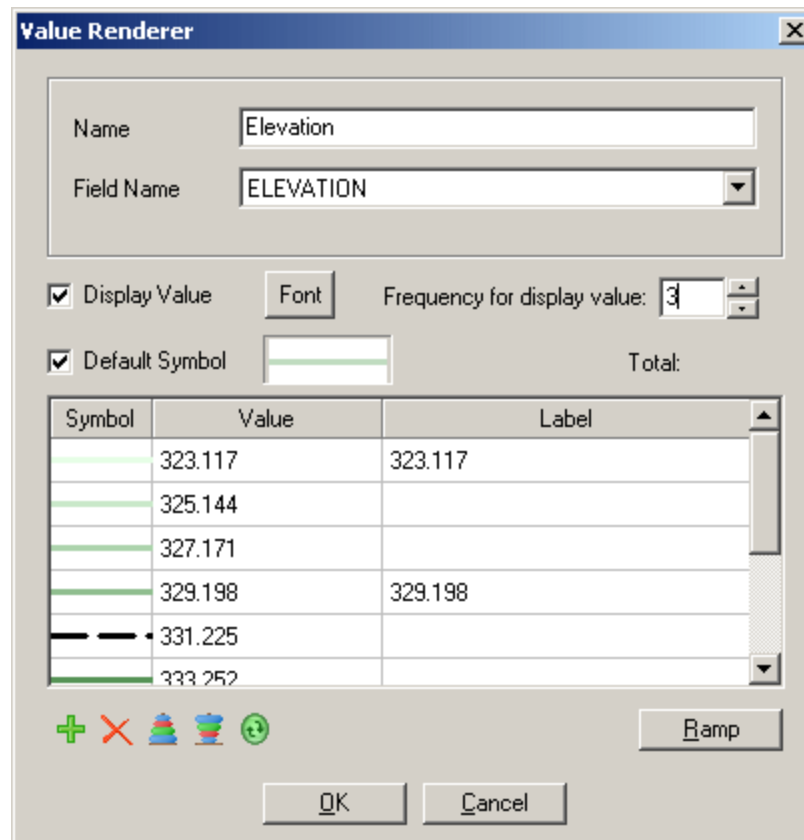
- Add a new row to the renderer table, with a new value and symbol/color
- Delete the selected row from the renderer table
- Order the values by Ascending order
- Order the values by Descending order
- Reverse the order of the colors/symbol; lowest will be flipped to highest, and highest will be flipped to the lowest.

When you are finished, click [OK] again to confirm the renderer settings.

Make sure the renderer you've created has a check mark in the "Visible" column and click [OK] to apply the renderer.

### **Value Renderer**

The Value renderer function is very similar to the Graduated renderer. The Value Renderer dialog is shown below.



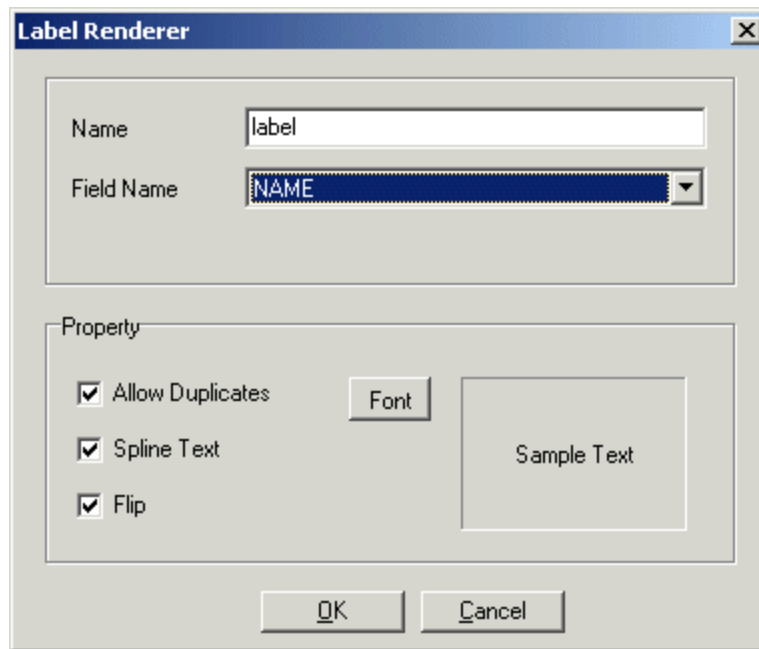
At the top of the dialog, specify a Name for the renderer and select a Field Name for the renderer.

The Value Renderer dialog allows for detailed symbol and label rendering. Use the Frequency for display value vertical scroll box to set the label display frequency. You can manually specify value symbols and their corresponding labels by clicking in the desired symbol and label field. Alternatively, specify a default symbol and select the Default Symbol checkbox to apply the same symbol characteristics to each value.

Use the Ramp function to specify the color scheme and size for the symbols and click [OK] first to return to the Value renderer dialog, click [OK] again to accept the settings. Then also make sure the "Visible" box is checked, and click [OK] to apply the renderer.

### Label Renderer

This renderer allows you to display various labels for the selected layer (stations or contour map, for example).



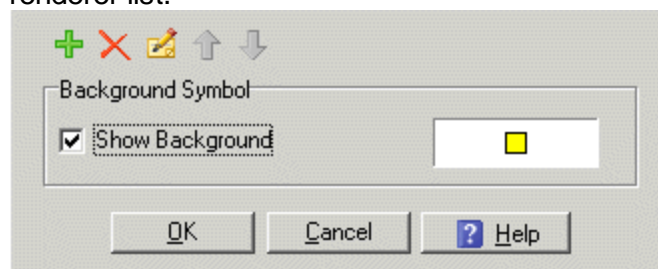
Enter the Name for the renderer and choose the Field Name which will be displayed as a label. Customize the settings as desired. Please note that for numeric fields, labels will be displayed using the precision defined in the Set Field Precision dialog box, when the HGA data is being loaded into the map project.

**Note:** Flip option applies only to the labels that may appear up-side down, such as line labels. Checking Flip will ensure that all labels will appear right-side up.

Click [OK] to accept the settings.

Make sure the "Visible" box is checked and click [OK] to apply the renderer.

You can add, delete, and edit different renderers using the toolbar located under the renderer list.



The renderer may also apply a background to the data symbols; this background can be modified using the standard "Point Style" dialog.


### **Custom Renderers**


Custom renderers are renderers that have been developed by Waterloo Hydrogeologic. Currently, the only custom renderer available is the custom label renderer. The custom label renderer is similar to the system label renderer

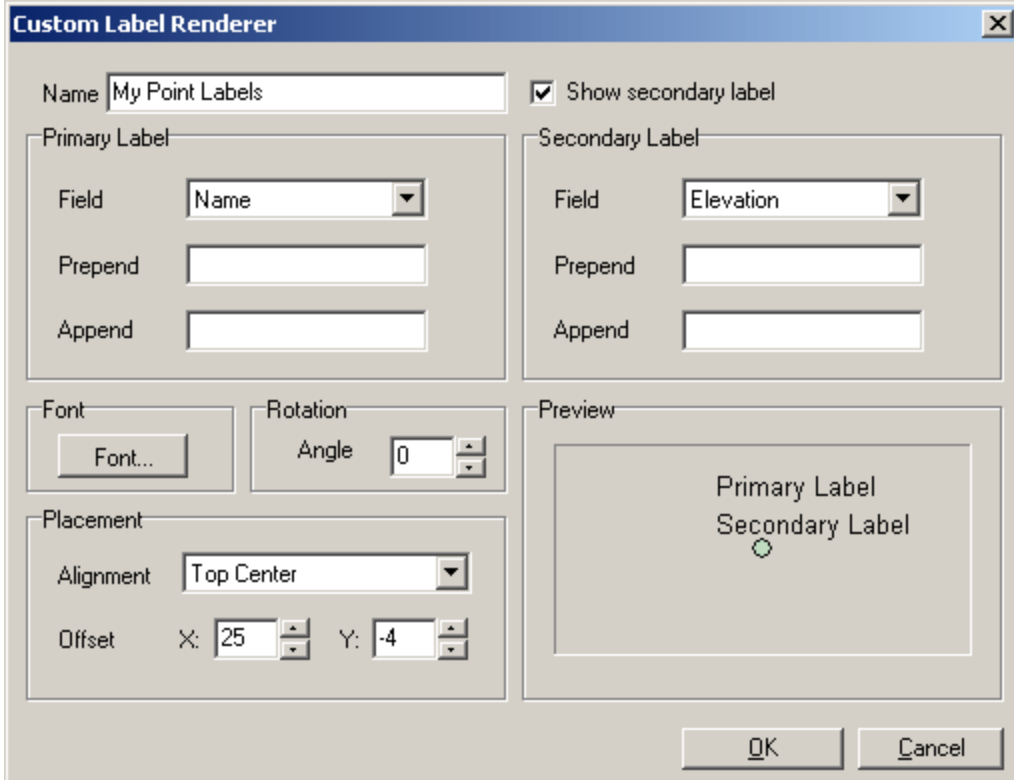
(described above), however it provides additional options, allowing for greater control and flexibility when displaying labels on the map.

**Note:** Please note that system renderers and custom renderers are mutually exclusive, i.e., you cannot apply both a system renderer and a custom renderer to the same map layer.

To add a new custom renderer, make sure "Custom Renderers" is selected from the comb box at the top of the Renderers dialog.

A new Custom Renderer may then be added by clicking on the  (Add) button. The Label renderer will be added to the list of renderers.

To configure the custom label renderer, click the  (Edit) button. The Custom Label Renderer dialog box will appear on your screen.



The label renderer settings are described below:

**Name:** Specify the name of the renderer configuration

**Show Secondary Label:** This control allows you to show/hide a secondary label.

**Field:** Allows you to specify which layer attribute to show as the object label.

**Prepend:** Allows you to prepend text to the chosen layer attribute.

**Append:** Allows you to append text to the chosen layer attribute.

**Font...:** Loads the generic font settings, e.g., font style, size, color, etc.

**Rotation:** Allows you to rotate the label.

**Alignment:** Allows you to set the default label alignment.

**Offset:** Allows you to offset the label from the default alignment by specifying X and Y values.

Once you have defined the renderer settings, click the [OK] button.

#### 14.2.2.11 Create Thematic Map

This menu item allows the user to create a thematic map for any of the active Map Layers containing numeric data. A thematic map shows the spatial distribution of one or more specific data values in the form of a Pie or Bar chart. Thematic Maps can only be drawn on layers that contain data (such as stations, contour maps, etc.). They are not applicable to annotation layers.

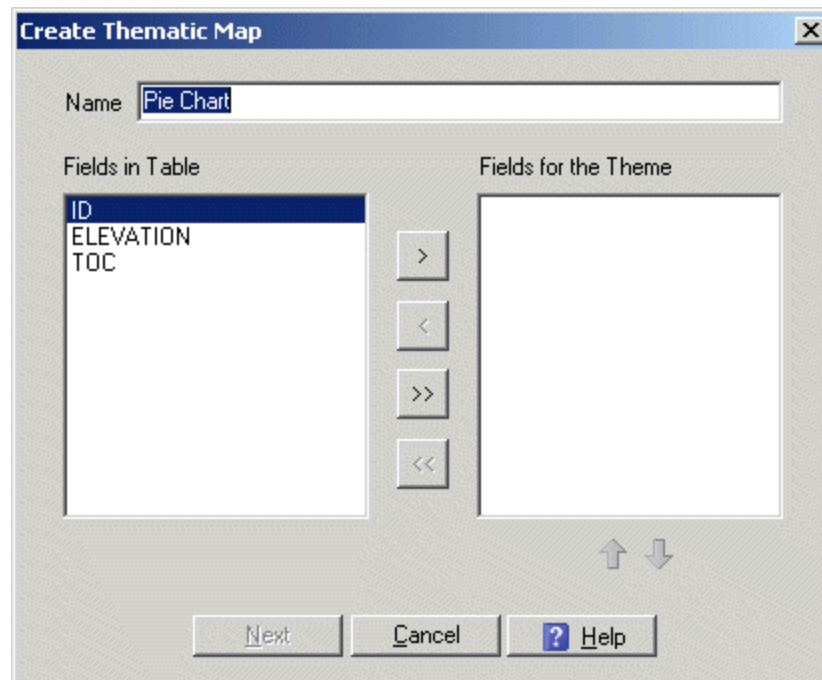
A common example of the applications for a thematic map would be displaying the distributions of multiple chemicals.

To create a Thematic Pie Chart for Hydro GeoAnalyst station data,

A Hydro GeoAnalyst Data layer from the Layer Manager, to ensure that this layer is active. (e.g. a Station Group or Data Query layer, such as Boreholes, Monitoring Wells, etc.)

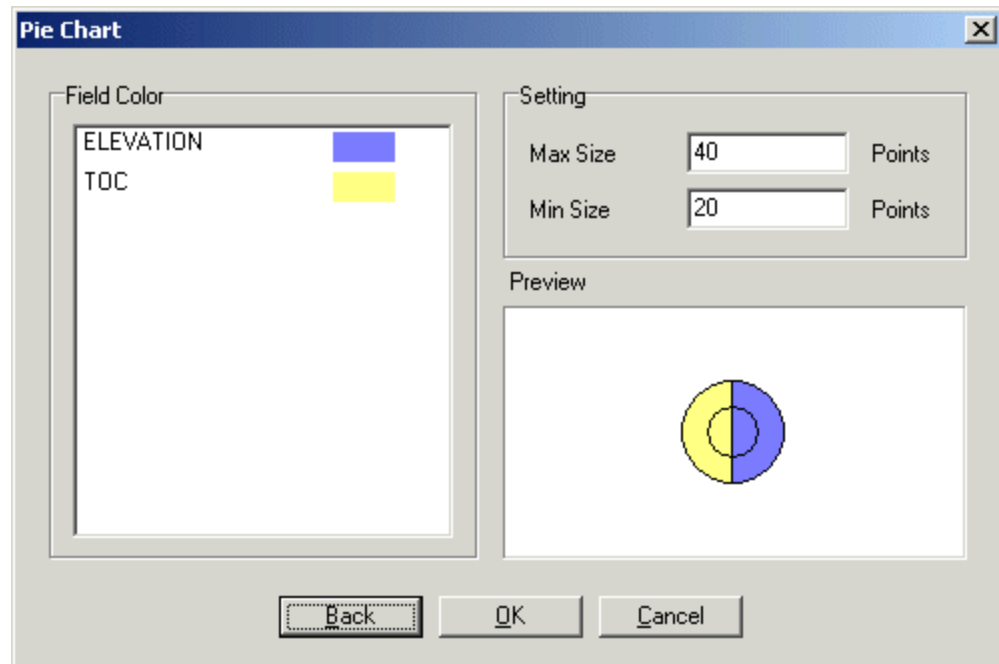
Select the menu option Map / Create Thematic Map / Pie Chart from the Map Manager main menu.

A Thematic map window will appear as shown below:



Enter a name for the map in the Name field. This name will appear in the thematic map list, should you choose to edit it later.

From the left panel, select the fields for map. Move fields to the right panel using the [>] button. To move all fields, press the [>>] button. [Next] to proceed to the next window.

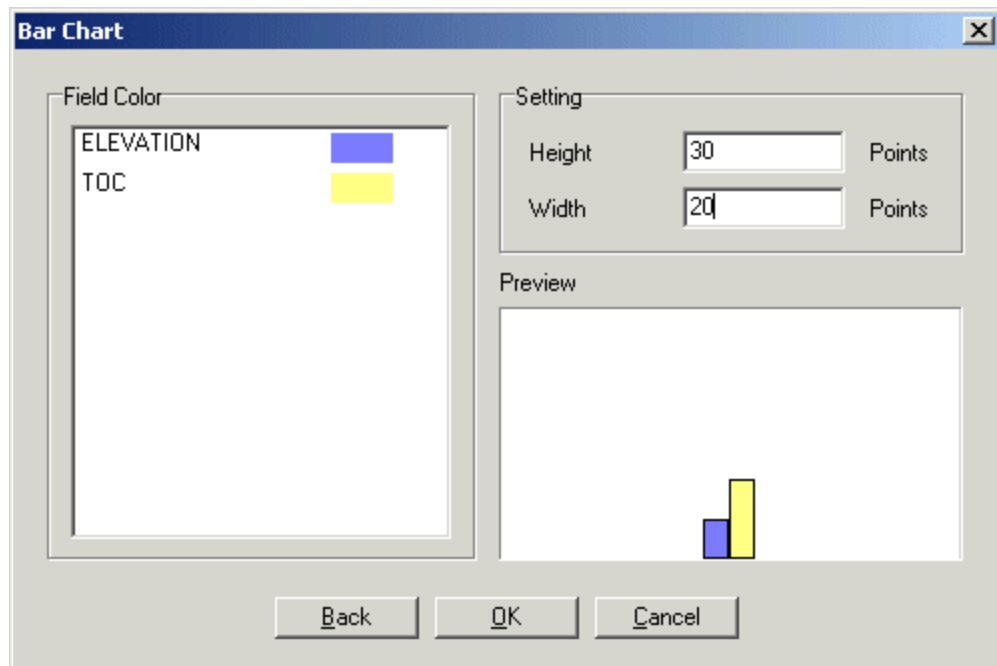


In this dialog, specify the field color by clicking on the colored rectangles to the right of each field, and specify the chart size in the Max size and Min size fields. A preview window in the lower right corner displays a preview of the true size and color of the thematic map, as it will appear in the Map Manager.

[OK] to create the map.

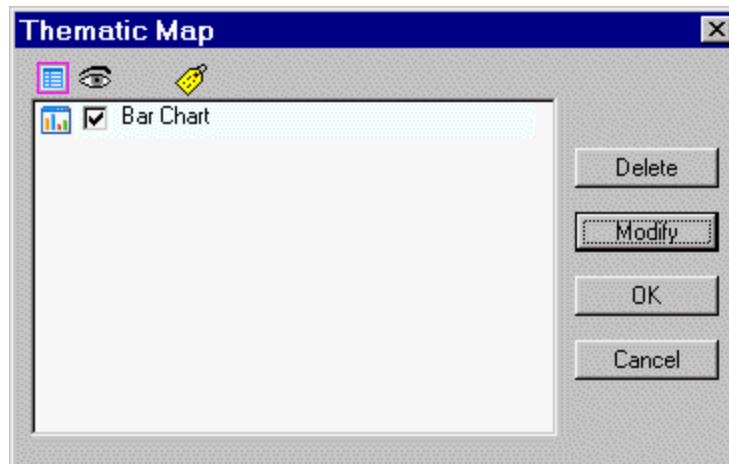
The thematic map is an entity of the selected layer; when this layer is hidden, the corresponding thematic map will also be hidden.

The Bar Chart is created in much the similar way. Choose Bar Chart from the Layer /Create Thematic Map menu and choose which fields you wish to map. The following dialogue will allow you to choose colors for the bars representing different fields, as well as the max height and width of the bars.



#### 14.2.2.12 Modify Thematic Map

Provides options for modifying the properties of an existing Pie or Bar chart.



Select the map you wish to edit by clicking on the check box beside the name you entered for that map, and click [Modify]. The same Bar Chart dialogue will appear allowing you to go through the procedure again and change various aspects of the chart

#### 14.2.2.13 Create Contours

##### With HGA



Provides options for creating contours with data from a selected field, from the selected points layer. Upon selecting this menu item, the following dialog will appear:

The screenshot shows the 'Contours' dialog box. The 'Data to be Contoured' section includes a 'Choose Field' dropdown menu with 'ELEVATION' selected, and two input fields for 'Min Value' (321.09) and 'Max Value' (340.49). The 'Interpolator Settings' section features an 'Interpolation Method' dropdown menu with 'Natural Neighbours' selected and an 'Advanced Settings' button. The 'Contour Type' section has three options: 'Contour Line' (checked), 'Color Shade', and 'Zebra', each with a 'Name' input field and a 'Settings' button. At the bottom, there are checkboxes for 'Use Only Selected Stations' and 'Restrain within Domain', and a 'Choose Domain' button. The 'Create', 'Cancel', and 'Help' buttons are located at the bottom center.

The gridded data can be represented as the following Contour Types:

- Contour lines
- Color shaded map
- Zebra

Select the desired Contour type, and enter a name for the layer. For each type, there are additional settings that can be accessed by clicking on the [Settings] button. See the sections below for more details on these settings.

### Data to be contoured

Select a Field that contains the data you want to contour. Define the Min and Max values, or accept the defaults

### Interpolation Settings

Under Interpolator Settings, select the interpolation method (choose from Natural Neighbor, Inverse Distance, or Kriging).

To use the advanced interpolation settings, click the [Advanced Settings] button, and advanced options will be displayed as shown below (for Natural Neighbor):

Settings	Values
Start X	-80.5713902578462
End X	-80.5400465140058
X_Nodes	50
Start Y	43.4674110323148
End Y	43.4849075419692
Y_Nodes	50
Use Log Interpolation	<input type="checkbox"/>
Restrict Min Value	<input type="checkbox"/>
Restrict Max Value	<input type="checkbox"/>
Value Min	0
Value Max	0
Real Min	0
Real Max	0
Mag_X	1
Mag_Y	1
Mag_Z	1
No_Value	-999.0
Allow_Extrapolation	<input checked="" type="checkbox"/>
Sdip	<input type="checkbox"/>
Tautness_1	1.5
Tautness_2	7
Use_Gradient	<input type="checkbox"/>

Least easting

OK Cancel

You may modify the interpolation settings, then click [OK] to return to the main window. For more details, see "Appendix C: Advanced Interpolation Settings" .

### Use Only Selected Stations

When selected, the contour component will use only those stations that are selected on the layer, as the data source for the contouring. The option is only enabled when one or more stations are selected. If not selected, all stations on the layer will be used.

### Restrict Within Domain

This option allows you to clip contours lines to a selected polygon layer.

Select Domain
Please choose a polygon layer as the clipping domain
domain1
OK Cancel ? Help

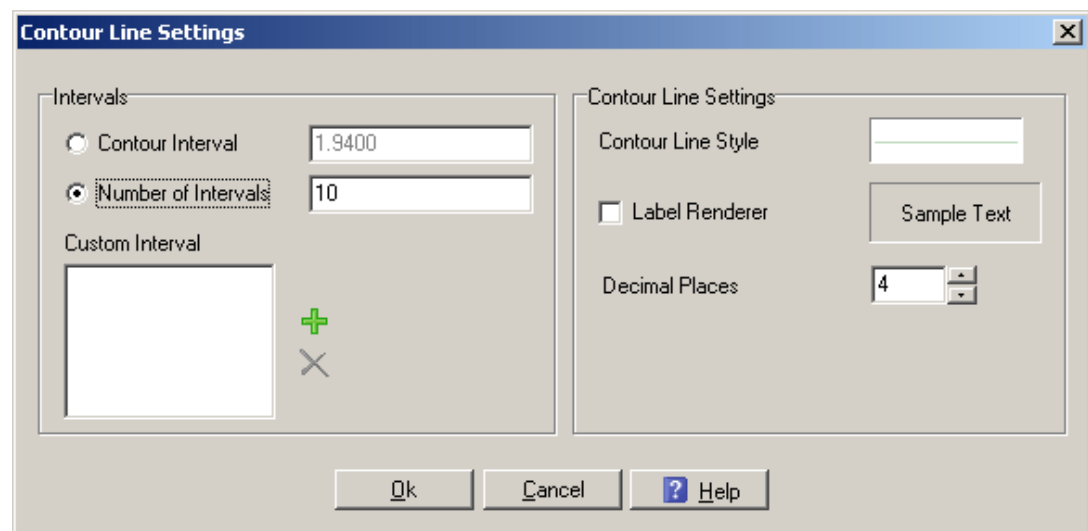
You may select any polygon shapefile from the combo box. Then click [OK] to continue. The calculated contours will then be clipped at the edges of the polygon.

**NOTE:** If the polygon is greater in extents than the selected station layer, the contouring will end at the furthest point. Currently, extrapolation to the edge of the polygon is not possible.

When you are satisfied with the settings, click the [Create] button to create the contour map.

### Contour Line Settings

Click on the [Settings] button beside Contour Lines, and the following dialog will appear:



Specify Intervals; you may select to define the Contour Interval (e.g. 0.5, 1.0, 5, etc.) or the Number of Intervals (5, 10, 20, 50, etc.).

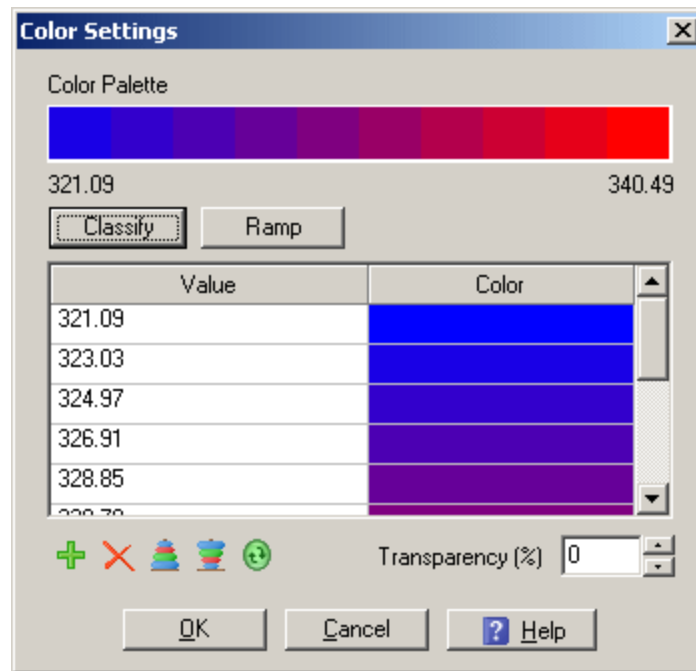
You may also define Custom Contour Lines in the grid in the lower corner. Use the + and X buttons to add/remove custom contours respectively.

Note: Custom Contour Lines will be added to the map in addition to the ones defined by selecting Contour Interval or Number of Intervals.

Under Contour Line Settings, specify the line color, thickness, style, and label settings. Label Renderer will add a label to the lines.

### Color Shading / Zebra Map Settings

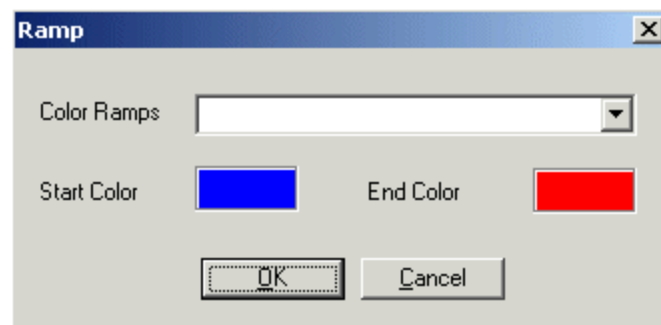
Click on the [Settings] button beside Color Shading or Zebra, and the following dialog will appear



The Color Settings Renderer allows you to define different colored zones/ranges according to their specific interval of values.

The [Classify] button allows you to decide how many intervals you wish to have, and HGA automatically divides the available range of values into that number of equal intervals.

The [Ramp] option loads the following dialog.



You can choose a monochromatic ramp that provides a range of the same color, but with varying degrees of darkness, a dichromatic ramp that provides a spectrum between two different colors, or a custom ramp by choosing colors for the Start Color and End Color boxes (to load the color dialogue, click on the colored box). Click [OK] to return to the renderer screen.

Alternatively, you may set the color for each value; simply click on the Color box under the Color column, and the Windows Color palette will display. Select the desired color, and click [OK] to continue. Repeat this for other values, as desired. Adjust the Transparency option to make it possible to see layers under the color shading/zones. The higher the value, the more transparent the layer will be. The value must be within the range 0-100.

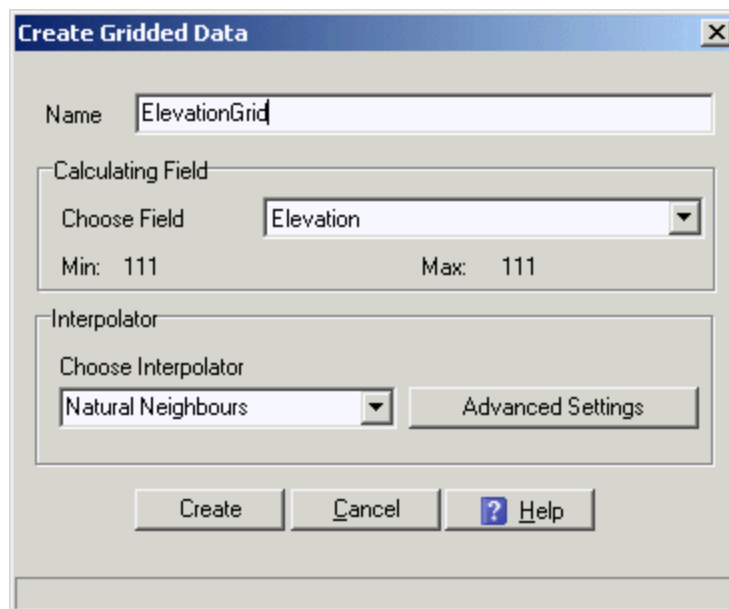
The remaining options are similar to those for Graduated Renderers (Add Value, Delete Value, Ascend, Descent, Change Color); see [Renderer](#) for more details.

When you are finished, click [OK] to return to the Contours screen.

#### 14.2.2.14 Create Gridded Data

This feature allows you to interpolate data for the current layer, and create a grid file (.GRD) for visualization in the Scene Viewer or other applications. For example, if you have a station layer selected, you can create a grid file based on station elevations or TOC (top of casing) elevations.

Select this menu item and the following dialog will appear:



Enter a name for the grid file, and select a field containing the source data. Click the [Create] button to create the file. The grid file will be created in the HGA project's folder, in the "Surface" sub-folder:

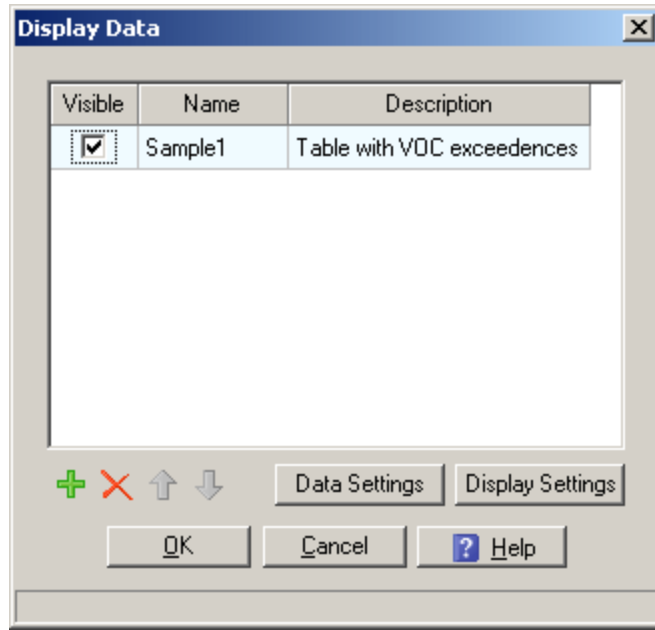
(for example, "D:\Program Files\HGAnalyst\Projects\Demo\_Project\Surface\test.grd")

**NOTE:** As with contours, you can select an interpolation method, and customize interpolation settings by clicking on the [Advanced Settings] button.

#### 14.2.2.15 Display Data

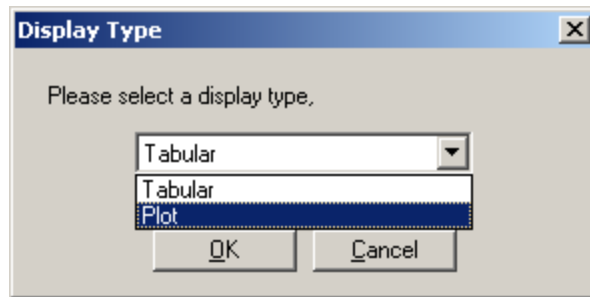
This feature allows you to display data in a plot or tabular format on the map, for the current points map layer. Fields are based on points data loaded from Station Groups or Data Queries (created using the Query Builder). You may define

conditions for fields, and highlight rows in the tables that violate the conditions. For plots, the templates are selected from available Chart templates. To activate this feature, first select a layer that contains points data (i.e. a data query or a station group) from the Layer Control. When you select the Display Data option from the Layer menu, the following dialog will appear:



This dialog allows you to manage the various layouts for the map layer. In the first column, show/hide the layout by setting the Visible status. Define the Name in the second column. In the third, you may optionally enter a Description.

Click on the **+** (Add) button to add a new layout. In the combo box that appears, select either Tabular or Plot (shown below).



Click on the **X** (Delete) button to delete the selected layout.

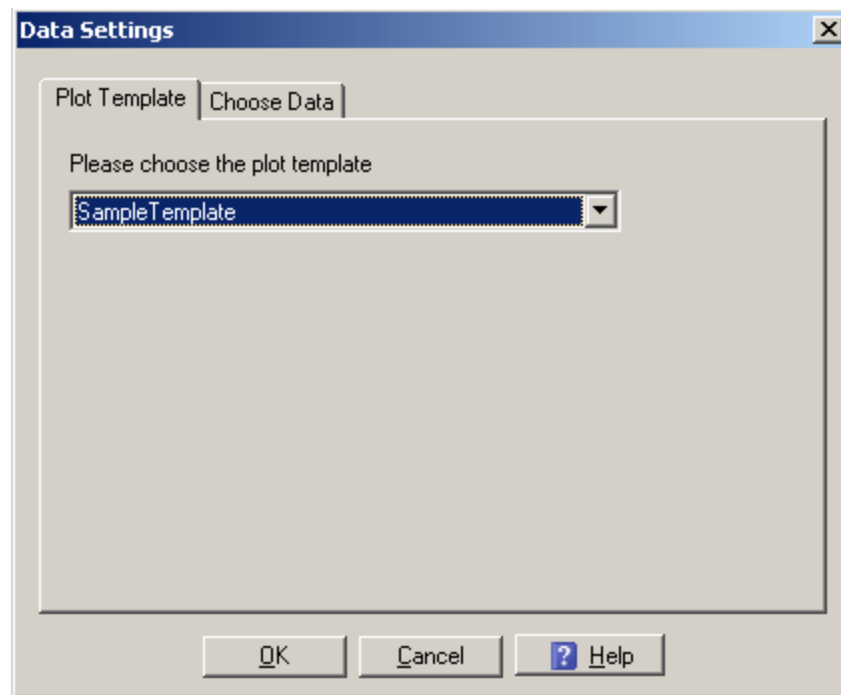
Use the **↑** button to move the selected layout up.

Use the **↓** button to move the selected layout down.

Next you must define the settings for the layout.

## **Plots**

For a Plot display, click on the [Data Settings] button and the following dialog will appear:



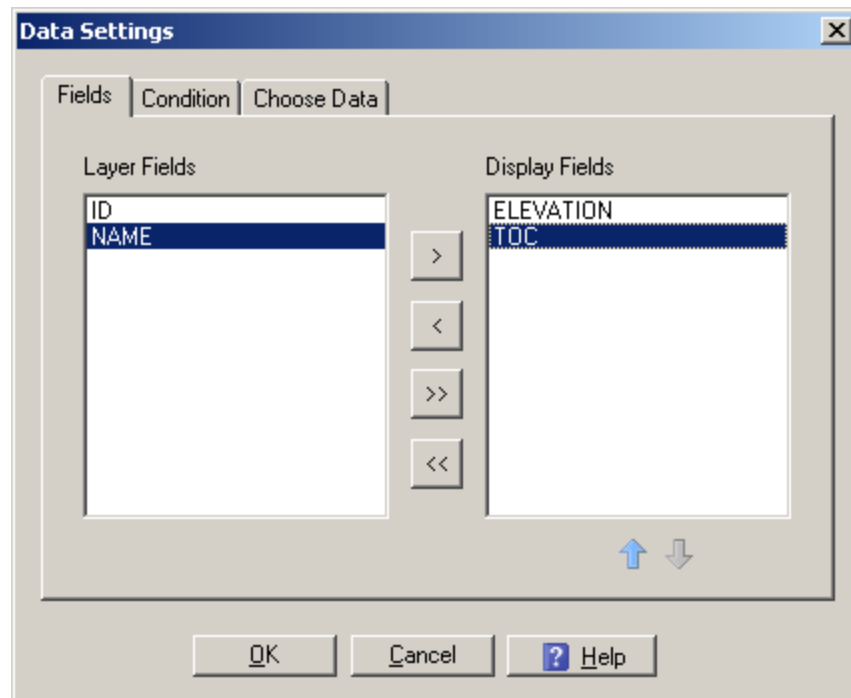
In the list, choose from available plot templates that were created using the chart component. For details on how to create plot templates, please see [Managing Plot Templates](#). In order to display the plot in the map, the following requirements in the template must be met:

- Plot Grouping and Series Grouping must be done by station ID
- The plot template must contain data for the selected stations



The remaining settings for the plot are similar to those described in the sections "Choose Data" tab below.

### **Tabular**

For a tabular display, click on the [Data Settings] button and the following dialog will appear:

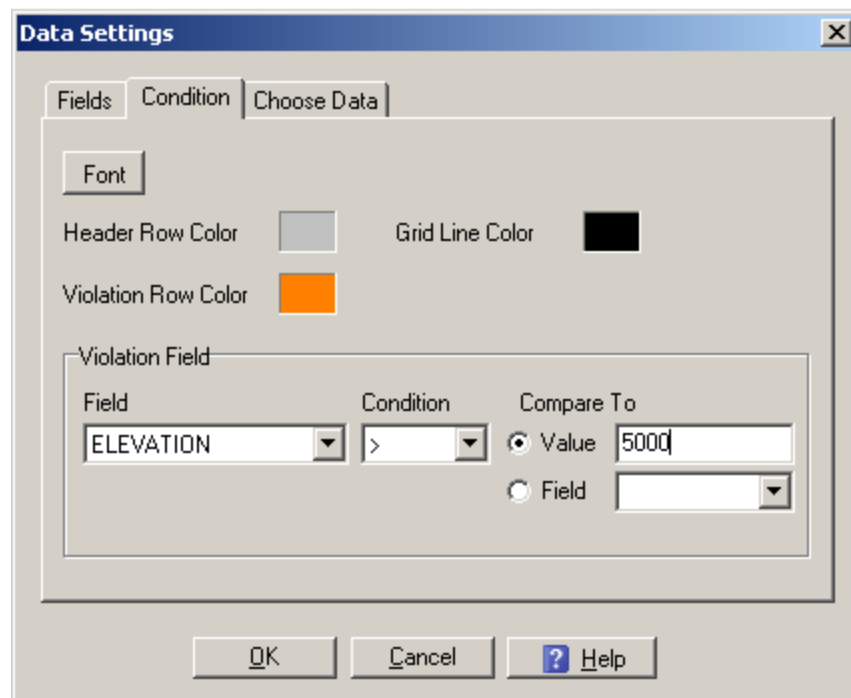


In the Data Settings dialog, you select which Layer Fields from the layer should appear as Display Fields in the layout table, as well as define the Display settings.

Select the desired fields from the left panel under Layer Fields, then move fields to the Display Fields under the right panel using the [>] button. To move all fields, press the [>>] button. To remove fields from the Display Fields, click on the [<] or [<<] buttons respectively. Use the  button to move the selected field up. Use the  button to move the selected field down.

Click on the Condition tab, and you will see options for defining validation rules for one of the selected fields, along with display settings for the table.





The Header Row Color controls the color of the first row in the layout table. The Violation Row Color allows you to assign a color to values in the table that exceed the violation conditions (explained below). This is useful for quickly identifying exceedences on the map.

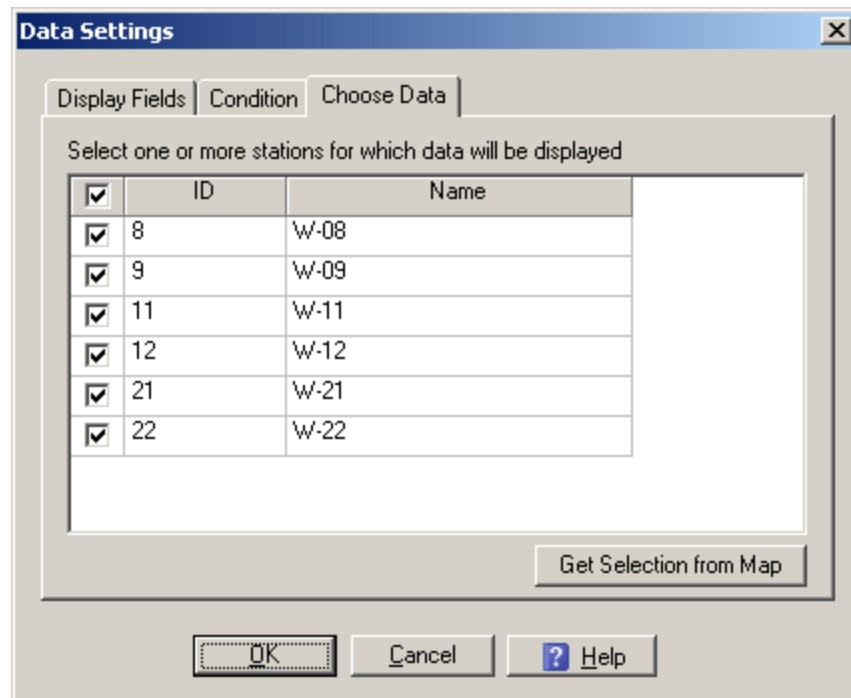
The Grid Line Color controls the color of the gridlines in the table. Under the Violation Field frame, you may specify a condition for one of the display fields. Select a Field from the combo box, then a Condition (<, >, =, etc.), and define the Compare To settings. There are two options available:

- Compare to a Value: simply type the value in the provided text box, OR
- Compare to a Field: select another field from the data query, to compare against.

The possibilities are limitless, but here are some examples:

- concentration > 5000 ug/l (a government guideline, or MCL) as shown in the screenshot above
- depth to bedrock > 40 feet
- overburden thickness < 50 feet
- concentration of a chemical exceeds the criteria limit, where the criteria limit is available in another field in the selected data query

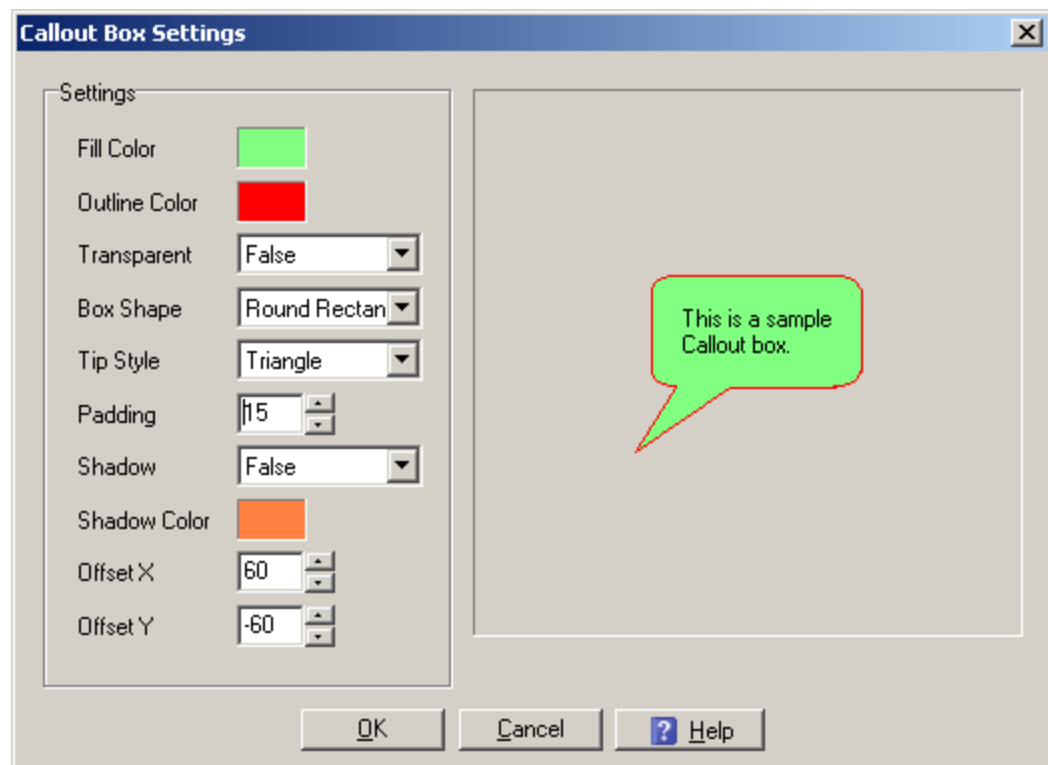
In the Choose Data tab, you can specify which stations should display the data table. This is useful if you have a station group with numerous stations, and are interested in displaying the data summary table only for a few stations.



Simply place a check-box beside the stations that should display the data summary table.

If you click on the Get Selection Map button, then the Map Manager will "get" only those stations that are selected on the map layer on the map project, and use only those for the Display Data. This button is enabled only if you have at least one station selected in the map layer.

Once you are finished, click [OK] to return to the layout window. From the Layout Setting dialog, click on the [Display Settings] button in the Callout Box column, and the following dialog will appear:



In the Callout Box Settings dialog, you can modify several display properties for the callout box. The callout box is the box, oval, or bubble, that contains the data for the selected station. A preview is shown on the right side of the window, in the image above. The following display settings are available:

**Fill Color:** set the fill color for the callout box

**Outline Color:** set the color for the outline of the callout box

**Transparent:** set the transparency; select from True or False

**Box shape:** select the box shape; choose from Rectangle, Round Rectangle, or Oval

**Tip style:** set the tip style; choose from Triangle or Line

**Padding:** set the padding thickness, the higher the value, the larger the box shape will be around the tabular values in the layout

**Shadow:** display a shadow around the callout box; select from True or False

**Shadow Color:** select the shadow color; only used if Shadow has been set to True

**Offset X:** set the X Offset; this parameter controls how far the callout box will be placed horizontally from selected station.

A positive offset will result in the callout box displayed to the right of the station

A value of 0 will center the call out box over the station

A negative offset will result in the callout box displayed to the left of the

station

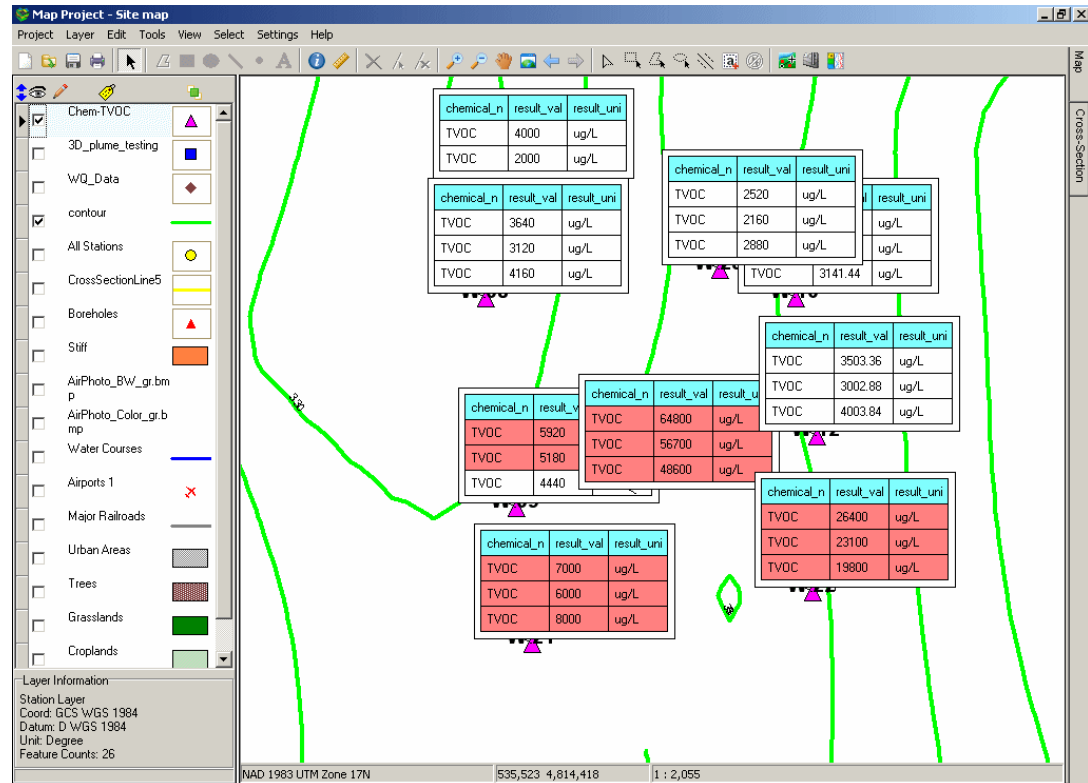
**Offset Y:** set the Y Offset; this parameter controls how far the callout box will be placed vertically from selected station.

A positive offset will result in the callout box displayed below the station

A value of 0 will center the call out box over the station

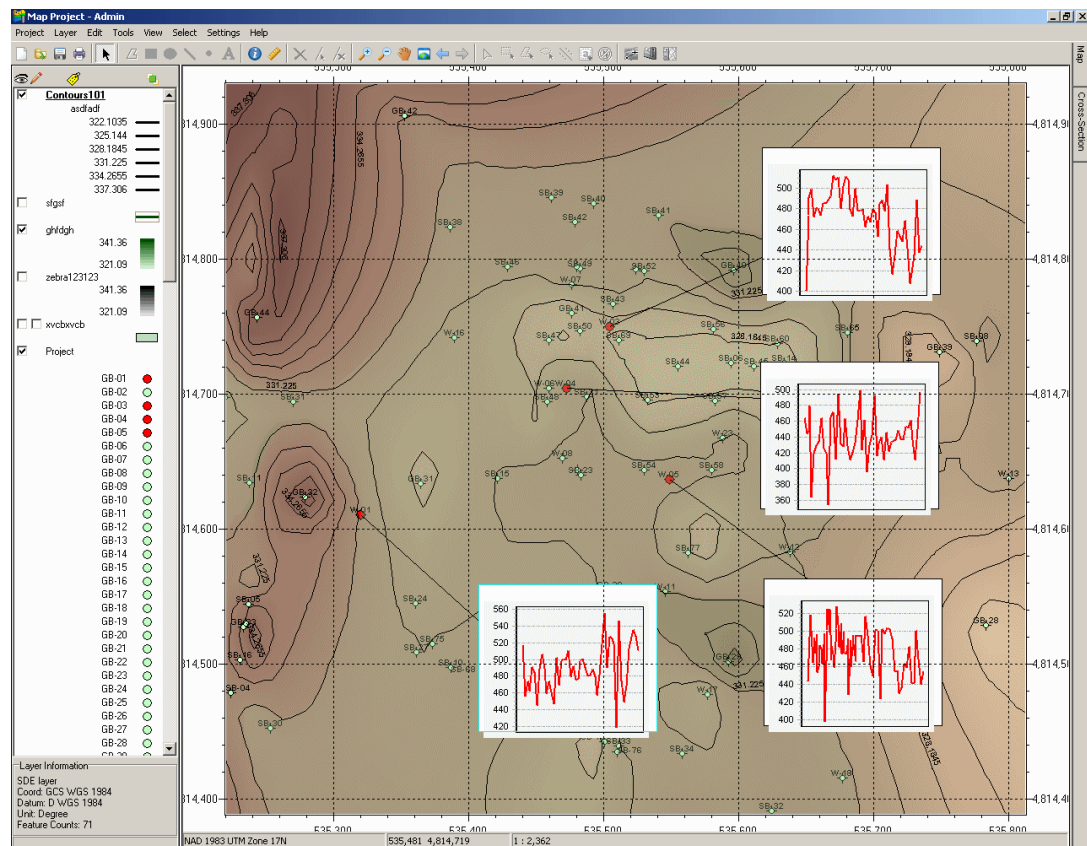
A negative offset will result in the callout box displayed above the station

When you are finished with the Display Settings, click [OK] to return to the layout window. Click [OK] once more to create the layout on the map, as seen in the examples below.



### Example of Display Data: Chart

You can see that sample values that exceed the specified conditions (TVOC concentration result value greater than 5000 ug/l), are shaded red for easy detection.



**Example of Display Data: Plot**

When stations are clustered, it may be necessary to modify the display location of the callout boxes. You have the option to manually move individual callout boxes to a new location to improve presentation. This is explained below.

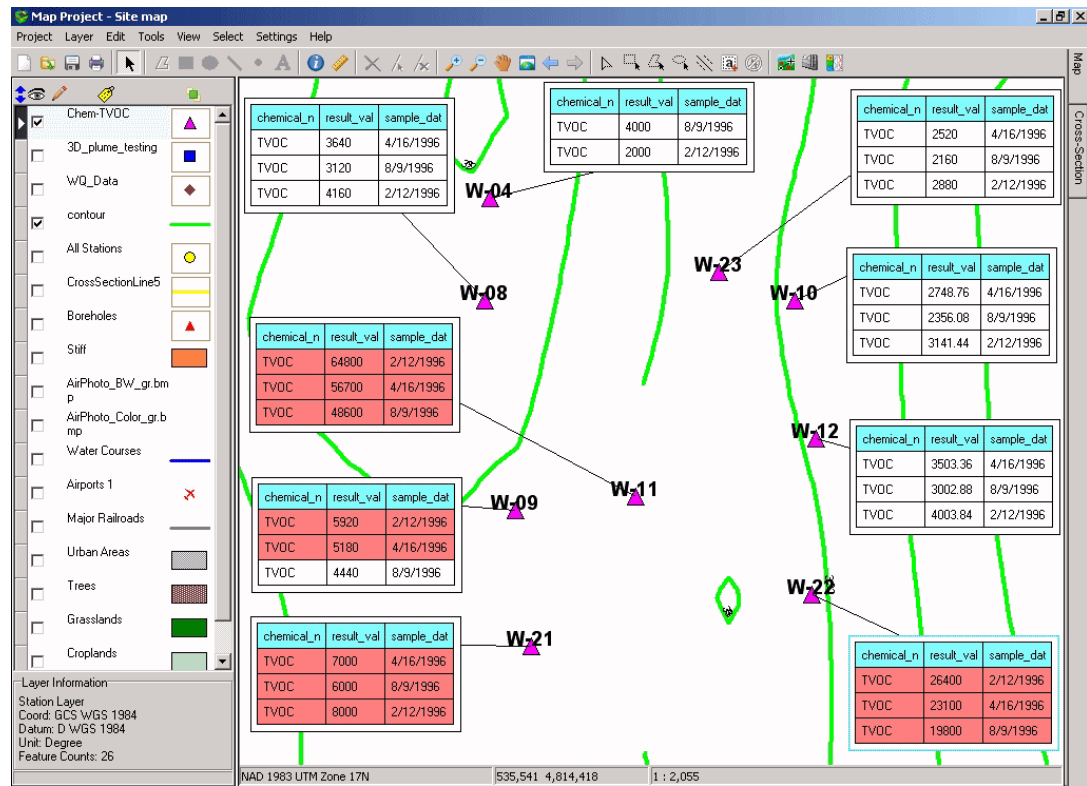
### Edit Layout Setting

To edit the position of the callout box:

Right-mouse click on the map window, and select Edit Layout from the pop-up menu

Click once on any callout box to select it; the box will become highlighted in a color outline, indicating it has been selected

Left click on the callout box, and using your mouse, drag the box to the new location  
When you have done this, the result could be similar to the example shown below.



When you are finished with the position edits, you must right-click on the map window and turn off the Edit Layout option, to disable this feature.

To edit the remaining layout settings, including fields, violation conditions, and display properties, simply select Layer / Display Data from the main menu, then modify the settings as explained above.

### 14.2.3 Edit

The Edit menu contains standard windows functions such as Cut, Copy, and Paste objects, as well as other options for editing shapefiles.

**NOTE:** Before editing a layer make sure that the Editable check box is selected. After editing, deselect the Editable check box on the Layer Manager.

#### Cut

Cuts the selected object to clipboard; only available if an object (polygon, rectangle, circle, line, or text) is selected.

#### Copy

Copies the selected object; only available if an object (polygon, rectangle, circle, line, or text) is selected.

#### Paste

Pastes the clipboard item onto the current layer.

### **Delete**


Deletes the selected object.

### **Delete All**

Deletes all objects from the current map layer.

### **Add Vertex**

Provides an option to add a vertex to the selected object. To add a vertex:  
Activate the desired map layer containing an annotation object and make it editable  
Select an object on this layer

Click on the  (Add Vertex) button or select the Add Vertex option from the Edit menu/


Place the mouse cursor at the desired location; the mouse cursor will change to a pen

Click once with the left mouse button at this location to add a vertex

This menu item is only available when an object (polygon, circle, line or rectangle) is selected.

### **Delete Vertex**

Provides an option to delete a vertex from the selected object. To delete a vertex:  
Activate the desired map layer containing an annotation object, and make it editable  
Select an object on this layer; all its vertices will be highlighted

Click on the  (Delete vertex) button or select the Delete Vertex option from the Edit menu

Place the mouse cursor on the vertex to be removed; the mouse cursor will change to an "X"

Click once with the left mouse button on this vertex to remove it from the object

This menu item is only available when an object (polygon, circle, line or rectangle) is selected.

### **Copy Map to Clipboard**

Copies the entire Map Window to the clipboard. The map window can then be pasted as an image in other applications.

---

## **14.2.4 Tools**

The Map Manager provides annotation tools which allow for drawing shapes and inserting text labels on the map. The drawing tools are available in both the Tools menu and in the Map Manager toolbar.

The options for the annotation tools allow modifying the color and style of the annotation objects.

The annotation items are only available on map layers with the corresponding object type (i.e. text, line, point, polygon). These are called annotation layers. For example, to draw polygons on the map, a new map layer with the type "Polygon" must first be created (using the Layer / New menu option), or if a polygon layer already exists it has to be set to "edit" mode. To add text to a map layer, a new layer with the type "Text" must first be created (using the Layer / New menu option).

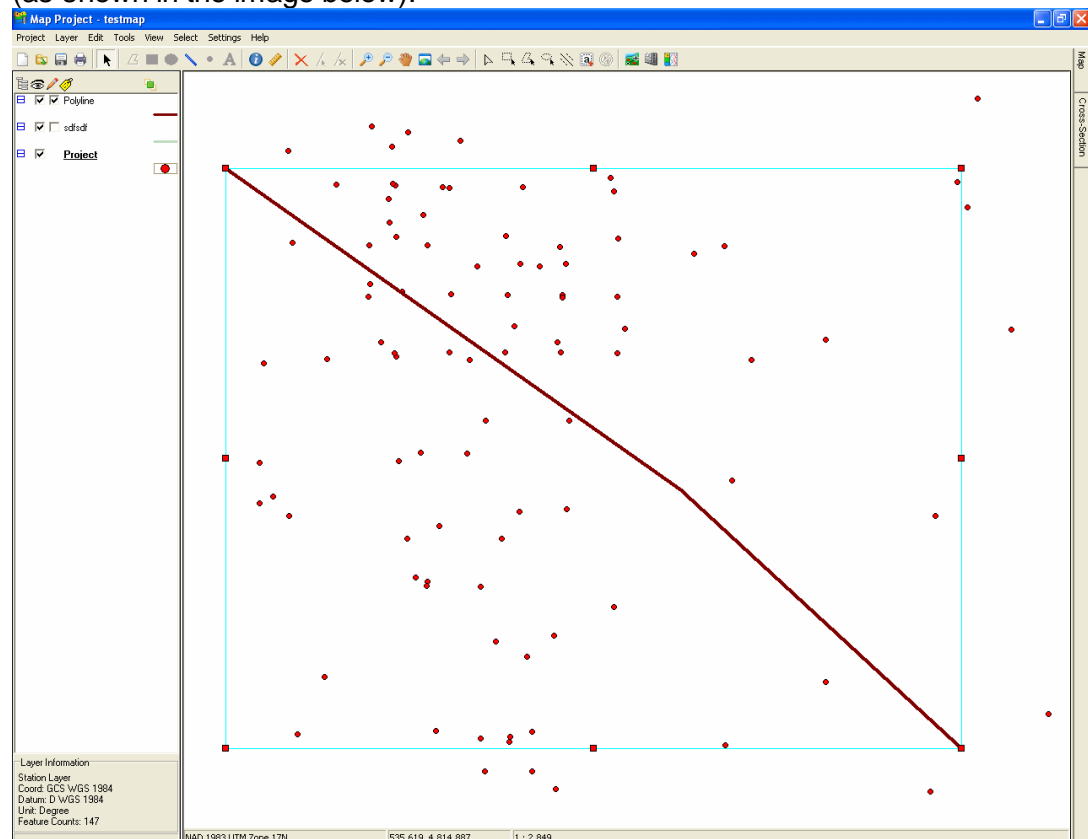
The following annotation options are available:

### Polygon

Provides the option to draw a polygon. This option is available only when a polygon shapefile layer is selected and set for editing.

### Shifting and Scaling Digitized Polylines/Polygons

Map Manager allows you to shift and scale digitized polygons and polylines. These options are NOT accessible through the main menu. However, they can be accessed by double-clicking on a digitized polyline or polygon, while you are in edit mode. When double-clicked, a blue box will appear around the vertical and horizontal extents of the digitized shape indicating that the whole shape is selected (as shown in the image below).





You can scale the polyline/polygon by clicking on one of the vertices located on the blue box, and moving it to a new position (holding the left mouse button).

You can shift a polyline/polygon (up, down, left or right) by placing your mouse cursor inside the blue box (mouse cursor symbol will change) and then clicking and dragging the entire shape to a new position.

**Note:** These features are only available for polyline and polygon layers, which have been digitized (created) in Map Manager.

### **Rectangle**

Provides the option to draw a rectangle. This option is only available if a polygon shapefile layer is selected and set for editing.

### **Circle**

Provides the option to draw a circle. This option is only available if a polygon shapefile layer is selected and set for editing.

### **Line**

Provides the option to draw a line. This option is only available if a line shapefile layer is selected and set for editing.

### **Point**

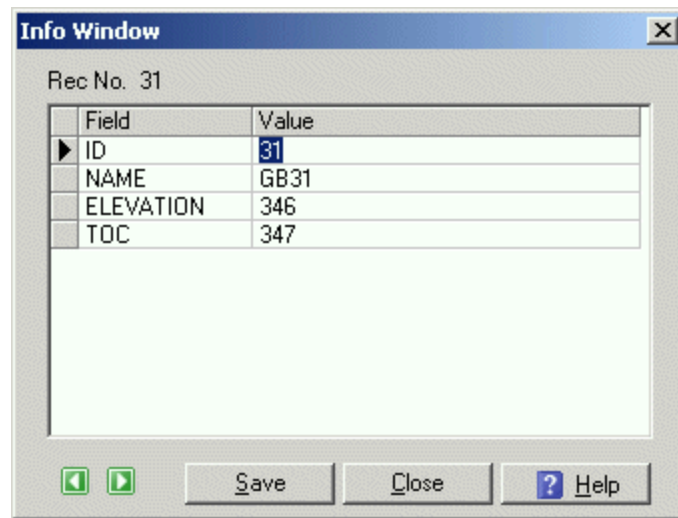
Provides the option to add points to the map layer. This option is only available if a point shapefile layer is selected and set for editing.

### **Text**

Provides the option to add text labels to a map layer. This option is only available if a text layer is selected and set for editing.


### **Information**

Provides a dialog containing information about the selected station, or other objects such as contour lines; an example is shown below.



To load the Information dialog,

Select a layer containing HG Analyst station data.

Select Information from the Tools menu, or click on the  (Information) button in the toolbar


Click once on any station within the selected layer.

This window will display Station ID, Name, Elevation, TOC, and any other fields depending on the layer type. If there are stations that share the same ID, and are hidden behind the selected station, then the scroll arrow buttons (in the lower-left corner) can be used to view the information for other stations.

**NOTE:** The information tool can only be used on shape layers that are visible and active.

## Measure

Provides an option to measure distances on the map window. To use this utility:

Select Measure from the Tools menu, or click on the  (Measure) button in toolbar.

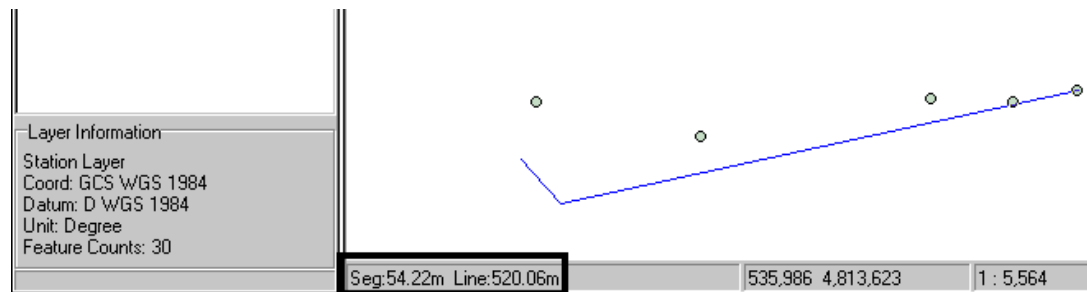
Place the mouse cursor at the start point for the line. The mouse cursor will change to a cross-hair.

Click once with the left mouse button to start the line

Drag the mouse cursor to the end point of the line

To add a vertex to the line, click once with the left mouse button, then continue drawing to the new location.

As the line is drawn, the distance from the start point to the end point (i.e. the current mouse cursor location) is displayed in a status bar at the bottom of the Map Manager window. This is indicated in the sample image below:



There will be two values displayed here; The Seg value is the distance from the current cross hair to the previous vertex location (i.e. the distance of the line segment). The Line value is the total line distance from the start point, including all segments.

To finish the line and end the line measurement, double-click the left mouse button.

### Define Cross Section Line

Allows you to create a cross section line. Make sure you are in one of the HGA data layers before drawing a cross section line.

Please see the section [Defining a Cross Section Line](#) for more details.

### Create Cross Section

Loads the cross section editor, for the selected cross section line. This menu item is activated only when a cross section line is selected/highlighted. There are two ways to highlight a cross section line:

- Choose the cross section line on the cross section line layer
- Draw a new cross section line on a station layer.

For more details on creating cross sections, please see [Cross Section Editor](#).

---

## 14.2.5 View

This menu provides options to modify the appearance and size of the Map Window, and the layers within the map project.

### Full Extent

This menu item will zoom the map window to its original full extents.

### Zoom In

Provides options for zooming into a section of the map that is defined by drawing a rectangle. Place the cursor on the map and click once to define one corner of the rectangle, drag to a second position to define the opposite corner of the rectangle, and release the mouse button. The selected section will be adjusted to fill the screen.

### Zoom Out

Provides options for zooming out on the map. Click this menu item and the map window will zoom out. The current screen will be zoomed out by a factor of two unless it is already in full-extent mode.

### Zoom to Active Layer

Zooms the map window dimensions to the extent of the selected map layer.

### Previous Extent

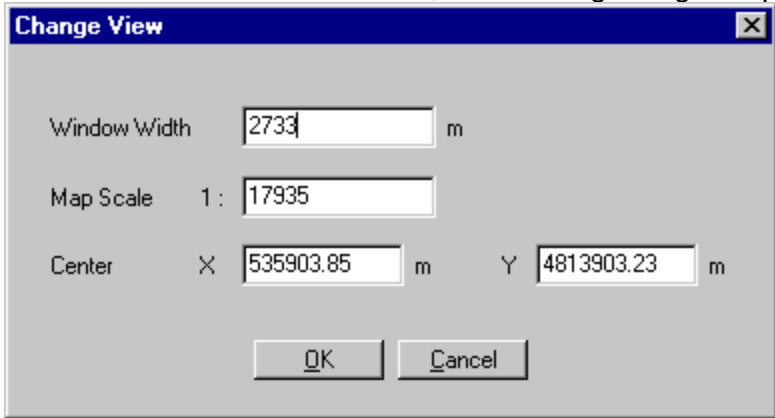
Zooms the map window to the previous window dimensions.

### Next Extent

Zooms the map window to the next window dimensions. Activated only after Previous Extent has been used.

### Custom Extent

Allows you to manually set the zoom extents and the center of the Map Window. When this menu item is selected, the following dialog will appear.



Field	Value	Unit
Window Width	2733	m
Map Scale	1 : 17935	
Center X	535903.85	m
Center Y	4813903.23	m

Provide, the desired viewable width, map scale, and X, Y coordinates of the map that will be repositioned at the center of the map window.

As the Zoom (window width) changes, the Map Scale changes and vice versa. The Zoom window width has equal proportions left and right of center.

**TIP:** When you save the map project, the view extent is saved together with the map project. The next time the map project is opened, the view extent will be restored.

### Turn on All Layers

Makes all layers visible.

### **Turn off All Layers**

Hides all layers.

---

## **14.2.6 Select**

This menu provides options for selecting or de-selecting stations on the selected layer in the Map project. Typically, this involves stations from the Hydro GeoAnalyst project. Once the station's data points are selected, a red circle will appear on top of the station's symbol.

Stations may be selected on the map by:

- Clicking individually
- Drawing a polygon, box, or circle (all stations inside the object become selected)
- Drawing a line and defining a buffer distance (all stations within the buffer distance become selected)
- Multiple station selections may be accomplished with the use of the <Ctrl> key. Simply press and hold down the Ctrl key after making the initial selection, then use one of the tools to select or de-select additional stations.

Each selection option is described below.

### **Pointer**

Allows to select stations one by one. When a station is selected, a red circle will appear on top of the station's symbol. When another station is selected, the previously selected station is un-selected and the new station's symbol becomes selected, indicated by a red circle on top of the station's symbol.

### **Rectangle**

Allows to select stations within a drawn box. To draw a rectangle, place the cursor in the map window, click once with the left mouse button in the area of interest and drag a window around the area, then release the mouse button. All stations within the box will become selected, indicated by a red circle on top of the station's symbol.

### **Polygon**

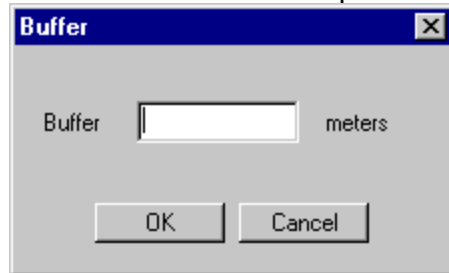
Allows to select stations within a drawn polygon. Place the cursor in the map window at one point of interest, click once with the left mouse button and digitize a polygon around the area of interest. To add a vertex to the polygon, continue to click with the left mouse button. To close the polygon, double click the left mouse button at the final vertex. All stations within the polygon will become selected, indicated by a red circle on top of the station's symbol.

### **Circle**

Allows to select stations within a drawn circle. To draw a circle, place the cursor in the center of the area of interest, click with the left mouse button and drag an expanding circle around the area, then release the mouse button. All stations within the circle will become selected, indicated by a red circle on top of the station's symbol.

### Line

Allows to select stations near a drawn line. To draw a line, place the cursor at one end of the area of interest, click with the left mouse button, and digitize a line through the area of interest. To add a vertex to the line, click with the left mouse at the vertex location. To finish the line, double click the left mouse button at the final vertex location. This will open the buffer distance window.



Enter a buffer distance from the drawn line, and click [OK]. All stations within the buffer distance of the line will become selected, as indicated by a red circle on top of the station's symbol. The Buffer distance extends out, perpendicular to the line location.

### All

All stations on the current Map Layer will be selected.

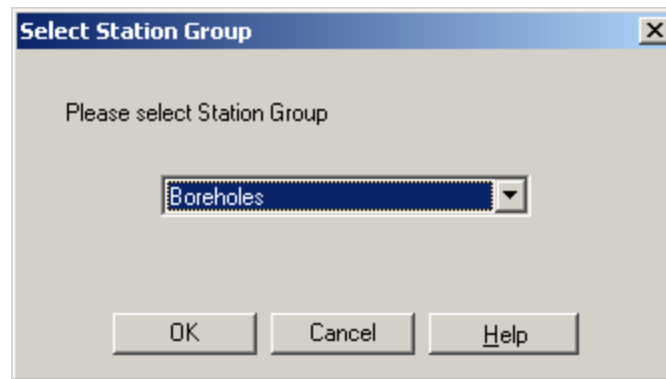
### None

All stations that are selected on the current Map Layer will be deselected.

**NOTE:** Once selected, you cannot deselect individual stations.

### Add to Station Group

Provides an option to add the selected stations to a Hydro GeoAnalyst station group. Using one of the Selection tools mentioned above, select one or more stations, then choose this menu item from the Select menu, and the following dialog will appear.



Stations can only be added to an existing station group.

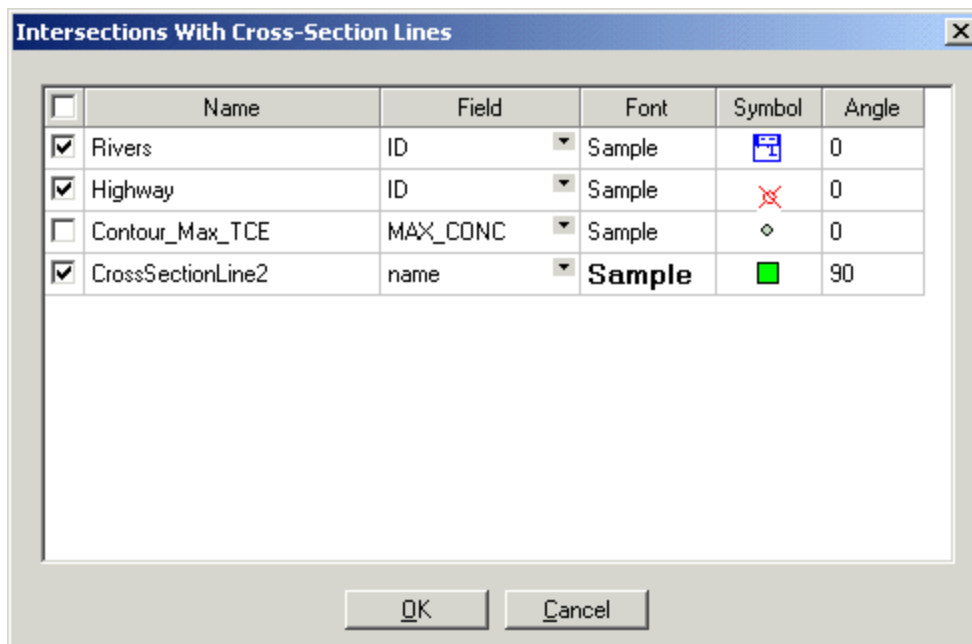
### Delete from Station Group

Remove the selected stations from a Hydro GeoAnalyst station group. The stations will be removed from the station group map layer currently selected and active in the layer manager.

## 14.2.7 Settings

### Cross Section

This dialog allows modifying the display properties of features that intersect with cross section lines, when viewing a cross section in the Cross Section Editor. Selecting this option launches a dialog similar to that shown in the following figure. The dialog makes a list of all line type layers available for selection.



A cross section line may intersect with one or more cross sections, or any line type features such as rivers and highways; in this dialog it is possible to specify the features to be displayed on the cross section plots. The dialog also allows you to set display properties of these features. The following options are available:

**Name:** Name of the intersecting layer (read-only)

**Field:** Select a field to represent the layer (typically Name, ID, Text)

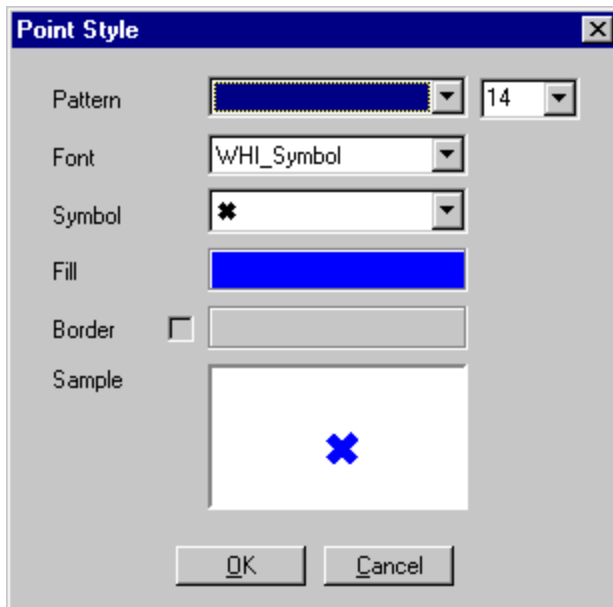
**Font:** Select a font for the label

**Symbol:** Define symbol properties for the selected layer

**Angle:** Define label angle

The Field column contains a list of available fields for the selected layer. This field will be used as the label in the cross section view.

The Symbol column contains the symbol options for the selected layer. Double click on the field in this column to load the options shown below.



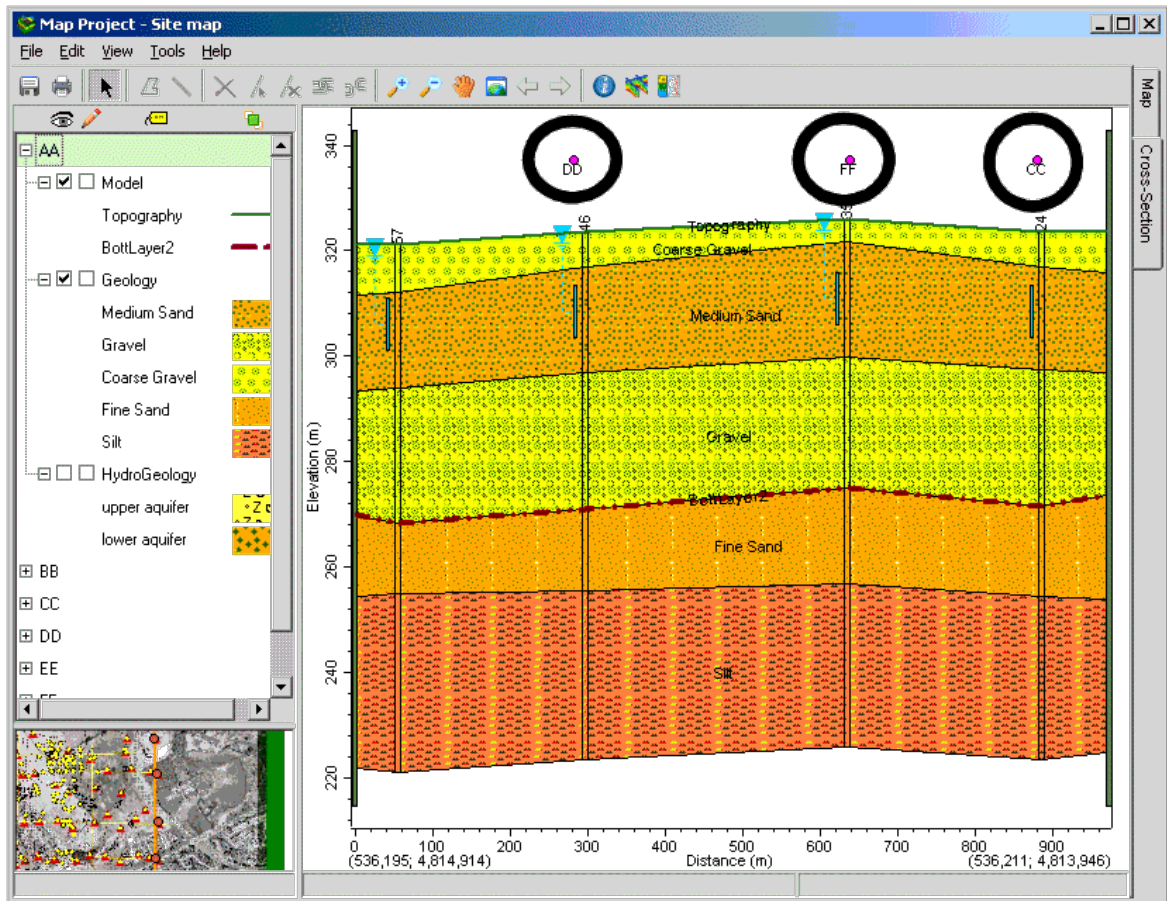
To show the intersections on the Cross Section,

Click on the Cross Section tab.

From the top Menu Bar click Tools, and then Update Cross Section.

The following image shows the intersections between the cross sections:

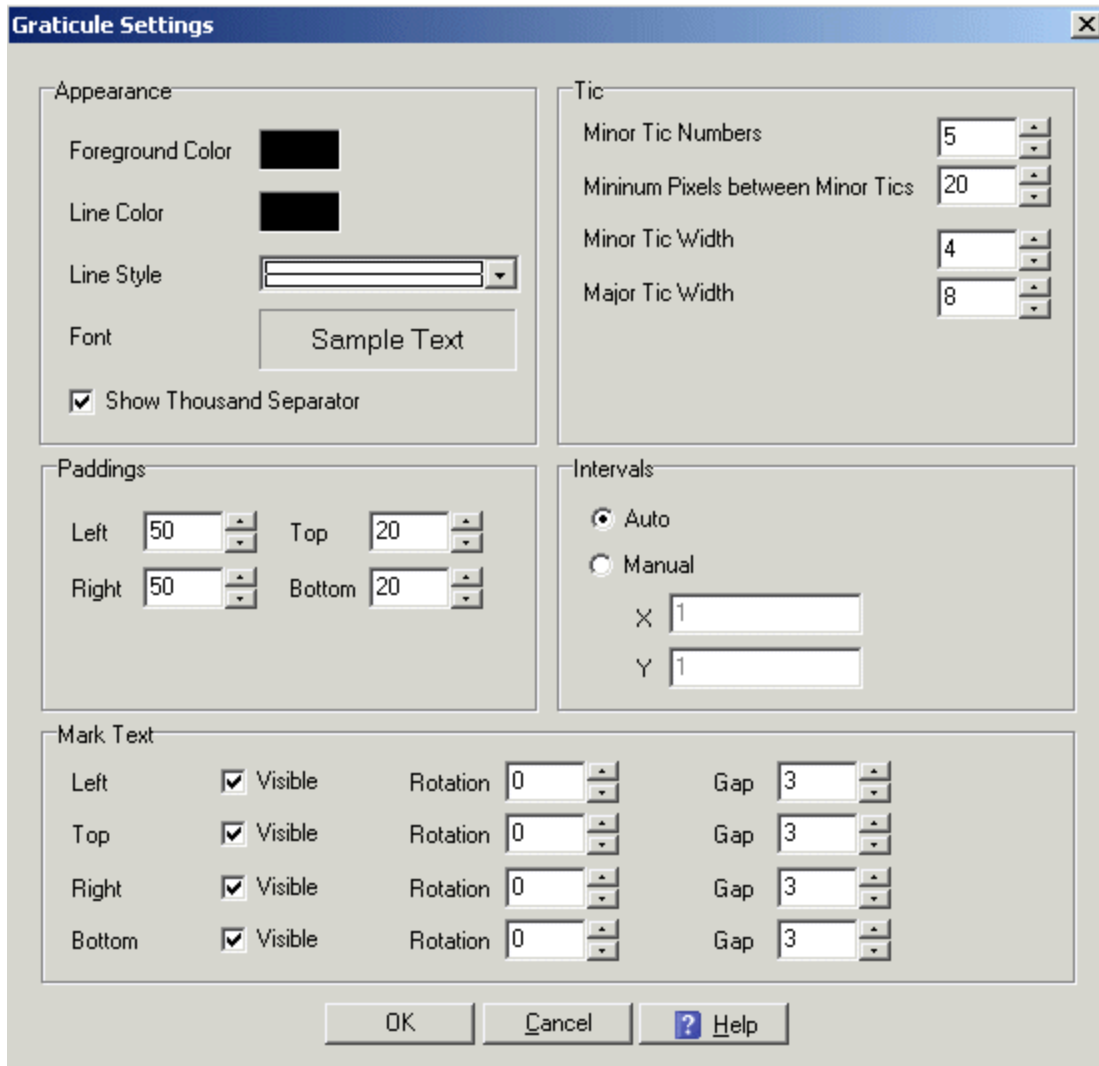




**NOTE:** In order to see intersecting cross sections in the cross section editor, the corresponding Map Manager project must be open.

## Graticule

Provides settings for the graticule (also referred to as gridlines) on the map. The following dialog will appear:



### Appearance

In the appearance frame, you can edit the line color, style, font.

### Tic

Allows defining the number of minor and major tics.

### Paddings

Controls the amount of buffer space between the edge of Map Manager window display, and the labels on the axis. It may be necessary to increase this value when the X and Y co-ordinates contain many digits

### Intervals

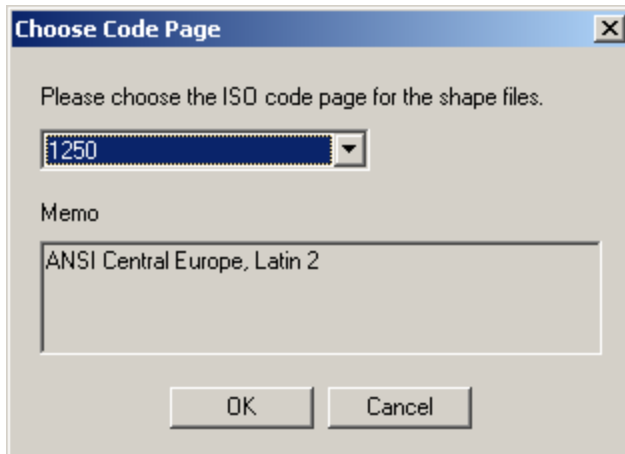
Controls the space between the major graticule lines. You can accept the system calculated Auto values, or enter Manual values.

### Mark Text

Controls the axis labels. For each axis, you can set the visible status, rotate the label, and control the gap between the label and the axis itself.

## Code Page

Use these settings to convert accented characters into a shapefile format that can be recognized by the Map Manager. The following options are available:



From the combo-box, select the Code Page that should be used for the shapefiles in your map project. The Map Manager provides several ISO standards. For a complete list of which standard you should select (based on your language and regional settings) please see "Appendix D: Map Manager: ISO Codes".

Click [OK] when you are finished.

**NOTE:** This option is available for new shapes files only; existing shapefiles cannot be converted.

### 14.2.8 Help

Contains the contents of the Map Manager help.


## 14.3 Defining a Cross Section Line

Use the Map Manager to define the locations of cross section lines, which can then be interpreted in the Cross Section editor. There are two methods for defining cross section lines: Digitizing and Use Existing Polyline. Additionally, you can modify the buffer area for your cross sections. Each method is described below.

### Digitizing a Cross Section Line

In the Map Manager, open an existing map project or create a new map project.

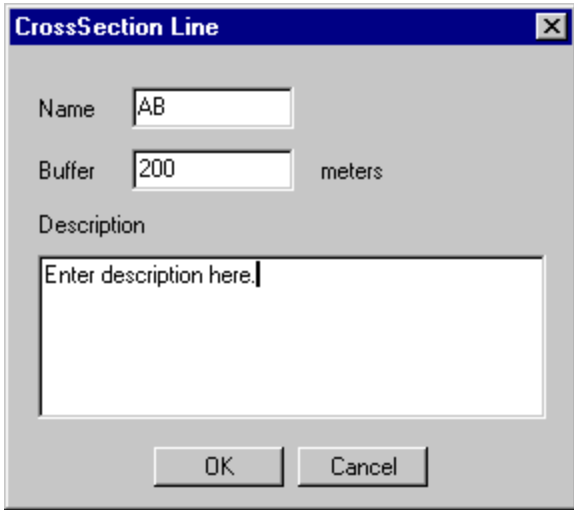
Select a Hydro GeoAnalyst data layer (i.e. station data), and ensure this is visible and active (selected). If you do not have such a layer, you may create one based on station groups that are available in your Hydro GeoAnalyst project. To do this use the Layer > Load HGA Data option to select a station group. The Map Manager creates a layer with stations that are available in the group. Zoom-in to the area of interest (optional).

Click the  (Cross Section Line) button at the right end of the toolbar, or select Tools/Define Cross-Section Line from the Main Menu.

Place the mouse cursor at the starting point of the line, and click once with the left mouse button.

Click again at another location to add a vertex to the line. You may add one or more vertices that define the cross-section line. Note: If you wish to place a vertex beyond the extent of the current map view, click and hold the right mouse button to pan across the map. Also, you can use the mouse wheel to zoom in and zoom out, while defining the cross section line.

At the end point of the line, double-click the left mouse button to finish. This will launch the dialog shown below:



The image shows a dialog box titled "CrossSection Line". It has a blue title bar with a close button (X) on the right. The dialog contains three input fields: "Name" with the text "AB", "Buffer" with the text "200" and the unit "meters" to its right, and a "Description" field with the placeholder text "Enter description here.". At the bottom of the dialog are two buttons: "OK" and "Cancel".

For each cross section line, specify a Name, Buffer Distance and Description. The Buffer Distance determines which stations will be included in the cross section; stations which lie within the buffer distance will all be selected (as indicated by a red circle on top of the station's symbol) and included in the cross section. The Buffer Distance is projected out perpendicular to the cross section line. Click [OK] to accept the Line attributes.

If necessary, selected stations can be deselected by clicking on each of them while holding down the <Ctrl> key.

If necessary, extra stations may be added to the selection by clicking on one or more stations while holding down <Ctrl> key.

**NOTE:** Once a cross-section line has been created, stations can still be added to or removed from the line by selecting the line, then right-clicking and choosing the Add/Remove Stations option. Stations can then be added/removed by clicking on the desired stations. In order to use this feature, the station layers on which the cross section are based (e.g. Boreholes), must be set to Visible in the Layer Control.

The cross section can then be created as follows.

Select Tools > Create Cross Section from the Main Menu, or click on the Cross

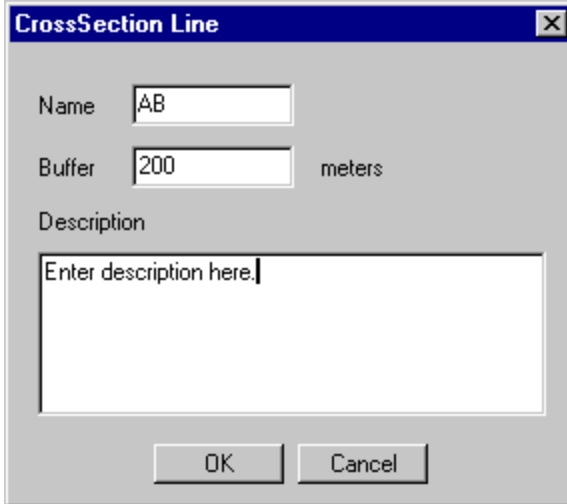
Section button  on the toolbar.

Click [Yes] to create the cross section; the name assigned to the cross section line will be used for the cross section name.

### Use Existing Polyline

You can create a cross section line from an existing polyline layer. To do so, follow the steps below:

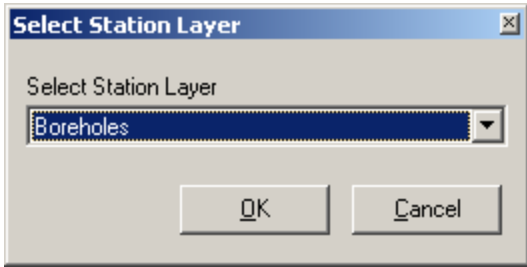
Right-click the desired line segment and select Convert to Cross Section Line from the pop-up menu.



The dialog box titled "CrossSection Line" has a blue title bar with a close button. It contains three input fields: "Name" with the text "AB", "Buffer" with the text "200" and the unit "meters" to its right, and a "Description" field with the placeholder text "Enter description here.". At the bottom are "OK" and "Cancel" buttons.

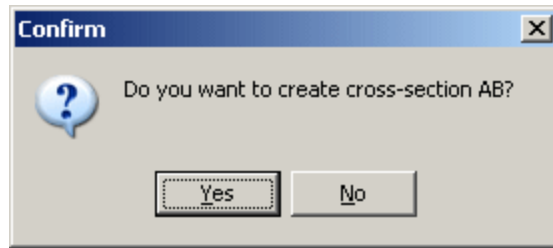
Specify a Name, Buffer Distance and Description. The Buffer Distance determines which stations will be included in the cross section; stations which lie within the buffer distance will all be selected (as indicated by a red circle on top of the station's symbol) and included in the cross section. The Buffer Distance is projected out perpendicular to the cross section line.

Click [Ok] to accept the line settings. The Select Station Layer dialog will display. Select the appropriate station layer from the dropdown list box and click [Ok].



The dialog box titled "Select Station Layer" has a blue title bar with a close button. It features a dropdown menu labeled "Select Station Layer" with "Boreholes" selected. At the bottom are "OK" and "Cancel" buttons.

The following message will display:



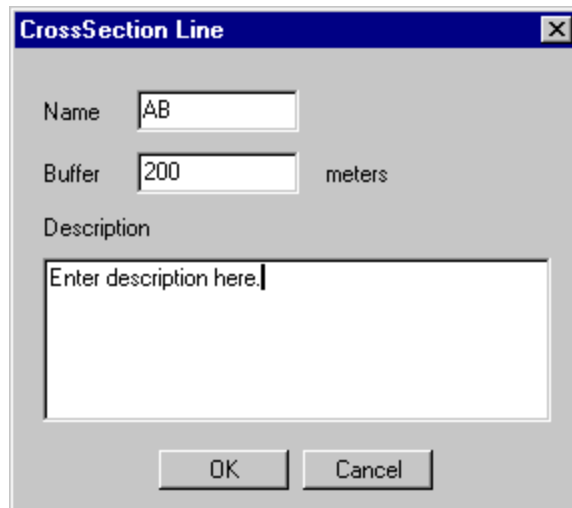
Click [Yes] to open the cross section in the Cross Section editor.

This will load the cross section editor. For more details on creating cross sections, you may refer to [Cross Section Editor](#) section.

### Modify Buffer Distance

To modify the buffer distance of a cross section line:

- Select the cross section layer from the Layer Manager panel.
- Select a cross section line.
- Right-click, and select Update Buffer from the pop-up menu.



From the CrossSection Line dialog, specify a new buffer distance. Click [Ok].

Map Manager will now regenerate the cross section line using the new buffer distance.

**Note:** Buffer distances for cross sections generated in past versions of HGA cannot be modified.

## 15 Cross Section Editor

The Cross Section Editor is designed with easy-to-use tools for interpreting geological and hydrogeological data, as well as interpreting data for groundwater flow models. Generating model layers for use as modeling layer elevations in groundwater modeling packages such as Visual MODFLOW Pro has never been easier!

In addition, the Cross Section Editor is seamlessly integrated with the Scene Viewer, a tool that combines and displays one or more cross sections in a 3D fence diagram view!

The Cross Section Editor allows for three types of data interpretations:

- Geologic (containing lithology structure data)
- Hydrogeologic (containing locations of aquifers, aquitards, etc.)
- Model (containing locations of model layer lines, which may be used in numerical groundwater modeling)

The Cross Section Editor provides users with the following key features:


- Digitize geologic and hydrogeologic layers using the polygon draw tool
- Select standard cross section fill patterns from the Geology
- Copy zones from geology layers in order to define hydrogeology zones
- Display the locations of intersecting layers and other cross sections (using symbols and labels)
- Display water table location in cross section view
- Dynamically view the spatial orientation of the boreholes in the Map Preview Window - simply move the mouse over the 2D borehole to highlight its location on the map
- View the orientation of cross sections as they relate to the Map Preview Window
- Define properties of intersecting features (other layers or cross sections)
- Display screened interval in cross section view
- Modify labels for lines and polygons
- Zoom in/out and pan features
- Launch cross section for viewing in the Scene Viewer
- Export cross section view to image format
- Export model layer points for use in groundwater models, including Visual MODFLOW
- Send cross sections to the Report Editor to be included in a report template
- Copy window to clipboard

---

### 15.1 About the Interface


The Cross Section Editor may be launched from Hydro GeoAnalyst:


- In the Project Tree, double click on an existing cross section from the Cross Sections node;

- Select the Cross Sections icon  on the main toolbar and then select the cross section you wish to launch from the drop down list
- Select Modules / Cross Section Editor and then select the cross section you wish to launch from the drop down list

The Cross Section Editor may also be launched from the Map Manager in one of the following ways:

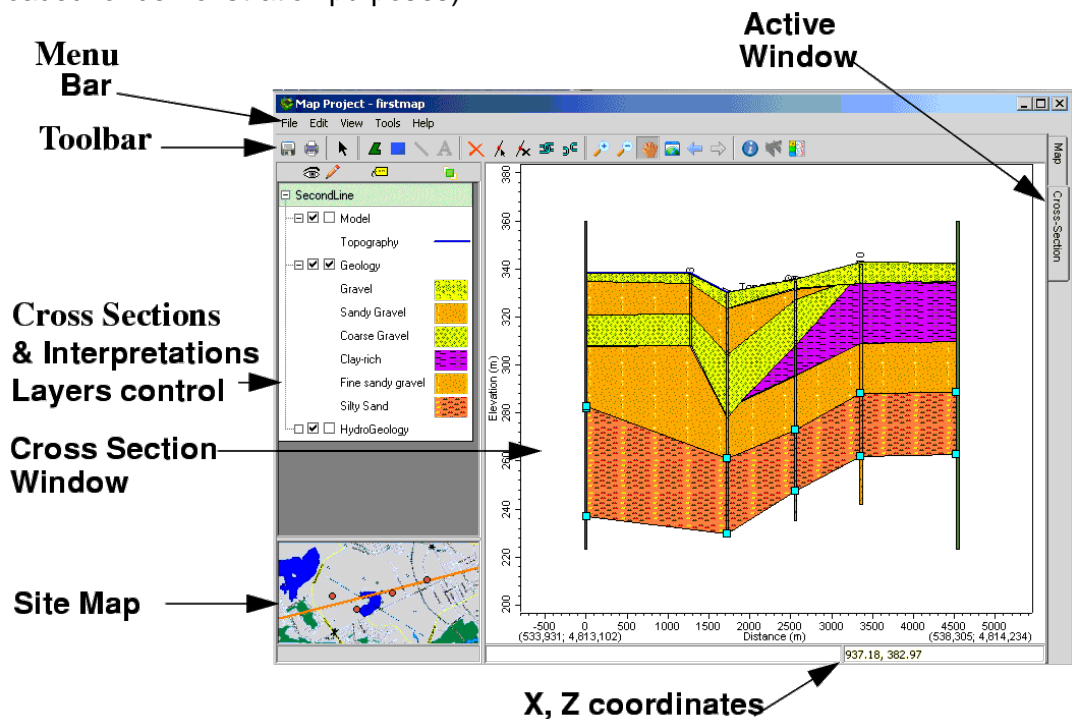
Activate the cross section lines layer from the layer manager, and select a Cross section line by clicking on the desired cross section.

To create a new cross section, select the Create Cross Section menu option from the Tools menu, or click on the Show/Create Cross-Section button  on the toolbar. This option will create a new cross section based on the selected cross section line.

To open an existing cross section based on an existing cross section line, click on the Show/Create Cross-Section button  on the toolbar. This opens the cross section editor with the corresponding cross section.

Click on the Cross-Section tab, in the upper right corner of the window (see figure below) to activate an existing cross section from a list of cross sections that are available for your project.

The Cross Section Editor window is shown in the figure below (with a cross section loaded for demonstration purposes).



The Cross Section Editor window contains the following items:

**Menu Bar:** Contains program menu commands



**Toolbar:** Contains short cut buttons to some of the most commonly used features in the Cross Section Editor.

**Layer Control:** Manages cross sections, visibility, and editability of interpretation layers. Right-click a layer to access additional options such as Move up/Move down, View 3D and Properties.

**Cross-Section Window:** Contains the cross section view for the selected cross section line.

**Site Map:** Displays the selected cross section line, as it appears in the map project. The selected stations for the cross section are highlighted in this Map preview window.

**Coordinates:** Displays the X, Z coordinate for the current mouse cursor location.

**Active Window:** Select between the Map Manager window and the Cross Section window.

### Description of Toolbar Items

The Cross section editor contains a toolbar with short cut buttons to some of the commonly used features. Most toolbar buttons are context sensitive, and react according to the active layer, window, or dialog. If there are no options for the selected layer, the respective toolbar button(s) will become inactive, indicated by a greyed out appearance. For example, the option to add a vertex is active only when a polygon or a line is selected.



Save button saves the current cross section project.



Print button sends the current cross section view to the report editor.



Selection Pointer feature is used for selecting objects in the active interpretation.



Draw Polygon feature is used for drawing a polygon or a rectangle in the active layer.



Draw Line feature is used for drawing a model layer line in the selected layer.



Add Text features is used for adding annotation to the selected layer.



Delete Selected Object feature deletes the selected object (shape) from the currently activate layer.












Add Vertex feature is used for adding a vertex to the selected object (polygon or line). This button is activated only if an object is selected.



Delete Vertex feature is used for deleting a vertex from the selected object (polygon or line). This button is activated only if an interpretation having at least one object is activated, and at least one of the objects is selected.



Link Vertex feature is used for linking two vertices from two polygons or lines. This feature is only available if an interpretation having at least two polygons or lines is activated, and at least one of them is selected.

-  Remove Links feature is used for breaking the vertex link between two or more polygons or lines. This button is activated only if an interpretation having at least one object is activated, and at least one of the objects is selected. For more information, see ["Link Vertex"](#)
-  Zoom In option is used to zoom in on an area of the cross section, defined by a rectangle.
-  Zoom Out option is used to zoom out from the current cross section view.
-  Pan button allows the user to pan the current view left, right, up, or down.
-  Full Extent button restores the cross section view to the full extents of the Cross Section's coordinates.
-  Previous Extent button restores the cross section view to the previous zoom extent.
-  Next Extent button switches the cross section view to the next zoom extent.
-  Information button displays information for the selected station. Moving the mouse cursor overtop of a station will display the information.
-  Export to Visual MODFLOW Flex button provides an option to export model layers to xyz text files for importing into modeling project.
- 

## 15.2 Description of Menu Items

### Save

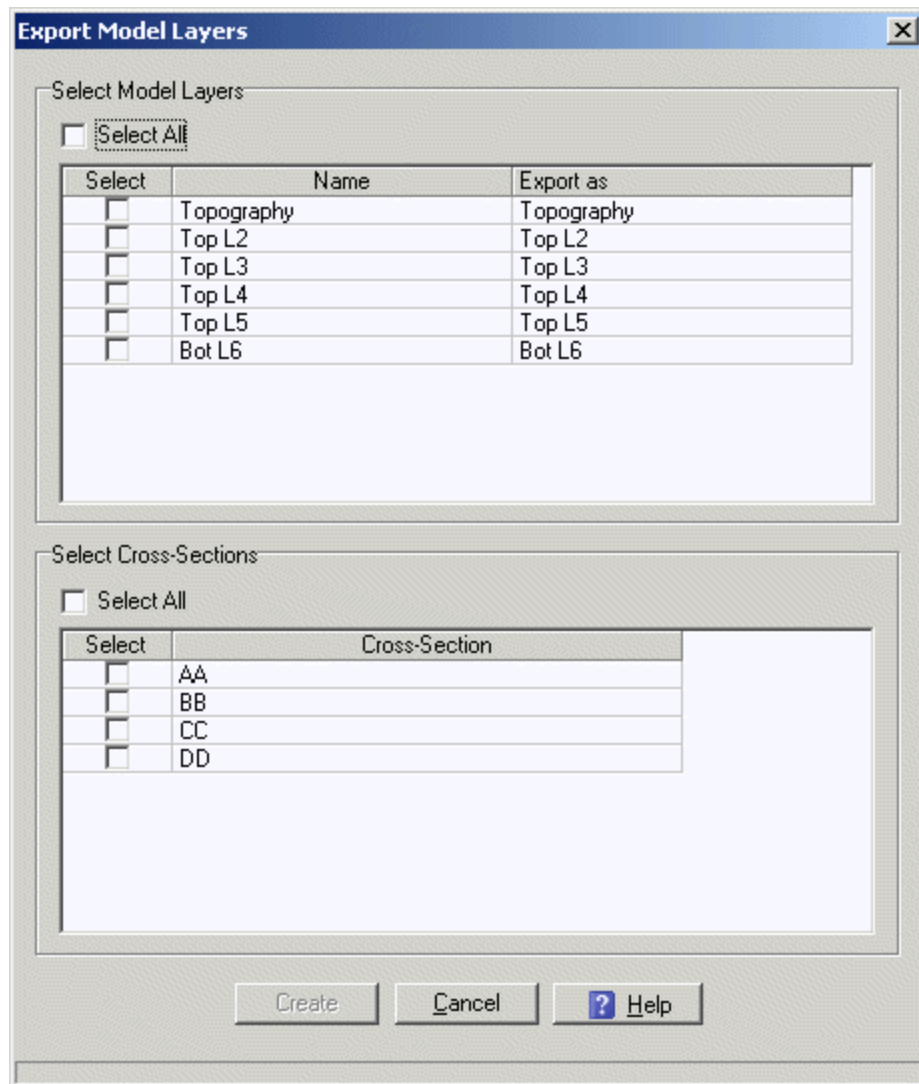
This menu item will save all current edits for the cross section to the current cross section project file (.VCP).

### Close

Closes the currently open cross section.

### Export Model Layers

This option allows you to export the model layer lines for all cross sections, to XYZ text file format. These files can in turn be used to define layer elevations in groundwater flow models, such as Visual MODFLOW. When this option is selected, the following dialog will appear:



In this dialog, select the model layers you wish to import. Each model layer will be exported as a separate file; for each file, you may define the name under the Export As column.

Next select which cross sections should be considered in the export. Click the [Create] button to generate the files. The files will be generated in the Model sub-folder, of the Project folder (for example: D:\Program Files \ HGAnalyst\ Projects\ Demo\_Project\ Model\ Topography.txt)

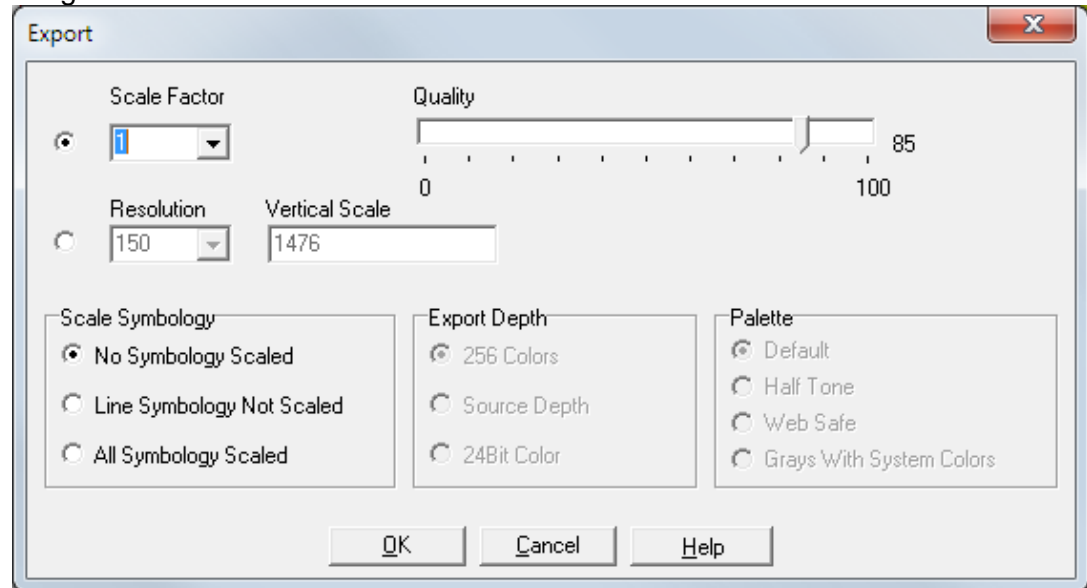
The Cross Section editor will generate the text files based on the vertex location of each model layer line, in each cross section. For example, for model layer 1 (Topography), if cross section AA' contains this model line with 5 vertices, and cross section BB' has the same model line with 10 vertices, then the text file should contain 15 rows (if both cross sections AA' and BB' are selected).

The X,Y location for each vertex corresponds to the X,Y location on the cross section line; the Cross Section editor also provides the option to save the well

contacts using the station's X,Y co-ordinates, and retrieve this info from the database.

## Export Image

Provides options for exporting the current cross section to a Raster Image file. Supported file types include: bitmaps (\*.BMP), Joint Photographic Experts Group (\*.jpg), and enhanced Meta Files (\*.EMF). Enter a filename, and choose the desired export format, and click [OK]. An Export dialog will appear with settings for the image file:



There are several options for the modifying the image provided in this dialog:  
**Scale Factor:** Choose a scale factor from the combo box. This factor will determine the resolution of the exported image. The greater the factor the better the resolution will be. A scale factor of 1 will keep the original size while a scale factor of 2 will be twice the size both in height and width.

**Resolution:** Instead of a scale factor you can choose a specific resolution (in units of dpi). The vertical scale is the ratio of the height of the Cross Section in actual world units / height of the Cross Section in screen units. These are used to calculate the output image size. So a higher a resolution will mean a bigger image, while a smaller vertical scale will mean a larger image.

**Quality:** Using the scroll bar, define the image quality. This option is available only if the JPEGs export format is selected. The greater the percentage the higher the quality will be. The image size is also directly proportional to this value.

**Scale Symbology:** Determines if the scale factor will be applied to symbols and lines.

**Export Depth:** Choose the color quality for the exported image.

**Palette:** Determines the color palette to be applied to the exported image.

The Palette and Color Depth options are available only for bitmaps (.BMP) and enhanced Metafiles (.EMF).

## Print

Loads the current cross section into the report editor's runtime designer. Please refer to [The Report Editor](#) for more details on managing reports.

### Exit

Exit the Cross Section Editor, and return to the main window of Hydro GeoAnalyst. Note that this menu option also closes the map manager.

---

## 15.2.2 Edit

### Delete

Deletes the selected object.


### Delete All

Deletes all shapes from the currently active cross section interpretation.

### Add Vertex

Provides an option to add a vertex to the selected object. To add a vertex:


Activate the desired cross section interpretation (make it editable);  
Select an object that is a polygon or a line (depending on the active interpretation type);

Click on the  button or select the Add Vertex option from the Edit menu.  
Place the mouse cursor at the desired location; the mouse cursor will change to a pen;  
Click once with the left mouse button at this location to add a vertex;  
Repeat the last two steps to add more vertices at other locations on the selected object.

### Delete Vertex

Provides an option to delete a vertex from the selected object. To delete a vertex:

Activate the desired cross section interpretation;  
Select an object that is a polygon or line;

Click on the  button or select the Delete Vertex option from the Edit menu.  
Place the mouse cursor on the vertex to be deleted; the mouse cursor will change to an "X";  
Click once with the left mouse button on this vertex to remove it from the object;  
Repeat the last two steps to delete more vertices from the selected object.


### Link Vertex

The Link Vertex option allows for linking two vertices from two polygons or lines. It is intended to assist in filling in gaps between adjacent polygons (or lines), thus creating continuous interpretations. The end result is that polygons (or lines) will be able to share a common "linked" vertex (or vertices).

To Link Vertices on polygons (or lines),

Select the desired interpretation layer and make it editable;

Select the polygon or line whose vertex will be linked with another vertex;

Click the Link Vertex option from the Edit menu or click the  button from the toolbar.

Click on the desired vertex (source vertex) that will be linked with another one; the color of the vertex changes to green to indicate it has been selected;

Move the mouse cursor to the desired destination vertex, to which the previously selected vertex will be linked. The mouse cursor will change to a red square outline, when a vertex is identified;

Click on this red square, and the vertices will be linked.

The Linked Vertex will turn orange to indicate that the vertex is linked, and shared by two or more polygons (or lines).

**NOTE:** "Link Vertices" option is activated only if there are at least two objects on the layer. Once two vertices are linked, they behave as a single vertex.

### Remove Links

The Remove Links option allows for separating previously linked vertices.

To use this option,

Select the interpretation layer containing at least two polygons or lines whose one or more vertices are linked;

Make this layer editable;

Click the Remove Links option from the Edit menu or click the  button from the toolbar;

Click on one of the linked vertices in the selected polygon; linked vertices are colored orange;

Upon clicking on a linked vertex, the vertex will change back to blue color to indicate that the link has been successfully removed;

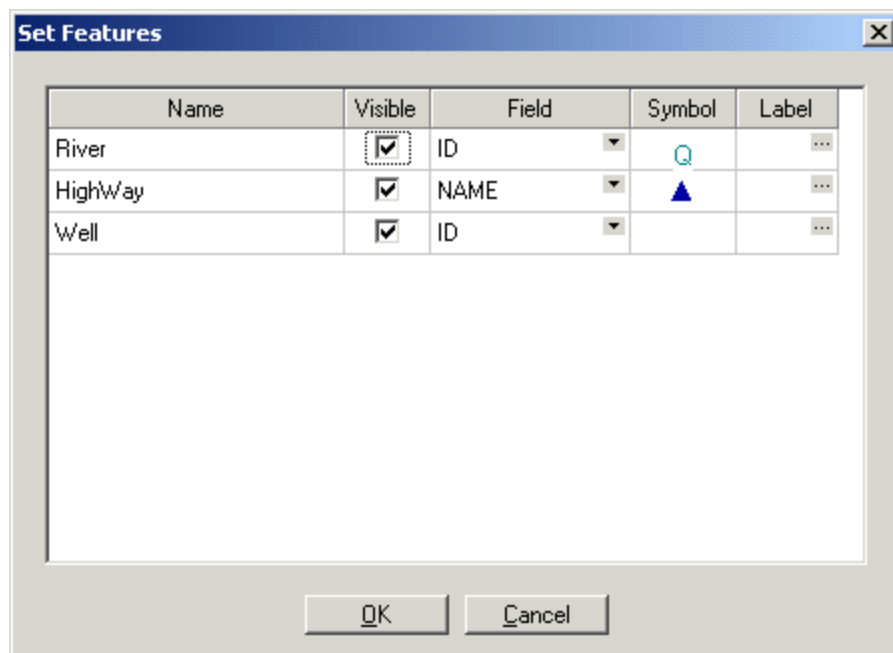
Click on the pointer button  in the toolbar;

Place the mouse cursor on this vertex which has been separated;

Click once on this vertex, and drag the mouse away from its position, and place the polygon vertex in the new position (if desired);

### Set Features

The Set Features option allows for modifying the display properties of most layers in your map project and other cross sections that intersect with the current cross section. If this option is selected from the Edit menu, a dialog similar to that shown below will be displayed.



A cross section line may intersect with one or more features that are displayed in one or more layers in your map project. For instance, one or more rivers from the "Rivers" layer may intersect with a given cross section at one or more points. Other features of importance may include roads, railway lines, lakes, etc. Features from selected map layers that intersect with a cross section may be displayed as a symbol and/or label on the cross-section line.

**NOTE:** The intersecting items display options can be defined only at the time when the cross section is created; currently, it is not possible to set these features later on, once the cross section has been created. Also, intersecting items must be selected in Map Manager before the cross section is created.

In the Set Features dialog, there are several options:

**Name:** Name of the intersecting layer (read-only)

**Visible:** Defines if the element is visible or not.

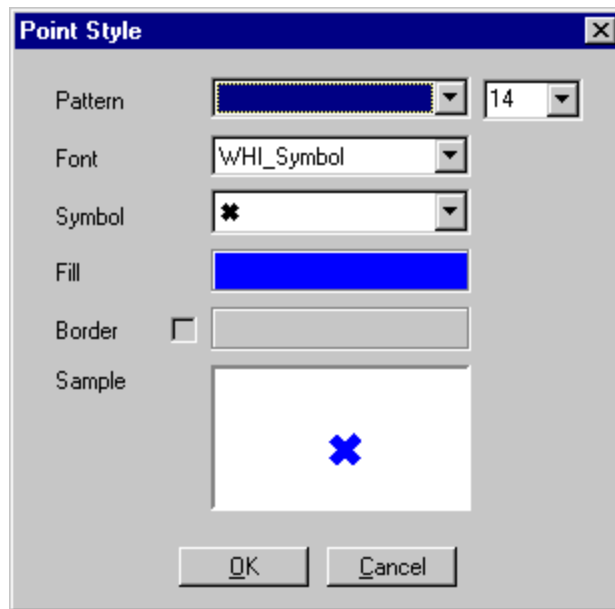
**Field:** Allows you to select a field to use as a label for the intersecting feature

**Symbol:** Allows you to select a symbol to represent the intersecting feature

**Label:** Allows you to set properties of the label representing the intersecting feature

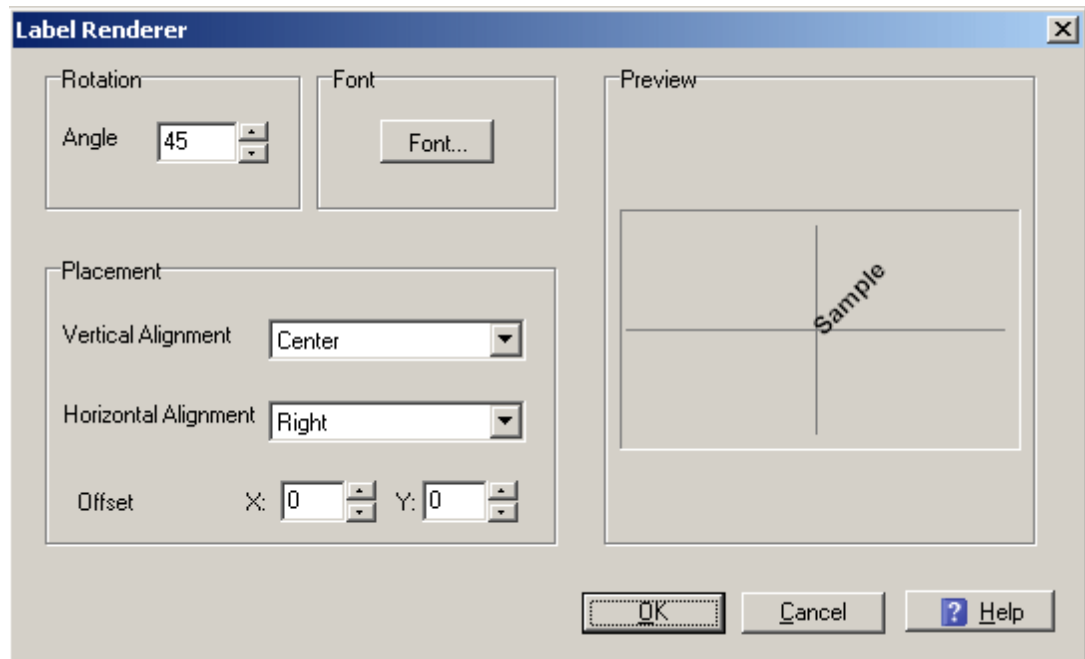
The Field column contains a list of available fields for the selected layer. This field will be used as the label in the cross section view.

Double-click on the desired cell in the Symbol column to load the dialog where a symbol can be selected and its properties set.



**NOTE:** You will only be able to change the Font and Symbol of the point if the Pattern is set to "True type".

The Label Properties dialog may be loaded by selecting the [...] button; the properties that are available are shown below.

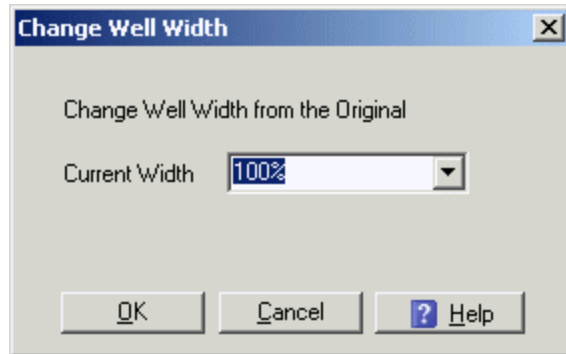


The Placement options allow you to set the default label placement relative to the feature. Use the Offset controls to fine tune the placement by adjusting the X and Y values. The labels can also be rotated by specifying a desired Angle .



## Change Well Width

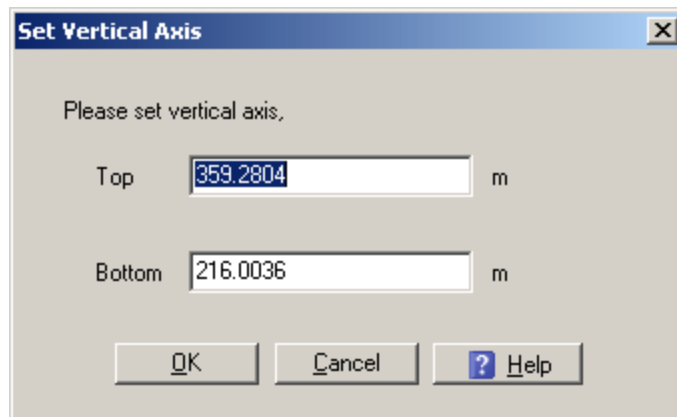
Provides options for increasing the display width of stations (wells and boreholes) plotted on the cross section.



You can change well width as it appears on the screen by a factor displayed in the "Current width" drop-down menu. Using this factor, you can make the wells thinner or thicker on the cross-sectional display.

## Change Vertical Axis

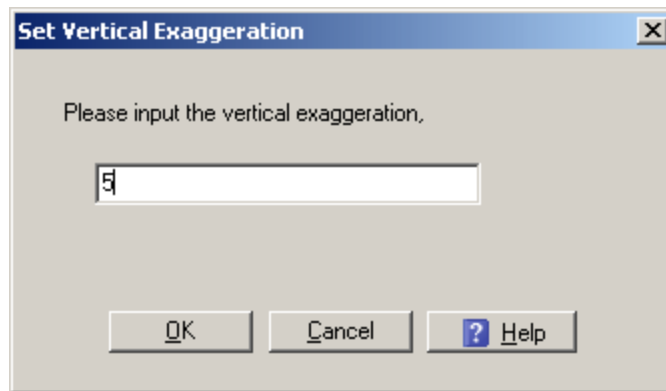
This option allows you to extend the vertical range of the elevation axis. When this option is selected, the following dialog will display:



Specify a Top value and a Bottom value. Click [Ok] to accept the new values.

## Change Vertical Exaggeration

This option allows you to change the vertical exaggeration of the current cross section. The vertical exaggeration is simply the ratio of the vertical scale to the horizontal scale.



Specify a new vertical exaggeration and click the [Ok] button. The cross section will then be regenerated to reflect the new vertical exaggeration.

### **Copy Window**

Provides an option for copying the current cross section window to the Windows clipboard. The window may then be pasted into a supporting application (such as a document, or image editor, or slide presentation).

---

## **15.2.3 View**

This menu provides options to modify the appearance and size of the Cross Section Window.

### **Full Extent**

This menu item will result in zooming out the cross section window to its original full extents.

### **Zoom In**

Provides options for zooming into a section of the cross section that is defined by a rectangle drawn around the desired area. Place the cursor on the cross section and click once to define one corner of the rectangle, drag to a second position to define the opposite corner of the rectangle, and release the mouse button. The selected section will be adjusted to fill the screen.

### **Zoom Out**

Provides options for zooming out on the cross section. Click this menu item and the cross section window will zoom out. The current screen will be zoomed out by a factor of two unless it is not already in a full-extent mode.

### **Previous Extent**

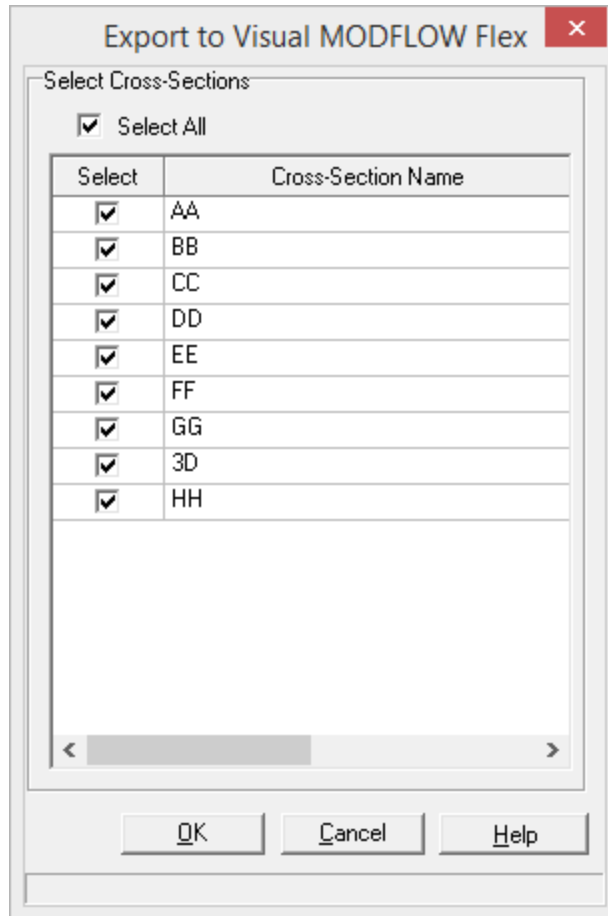
Zooms the cross section window to the previous window dimensions.

## Next Extent

Zooms the cross section window to the next window dimensions.

## Export to Visual MODFLOW Flex

Allows you to export one or more cross sections to a 3XS file which can be imported into Visual MODFLOW Flex. Upon selecting this menu item, the following dialog will appear:



Select the Cross sections to display from the dialog, by placing a check mark beside each cross section name. Or, to select all cross sections, place a check mark beside the Select All check box at the top of the dialog.

When you select [OK] you will be prompted for a file name and location.

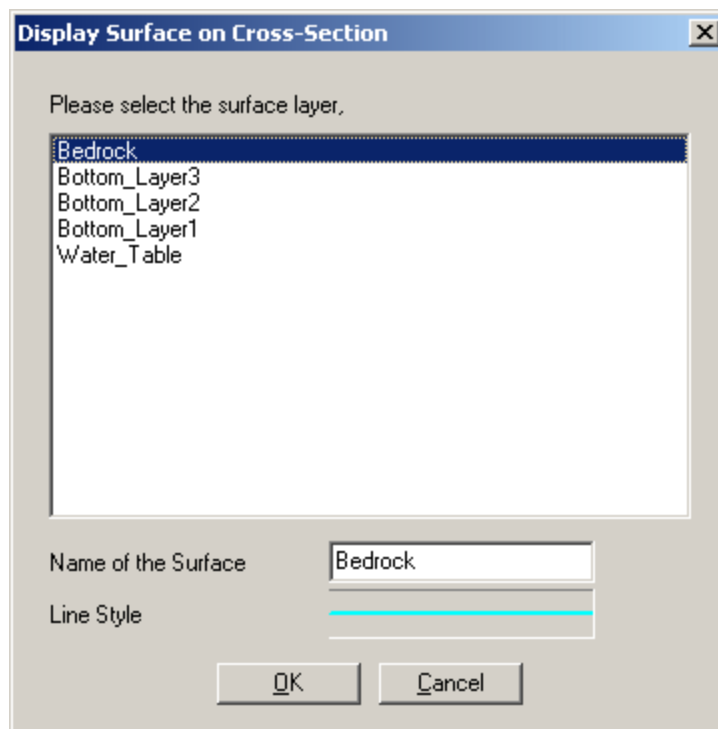
## Information

Provides a window containing information on the selected station. After selecting this option, you may place the mouse cursor on a particular lithologic column within a selected station. A small text box appears displaying specific information about the layer (layer type, top and bottom elevations, and thickness). If the station in question has screens, the Information feature can also highlight their pertinent features.

### Create Surface Line

Allows you to take surface layers from the map manager and display them as a line layer on cross section interpretations. Surface data can be used to show the relationship between interpretation layers and numerical model layers, or for showing interpolated subsurface features, e.g., water table.

In order to show surface data on a cross section, you must first import or create the surface in the map manager. Once the surface exists in the map manager, select Tools > Create Surface Lines from the cross section editor toolbar. The following dialog will appear on your screen



The Display Surface on Cross-Section dialog displays all surfaces currently loaded in the Map Manager. These surfaces may have been imported, or interpolated from point data (Layer > Create Contours).

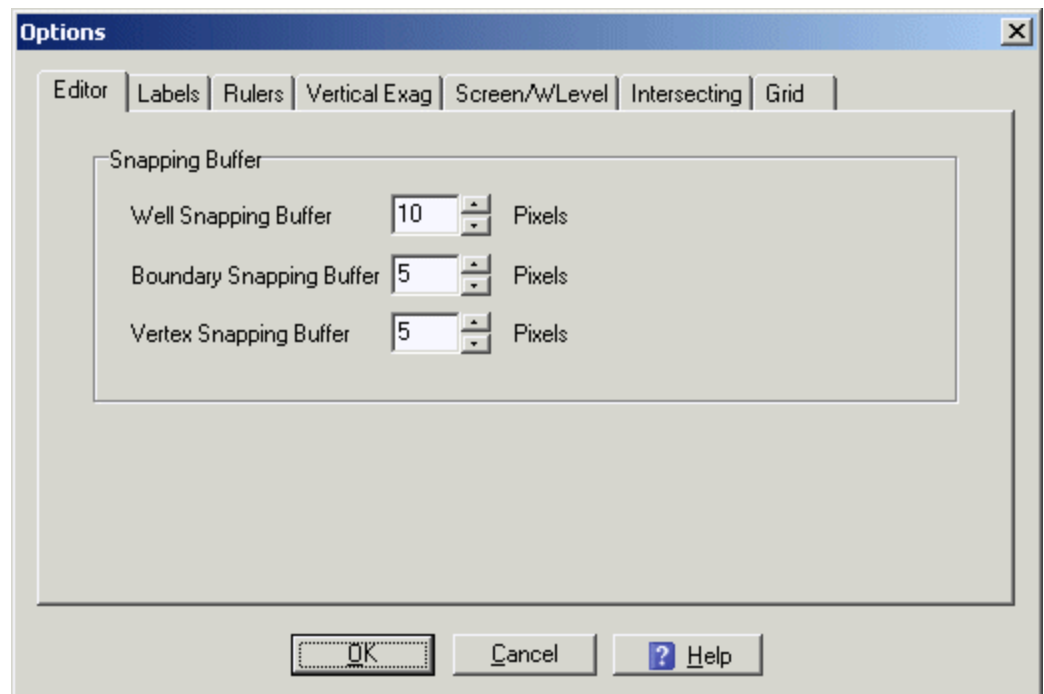
Select the desired surface to show on the cross section. You may also change the name of the surface, and specify the color, size and pattern of the surface line by clicking on the Line Style preview.

Click the [OK] button to add the surface line to the cross section. The surface line will appear in the cross section legend under the "Surface" category where it can be shown/hidden,

## 15.2.4 Tools

### Options

Allows setting line snapping options for lines drawn on the cross section. If this feature is selected, the dialog shown below will appear.



### Editor Tab

In this tab, there are options for specifying the snapping buffers for the selected cross section and its elements. The Snapping Buffers are specified in pixels. The buffer values determine the distance to which lines and vertices will snap (i.e. join) to the nearest line or vertex. If a low value for the Snapping Buffer is specified, the mouse cursor must be very close to a vertex or line in order for snapping to occur. If a high value for the Snapping Buffer is specified, then snapping will occur at a distance further away from the destination vertex (or line).

Snapping allows for exact placement of vertices, and eliminates the need for repetitive use of zooming in to specific locations. If the snapping is used, the vertices will be connected (but not linked) at the desired locations.

### Well Snapping Buffer

The default Well Snapping Buffer is 10 pixels. When a line is drawn, and the mouse cursor comes within 10 pixels of another well (borehole), then the borehole will be highlighted; upon clicking the left mouse button on this station's lithologic interval, the line will be automatically snapped to the closest vertex.

### Boundary Snapping Buffer

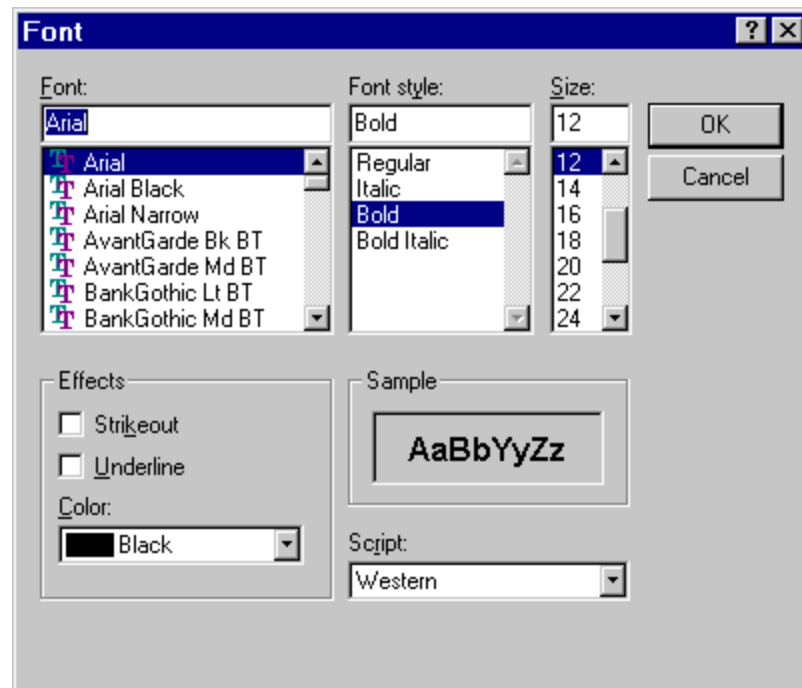
The default Boundary Snapping Buffer is 5 pixels. When a line is drawn, and the mouse cursor comes within 5 pixels of a cross section boundary line (either the left or right), then the boundary line will become highlighted; upon clicking the left mouse button on this boundary line, the drawn line will be automatically snapped to this boundary line.

### Vertex Snapping Buffer

The default Vertex Snapping Buffer is 5 pixels. When a vertex on a polygon is selected, and the Link Vertex option is used, and the mouse cursor comes within 5 pixels of a vertex on an adjacent polygon, then the vertex will become highlighted with a red box outline; upon clicking the left mouse button on this vertex, the vertex on the selected polygon will be automatically snapped to this newly selected vertex. Polygon Vertex Snapping makes it easy to place polygons adjacent to one another, for continuous cross section views.

### Labels Tab

Provides options for modifying the label fonts for the interpretation layers (Geology, Hydrogeology, and Model). Simply click on the sample box beside the appropriate label, and a Font options dialog will appear as shown below.



Define the desired font settings, then click [OK] to return to the Options dialog.

### Rulers Tab

Controls the appearance settings for the axis of the cross section plot. For each ruler (vertical and horizontal) you may define:

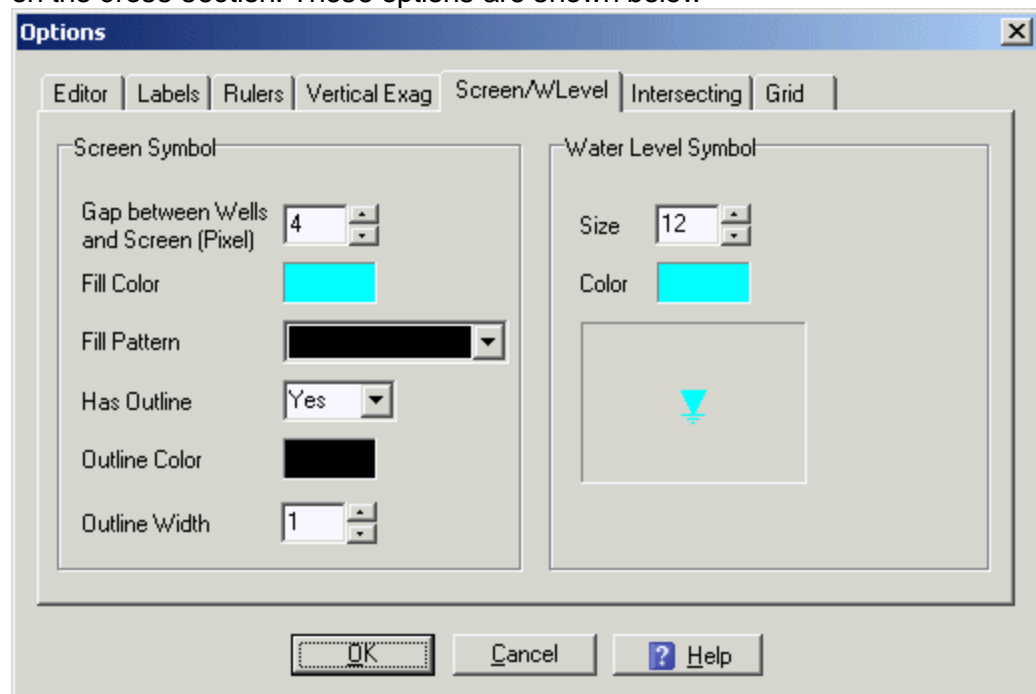
- Foreground Color
- Background Color
- Marker Width
- Min Tic Pixels
- Tic Numbers
- Font
- Vertical Exaggeration

Define the vertical exaggeration scaling factor for new cross sections. There are two options: Default value, or User-defined (Specific). If the default option is selected, the map manager will automatically calculate and assign the most appropriate vertical exaggeration factor.

**NOTE:** Please [see "Change Vertical Exaggeration"](#) in the Edit menu item discussed previously for information on how to change the vertical exaggeration once a cross section has been created.

### Screen / Water Levels

Controls the appearance settings for how screens and water levels are displayed on the cross section. These options are shown below

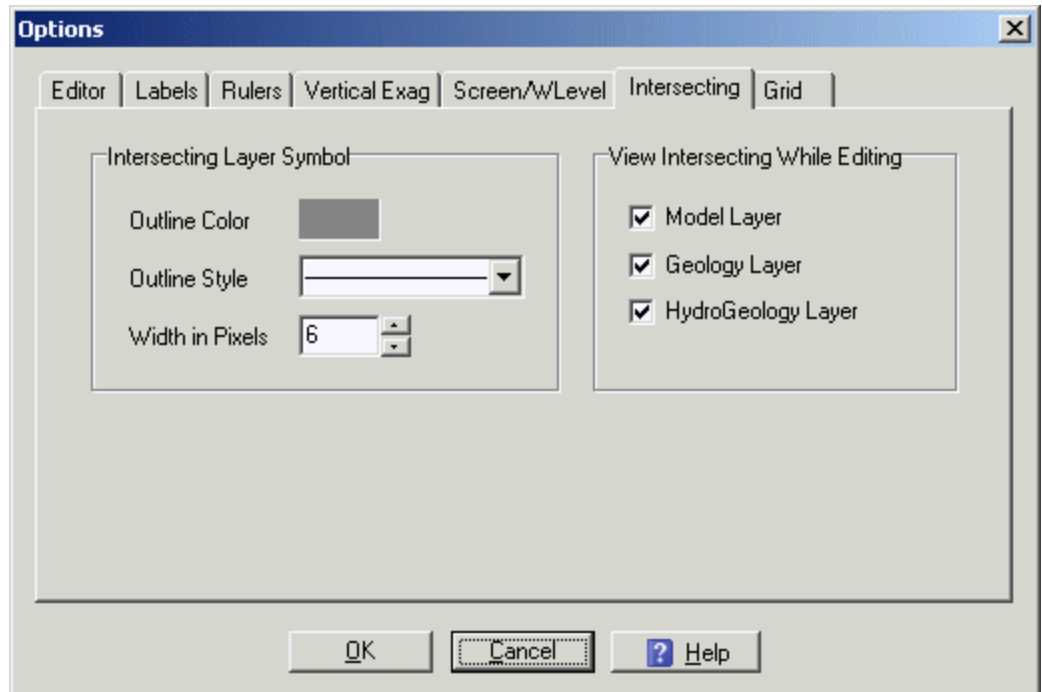


In this dialog, there are options for the view settings (color, style, etc) for both the screen and the water levels. The "Gap between Well and Screen" controls the

distance between the station and where the screen is placed. The larger this Gap value, the further away the screen will be from its respective station.

### Intersecting Tab

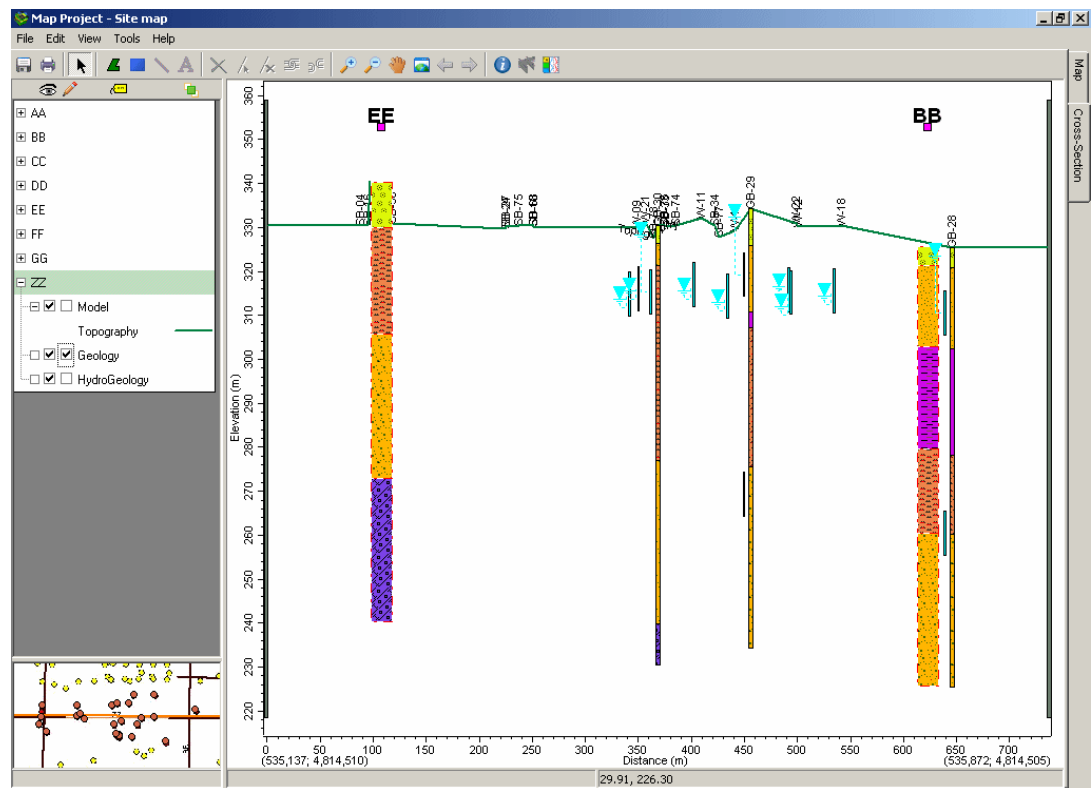
During a cross section interpretation, knowledge of other interpretations is essential. In this dialog, you can define display options for intersecting cross sections.



Specify the color and line style under the Intersecting Layer Symbol frame. In the View Intersecting While Editing frame, specify the view options for different interpretation types. By default, all modules will be active.

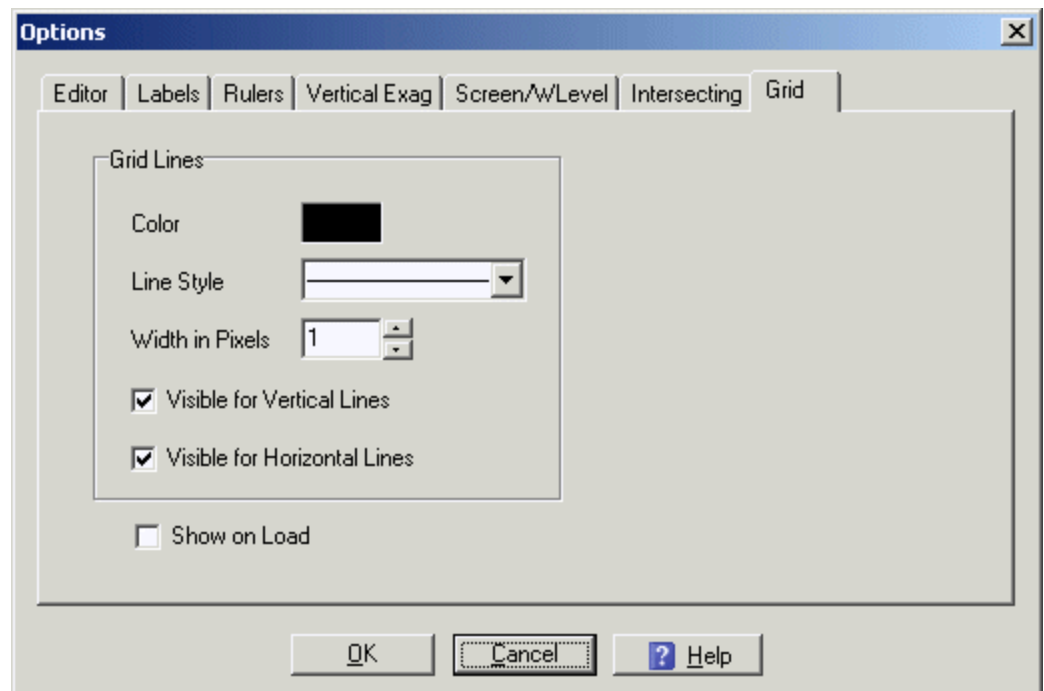
The intersecting cross sections will be visible when you set one of the interpretation types to visible, and editable. In the example screen shot below, you can see that cross sections EE and BB along with their interval locations, are visible while interpreting cross section ZZ:





### Grid Tab

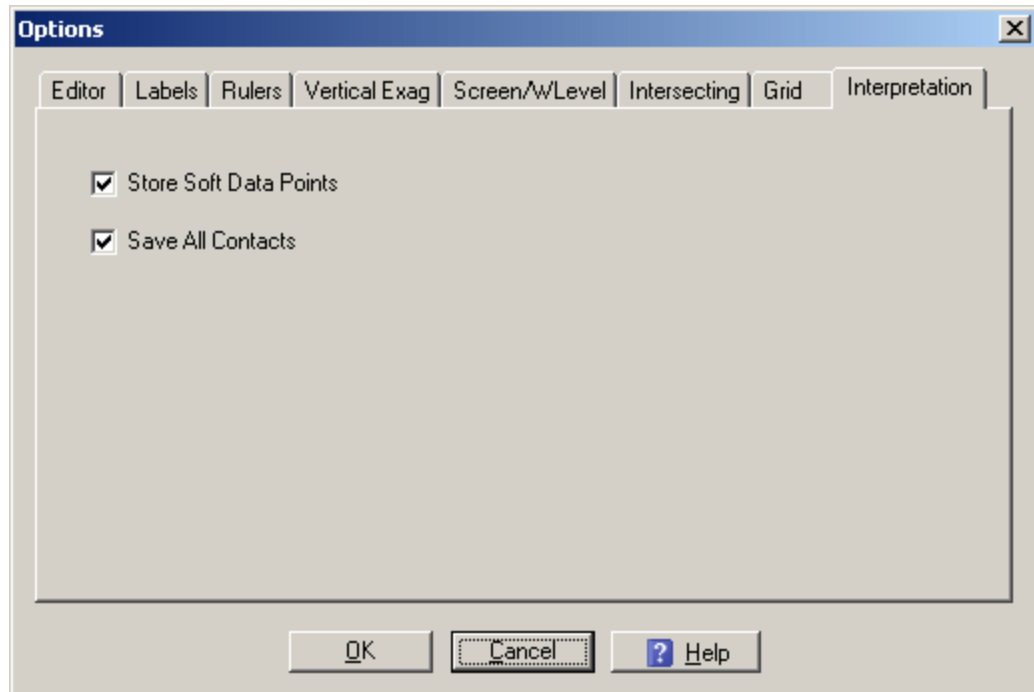
Set the display properties for grid lines in the 2D cross section view.



In the Grid Lines frame, set the line style, color and width, and also set visibility settings for the horizontal and vertical grid lines. The Show on Load option will result in the grid being displayed each time the cross section is loaded.

### Interpretation Tab

Define the data storage options for cross section interpretations.



The cross section editor now saves the cross section interpretations to the project database. The interpretations are also linked to the stations that were selected for the cross section, and these stations, along with their interval data, are also saved to the database. The interpretations, and the wells and corresponding interval data, can be retrieved later, using the Query Builder.

### Store Soft Data Points

Whenever a layer intersects with a station at only one point, it could be because of one of the following reasons:

The layer truly touches the well at only one location (e.g. pinch-out), or

There is no contact with the well

In either case, the following options are available:

Consider the actually intersecting point as the top elevation and insert NULL for both the thickness and bottom elevation

Extend the depth of the station fictitiously (within the bounds of the cross section) to determine the location of the other point. These extensions are known as Soft Data Points. If this point can not be found within the bound, the layer will be considered to be a zero thickness layer (with thickness of NULL).

### Save All Contacts

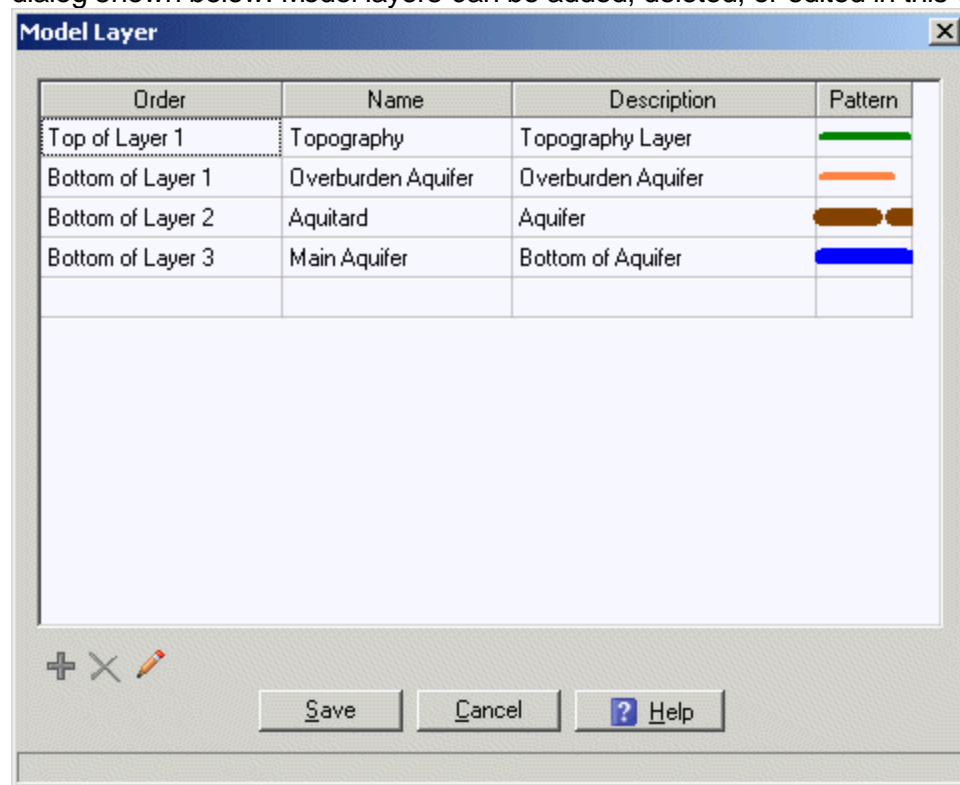
Some stations may be crossed by a layer but may not be involved in the interpretation (e.g. bad wells or data in those wells did not make sense, etc.) and as such, the following options are available:

Consider all intersection points as valid contacts; this is the option Save All Contacts

Only store contacts where there are vertices within the well (e.g. user snapped to intervals or clicked within a well and created a vertex). To do this, disable the option Save All Contacts

## Model Layers

Before drawing model layers, the model layer attributes must first be defined in the dialog shown below. Model layers can be added, deleted, or edited in this dialog.




In the Model Layers dialog, there are four columns:


- **Order:** Layer order, from top to bottom (read-only)
- **Name:** Defines the layer name
- **Description:** Defines layer description
- **Pattern:** Defines line properties for the model layer


In this dialog, specify the total number of model layers, and the properties for each layer. Layers will be ordered from top to bottom; the first layer will always be Top of Layer 1 (i.e. Ground surface), followed by Bottom of Layer 1, Bottom of Layer 2, and so forth. The top most layer represents the top surface for the first layer while the

bottom most layer represents the bottom surface of the last layer. (i.e. each model line defines the bottom of the model layer (excluding the top layer)).

Additional model layers may be inserted at any location, at any time.

Press the  (Add) button to add a new model layer. The new layer will be added ABOVE the currently selected layer.

Press the  (Delete) button to remove the selected model layer.

To edit an existing layer, press the  (Edit) button or double-click on the row containing this layer.

Each model layer does not need to appear in all cross sections.

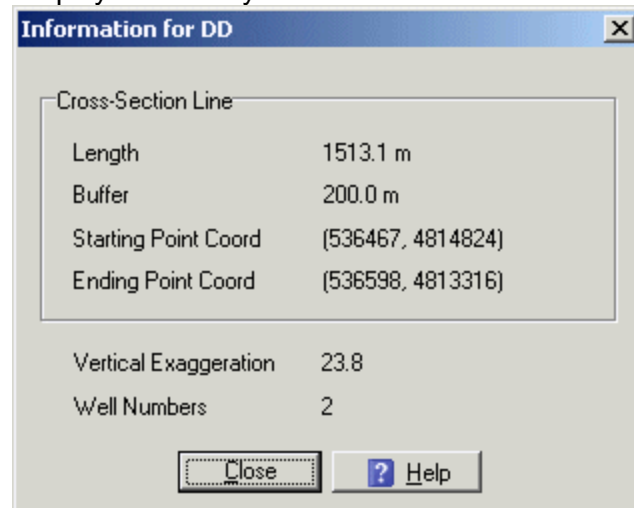
**NOTE:** The Model Layers options are not available when the Model Layer interpretation is set to edit mode in the layer manager.

### Update Cross Section

Use this option to update the screen, water level, and intersecting layer information displayed on the current cross section. The corresponding map project should be open in order to update information from intersecting cross sections.

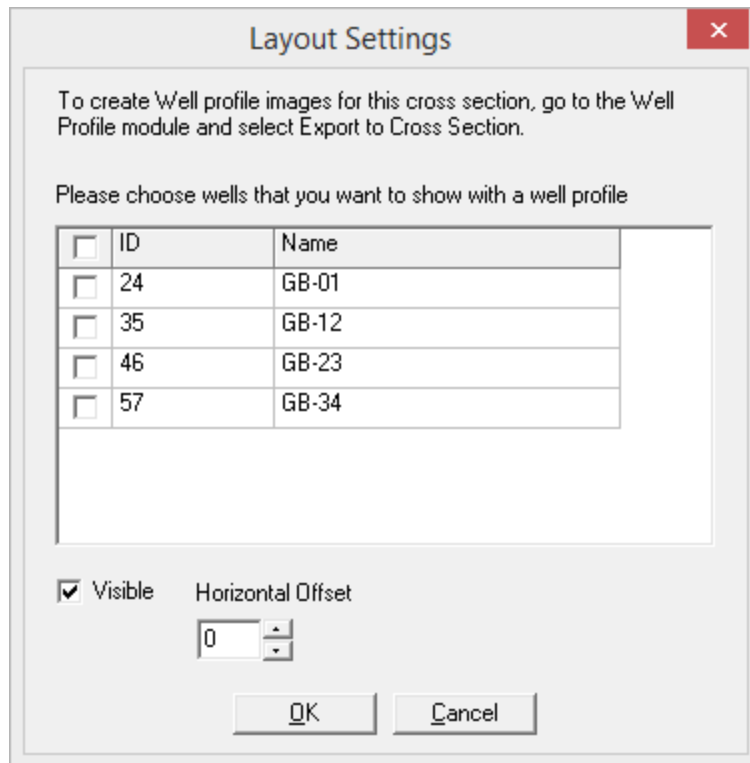
### Cross Section Info

Displays summary info for the selected cross section.



### Display Well Profile

Use this feature to display a well profile directly on the selected cross section; when displaying elements such as geophysical plots and well screen intervals, the well profile can be a valuable asset when creating a cross section interpretation. The layout settings is shown below:




You can select which station to display a well profile for - remember selecting too many stations may result in a crowded display. The well profile is displayed to the right of the station in the cross section.

### 15.2.5 Help

Launches HGA Help, placing the focus on the Cross Section Editor section.

## 15.3 Cross Section Interpretations

### Creating the Cross Section

As mentioned earlier, cross section locations must be drawn using the Define Cross-Section Line option, or the CrossSection Line button () in the Map Manager. See [Defining a Cross Section Line](#) for details on this procedure.

Once the cross section line is defined, the corresponding cross section can be created from the Map Manager, as follows.

In the Map Manager, select Tools > Create Cross Section from the main menu, or

click on the Show/Create Cross-Section button () on the toolbar.

Click [Yes] to create the cross section; the name assigned to the cross section line will be used as the cross section name.

If surface layers are present in your Map Project, you will be prompted to select a surface layer.

Please see [Loading Surface Layers](#) for further information.

The cross section editor opens the selected cross section and displays the stations and related information.

The cross section shows projections of the borehole lithology columns on the cross section plane. By default, the topography (top of model layer 1), will be drawn in for you. The starting point of the cross section line will appear on the left side of the cross section window; the end point of the line will appear on the right side of the window.

Locations for layers must be interpreted, and drawn manually using lines or polygons; layer types may be Geologic, Hydrogeologic, or Model

The process of drawing layers is described in the next section.

**NOTE:** Each cross section has required fields which must be present in your database structure, as defined in the Profile Settings.

### Drawing Cross Section Interpretations

Interpretation of the cross section is a considerably creative process, however the cross section editor makes it easy for you. Once the selected stations have been loaded into the cross section editor, the appropriate layers must be manually drawn, and interpreted. Start the interpretation by selecting the layer type from the layer manager. Choose from Geologic, Hydrogeologic, or Model. Each of these is explained below.

Hydrogeologic interpretations can be copied from geologic interpretations. As such, it is a better practice to first perform geologic interpretations of the cross section.

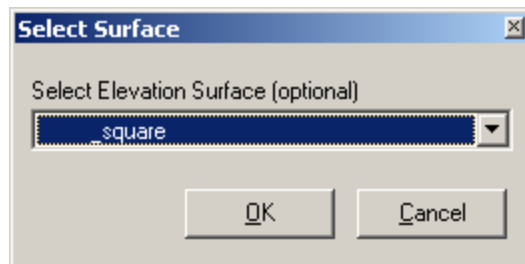
---

#### 15.3.1 Loading Surface Layers

Surface layers (e.g DEM, Surfer GRD) in a Map Project can be used to generate a detailed topography model line for a cross section.

**Note:** A surface layer can only be defined for a cross section line when the cross section is being created, in the Map component of Map Manager.

When a surface layer is present in a map project, you will be prompted to select a surface layer when creating your cross section line. The following dialog will display:




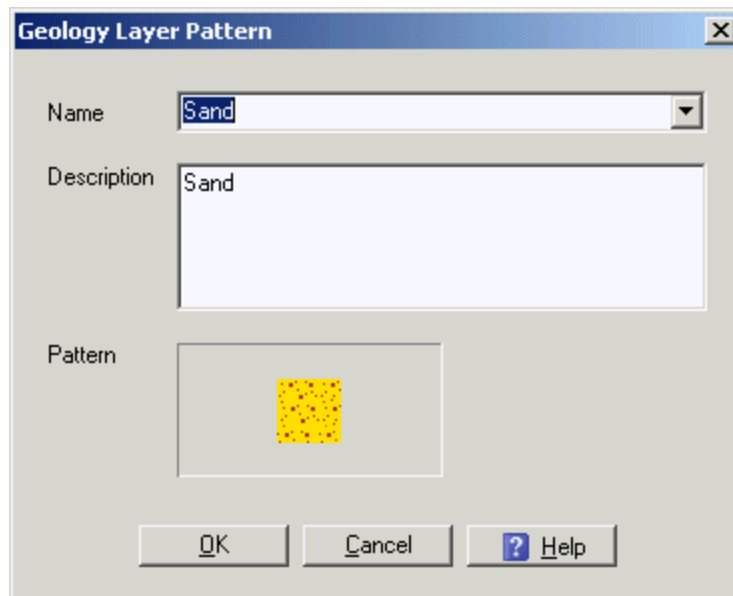
This dialog contains all of the surface layers currently present in your map project. Select a surface from the dropdown list box and click [Ok] to create the cross section. Be sure to select a surface layer that covers the full extent of the cross section line. Leave this dialog blank if you do not wish to use a surface layer.

### 15.3.2 Geology Layer Interpretations

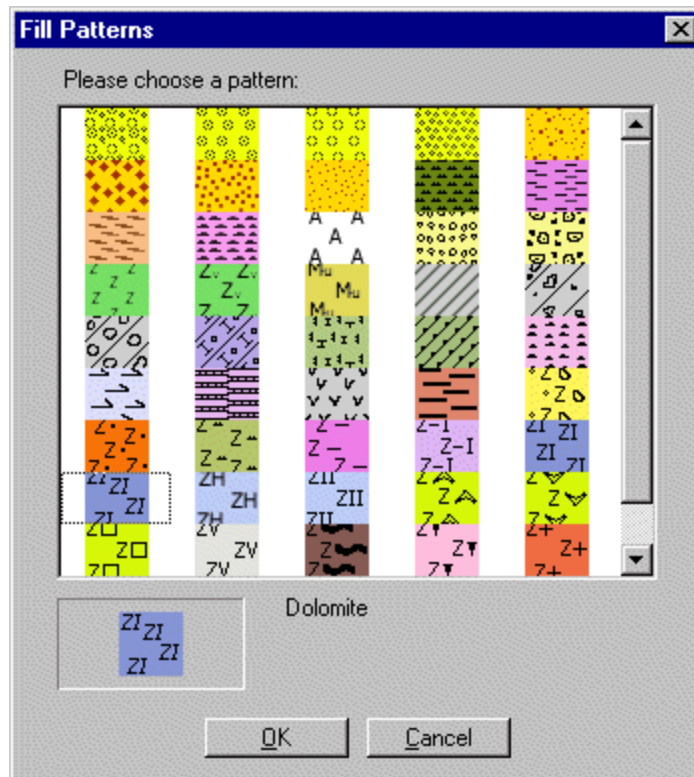
This option allows for drawing interpretation layers that assist in defining the geology (sand, clay, till, bedrock, etc) at the site. To draw Geologic interpretation layers, the polygon draw tool must be used, and the polygon must be digitized manually using the mouse.

Follow the directions below:

- Activate (make it editable) the Geology interpretation from the layer manager;
- Select the  (Polygon) button from the toolbar
- Place the mouse cursor at the desired location of the first vertex of the intended geology layer;
- Click once on the left mouse button to add a vertex and start digitizing the polygon in the desired direction;
- Add more vertices by clicking on the left mouse button at desired locations. Move the mouse cursor to an interval on a desired station; the mouse cursor will snap the vertex of the polygon to the nearest station interval. A vertex can also be added anywhere on the cross section by clicking on the left mouse button.
- Double click anywhere on the cross section using the left mouse button to close the polygon; the following dialog will appear:



- In the dialog that appears, enter a Name for the layer, a brief Description, and select a soil Pattern. If the geologic layer you have just digitized in the current cross section has already been created, you may select it from the list, instead of typing a new name. Click on the blank area beside Pattern to load the pattern options, as shown below:



- Select a pattern, then click [OK]




Repeat the same sequence of operations for other layers within the active cross section. The result will be a layered structure of the geological domain. The cross section may contain some gaps where polygons do not completely touch adjacent polygons; this can be easily fixed by selecting a vertex on a polygon, and using the pointer tool to re-position the vertex. Alternately, gaps between polygons can be filled by using the Link Vertex option. These options are explained below.

Once a layer is created in one cross section, it will be available for selection in all other cross sections that you might have for your project. Altering the properties of a given layer will be reflected in all cross sections.


### Editing Layers


Once the interpretation layers are drawn, it may be necessary to modify the positions of one or more vertices, or fill in the gaps between any two adjacent layers, to create a continuous layered structure.

To move a vertex,

Select the  (pointer) tool from the toolbar  
Click on one of the vertices of the polygon  
Drag the vertex to a new location.

To add a vertex,

Select the  (pointer) tool from the toolbar  
Click once anywhere on the polygon to activate the object

Select the  (Add Vertex) tool from the toolbar  
Place the mouse cursor at the desired location; the mouse cursor will change to a pen

Click once with the left mouse button at this location to add a vertex

Geologic interpretation layers can have a free form, and do not have to conform to a conceptual model (e.g. a sand layer may appear more than once in an individual cross section). Layers may not have to continue from first to last borehole.

However, to have a meaningful view of your cross sections in the Scene Viewer, you must avoid creating overlapping interpretation layers.

When defining Geologic interpretation layers, there is an option to snap the vertices of one polygon to adjacent polygons. For instance, if after drawing polygons and the cross section still contains gaps, the gaps may be filled in by linking the vertices of the polygons, using the Link Vertex option.

To use this option, please refer to the ["Link Vertex"](#) in the Edit menu.

**NOTE:** Moving a vertex of a selected polygon will also move the linked vertex of any polygons (or lines) that might have been linked through the "Link Vertices" operation.

### 15.3.3 Hydrogeologic Layer Interpretations

This option allows for drawing layers that define the hydrogeologic layers (Aquifer1, Aquitard1, Upper Unconfined Aquifer, etc.) based on relevant data in the stations that are displayed in a cross section. The hydrogeologic layers must be drawn using the polygon tool.

The procedure for drawing and editing these layers is identical to drawing geologic layers, as explained above.

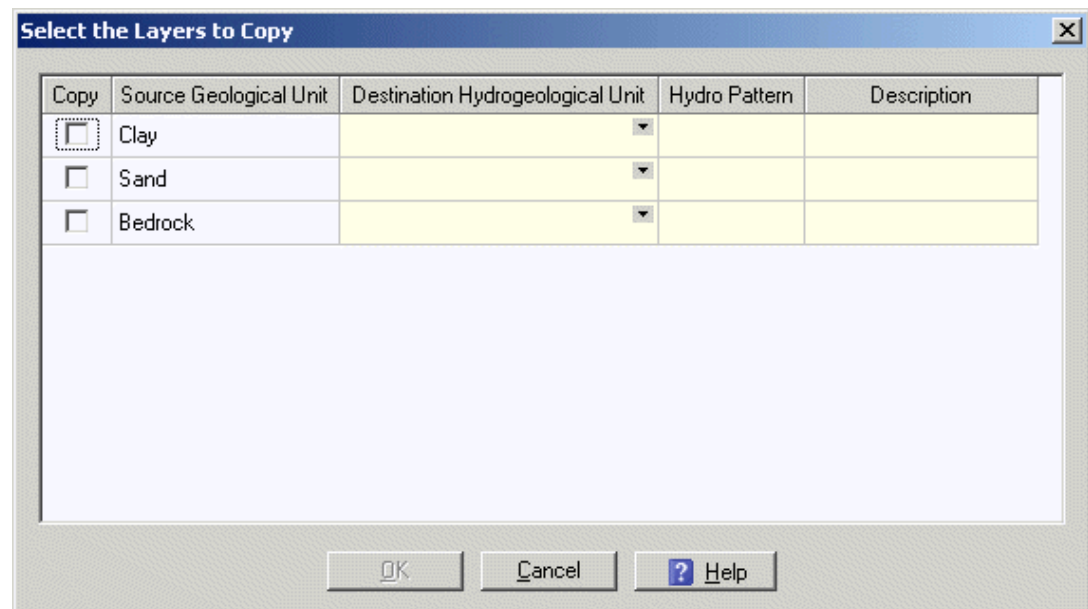
The position of the hydrogeologic interpretation layers may be defined based on the position of any Geological interpretations that may already be available.

#### Translating Geology Interpretations into Hydrogeology Interpretations

A hydrostratigraphic unit will generally include one or several geologic layers and the boundaries of a hydrostratigraphic unit will usually conform with the boundaries of the geologic layers. As such, you can copy one or more of your geologic interpretation layers and use them as a startup for hydrogeologic interpretation layers.

To do so:

Select the Hydrogeology option from the Layer Manager, to make this layer visible. Right mouse click on this interpretation layer, and select Copy from Geologic Layers, and the following dialog will appear:



In this dialog, select one or more geologic interpretation layers to copy. For each layer to be copied, provide the name, pattern and description of the corresponding hydrogeologic interpretation layer (Aquifer or Aquitard).

Once this is complete, the cross section editor draws the selected hydrogeologic interpretation layers.

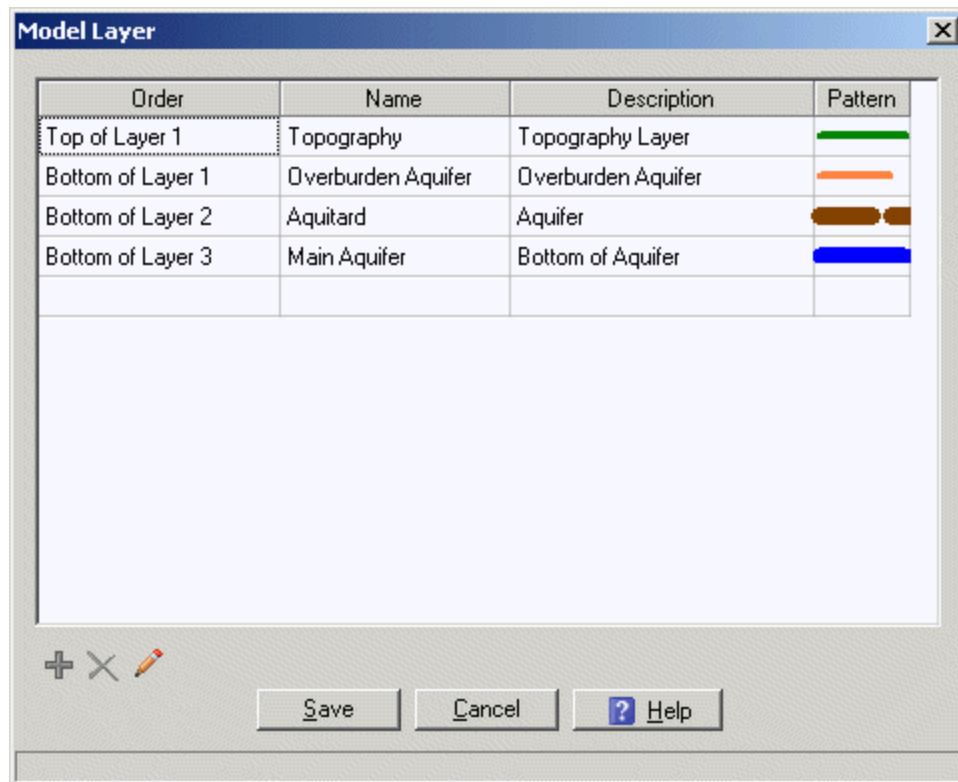
### 15.3.4 Model Layer Interpretations

This option allows for defining the unique model layers (Model Layer 1, Model Layer 2, etc.) for the displayed stations. Model layers can be used for numerical groundwater flow models, or for general purposes. The layer positions for model layers must be drawn in manually with the mouse, using the Line tool.

#### 15.3.4.1 Defining Model Layers

Before drawing model layers, the layer attributes must first be defined.

To do so,  
Select Tools > Model Layers from the main menu  
This will load the Model Layers dialog as shown below.



In this dialog, you can specify the total number of model layers, and set properties for each layer. In addition, the layers can be numbered in a particular order. Layers will be numbered starting with 1 for the top most layer and increase with depth. The top most layer represents the top surface for the first layer while the bottom most layer represents the bottom surface of the last layer. (i.e. each model line defines the bottom of the model layer). Once the layers have been defined, additional layers may be inserted at any location, at any time.


### 15.3.4.2 Drawing Model Interpretation Layers

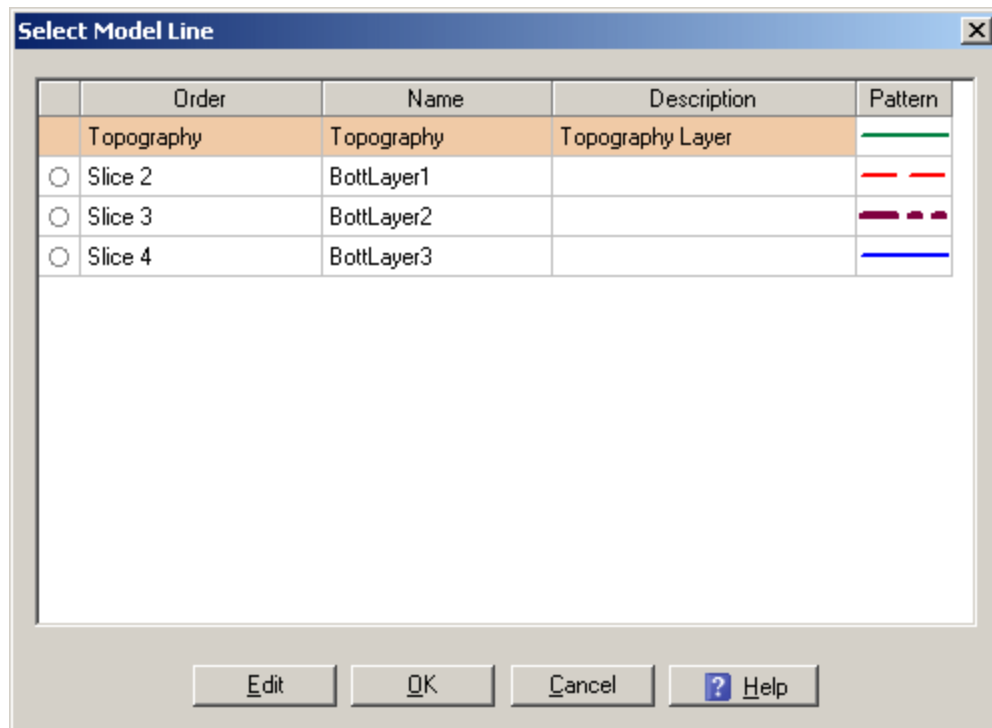
Before starting to draw model interpretation layers, please ensure that you have defined the model layer settings explained in the previous section.

You will see that the top of layer 1 (ground surface) is drawn in automatically for each new cross section. This layer can be modified by moving it through its existing vertices, adding new vertices at desired locations or deleting existing vertices.

To draw model layers, follow the directions below:

Activate the Model Interpretation Layer in the Layer Manager;

Select the Line draw button  from the toolbar. As soon as this option is selected, the following Model Layers dialog will appear



In this dialog, choose the desired model layer by selecting the radio button from the first column in this grid. Each model layer may be selected and assigned only once. Interpretation layers that are already drawn in the cross section are colored in orange and are not selectable.

Click [OK] to continue

Place the mouse cursor at the left boundary at the desired depth of the intended model layer; when the mouse cursor becomes close enough to the boundary line, the cursor will snap to the boundary.

Click once on the left boundary to add a vertex at this location, and start the line. Slowly move the mouse cursor (to the right) across the cross section to the interval in the first station which represents the model layer. When the cursor is within the specified buffer distance from the station's lithology interval, snapping will be activated.

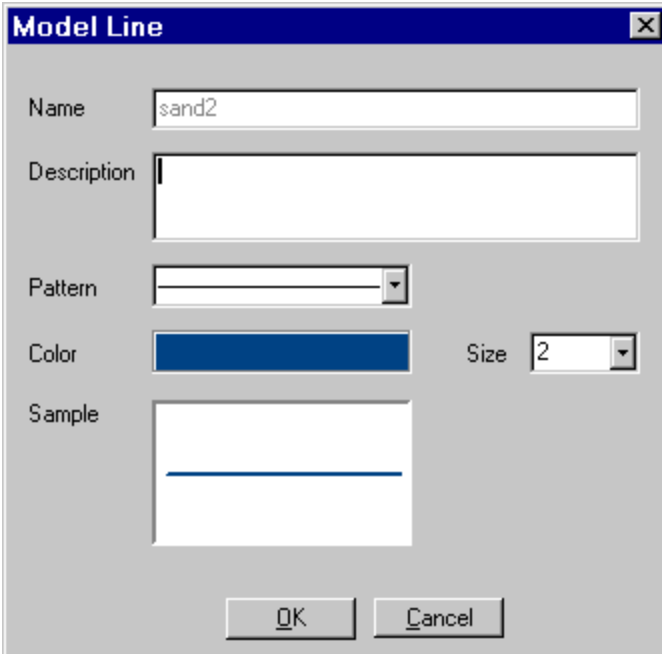
With a left mouse click, add a vertex at desired and appropriate locations both within and outside station intervals.

Continue to move the mouse cursor across the cross section, using the left mouse button at each station to add a vertex at the desired location for the model layer.

At the right cross section boundary, click once more with the left mouse button to add a vertex and complete the line; when the mouse cursor becomes close enough to the boundary line, the line will snap to the boundary. The selected model line will be drawn at the specified location.

**NOTE:** The model line is drawn using the attributes that were defined for it at the time it was created. Most attributes of a model interpretation layer can be modified by right-clicking on the desired model interpretation layer and choosing Properties from the pop-up menu.

A dialog similar to that shown below will appear.



The image shows a dialog box titled "Model Line". It has a standard Windows-style title bar with a close button (X). The dialog contains the following elements:

- Name:** A text input field containing "sand2".
- Description:** A large empty text area.
- Pattern:** A dropdown menu with a small arrow on the right.
- Color:** A color swatch showing a solid blue color.
- Size:** A dropdown menu showing the value "2".
- Sample:** A preview area showing a horizontal blue line.
- Buttons:** "OK" and "Cancel" buttons at the bottom.

Provide a Description, Line Style, Line Color, Fill Pattern for the model interpretation layer; the Name for the layer cannot be modified, as the name is defined in the Model Layer Options dialog.

Click [OK] to close the dialog.

Once this is finished, repeat the same sequence of operations for other model layers within the cross section domain.

### **Restrictions on Model Layers**

The following restrictions apply when drawing model interpretation layers:

- The model layer line must start at the left boundary and end at the right boundary.
  - The line must be drawn from left to right, and may not go backwards (i.e. no vertices can be drawn left of a previously drawn vertex.)
  - Model layer lines cannot intersect each other.
  - Model layers need to be drawn in the order they are created. For instance the bottom of model layer 3 can not be drawn between model layers one and two.
- 

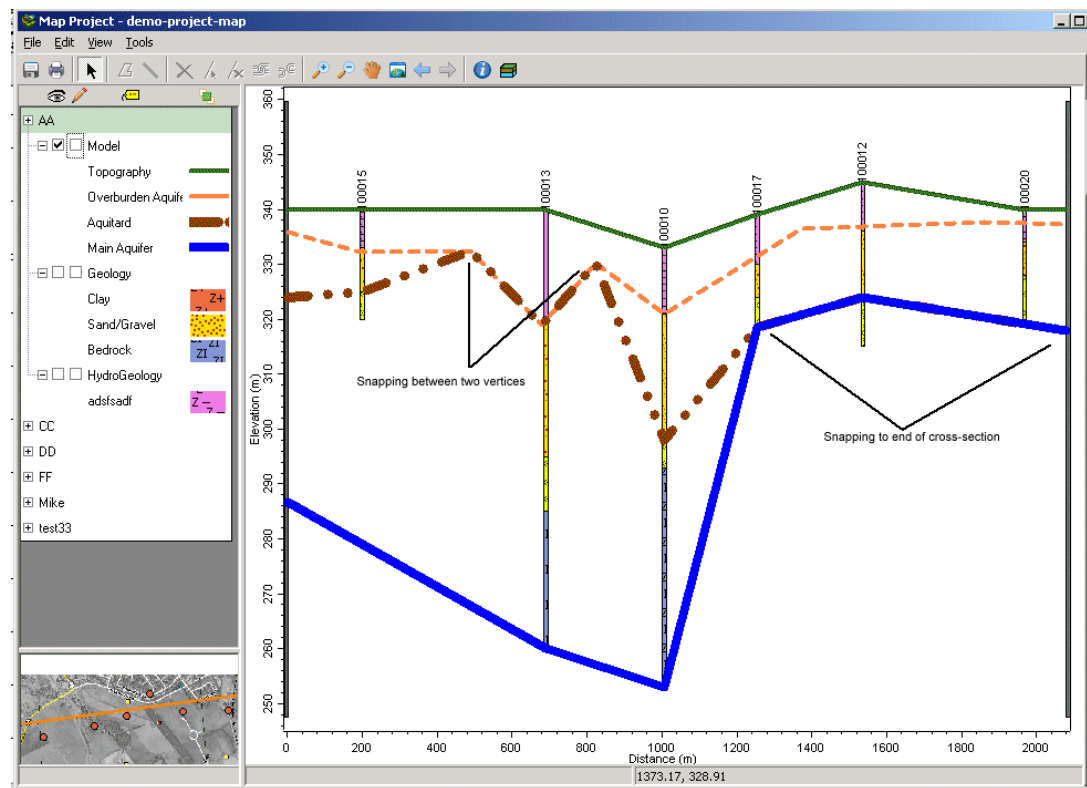
#### **15.3.4.3 Snapping Vertices to Other Model Layer Lines**

While drawing a model layer interpretation line, it is possible to snap to part of, or all of, the vertices of an already drawn model layer line. This can be helpful for defining geologic layers that pinch out (i.e. have zero thickness in some parts of the site).

#### **Snapping between two selected vertices**

Whenever a model layer line is drawn, and the vertex of the line is within the buffer for a vertex of an adjacent model layer line, a blue box will appear outlining the vertex on the adjacent line. If the mouse is clicked on this vertex, the vertex will snap to the existing vertex. The line vertex will change to an orange color to indicate the vertex is linked (shared) between the two model layer lines. You can link to as many vertices as desired by repeating the above step.

However, if snapping to a series of consecutive vertices is desired, you may click on the first and the last desired vertices. The cross section editor will create the necessary number of vertices on the model layer line being drawn and link them to their respective vertices. For instance, if there are five vertices on the existing model line layer between the selected first and last vertices, six vertices will be created on the current model layer line. Linked vertices will move together, and can be separated if needed. The following figure depicts an example of a model layer pinching out around the middle of the cross section.



### Snapping to the end of the cross-section line

If the model layer pinches out from any given point on the cross section to the end of the cross-section line, the cross-section editor can draw the model line from that given point on for you. To do this, double-click on the first vertex. The model line will automatically be created for you. See the bottom most layer in the figure above.


In this example, the model layer pinches out at the right side of the cross section.

#### 15.3.4.4 Editing Model Layers


### Editing Model Layers


Once the model interpretation layer lines are drawn, it may be necessary to modify the positions of one or more vertices or add more vertices.

#### To move a vertex,

- Select the  (Pointer) tool from the toolbar
- Click once on the desired model layer line to activate
- Click on the vertices to be moved
- Drag the vertex to a new location.

#### To add a vertex,

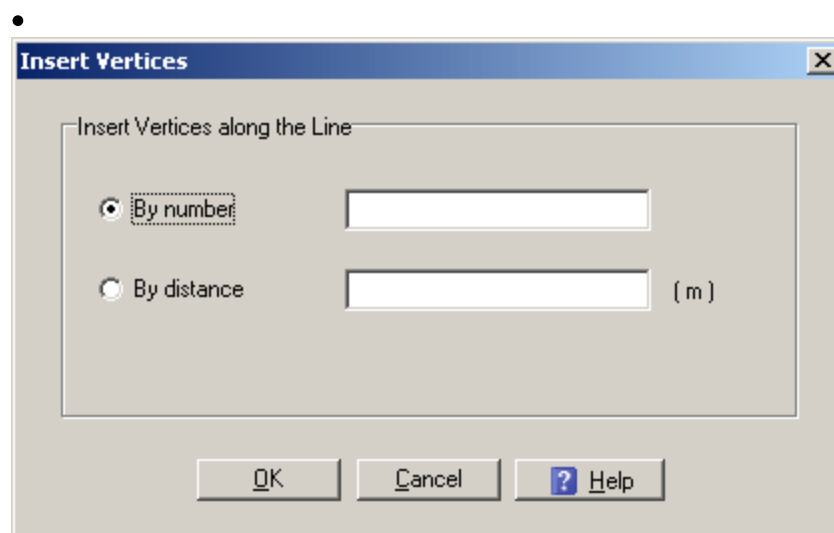
- Select the  (Pointer) tool from the toolbar
- Click once anywhere on the line to activate the line

- Select the  (Add Vertex) tool from the toolbar
- Place the mouse cursor at the desired location on the line; the mouse cursor will change to a pen;
- Click once with the left mouse button at this location to add a vertex

### Adding Multiple Vertices

To insert multiple vertices along a model line, follow the steps below:

- From the layer manager panel, enable edit mode for the Model interpretation layers.
- Select a model interpretation line from the cross section.
- Right-click the line and select Insert Vertices along Line. The following dialog will display:



You can insert multiple vertices in one of the following two ways:

- By number: inserts a specified number of vertices along the model line, at regularly spaced intervals.
- By distance: inserts a vertex at a specified distance interval (e.g every 50 metres), along the entire model line.

Select the desired method, specify a value and click [Ok] to insert the vertices. Other properties of model layers (such as name, pattern and description) can be edited by using the Tools > Model Layers menu option described in the ["Model Layers"](#).

### 15.3.5 Remove Stations from Cross Sections

When working with a cross section in the Cross Section tab, one or more stations can be removed from the cross section line by right-clicking on the cross section and selecting the Remove Stations option. Then simply click on a station to remove it from the cross section. Stations can also be added to/removed from a cross section line in the Map tab, as described in [Defining a Cross Section Line](#).



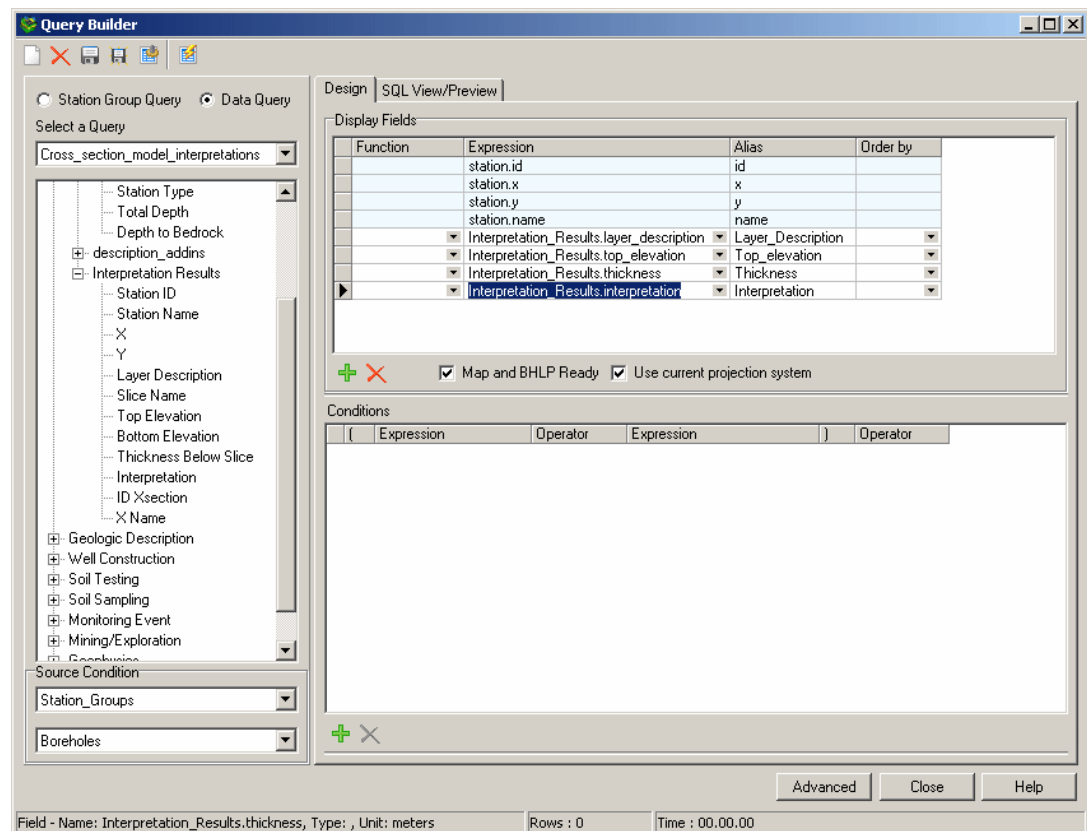
## 15.4 Querying Cross Section Interpretations

In earlier versions of HGA, the cross section interpretations were saved in shapefiles and along the cross-section line. The cross section editor now saves the interpretation results to the database, for various uses including:

- displaying the results of each interpretation in HGA
- querying the interpretation table for any desired surface(s) or thickness data, that can be used for groundwater modeling applications

The final interpretation results may be queried for information such as layer thickness at selected station(s), top elevation(s), bottom elevation(s), layer type, name and description.

When you create a Data Query in the Query Builder, and expand the Description data category, you will see the Interpretation Results table, as shown below:



The Interpretation Results table is read-only (also known as a View), and stores data from the cross section interpretations. By default, the following fields are included:

- Station ID
- Station Name
- X (using project coordinates)
- Y (using project coordinates)
- Slice Name

- Layer Description
- Top Elevation
- Thickness Below Slice
- Interpretation type

Simply select the desired fields from the tree view, and move these into the Display Fields, or Conditions as required. When you are finished, Generate and Execute the query. An example of the results is shown in the screenshot below.

The screenshot shows the Query Builder window with the following SQL query:

```
SELECT station.id AS id, station.x AS x, station.y AS y, station.name AS name, Interpretation_Results.layer AS Layer_Name,
Interpretation_Results.TOP_elevation AS Top_elevation, Interpretation_Results.thickness AS Thickness, Interpretation_Results.interpretation AS Interpretation
FROM ( Station RIGHT JOIN SStation ON Station.ID = SStation.SID ) LEFT JOIN [interpretation_results] ON (Station.id = interpretation_results.Station) WHERE
SStation.ID=2
```

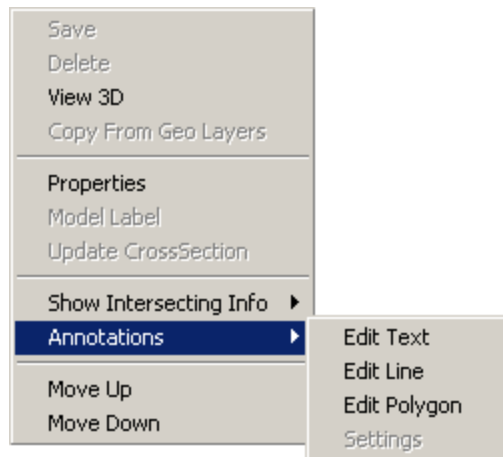
The results table is as follows:

id	x	y	name	Layer_Name	Top_elevation	Thickness	Interpretation
24	293844946	1108770147	GB-01	Topography	323.500000072527	52.00000001512	Model
24	293844946	1108770147	GB-01	Bott.Layer1	271.500000057407	0	Model
24	293844946	1108770147	GB-01	Bott.Layer2	271.500000057407	48.000000070855	Model
24	293844946	1108770147	GB-01	Bott.Layer3	223.499999986552	1.499999986517	Model
24	293844946	1108770147	GB-01	Medium Sand	316.999999908833	19.9999999363255	Geology
24	293844946	1108770147	GB-01	Gravel	297.499999972507	25.9999999151006	Geology
24	293844946	1108770147	GB-01	Coarse Gravel	323.500000072527	6.500000016369393	Geology
24	293844946	1108770147	GB-01	Fine Sand	271.500000057407	17.0000000867341	Geology
24	293844946	1108770147	GB-01	Silt	254.499999970673	30.999999984121	Geology
24	293844946	1108770147	GB-01	upper aquifer	323.500000072527	6.500000016369393	Hydrogeology
24	293844946	1108770147	GB-01	lower aquifer	271.500000057407	17.0000000867341	Hydrogeology
25	1204770644	936676091	GB-02	Topography	325.999999922118	47.999999985963	Model
25	1204770644	936676091	GB-02	Bott.Layer1	278.000000036182	46.000000002631	Model
25	1204770644	936676091	GB-02	Bott.Layer2	278.000000036182	0	Model
25	1204770644	936676091	GB-02	Bott.Layer3	232.000000029919	10.0000000299187	Model
25	1204770644	936676091	GB-02	Medium Sand	321.999999977853	12.999999957503	Geology
25	1204770644	936676091	GB-02	Gravel	309.000000020303	30.999999984121	Geology
25	1204770644	936676091	GB-02	Coarse Gravel	325.999999922118	3.99999994426497	Geology
25	1204770644	936676091	GB-02	Fine Sand	278.000000036182	18.0000000265706	Geology
25	1204770644	936676091	GB-02	Silt	260.000000009611	27.9999999796925	Geology
25	1204770644	936676091	GB-02	Sand	232.000000029919	6.0000000088686	Geology
25	1204770644	936676091	GB-02	upper aquifer	325.999999922118	3.99999994426497	Hydrogeology
25	1204770644	936676091	GB-02	lower aquifer	278.000000036182	18.0000000265706	Hydrogeology
26	871233061	774674142	GB-03				
27	324895205	333321587	GB-04	Topography	321.999999977853	24.0000000354275	Model
27	324895205	333321587	GB-04	Bott.Layer1	297.999999942426	9.00000001328527	Model
27	324895205	333321587	GB-04	Bott.Layer2	288.99999992914	46.9999999460998	Model
27	324895205	333321587	GB-04	Bott.Layer3	241.999999983041	19.999999930406	Model
27	324895205	333321587	GB-04	Coarse Gravel	321.999999977853	7.999999988853	Geology
27	324895205	333321587	GB-04	Fine Sand	314.000000089323	16.00000001468975	Geology
27	324895205	333321587	GB-04	Silt	268.00000008306	26.00000001000194	Geology
27	324895205	333321587	GB-04	Clay	297.999999942426	9.00000001328527	Geology

For more details on using the Query Builder, please see [Query Builder](#) section .

## 15.5 Adding Annotations to the Cross Section

Text labels, lines, and shapes can be added to any layer in the cross section. To add annotations, you must select the layer, but NOT make it active (i.e. do not check the active (edit) check box). Once the layer has been selected, right-click and select Annotations from the list of options. The Edit options shown in the following screenshot can be used to add, edit, and delete text, lines, and polygons.




To add an annotation, select the appropriate option from the list to enter Edit mode, then click the corresponding button from the toolbar. You can then use your mouse to select the location to add your annotation. After adding an annotation, you will need to click on the corresponding button again to add another annotation of the same type.

**NOTE:** If you are adding/editing/deleting one annotation type, you must right-click on the selected layer and either switch between annotation types, or de-select the current annotation type, otherwise you will remain in Edit mode for the selected annotation type. Upon deselecting/switching annotation types, you will be prompted to save your changes.

### Add Text

To add text:

Select the Edit Text option from the pop-up menu.

Click on the  Text button on the toolbar

Click on the desired text location in the cross section window

Enter the text in the Input text window that appears.

Once a text box has been created, it can be moved by clicking-and-dragging, or edited by double-clicking on the existing text. Text can be deleted by right-clicking on a text box and selecting the Delete option. All text added to a layer can be deleted by right-clicking and selecting the Delete-All option.

### Add Lines

To add Lines:

Select the Edit Lines option from the pop-up menu


Click on the  Draw Line button on the toolbar

Click once on the desired line location in the cross section window, and simply drag and click to create a line with several vertices.

A vertex can be added to an existing line by right-clicking on a line and selecting the Add vertex option. A line can be deleted by right-clicking on a line and selecting the Delete option. All lines added to a layer can be deleted by right-clicking and selecting the Delete-All option.

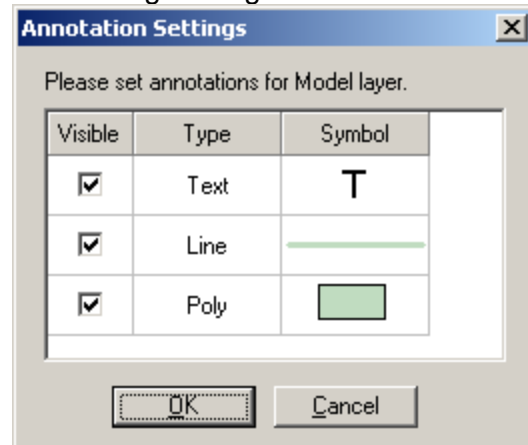
## Add Polygons

To add polygons or rectangles,  
Select the Edit Polygons option from the pop-up menu

Click on the  Draw Polygon or Rectangle buttons on the toolbar  
Insert the mouse cursor at the desired location  
Click-and-drag the mouse to create the desired shape (double-click in the case of a polygon to finalize the shape).

## Settings

The Settings dialog for Annotations is displayed below:



For each Annotation type, you may show/hide using the Visible check box, or edit the display properties by clicking on the preview in the Symbol column. You can modify the standard properties for Text, Line and Polygons.

To save the annotation changes you have made, you can either deselect/switch annotation types, or click the Save button from the button bar.


## 15.6 Limitations

Although the cross section component currently allows creating complex, overlapping, zig-zagging interpretations, these types of interpretations are not suitable for the purpose of saving (and later querying) in the database. As such, the following rules/limitations are enforced to avoid saving such results in the database:

- A given layer may not be allowed to intersect a given station more than twice. When this rule is violated, HGA will consider the two top-most intersection points as defining the layer
- All layers in a cross section must be uniquely identified by the layer name. HGA may pick the top most layer and ignore all other layers with the same name.
- If a station is removed from a cross section, related saved interpretations (contacts) are removed as long as this station is not involved in any other cross sections;

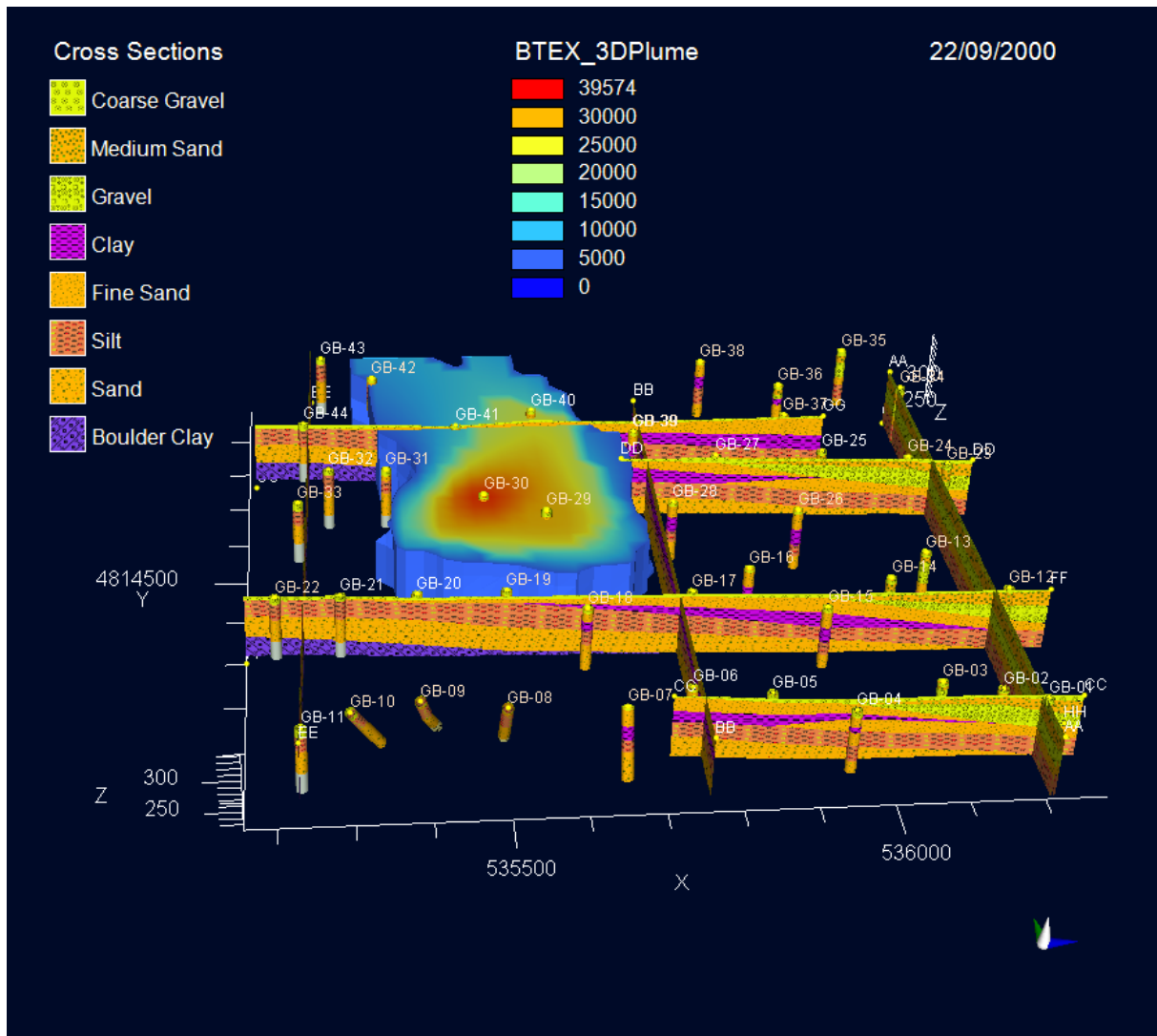
- 
- If a layer is deleted from a cross section, all related interpretations (contacts) are removed from all stations that are involved in the cross section as long as this layer does not appear in another cross section for any of the stations involved in the current cross section;
  - If a given well appears in more than one cross section, interpretation results are updated with interpretations from the cross section that is last updated.
-

## 16 Scene Viewer

The Scene Viewer allows you to visualize your data in 3D space to get a better understanding of your entire project. Launch it by selecting the  button in the main toolbar and it will launch as a tab. Unlike other modules in HGA you are able to launch multiple scene viewers at once - so you can visualize multiple scenes at once.

Data you can load:

- [Station Groups](#)
- [Cross Sections](#)
- [Plumes](#)
- [DXF files](#)
- [Image files](#)
- [Shape Files](#)
- [Surfaces](#)

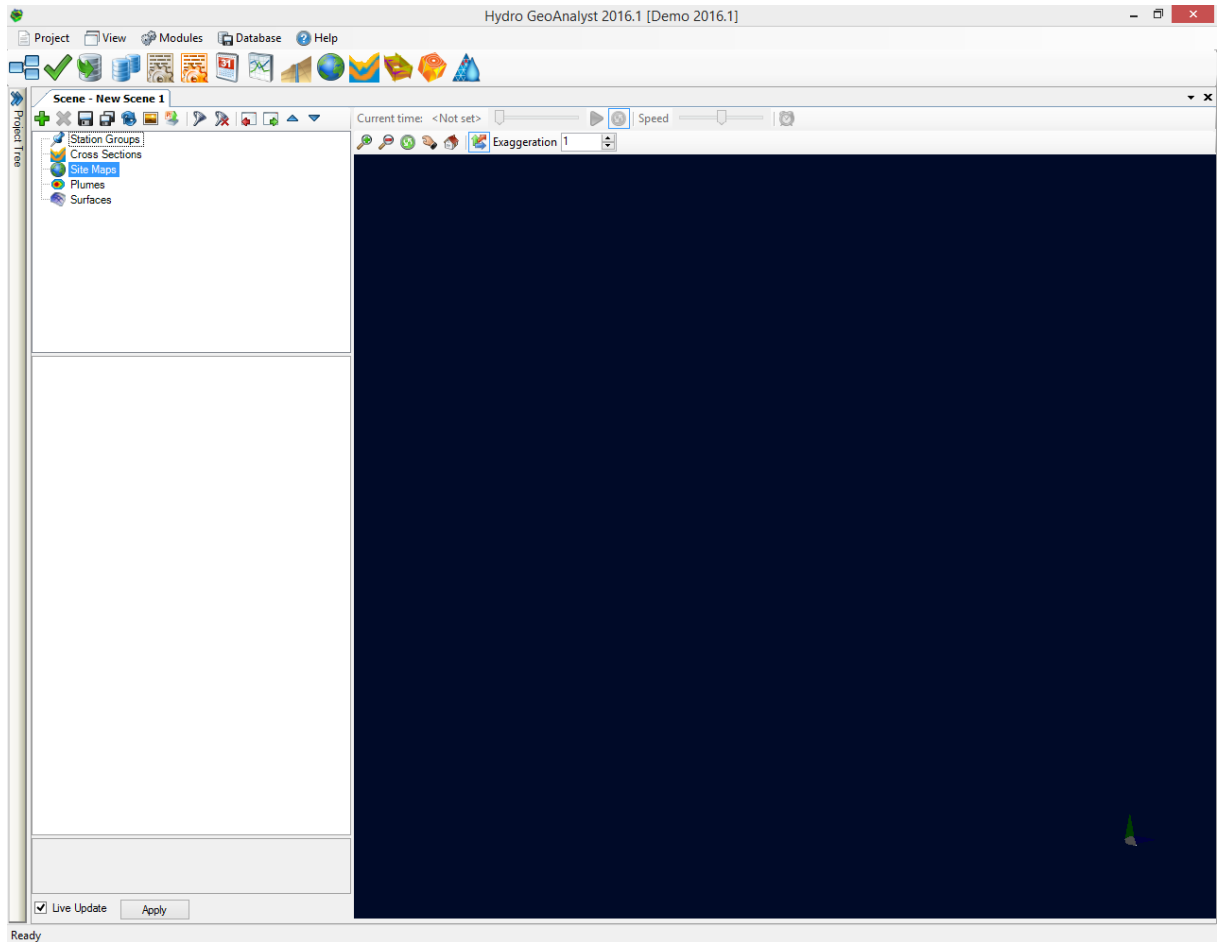


If you previously had 3D Views saved in your project they will be updated to Scenes when you open your project in Hydro GeoAnalyst 2016 or later.













Your Cross Sections will not be dynamic - meaning they will show you the most up to date information in the database - as opposed to the static view they were previously in the 3D Explorer.

## 16.1 Scene Viewer Interface


When you launch a new scene in the Scene Viewer it will appear empty and ready for you to add data to it.









You will find the following options in the toolbar above the Scene tree:

-  provides you with options for adding data to the scene
-  allows you to delete the selected item from the scene
-  lets you save the scene so it can be recalled later
-  lets you save the current scene with a new name
-  allows you to save the current scene as an image file (\*.bmp)
-  allows you to print the current scene to a Power Point template
-  allows you to refresh the Scene tree
-  allows you to filter for anything in the Scene tree - simply start typing the name of the item you are looking for
-  allows you to clear the filter on the Scene tree
-  allows you to dock the Scene tree on the left
-  allows you to dock the Scene tree on the right
-  allows you to collapse all branches in the Scene tree



-  allows you to expand all branches in the Scene tree

There are additional options available in the toolbar above the Scene:



-  allows you to zoom in
-  allows you to zoom out
-  lets you rotate on the axes within the scene
-  lets you pan within the scene
-  resets the view back to home
-  allows you to show or hide the axes within the scene

You also have the option to adjust the vertical exaggeration of the scene


Exaggeration

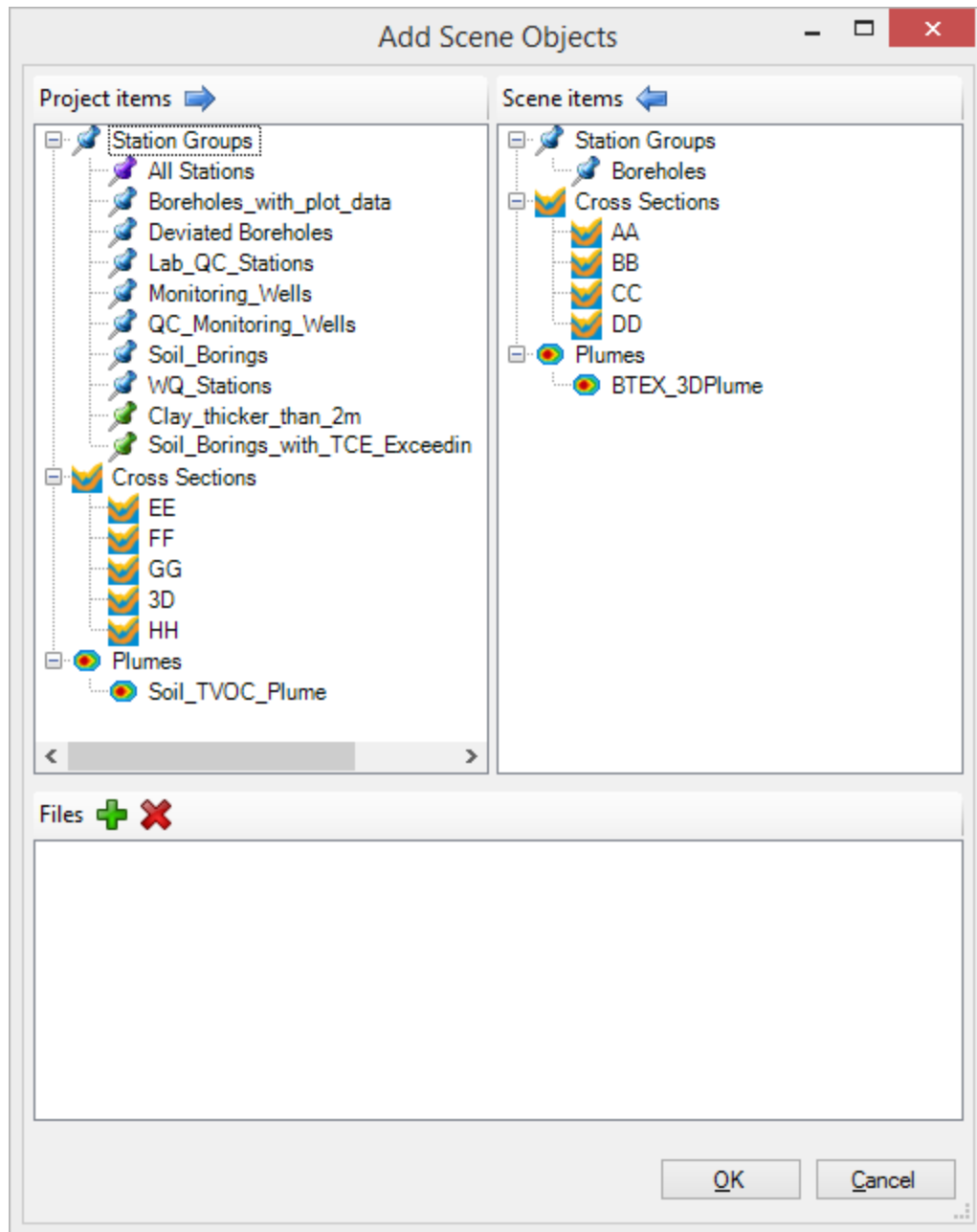
Once you have loaded a plume into the scene you will find additional options available in the toolbar above the scene:

There are sliders for both the current time as well as the speed option

-  allows you to play the plume in a continuous loop
-  provides options for time settings including the start and end dates as well as label options

## 16.2 Adding Data to a Scene

Once you have opened/create a new scene you will want to add data into it. You can drag and drop your Station Groups or Cross Sections (one at a time) from the Project Tree into the scene. Or you can use the  button to add multiple items at once.




This dialog allows you to add project items like Station Groups, Cross Sections, and Plumes in the top half of the dialog.

Double clicking on an item will move it from the Project Items over to the Scene Items. You can also use the blue arrows (➡ or ⬅).

In the bottom half of the dialog you can add external files like:

- DXF files (\*.dxf)
- Surface files (\*.asc, \*.txt, \*.grd, \*.dem)

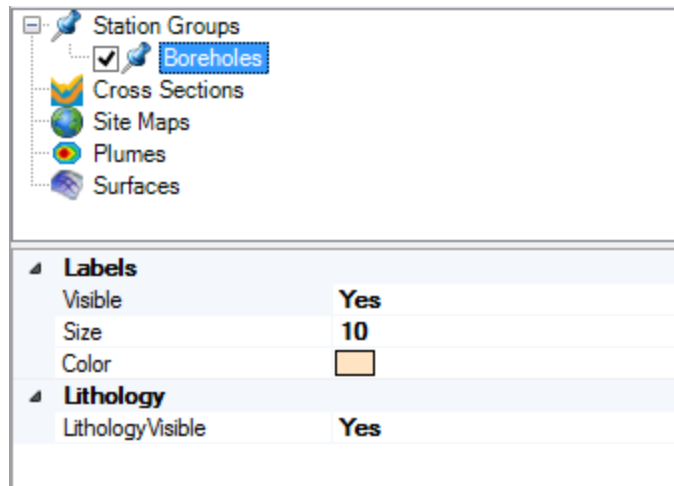
- Image files (\*.bmp, \*.tif, \*.jpg, \*.png)
- Shape files (\*.shp)

You can add multiple external files by selecting the  and browsing to them. Select multiple files at once and they will all be added to the dialog and then to the scene when you select OK.

- [Station Groups](#)
- [Cross Sections](#)
- [Plumes](#)
- [DXF files](#)
- [Image files](#)
- [Shape Files](#)
- [Surfaces](#)

### 16.2.1 Station Groups

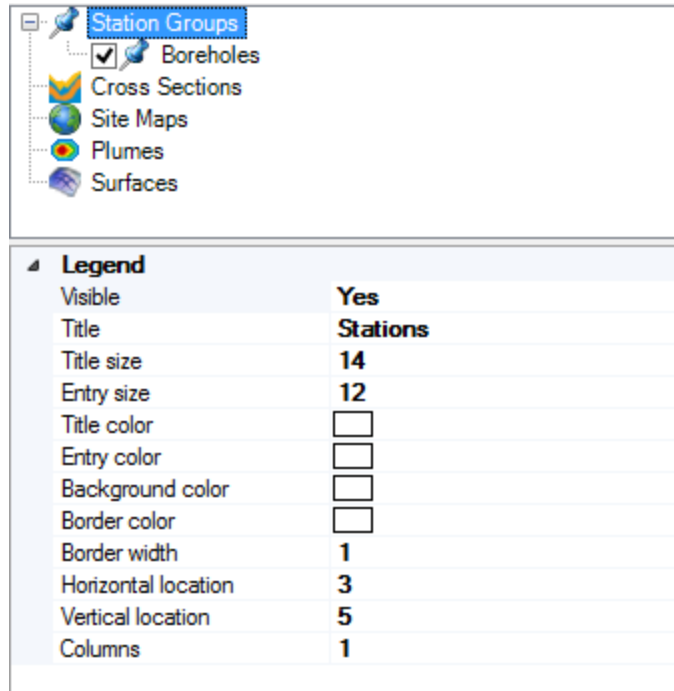
When you load a station group into a scene an item will be placed into the Scene tree under the Stations Groups branch and this is where you can access the settings for how that particular Station Group is displayed in the scene.



These settings include whether or not to show labels (station names) the size and colour of the labels as well as an option to show the Lithology of the stations (based on the soil type field in the Lithology table (Geologic Description category) and the Material Specification set for the project).

Angled or deviated stations can be displayed in the Scene - the inclination and azimuth are taken from the Drilling Protocol table (Well Construction category) to display these wells.

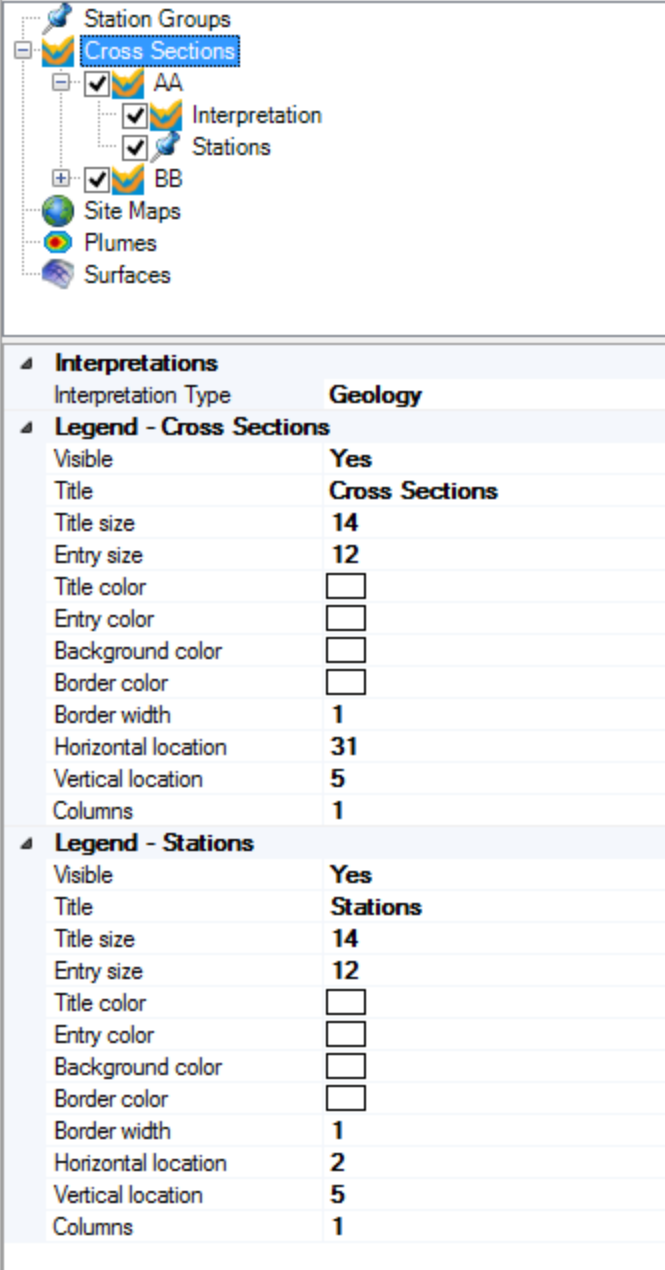
The settings for the legend for ALL Station Groups loaded into the scene will be found by selecting the Station Groups branch of the Scene tree.



These settings include whether or not the legend is visible as well as the size of the items in the legend background colour and location of the legend in the scene. The location can be adjusted using the Horizontal location and Vertical location settings by entering values between 0 - 100 as a percentage of the Scene window.

### 16.2.2 Cross Sections

When you load a Cross Section into a scene a node will be added under the Cross Sections branch of the Scene tree for each cross section. The main Cross Sections branch of the scene gives you access to the Interpretation type setting as well as the settings for the Legends. When you load a Cross Section into a scene you will notice there are 2 legends. One for the Cross Sections (interpretations) and one for the Stations.



Interpretations	
Interpretation Type	<b>Geology</b>
Legend - Cross Sections	
Visible	<b>Yes</b>
Title	<b>Cross Sections</b>
Title size	<b>14</b>
Entry size	<b>12</b>
Title color	<input type="text"/>
Entry color	<input type="text"/>
Background color	<input type="text"/>
Border color	<input type="text"/>
Border width	<b>1</b>
Horizontal location	<b>31</b>
Vertical location	<b>5</b>
Columns	<b>1</b>
Legend - Stations	
Visible	<b>Yes</b>
Title	<b>Stations</b>
Title size	<b>14</b>
Entry size	<b>12</b>
Title color	<input type="text"/>
Entry color	<input type="text"/>
Background color	<input type="text"/>
Border color	<input type="text"/>
Border width	<b>1</b>
Horizontal location	<b>2</b>
Vertical location	<b>5</b>
Columns	<b>1</b>

The Legend for the Cross Sections displays the material images that were used for the interpretation of the cross section. While the Legend for the stations displays the soil type images for the stations that are used in the cross sections. The legend for the stations of the cross section are combined with the legend for any Station Groups that have been loaded into the scene.

The interpretation type can be adjusted to display any of the available interpretations done for the cross sections - **Geology**, **Hydrogeology** or **Model**.

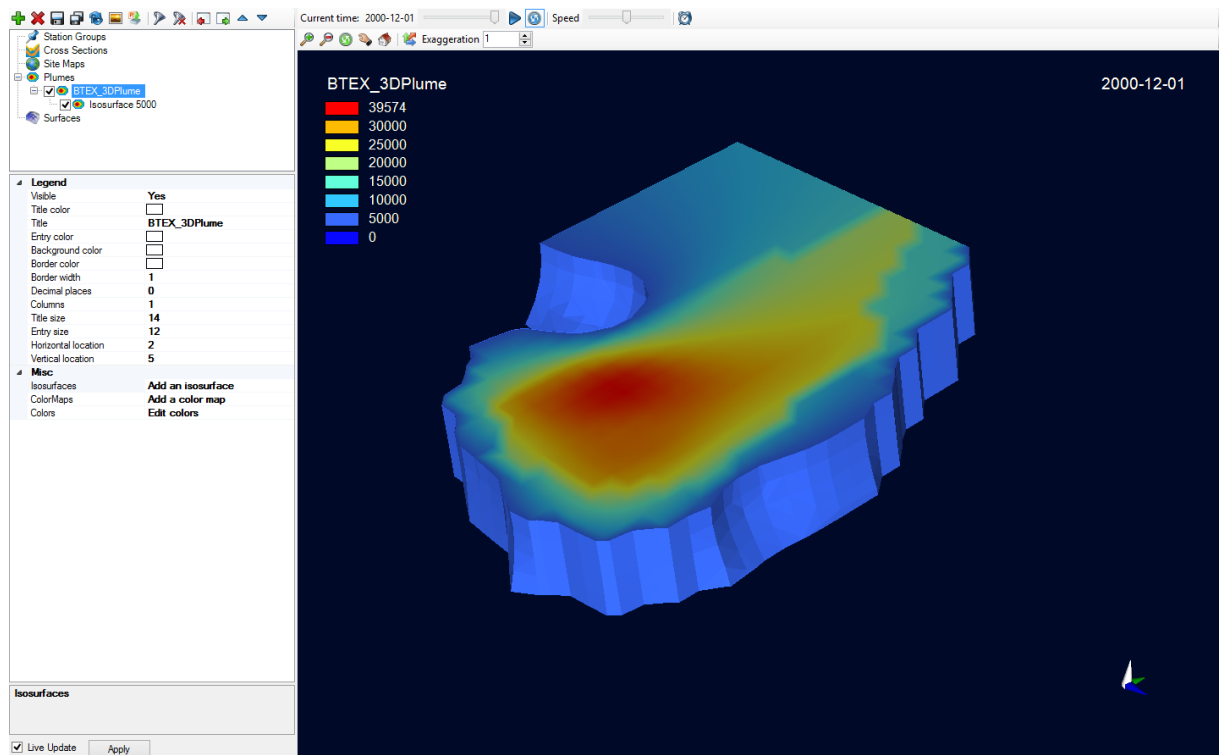
The settings for the legends include the title, size of the legend entries, text color, background color, etc. Also the location of the legend can be adjusted using the Horizontal location and Vertical location settings by entering values between 0 - 100 as a percentage of the Scene window.

When you load a cross section you will be able to toggle the stations and the interpretations on and off with the check box for each of these items as they are sub nodes for each cross section.

And you can turn the entire cross section off by using the visibility check box beside the name of the cross section.

### 16.2.3 Plumes

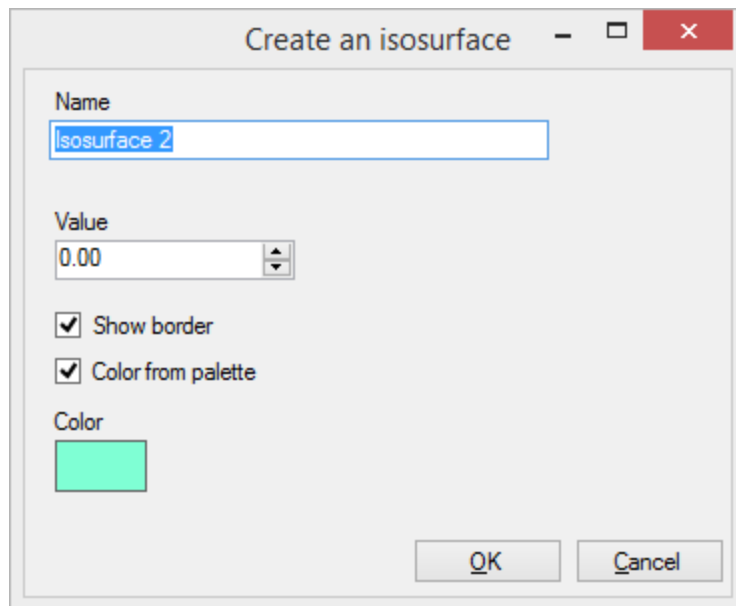
You can load one or more plumes into a scene. Each plume will have its own node under the Plumes branch of the scene tree. By default when you load a plume an isosurface will be created and loaded for this plume. Here for example is the BTEX plume from the Demo Project.



When you select the name of the plume in the scene tree you will find the settings for the Legend including the title, color, entry size and location. As well as the options to add Isosurfaces and color maps.

Additionally you have options to edit the default color scheme that has been generated for the plume.

When selecting to add an isosurface you will simple need to provide a name and a value and then you can select the color for the isosurface - or by default the color from palette will be selected. This means depending on the value you enter for the isosurface - the appropriate color will be selected.



The Show border option when selecting will mean that the isosurface is shown as a continuous object even when it extends outside the bounds of the grid using during the creation of the plume.

You can add as many isosurfaces as you would like to the scene. Once you have created an isosurface these same settings can be found by selecting the isosurface sub node on the scene tree. You will also find an estimate of the volume of the isosurface in the settings.

When selecting the add a colormap you will have several options.

The screenshot shows the 'Add Color Map' dialog box. It features a title bar with standard window controls. The main content area is organized into sections based on slice types, each with a radio button selection:

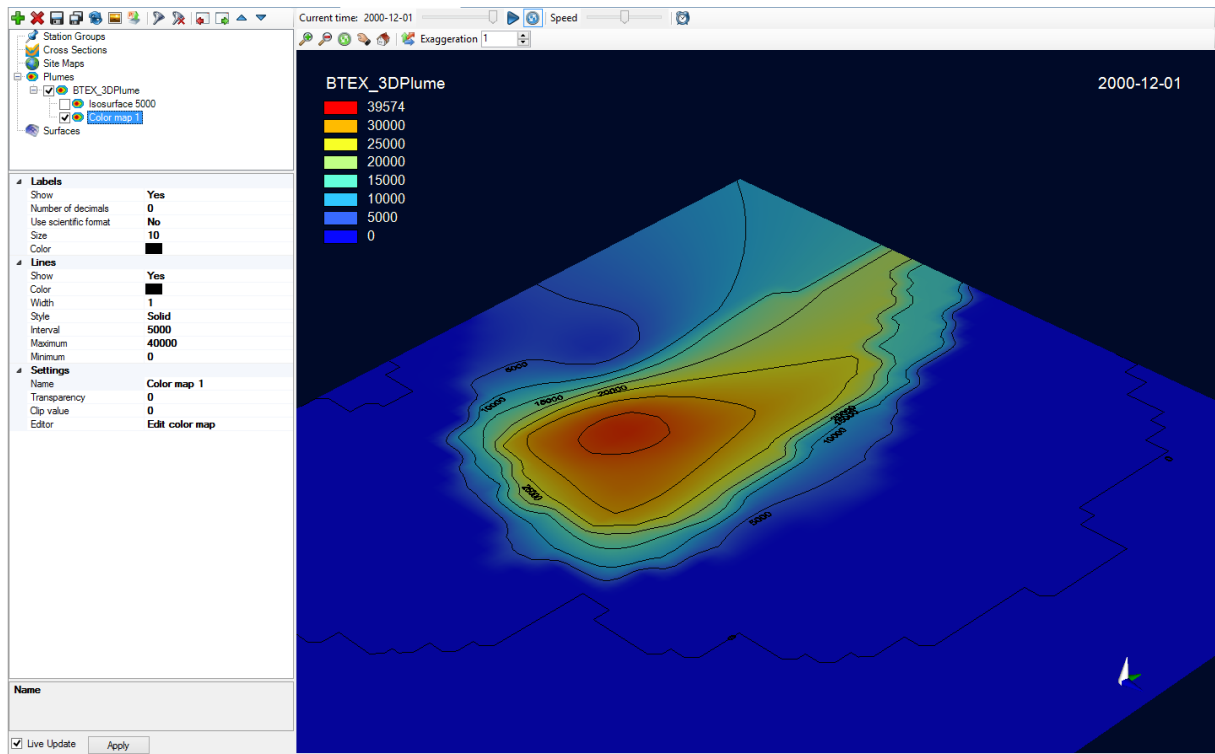
- Color map name:** A text input field containing 'Color map 1'.
- North-South slice:** Selected with a radio button. It includes:
  - Input fields for X1 and X2, both set to 535200.00.
  - A checked checkbox for 'Synchronize x values'.
- East-West slice:** Unselected. It includes:
  - Input fields for Y1 and Y2, both set to 4814000.00.
  - A checked checkbox for 'Synchronize y values'.
- Horizontal slice:** Unselected. It includes:
  - An input field for Z, set to 235.26.
- Cross section:** Unselected. It includes a text area containing the text 'No cross sections.'

At the bottom right of the dialog, there are two buttons: 'OK' and 'Cancel'.

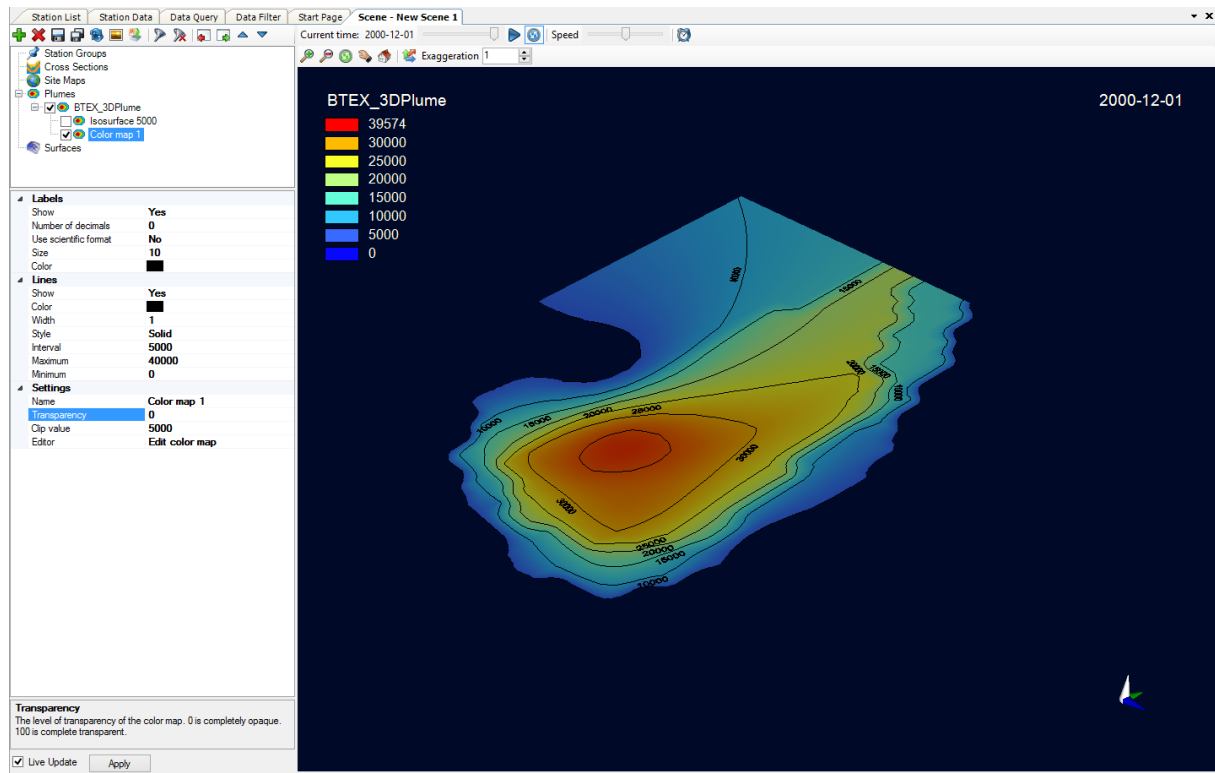
You can create colormaps on a North-South slice or an East -West slice. Additionally you can create a Horizontal slice color map. And finally you can also use a Cross Section (which has been loaded into the scene) to display your color map.

Once you have created the color map another sub node is added to the plume node. From here you will find the settings to adjust the color map line and labels.

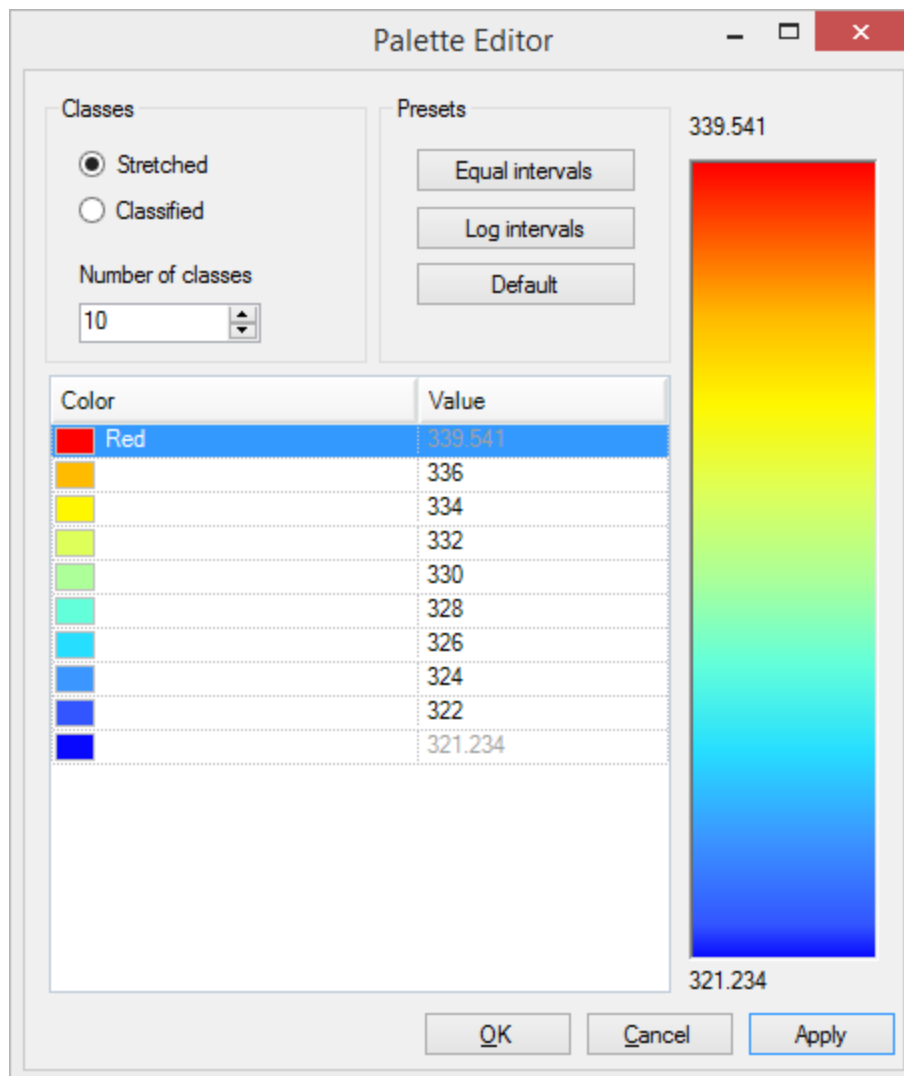




You will also find the settings for the transparency of the color map and the clip value. When you enter a clip value - any part of the color map below the clip value will be removed. Here for example you can see the BTEX color map clipped at 5000.



To edit the colormap palette select the ... button and you will find the following dialog:






From this dialog you can adjust the number of classes and adjust the style from Stretched (where the colors blur from one to the next) to Classified (where there are distinct bands of colors).

You will also find preset options for Equal intervals, Log intervals as well as an option to return to the default settings.

Once you have added a (transient) plume to the scene you will also notice that some additional options are available on the toolbar on top of the scene window.



It displays the current time on a slider bar and gives an option for you to play  the plume through time. There is also a loop  option which will continue the animation over and over until the pause button is selected. There is also a slider bar option to adjust the speed of the animation of the plume. As well as an option to adjust the time settings .

Time Settings

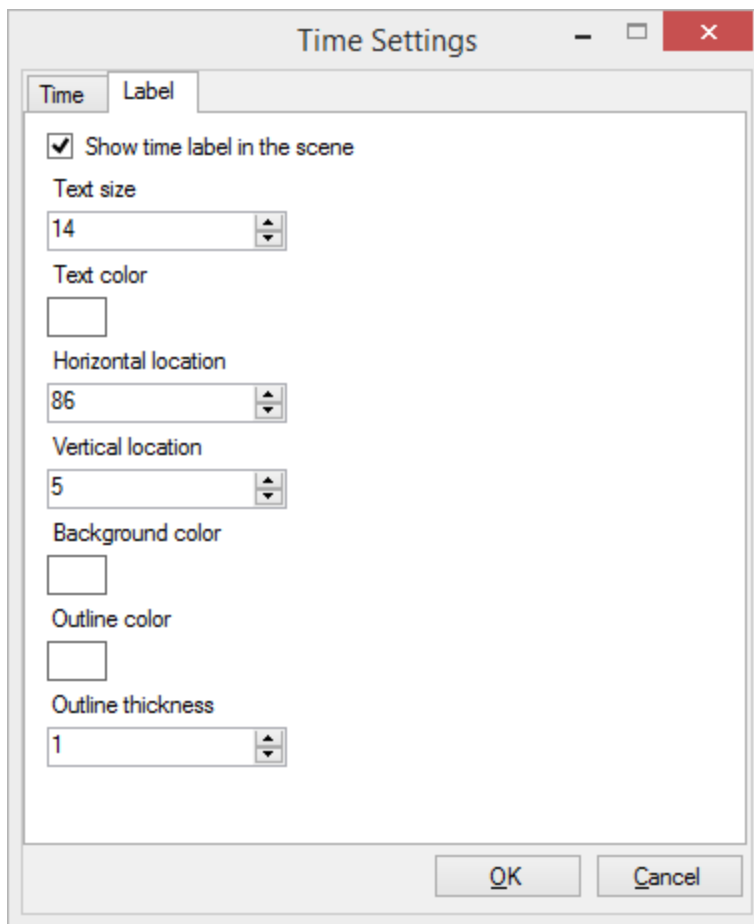
Time Label

Start date  
May 1, 2000

End date  
December 1, 2000

Intervals  
50

OK Cancel

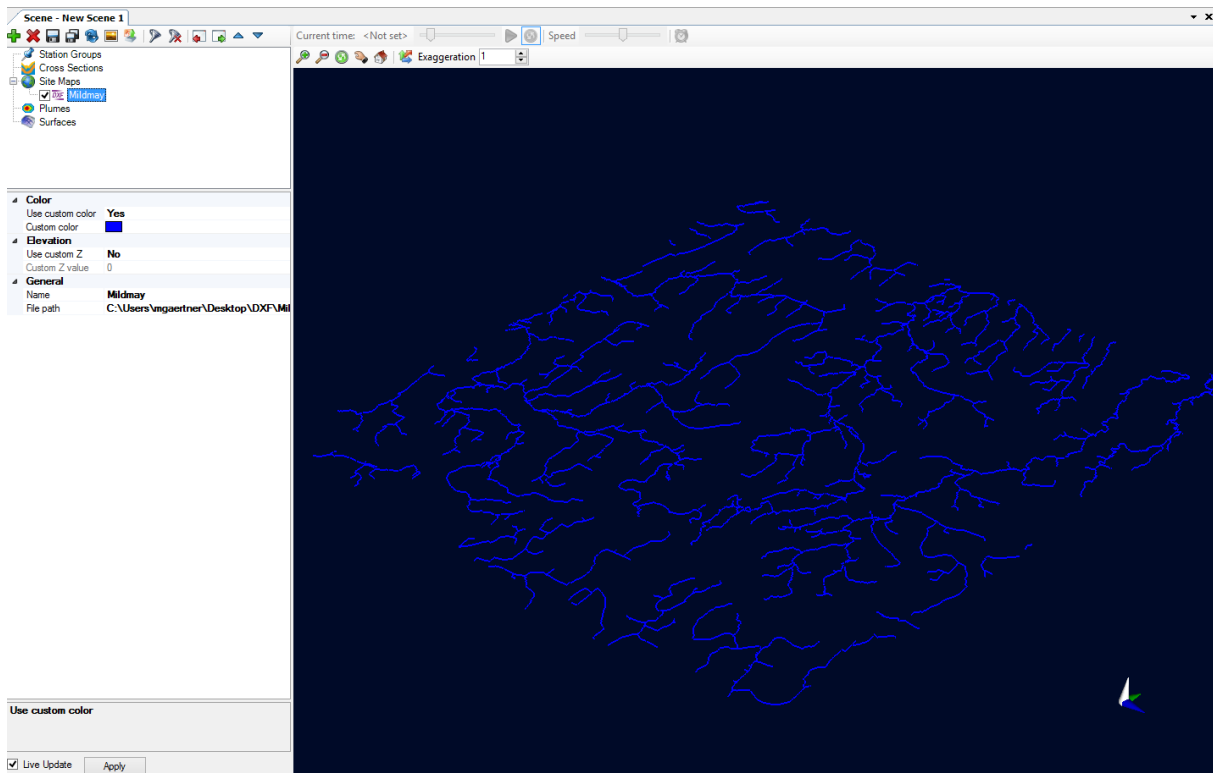


The Time tab of the Time Settings displays the start and end of the plume (or if multiple plumes have been loaded the start of the earliest plume and the end of the latest plume). As well as an option for the number of intervals along the timeline to display. Less intervals will make the animation skip through time quicker while more intervals will mean more steps through the timeline.

The label tab gives you the settings to adjust the time label size, color location etc.

#### 16.2.4 DXF files

When you load DXF files into the Scene they will appear under the Site Maps node of the Scene tree. Each DXF file will have its own node.



When you select the name of the dxf you will find the associated settings. By default it will load with the color designated within the file - however you can change this by selecting Yes for Custom Color and then select a new color to use for displaying the DXF. Similarly, the DXF will display using the elevation designated within the DXF file - however you can overwrite this by selecting Yes for Use custom Elevation. This allows you to place the DXF file at any elevation within the scene.

You can also change the name of the dxf (by default it uses the file name).

The scene viewer supports 3D DXF files as well as the following DXF entities:

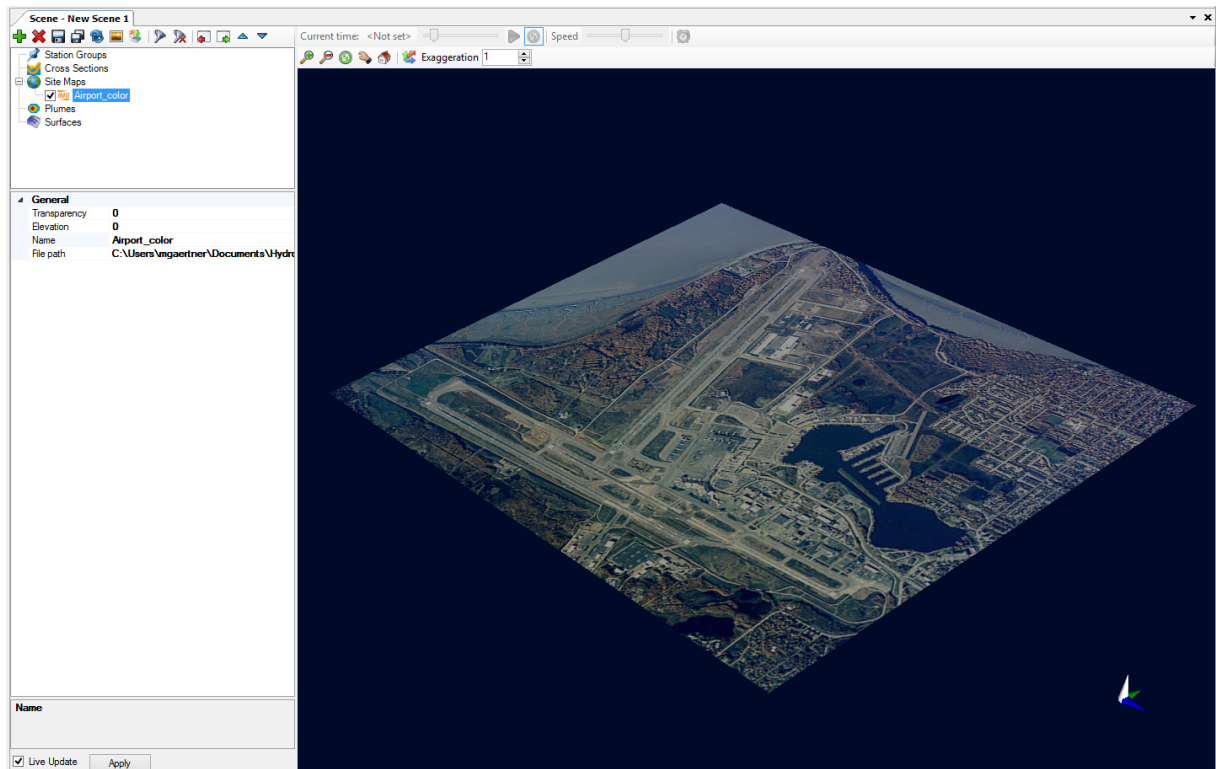
- LINE
- POLYLINE
- LWPOLYLINE
- FACE3D
- SOLID
- CIRCLE
- ARC
- BLOCK
- INSERT
- TEXT



**Please Note:** If you are encountering difficulties displaying your DXF it may be due to unsupported entities (like SPLINE or 3DSOLID) or the DXF was created by a third party writer that does not adhere to AutoCAD DXF standards or was created in a very old version of AutoCAD.

### 16.2.5 Image files

When you load image files into the Scene they will appear under the Site Maps node of the Scene tree. Each image file will have its own node.



When you select the name of the image file you will access the associated settings. You can enter adjust the transparency as well as the elevation. By default if nothing else is loaded into the scene an image will load at an elevation of 0. Otherwise it will load at the bottom of whatever other items have been loaded into the scene.

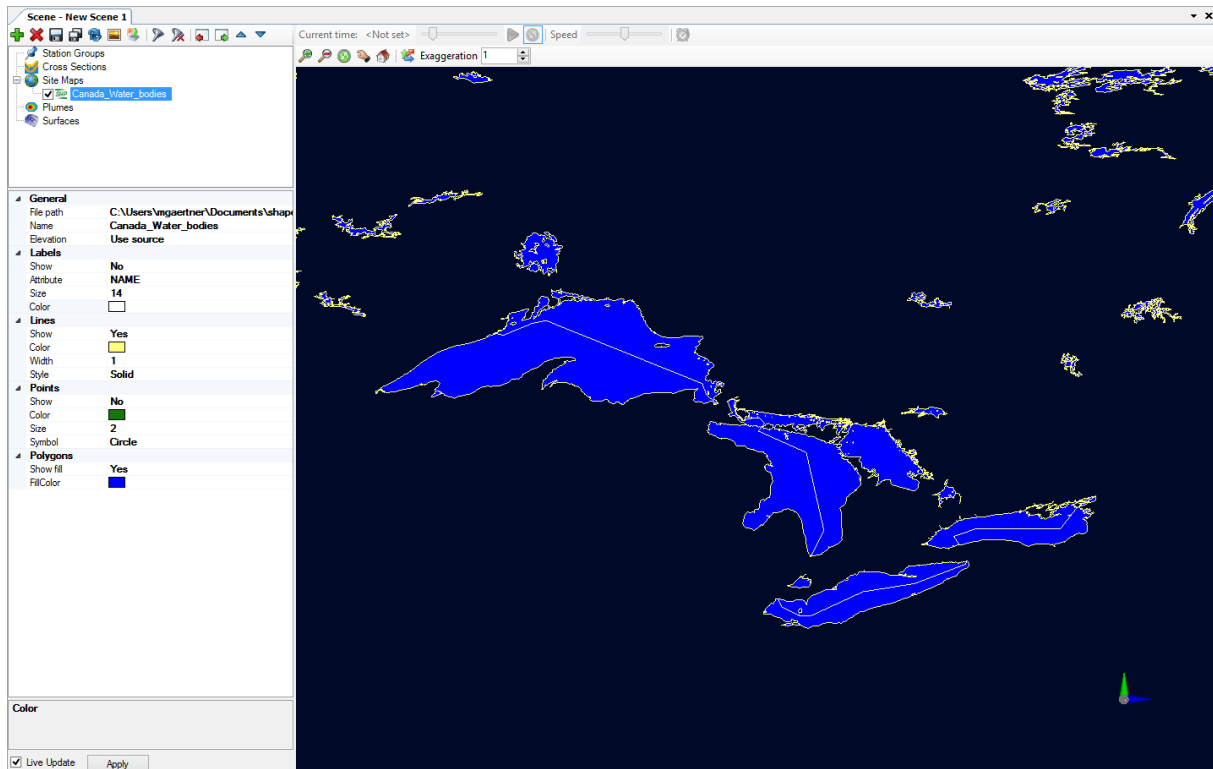


**Please Note:** Image files must have the associated georeferencing file in the same folder as the image in order to be brought into the scene.

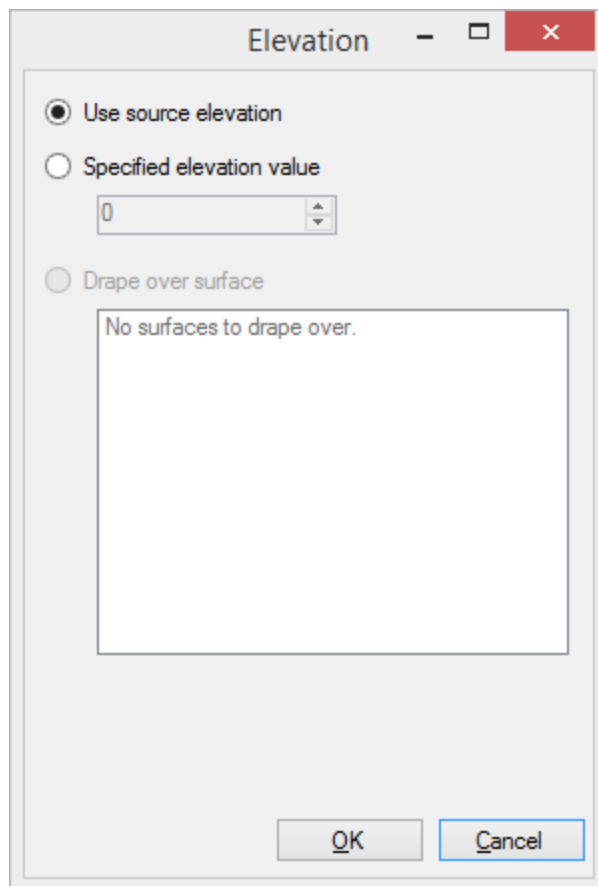


## 16.2.6 Shape Files

When you load Shape files into the Scene they will appear under the Site Maps node of the Scene tree. Each Shape file will have its own node.



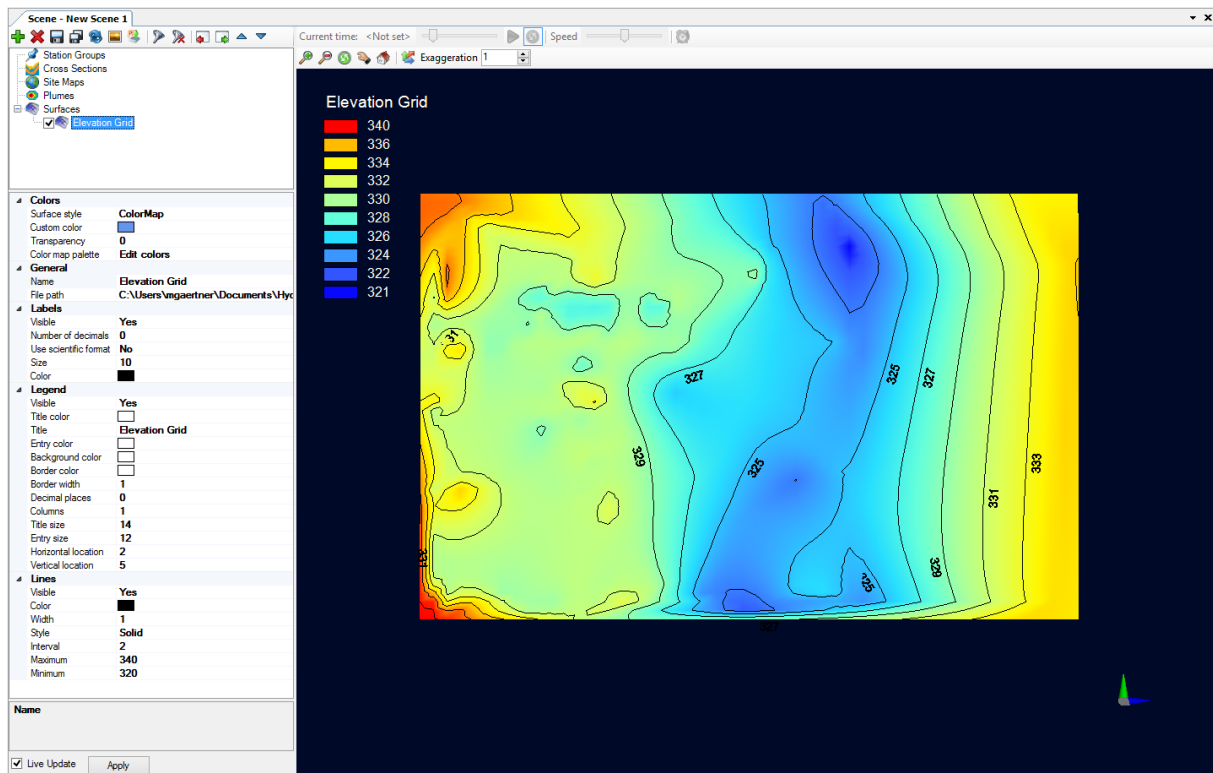
When you select the name of the shape file you will access the associated settings. You have 3 options for the elevation - by default it loads using the source elevation. However, you can adjust this to use a specified value or you can drape the shape file over a surface which is already loaded into the scene.



All elements of the shape file have associated settings including the Labels, Lines, Points and Polygons. You can turn each element on or off, adjust the colour, size/width.

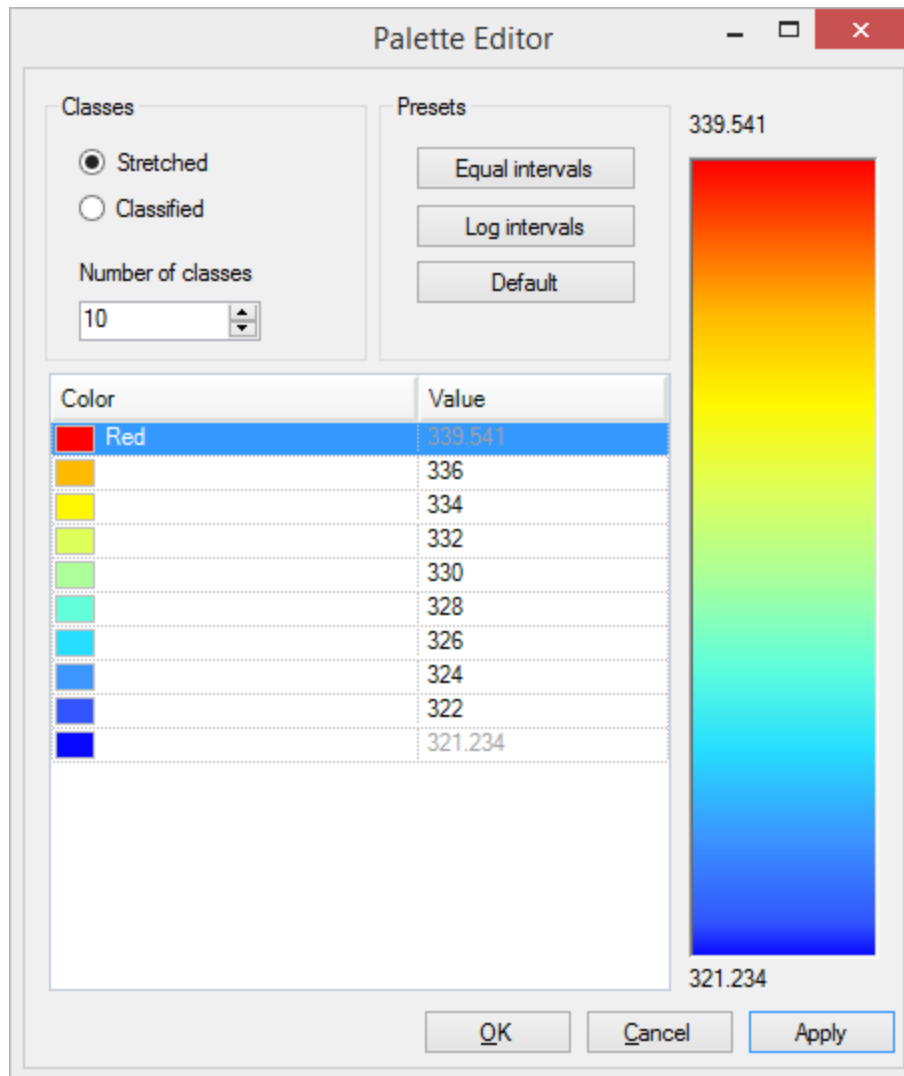
### 16.2.7 Surfaces

When you load surface files into the Scene they will appear under the Surfaces node of the Scene tree. Each surface file will have its own node.



When you select the name of the surface you will access the associated settings. Under the Colors section you can choose to display the surface as a color map or using a custom color - and you can set the custom colour. By default surfaces are displayed as color maps. You can adjust the color map palette from the colours selected by default. You can also set a transparency for the surface.

To adjust the color map palette select the ... button and you will find the following dialog:



From this dialog you can adjust the number of classes and adjust the style from Stretched (where the colors blur from one to the next) to Classified (where there are distinct bands of colors).

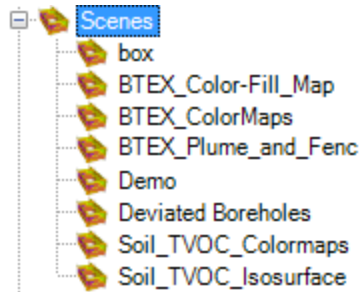
You will also find preset options for Equal intervals, Log intervals as well as an option to return to the default settings.

You will also find settings for the Labels (size, color etc) for the Legend (title, color, entry size, location etc.) and Lines (color, width, style etc).

### 16.3 Saving and Recalling Scenes

Scenes can be saved so that they can be recalled later. When you save a scene you will find it in the Project tree under the Scenes branch.

To recall (or reload) a scene simple double click on it from the Project tree. And remember you are able to open multiple scenes at once.



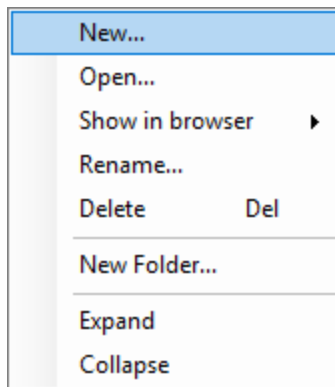
## 17 Online Sharing

This module allows you to share your HGA project with others who do not have the program by creating a configurable webpage to share with project team members and/or stakeholders.

You can find this option by selecting **Modules > Online Sharing** .

### Project Tree Options

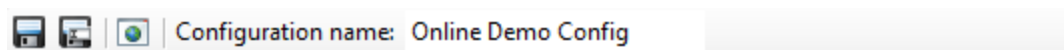
You can also load an existing Online Sharing configuration in the Project Tree by double-clicking on it. Right-clicking on an existing Online Sharing item in the Project Tree will provide the following options:



- **New:** creates a new empty Online Sharing configuration
- **Open:** opens the selected Online Sharing configuration
- **Show in browser:** provides a list of link(s) to recently published configurations. Selecting a link will open the published Online Sharing configuration in your default browser.
- **Rename:** allows you to rename the Online Sharing configuration
- **Delete:** deletes the selected Online Sharing configuration
- **New Folder:** creates a new folder on the Online Sharing node of the Project Tree
- **Expand:** expands the selected node of the Project Tree
- **Collapse:** collapses the selected node of the Project Tree

### Toolbar

The Online Sharing module contains several options for working with Online Sharing configurations:

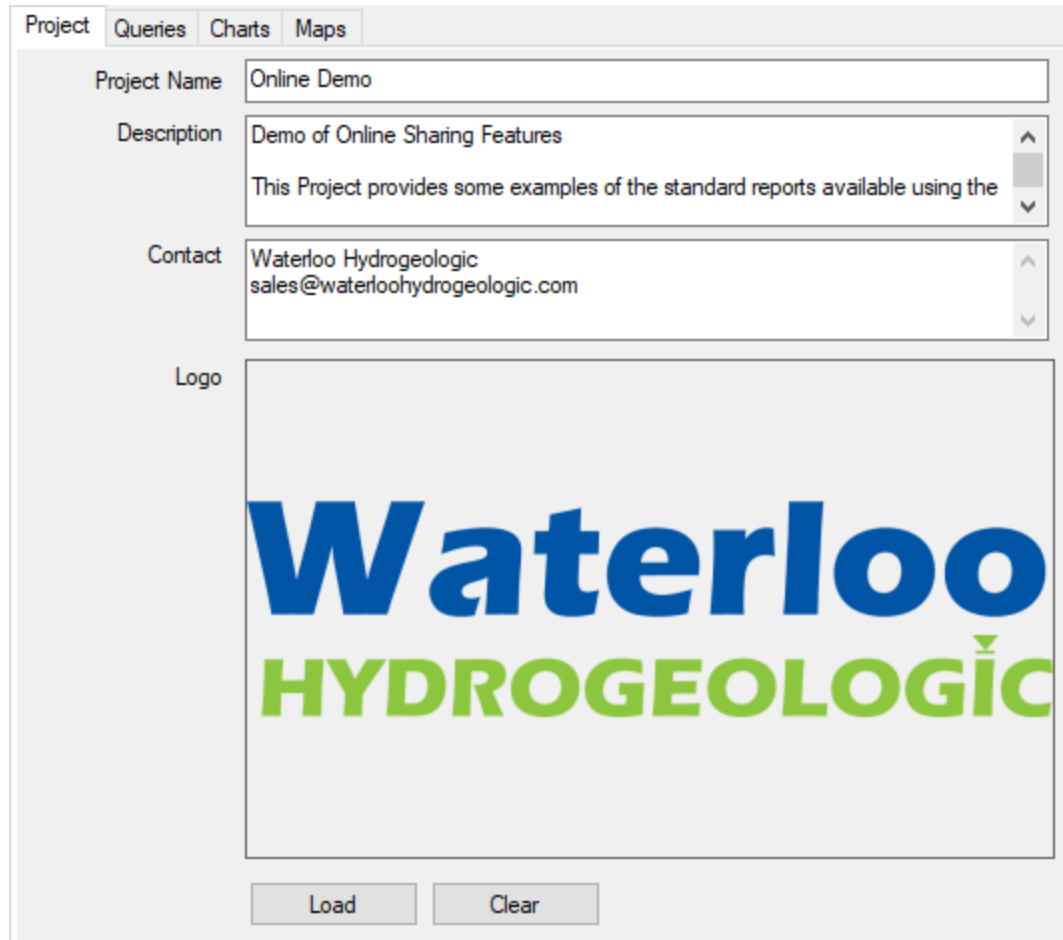


- **Save:** creates a new empty Online Sharing configuration
- **Save as:** opens the selected Online Sharing configuration

- **Launch browser:** launches the most recently published version of the current Online Sharing configuration in your default browser.
- **Name:** allows you edit the name of the Online Sharing configuration

## Project Tab

On the first tab you can provide some general information regarding the project, including the project name, a description, contact information and a project/corporate logo.



The screenshot shows a web interface with four tabs: "Project", "Queries", "Charts", and "Maps". The "Project" tab is active. It contains the following fields:

- Project Name:** A text input field containing "Online Demo".
- Description:** A text area containing "Demo of Online Sharing Features" and "This Project provides some examples of the standard reports available using the".
- Contact:** A text area containing "Waterloo Hydrogeologic" and "sales@waterloohydrogeologic.com".
- Logo:** A large image placeholder containing the "Waterloo HYDROGEOLOGIC" logo.

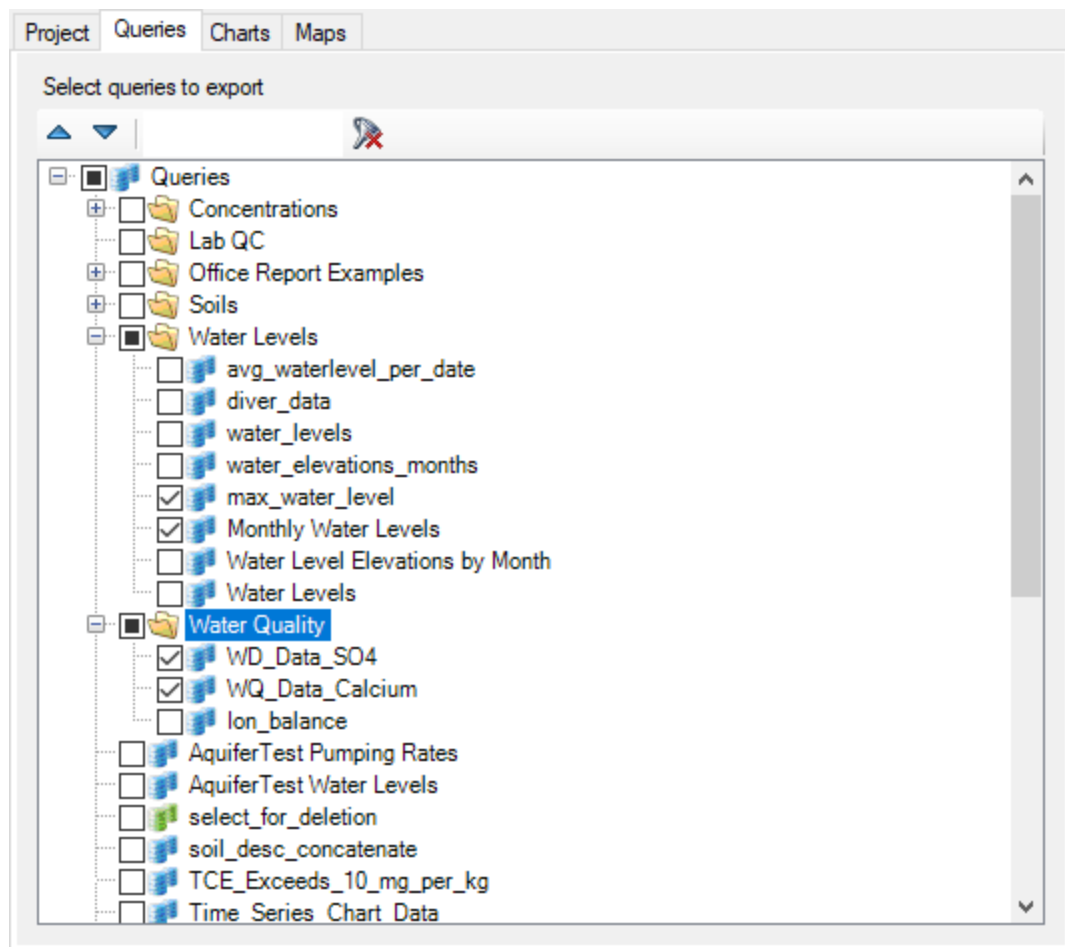
At the bottom of the form are two buttons: "Load" and "Clear".



**Please Note:** the optimal dimensions for the logo is an aspect ratio of 3:2 (e.g. 150 pixels wide by 100 pixel high).

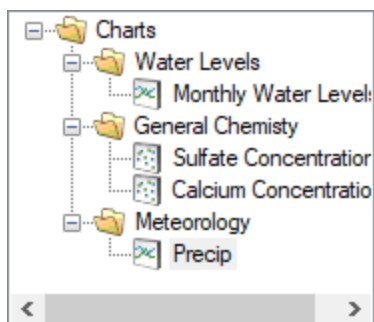
## Queries Tab

The Queries tab allows you to select one or more queries to display data that is important for your project (for example chemical concentration information).



## Charts Tab

The Charts tab allows you to create and organize charts based on data from one or more queries using the Charts tree, as shown below.



You can add, remove, edit, and organize charts to the Charts tree using the toolbar:





- **Add a chart page:** creates a new empty chart configuration
- **Add a folder:** opens the selected Online Sharing configuration
- **Delete:** deletes the selected chart or folder
- **Move Up:** moves the selected item up in the folder Chart tree
- **Move Down:** moves the selected item down in the folder Chart tree
- **Rename Folder:** allows you to rename the selected folder

### Configuring the Chart

You can configure a chart selected in the Charts tree on the right side of the tab. The first step is to select a Source query that contains the data to be plotted. Other options are described below:

- **Chart Title:** allows you to create a title for the chart. This will be the label in the Charts tree as well as the title displayed on the chart itself.
- **Chart Type:** allows you to choose what type of plot will be shown on the chart; currently, you can choose from Line or Scatter.

- **X-axis:** allows you to select the source data for the X-axis - this is commonly a date/time field.
- **X-axis label:** the label for the X-axis that will appear on the chart
- **Y-axis label:** the label for the Y-axis that will appear on the chart
- **Plot options:** a set of options to add Y-value source data and configure the appearance of the data series:



**Please Note:** the query should be set up to sort the data according to the source data field for the X-axis otherwise the data plot may not appear correctly.

## Plot Options

The following options are available to configure the series plotted on the Chart:



- **Add Series:** adds a new data series for plotting
- **Add Line:** adds a new line with a specified constant Y-value. This is particularly useful if you want to add a threshold/criteria value to compare against the data (e.g. a regulatory limit concentration).
- **Remove series:** removes the currently selected data series.

## Series Options

- **Group-by-Field:** the field by which data series should be grouped into distinct series (e.g. Station name or Station ID) (for Series only)
- **Constant:** a constant value to plot (for Lines only)
- **Name:** the name of the data series to be added.
- **Source Field:** the field in the data query which contains the y-values of the series (for Series only)

## Style Options

- **Line Color:** sets the color of the lines for the data series
- **Line Style:** allows you to select the line type. Options include: Solid, Dash, or Dot
- **Line Thickness:** allows you to select the width of the line
- **Point Color:** sets the color of the data points for the data series
- **Point Size:** sets the size of the data point for the data series

## Maps Tab

The Maps tab allows you to select layers from any of the maps in your project that you wish to share. Additionally, any water level information for the points layers you select from the map will be included in the Online Share. You have an option to specify if you want a specific date

range for the water levels or simply include all water levels. This will be displayed as water level elevations in the Online Share when you select a station on the Map.

The screenshot shows the 'Maps' tab of a software interface. It is divided into three main sections:

- Map to publish:** A list with '<None>', 'Map 1' (highlighted), and 'Map2'.
- Select the layers to show on the map:** A list of checkboxes. 'Select All' is checked. Other options include 'MonitoringWells', 'Water Levels', 'Water Level Elevations by Month', 'TVOC\_Exceeds\_1000\_ug\_L', 'All Stations' (checked), and 'Airport\_color.bmp'.
- Select the Water Levels to be displayed:** Radio buttons for 'None', 'All' (selected), and 'Specify date range'. Below are date pickers for 'From: 1/ 1/1900' and 'To: 9/ 4/2018'.

On the right side, there is a line graph showing water level elevation over time. The y-axis ranges from 212.0 to 217.0. The x-axis shows months from Jan 1900 to Aug 1990. The graph shows a sharp initial drop from approximately 216.5 in Jan 1900 to 214.0 in Feb 1900, followed by a gradual decline to about 212.5 by Aug 1990.

Notes: Water Level Elevation will be calculated for all Station Point Layers selected above, based on Elevation field (Station table) and Depth-to-WaterLevel field (Water Level table). Water levels without associated station elevations will be excluded.

### Publish

Once you have setup the Online Sharing Configuration, you can select the publish button at the bottom of the dialog. This allows you to configure where the Online Sharing webpage will be published to. Options include:

The screenshot shows the 'Publish target' section of a software interface. It contains three radio button options:

- Custom web server
- Local file folder
- Waterloo Hydrogeologic (demo) web server

When publishing a configuration, you may select the option to launch your default browser at the Project page of the published Online Sharing Configuration.


## Custom Web Server

If you select the custom web server option, the Online Sharing Configuration will be published directly to the webserver you specify via FTP. You must have the proper credentials to access and modify files in the location you specify.

Web link folder ( Eg: web/content/hgmobile/EddName)	<input type="text" value="/web/content/HGAClient/"/>
Web root URL ( Eg: http://online.sharehga.com/hgmobile )	<input type="text" value="http://online.sharehga.com/HGAClient"/>
FTP host name ( Eg: ftp.sharehga.com )	<input type="text" value="ftp.sharehga.com"/>
User name	<input type="text" value="hgamobile"/>
Password	<input type="password" value="*****"/>
Port	<input type="text" value="22"/>

## Local File Folder

If you select the Local file folder option, the Online Sharing Configuration will be published to a local folder that you specify. You have the option to clear out the contents of this folder before publishing so that you only have the latest information present in the folder you specify.

Output folder	<input type="text" value="C:\Files\_HGA\Projects\Sharing"/> 
<input checked="" type="checkbox"/> Always overwrite folder if it exists	
<p>Note: Your browser may not support the correct display of files stored on a local or network drive. This publishing option is meant to provide an intermediate publishing location to facilitate additional user customization and/or staging for final publishing to a web site. In order to test/preview the web page, you may use the Waterloo Hydrogeologic Web Server (Demo) option.</p>	



**Please Note:** most browsers *will not* correctly display files loaded from a local or network drive. In order to view the Online Share correctly, they must be viewed via a web server. You may be able to preview files stored locally by using a locally run web server such as [IISExpress](#).

## Water Hydrogeologic (Demo) Web Server

If you select the Waterloo Hydrogeologic (Demo) Web Server, the Online Sharing Configuration will be published to the Waterloo Hydrogeologic Demo (Demo) server. This server is available as a courtesy for demonstration/preview purposes only.



**Please Note:** In order to ensure that you do not overwrite an existing Online Sharing configuration of another user, *each time* you publish to the Demo server, the resulting webpage address will include a unique 16-digit key. You can access the publication history and the resulting unique address of a given configuration publication event by right-clicking on that configuration and selecting the show in browser option.



**Please Note:** This option should not be used to publish private or confidential information or be used for long-term data sharing as the data are publicly visible and may be deleted at any time as part of maintaining the server. All information published to the demo web server is subject to the software [Terms and Conditions](#) (see Section 11)

## Example

The following images are screenshots of an example project Online Share:

***Project Tab Example***

***Queries Tab Example***

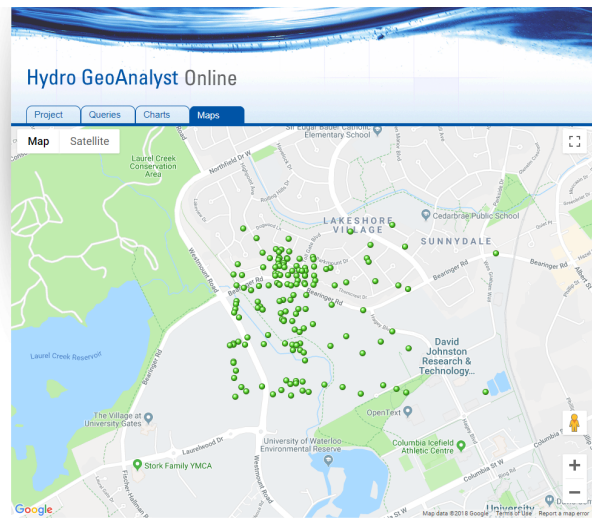
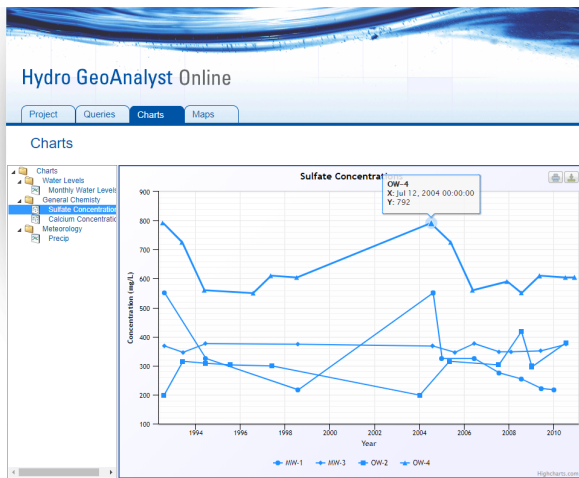
The Project tab displays the 'Online Demo' section. It includes a 'Demo of Online Sharing Features' and a list of standard reports available. A 'Contacts' section provides the name 'Waterloo Hydrogeologic' and an email address 'sales@waterloohydrogeologic.com'. The Waterloo Hydrogeologic logo is prominently displayed.

The Queries tab shows a table titled 'Monthly Water Levels'. The table lists various monitoring stations with their IDs, names, coordinates, and data dates. A pop-up window is visible over the table, showing details for a specific station: 'OW-4' at 'Jul 12, 2004 00:00:00' with a value of '792'.

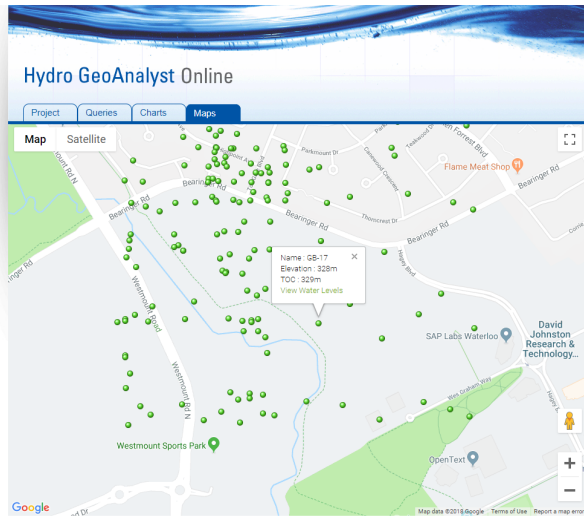
ID	Name	X (degree)	Y (degree)	Station_Name	date	depth_ft
1	MW-1	535250	4814315	MW-1	1/2/1996 12.0	13
2	MW-1	535250	4814315	MW-1	1/8/1996 12.0	14
3	MW-1	535250	4814315	MW-1	2/12/1996 12.0	15
4	MW-1	535250	4814315	MW-1	4/16/1996 12.0	15
5	MW-1	535250	4814315	MW-1	8/9/1996 12.0	15
6	MW-3	536668	4814036	MW-3	1/2/1996 12.0	12
7	MW-3	536668	4814036	MW-3	1/8/1996 12.0	13
8	MW-3	536668	4814036	MW-3	2/12/1996 12.0	14
9	MW-3	536668	4814036	MW-3	4/16/1996 12.0	14
10	MW-3	536668	4814036	MW-3	8/9/1996 12.0	15
11	OW-2	535536	4814905	OW-2	1/2/1996 12.0	14
12	OW-2	535536	4814905	OW-2	1/8/1996 12.0	15
13	OW-2	535536	4814905	OW-2	2/12/1996 12.0	16
14	OW-2	535536	4814905	OW-2	4/16/1996 12.0	16
15	OW-2	535536	4814905	OW-2	8/9/1996 12.0	17
16	OW-4	536721	4814826	OW-4	1/2/1996 12.0	14
17	OW-4	536721	4814826	OW-4	1/8/1996 12.0	15
18	OW-4	536721	4814826	OW-4	2/12/1996 12.0	16
19	OW-4	536721	4814826	OW-4	4/16/1996 12.0	16
20	OW-4	536721	4814826	OW-4	8/9/1996 12.0	16
21	W-01	535320	4814610	W-01	1/2/1996 12.0	13
22	W-01	535320	4814610	W-01	1/8/1996 12.0	14
23	W-01	535320	4814610	W-01	2/12/1996 12.0	15
24	W-01	535320	4814610	W-01	4/16/1996 12.0	15
25	W-01	535320	4814610	W-01	8/9/1996 12.0	15
26	W-01	535320	4814610	W-01	1/2/1996 12.0	15

Charts Tab Example

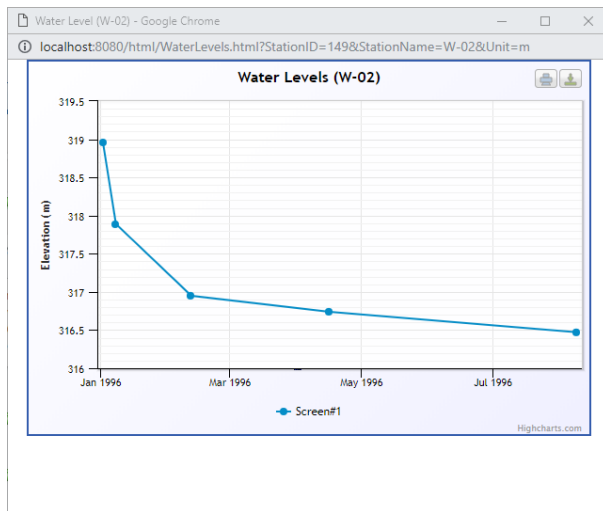
Maps Tab Example



If you select one of the stations on the map you will find a pop up with some additional information.



Also, the pop up will provide a link to visualize the water levels (in another window) associated with that stations if the water level data options were set up on the Maps tab.



## 18 Report Editor

The Report Editor included with the Hydro GeoAnalyst package is used to create professional reports containing data, and 2D and 3D-views you have generated for your projects. This chapter presents information on how to transfer stations, grids, query results, maps, cross sections, borehole log plots, and 3D views into a printable report format, which can be printed or exported for convenient transfer to your colleagues and/or clients.

The Report Editor provides the following features:


- Create and save Report Layout Templates
- Create and Manage Reports
- Import Reports
- Design and Preview Reports
- Save, Export, and Print Reports
- In addition the report editor:
  - Provides an easy-to-use Office-like designer environment
  - Supports VBScript and JScript events and expressions
  - Provides Barcode control
  - Allows report bookmarks and internet hyperlinks



**Please Note:** This chapter provides a brief overview of the features that the Report Editor offers. For more details, refer to the Active Reports on-line help file. This file is named AR2Std.CHM, and is found in the report folder of the HGA installation folder; (The default is \Program Files\Common Files\Data Dynamics\Active Reports\AR2Std.chm). Simply double-click on the .CHM file to load the help file.

### 18.1 About the Interface

The Report Editor may be launched from HGA in several ways:

Select Project / Report or click on the  (Report) button in the Map Manager or Cross Section Editor modules. When this option is selected, if there are report templates available for this module, there will be a prompt to Select a Report Template, before proceeding.

The Report Editor may be loaded from the Project Tree in the main window; simply double-click on an existing Report or Report template under the Reports node

The report editor consists of two main windows:

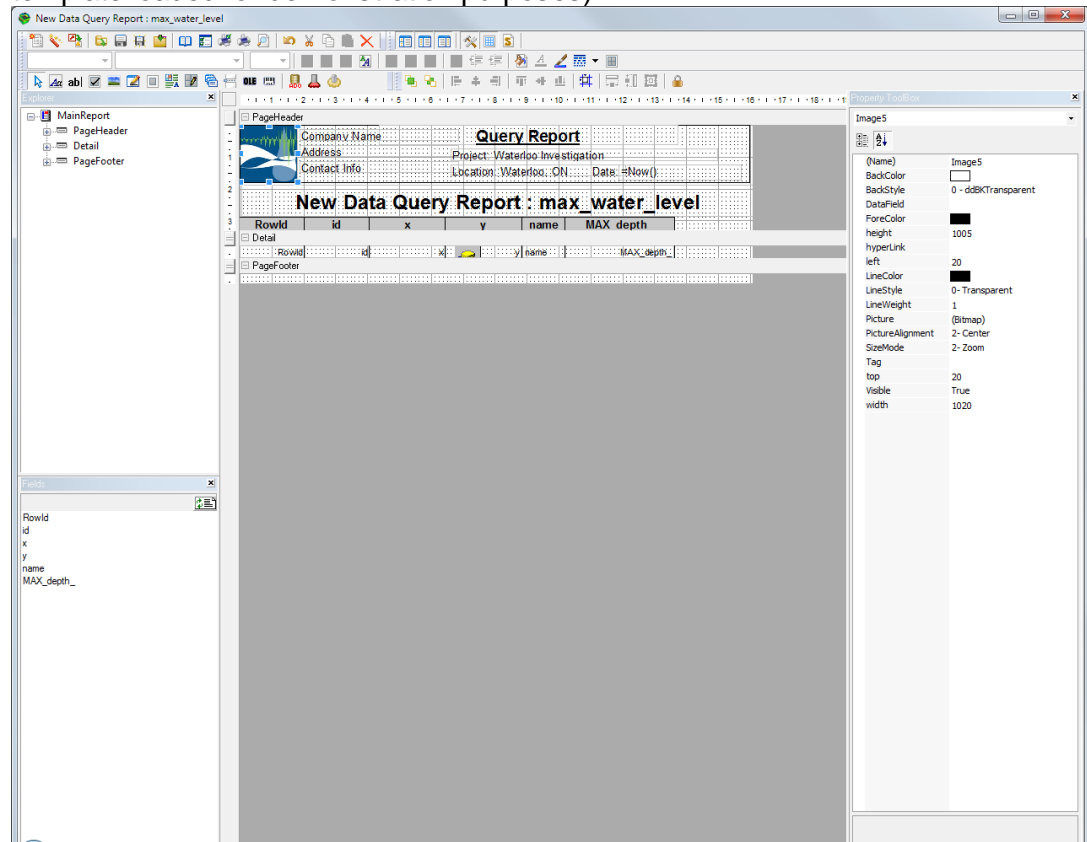
- The Designer Window
- The Viewer Window

Each component of the Report Editor comes with its own set of toolbars and icons that perform specific tasks related to the window. The following few sections present a detailed description of the toolbar icons for each component.



## 18.2 Report Designer Window

The Report Designer allows you to design the contents, as well as looks, of your reports. All report designs can be saved and opened for editing and/or generating the final report. A sample of the designer view is shown below (with a report template loaded for demonstration purposes).



The designer window contains the following items:

**Property Toolbox:** provides the tools that can be used to edit properties of the report and all its sections including any controls that the report may contain.

**Toolbar:** provides multiple buttons for functions in the designer

**Explorer:** allows you to browse through the controls that are placed on the currently opened report. It facilitates selecting a control for further editing.

**Layout window:** provides the interface for designing the report

**Fields:** allows you to select one or more data fields, for displaying data. Simply drag and drop the selected field into the desired section of the report.

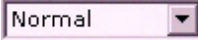

















### 18.2.1 Report Designer Toolbars

The figure below shows a closer view of the toolbars used in the Report Designer window:

.




















## Formatting Tools

-  Text Style: Selects a format style
-  Font: Selects a font for the selected object
-  Font Size: Sets the font size for the selected object
-  Bold: Sets the bold status of the selected text
-  Italics: Sets the italics status of the selected text
-  Underline: Sets the underline status for the selected text
-  Detailed Font: Launches a dialog that allows setting font details
-  Left Align: Aligns selected text on the left margin
-  Center Align: Centers selected text
-  Right Align: Aligns selected text on the right margin
-  Bulleted List: Formats the selected paragraph in the RTF control as a bulleted list
-  Outdent: Outdents the selected paragraph in the RTF control as a bulleted list
-  Indent: Indents the selected paragraph in the RTF control as a bulleted list
-  Background color: Sets the background color of the selected control
-  Text Color: Sets the forecolor of the selected text
-  Line Color: Sets the line color of the selected control
-  Line style: Sets the line style of the selected control
-  Border: Sets the border style of the selected control














## General Tools

To insert any of the items listed below into your report, select the item from the toolbar, and in the designer window, draw a box in the position where you wish that object to appear.

-  Select: Selects a control (object) on the Designer
-  Label: Allows you to put headings and labels in your report
-  Field: Insert it and link to a data field to display specific data from the project. Field also allows you to put text in your report
-  Check box: Add a check boxes to a report; can be used to create check lists in your report
-  Image: Add logos, maps, and other images to your report. You can link it to a data field in your project, or to an image file outside of the project
-  Line: Add simple lines in your report
-  Shape: Add shapes (rectangle, square, circle,...) to the report
-  Rich Text Control: Add a text box with a RTF text to your report
-  Frame: Add a frame in and/or around the report. Similar to the square Shape tool, however the emphasis is on the border, not fill.

-  Subreports: Add any number of subreports to the report. The subreport will be limited by the width of the control, but the height will grow to accommodate the length of the subreport.
-  Page Break: Add a page break in the report at a desired location
-  OLE Object: Add an OLE (Object Linking and Embedding) object (such as a picture) to the report
-  Bar Code: Insert a bar code into the report
-  ADO Control: Click on it to add a ADO (ActiveX Data Object) datasource control on the report
-  Chart Object: Drag it to the designer to add a chart to the report
-  Well Profile: Add a borehole log plot to the report
-  ActiveX Controls: Add any ActiveX control that is registered on the current computer to your report

### Alignment Tools

-  Bring To Front: Move the selected item to the front of the overlay view
-  Send to Back: Move the selected item to the back of the overlay
-  Align Left: Aligns selected controls to the same left coordinate of the last selected control.
-  Center Align: Aligns selected controls to the same center coordinate of the last selected control.
-  Right Align: Aligns selected controls to the same right coordinate of the last selected control.
-  Align Top: Aligns selected controls to the same top coordinate of the last selected control.
-  Align Middle: Aligns selected controls to the same middle coordinate of the last selected control.
-  Align Bottom: Aligns selected controls to the bottom coordinate of the last selected control.
-  Align to Grid: Aligns the selected controls to the closest grid point
-  Size to Same Width: makes all selected controls the same width as the last selected control
-  Size to Same Height: makes all selected controls the same height as the last selected control
-  Size to Same: makes all selected controls the same height and width as the last selected control
-  Lock Controls: Locks all controls on the designer so that they will not be resized or moved from their original location

## 18.2.2 Toolbox options for General Tools

This section is designed to help familiarize you with the different options available in the toolbox for various tools. The Toolbox is dynamic, and changes depending on the object currently active in the Report Designer. The vital options of select tools are described in this section, however if you require further information, please refer to the ActiveReport help file included with the installation in the Reports folder.

---

### 18.2.2.1 Label

#### **Angle**

Allows you to change the angle at which the text appears in the label.

#### **ClassName**

Sets the overall text style of the label caption (e.g. Heading1)

#### **Hyperlink**

Allows you to change the label into a hyperlink. To do so, enter an internet address inside the Hyperlink field.

#### **Left**

Determines how far (in pixels) from the left edge of the report the object is located. You can either enter the pixel value manually or elect the object and drag it to the desired location.

#### **Multiline**

Allows you to set whether you want the text to move to the next line when it reaches the right border of the object (Multiline = "True") or if you want to force the text into a single line (Multiline = "False").

#### **Top**

Determines how far (in pixels) from the top edge of the report the object is located. You can either enter the pixel value manually or select the object and drag it to the desired location.

#### **Vertical Alignment**

Allows you to set how the text is aligned in the object vertically. "Top" will start the text at the top of the object and the cursor will move down with every new line, while the text is stationary. "Bottom" will start the text at the bottom of the object and the cursor will remain on the same line with every new line, while the text moves upwards. "Middle" will start at the vertical midpoint of the object and the cursor will move down with every new line, while the text will expand equally upwards and downwards.

---

### 18.2.2.2 Field

#### **Custom**

Allows you to change the object output format to General, Number, Currency, Date, Time, Percentage, and Custom. It also allows you to specify the line/border style.

**CanGrow**

Allows you to set whether you want the text field to become larger if the entered text does not fit within the allotted frame.

**CanShrink**

Allows you to set whether you want the text field to become smaller if the text does not fill up the allotted frame.

**DataField**

Allows you to attach the field to a datafield in a project through a DataControl (e.g. ADO). If the field is linked to a DataControl, select the desired data field from the drop-down menu. All fields linked to a DataControl in a current report are listed in the Fields window under the Report Navigator tree.

**SummaryDistinctField**

Specify the field name of the field used in a distinct summary function.

**SummaryFunction**

Set the function to be used for aggregating data.

**SummaryGroup**

Set the name of group section for summarization.

**SummaryRunning**

Determines whether the summary is a running value or not.

**SummaryType**

Determines the type of summary to be used.

---

**18.2.2.3 Check Mark****Value**

Allows you to determine whether the starting condition of the checkmark is "True" (checked) or "False" (unchecked).

---

**18.2.2.4 Image****LineColor/Style/Weight**

Set the properties of the lines/borders for the object.

**Picture**

Select the picture you wish to display in the frame. Supported graphics formats are \*.bmp, \*.ico, \*.cur, \*.jpg, \*.gif, and \*.wmf.

**SizeMode**

Specify how the picture will be displayed in the frame. "Clip" will display the picture at original size and if the frame is larger than the frame, it will be cut off. "Stretch" will adjust the image proportions to fit the frame (even if it means distorting the

---

picture. "Zoom" will adjust the size of the picture until the entire image is visible in the frame and there is the least amount of unfilled space possible.

---

#### 18.2.2.5 Line

##### **AnchorBottom**

Anchors bottom of vertical lines to section bottom.

##### **x1, y1, x2, y2**

Specify the coordinates (in pixels) of the start and end of the line.

---

#### 18.2.2.6 Shape

##### **Shape**

Specify which shape you wish to display - rectangle, ellipse, or rounded rectangle.

---

#### 18.2.2.7 Rich Text

##### **MaxLength**

Specifies the maximum number of characters a user can enter in the control. The default for MaxLength is 0, indicating that the text is limited only by available system resources. Any number greater than 0 indicates the maximum number of characters.

---

#### 18.2.2.8 Frame

##### **CloseBorder**

Specify whether or not the bottom border line will be displayed if the frame spans across multiple pages.

---

#### 18.2.2.9 Sub Report

##### **ReportName**

Sets/gets name for the sub-report.

---

#### 18.2.2.10 Page Break

##### **Enabled**

Allows you to enable or disable the page-break.

---

#### 18.2.2.11 OLE

##### **PictureAlignment**

Set the alignment of the contents within the frame.

---

#### 18.2.2.12 Barcode

##### **BarWidth**

Set the width of the thinnest line in the code.

---

**Caption**

In barcode, the caption is the set of symbols (alphanumeric) you want to code.

**Direction**

Set the direction in which the code will be written.

**EnableChecksum**

Set whether the checksum is used when the code is rendered.

---

**18.2.2.13 ActiveReport****DocumentName**

The document name appears in the print spooler and can be used to easily identify the report.

**MaxPages**

Sets or returns the maximum number of pages ActiveReports will process. Once the number of maximum pages is reached, ActiveReports will stop processing the report.

This property can be used to limit the number of output pages when running large reports and distributing the results over a slow connection.


**WaterMark**

Adds a specified image to the report's background. The watermark image can be positioned, sized, aligned and placed on specified pages by using the other watermark properties.

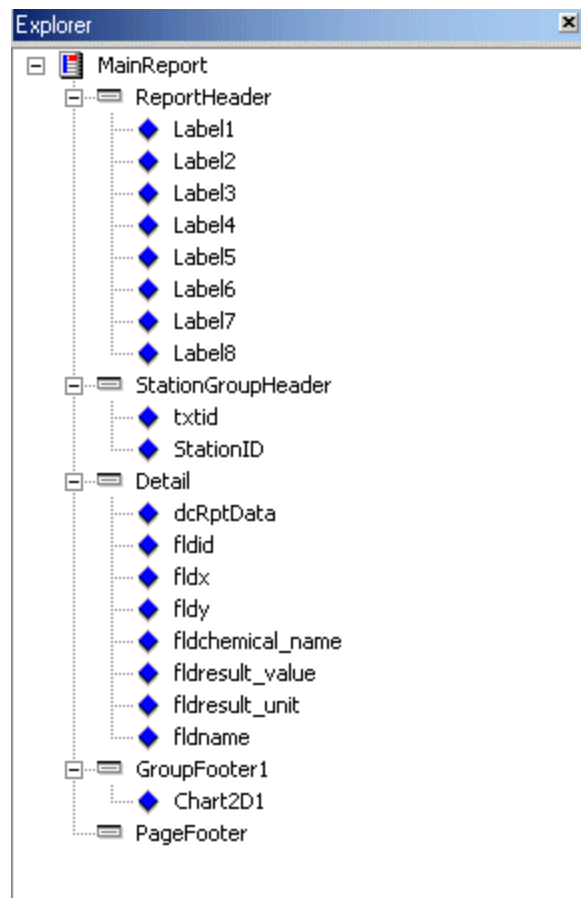
---

**18.2.3 Using the Report Designer****Report Explorer**

The Report Explorer (as shown in the figure below) allows you to browse through the controls of the active report and facilitates selecting controls for further editing.

The Report Explorer windows can be accessed by clicking on the Explorer icon  on the toolbar.






The explorer provides quick access for selection of controls on the report. Selecting a control in the Report Explorer activates the corresponding control on the report. This makes the control ready to be formatted or moved to another location.

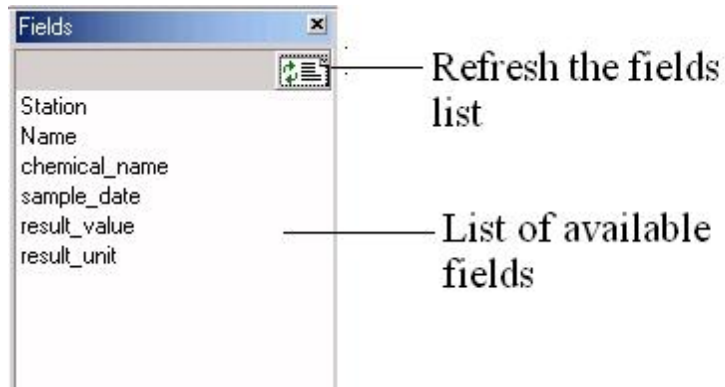
The explorer lists at least three nodes under the "MainReport" node, namely:

- PageHeader: refers to the page header for the current report
- Detail: refers to the section that hosts the details of the report
- PageFooter: refers to the page footer for the current report

Any item placed on the page header and footer of your report will be displayed on all pages of the report. In addition to these sections, one or more sections named Group Headers and a corresponding Group Footer sections, can be added to the report. In the figure depicted above the data on the report is grouped by stations. That is, the data for each station is displayed together. Group Headers can have their own header and footer that will be displayed above and below each group's data respectively.


### Data Fields Explorer

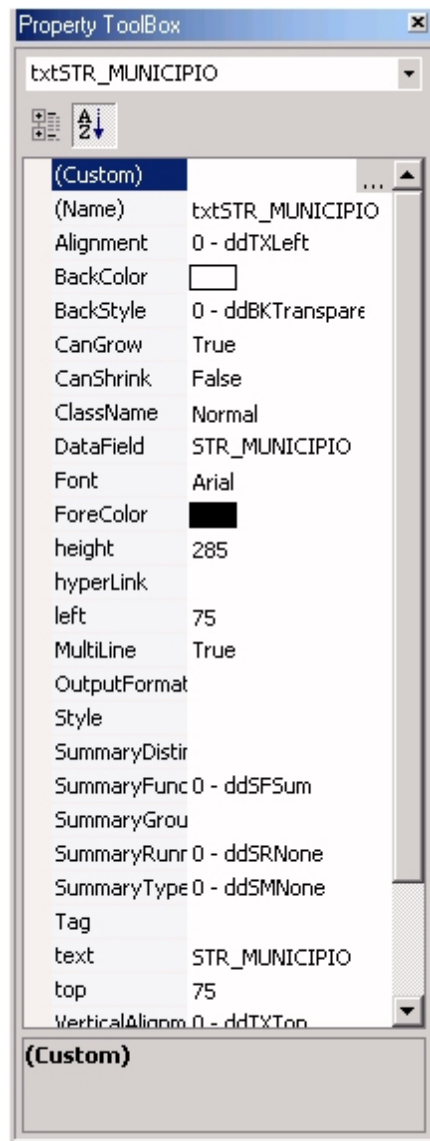
For most report types, the Report Editor takes data directly from the database, based on the design, and generates the desired report. Access to the data in the database is provided through the connection string and SQL Statement. These inputs result in a list of fields that are available for the current report. These fields are listed in the Fields Explorer (as shown below) that can be displayed by clicking on the Fields icon  on the toolbar.



One or more fields in the fields explorer can be selected and dragged and dropped into the desired section of the report if displaying data from these fields is desired.

### Report Properties Toolbox

The Report Properties toolbox (as shown in the figure below) provides the tools that can be used to edit properties of the report and all its sections including any controls that the report may contain. This window can be accessed by clicking on the Properties icon  on the toolbar.




This window serves to access the properties of the controls that are present on the report, and it contains an orderly list with the names and values of the properties of the objects in the report, presented in the first and second column respectively. A combo box with the list of objects whose properties can be edited is provided in the upper part of the window. Additional information for the selected property is provided at the bottom of this window.

## Designer: Advanced Controls and Settings

### Types of Controls

The runtime Report Designer allows you to add several types of controls to your reports. These controls range from those that are currently shown on the toolbar to all controls that are present on your computer. The types of controls that are provided on the toolbar can be grouped as follows:

**Data Access Controls:** ADO data control: Provides access to the database using information provided to it. Only one ADO control can be added to a given report. This control can be added to the report by clicking on the "Insert ADO Data control icon () on the toolbar

**Data Display Controls:** Controls that can be used to display information that is either coming from the data source (database) or provided on the Report Designer. The controls that fall into this category include:

- Label
- Check box
- RTF Text
- Graphics (Image, Line, Forms, OLE objects, Barcodes, etc.)
- Page break
- Sub reports

### Adding Controls

Except for ADO data control, all controls can be added to the report in the desired section. To add a control to a report:

select the desired control by clicking on the icon on the toolbar


position the cursor at the desired location and click-and-drag to define the size of the control

Depending on the selected control, specific dialog boxes may be displayed requesting information. Once the control is placed on the report, its properties could be altered by activating the [Properties Explorer] window and modifying the desired property.

The position of the controls can be changed by selecting and moving the selection to the desired location. Controls can be moved this way only within a given section. Cut and paste can be used to move controls to another section.

Some controls have special properties that require the user's attention; these controls are described below.

### Altering Borders of Controls

Border properties of one or more controls can be modified by selecting the controls first and either clicking on the  (Borders) button on the toolbar or selecting the option from the pop-up menu.

### Modifying Data Source information of the ADO data control

The ADO data control mainly uses the connection string and SQL statement as its input to provide access to the data stored in your project's database. Currently HGA provides basic inputs for this control.

However, advanced users may want to modify these inputs in order to produce advanced reports that are supported by the Report Editor. One interesting feature provided by the Report Editor is that of generating a report based on specific values. For example, a report that displays chemical data for all stations can be modified to only generate reports for a given station and/or chemical.

The SQL statement is usually composed of the following four parts:

```

SELECT Field1 [, Field2, Field3,...]
FROM Table Name
WHERE Condition1 [AND/OR Condition2]
ORDER BY Field1 [, Field2, Field3,...]


```

where the highlighted words are internal to the SQL language, and the terms in the brackets ([]) are optional.

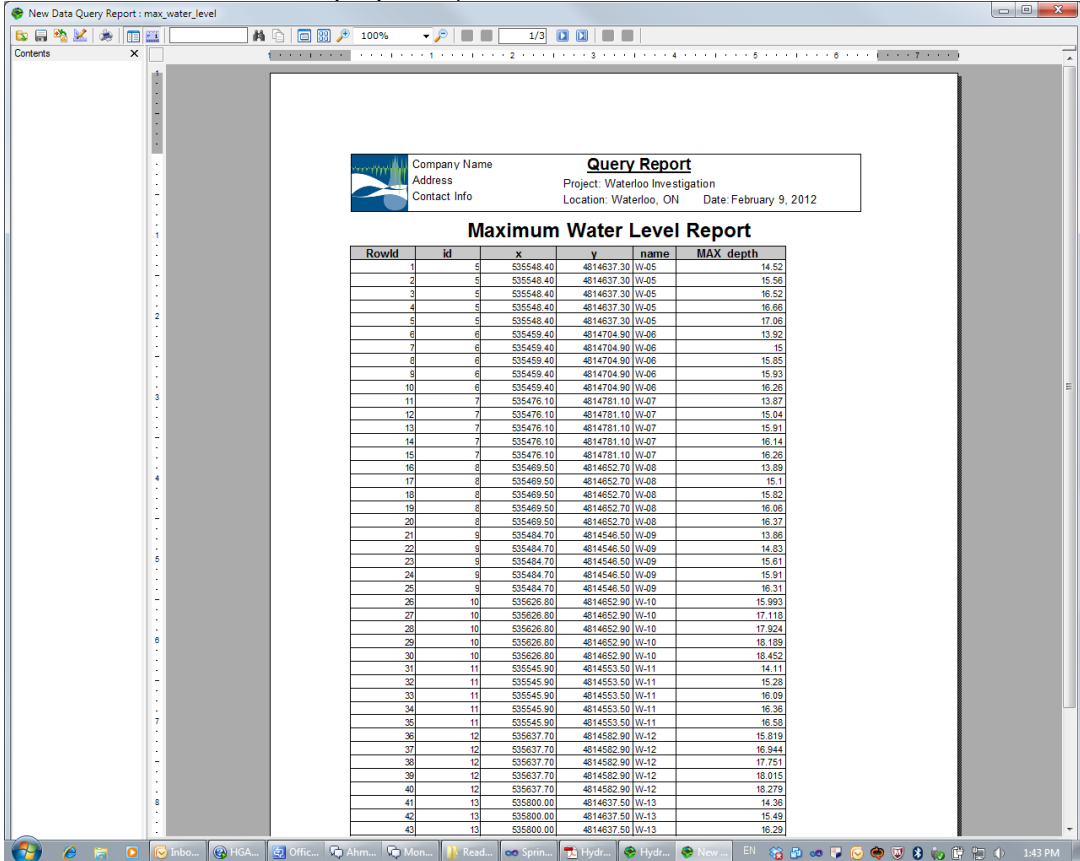
To modify the data source information of the ADO control in your report:

- Select the ADO control by clicking on the appropriate icon on the toolbar
- Display the Properties explorer window if it is not already visible
- Select the Custom properties option by clicking on the button next to this item
- A dialog will appear. Provide or modify the desired options

## 18.3 Report Viewer Window

The Viewer allows you to visualize the final report as it would be printed. It can be considered a print preview of your reports. Once your report arrives at the viewer it is ready to be printed, saved in the native binary format of the Report Editor, or exported to the various formats. A report preview can be generated by clicking on the  (Preview) button from the Designer window's toolbar.

A sample of the Report viewer window is shown below (with a report template loaded for demonstration purposes).




The screenshot shows the Report Viewer window titled 'New Data Query Report : max\_water\_level'. The report content includes a header section with the following information:

**Query Report**  
 Project: Waterloo Investigation  
 Location: Waterloo, ON Date: February 9, 2012

**Maximum Water Level Report**

RowId	id	x	y	name	MAX depth
1	5	53548.40	4814637.30	W-05	14.52
2	5	53548.40	4814637.30	W-05	15.56
3	5	53548.40	4814637.30	W-05	16.52
4	5	53548.40	4814637.30	W-05	16.66
5	5	53548.40	4814637.30	W-05	17.06
6	6	535459.40	4814704.90	W-06	13.92
7	6	535459.40	4814704.90	W-06	15
8	6	535459.40	4814704.90	W-06	15.85
9	6	535459.40	4814704.90	W-06	15.93
10	6	535459.40	4814704.90	W-06	16.26
11	7	535476.10	4814781.10	W-07	13.87
12	7	535476.10	4814781.10	W-07	15.04
13	7	535476.10	4814781.10	W-07	15.91
14	7	535476.10	4814781.10	W-07	16.14
15	7	535476.10	4814781.10	W-07	16.26
16	8	535469.50	4814652.70	W-08	13.89
17	8	535469.50	4814652.70	W-08	15.1
18	8	535469.50	4814652.70	W-08	15.82
19	8	535469.50	4814652.70	W-08	16.06
20	8	535469.50	4814652.70	W-08	16.37
21	9	535484.70	4814546.50	W-09	13.86
22	9	535484.70	4814546.50	W-09	14.53
23	9	535484.70	4814546.50	W-09	15.61
24	9	535484.70	4814546.50	W-09	15.91
25	9	535484.70	4814546.50	W-09	16.31
26	10	535626.80	4814652.90	W-10	15.993
27	10	535626.80	4814652.90	W-10	17.118
28	10	535626.80	4814652.90	W-10	17.924
29	10	535626.80	4814652.90	W-10	18.189
30	10	535626.80	4814652.90	W-10	18.452
31	11	535545.90	4814553.50	W-11	14.11
32	11	535545.90	4814553.50	W-11	15.28
33	11	535545.90	4814553.50	W-11	16.09
34	11	535545.90	4814553.50	W-11	16.36
35	11	535545.90	4814553.50	W-11	16.58
36	12	535637.70	4814582.90	W-12	15.819
37	12	535637.70	4814582.90	W-12	16.944
38	12	535637.70	4814582.90	W-12	17.751
39	12	535637.70	4814582.90	W-12	18.015
40	12	535637.70	4814582.90	W-12	18.279
41	13	535800.00	4814637.50	W-13	14.36
42	13	535800.00	4814637.50	W-13	15.49
43	13	535800.00	4814637.50	W-13	16.29




















The Report Viewer contains three main components:

- Report Navigation Toolbar: provides a number of toolbar icons that allow you to interact with the report (described in detail below)
- Table of Contents: can be displayed by clicking on the TOC icon () on the toolbar. The table of contents allows you to jump to any desired section in the report.
- Main Body of the Report (Preview): The main body of the report displays the final report as per the report design and data.

### 18.3.1 Report Viewer Toolbars

The Report Editor Viewer offers an extensive list of navigation tools; the figure below shows the toolbars used in the Viewer window.

The following describes the toolbar buttons of the viewer window.

-  Open Static Report: Opens a previously saved static report
-  Save Static Report: Saves the current report in the Report Editor's native format
-  Export Report: Exports the current report to the desired format
-  Report Designer: Displays the Report Designer window
-  Print Report: Sends the current report to printer
-  Show TOC: Displays the table of contents for the current report
-  Show Ruler: Displays a ruler
- Search Text: Allows you to provide text to search for
-  Find Text: Searches for text provided in the "Search Text" text box
-  Copy Page: Copies the current page to windows clipboard
-  Show Single Page: Displays report one page at a time
-  Show Multiple Pages: Displays multiple pages of the report at once
-  Zoom in: Zooms in to a selected area of the report
- Zoom in percent: Sets the zoom level to that selected in here
-  Zoom out: Zooms out the report
-  First Page: Moves to the first page of the report
-  Previous Page: Moves to the previous page in the report
- Page: Moves to the page specified in this text box
-  Next Page: Moves to the next page in the report
-  Last Page: Moves to the last page in the document
-  Back: Moves back to the previous page in a list of recently accessed pages
-  Forward: Moves forward to the next page in a list of recently accessed pages

### 18.3.2 Using the Report Viewer


Once a report is generated and displayed on the Viewer, it can either be saved in the Report Editor's native binary format, printed, or exported to various formats that are supported by the Report Editor.

Using the  button on the toolbar, reports can be exported to:

- Portable Document Format (PDF)
- Microsoft Excel
- TIFF
- Hyper Text Markup Language (HTML)
- Rich Text Format (RTF)

### Saving Reports


Saving the report design as opposed to the final report is preferable as the design requires a smaller storage space (for most reports) and the reports that are generated from a saved report design are dynamic - they are up to date with the data stored in your database. However, reports that are saved from the Viewer are static, and they may not reflect the exact content of the current data.

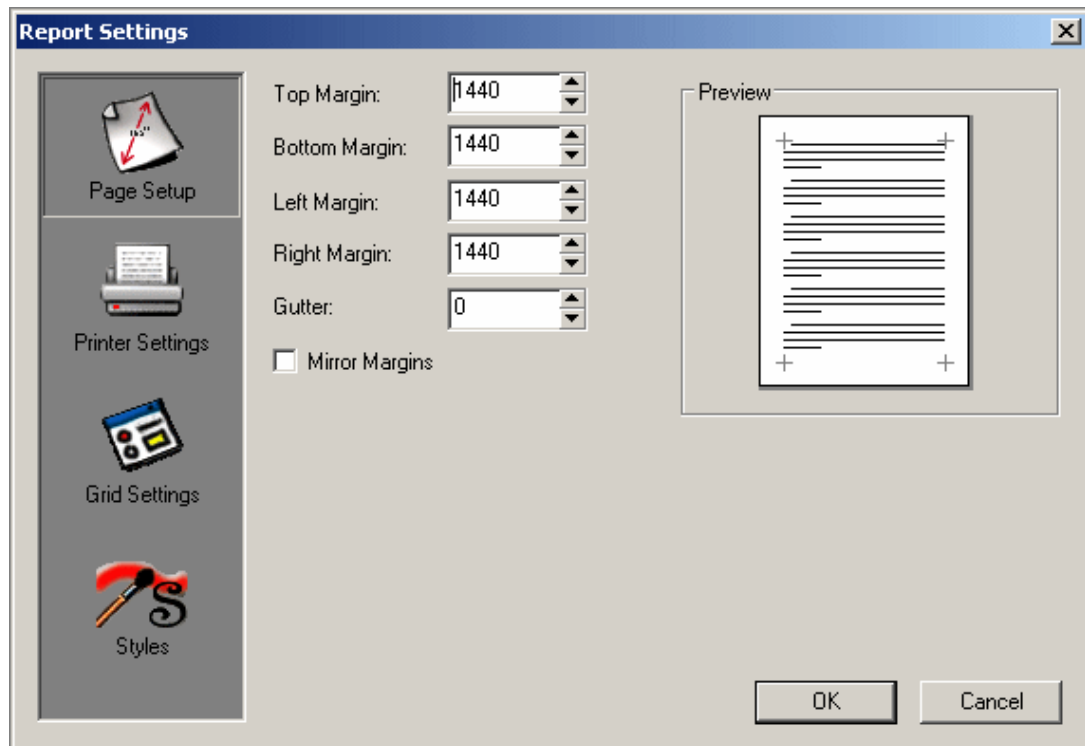
To save the report, press the  (Save button) from the Viewer window's toolbar. The Report will be saved as a .RDF file (archive file).

HGA stores and manages all report designs in your project database. All reports that are created for your project will be retrieved from the database and are listed in the Project Tree when your project is loaded into HGA.

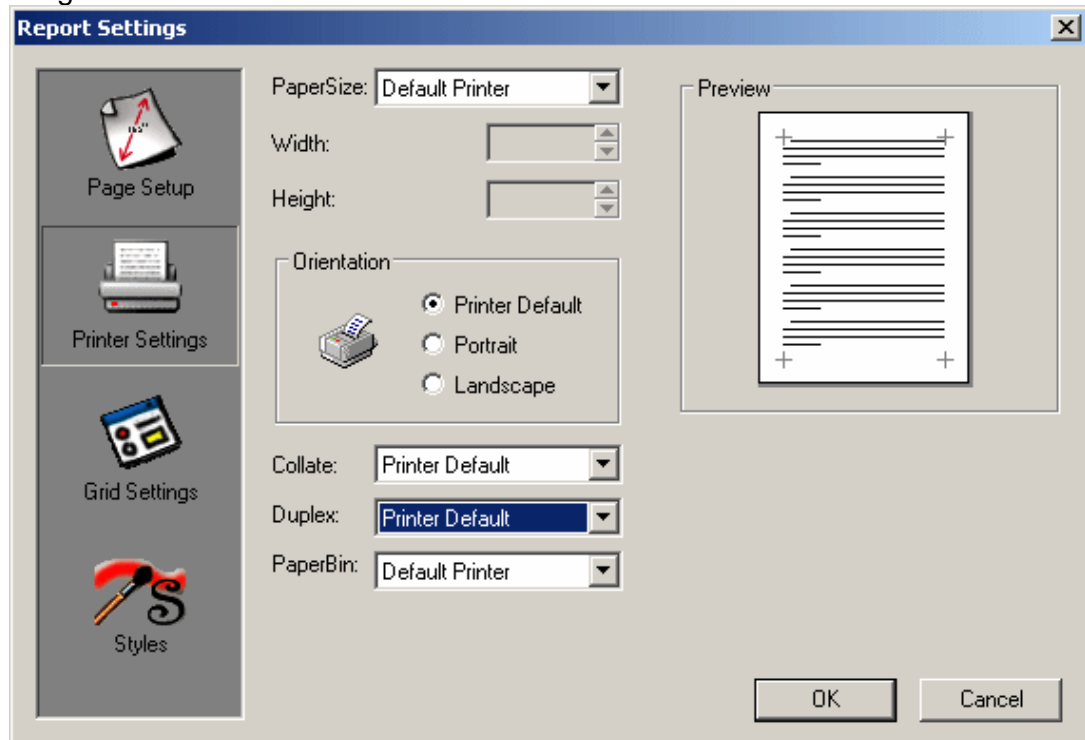
---

## 18.4 Report Settings

The Report Settings dialog can be accessed by clicking the Page Report button  from the Main Toolbar. This dialog consists of four sections: Page Setup, Printer Settings, Grid Settings and Styles. Each section is described below.

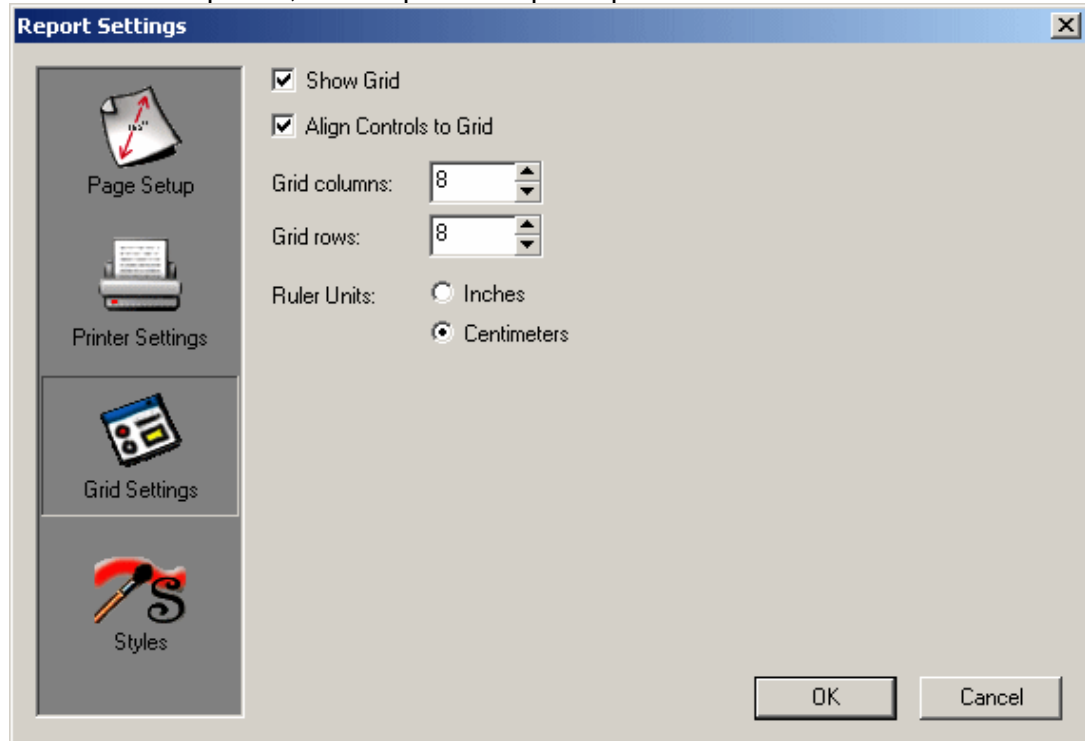


The Page Setup section allows you to set the page margins of your report page. Set the Top, Bottom, Left, Right and Gutter margins by using the appropriate vertical scroll bars. Margin values can be set in quarter increments (1440 = 1 inch). You may also choose to mirror the margins of facing pages by selecting the Mirror Margins check box.



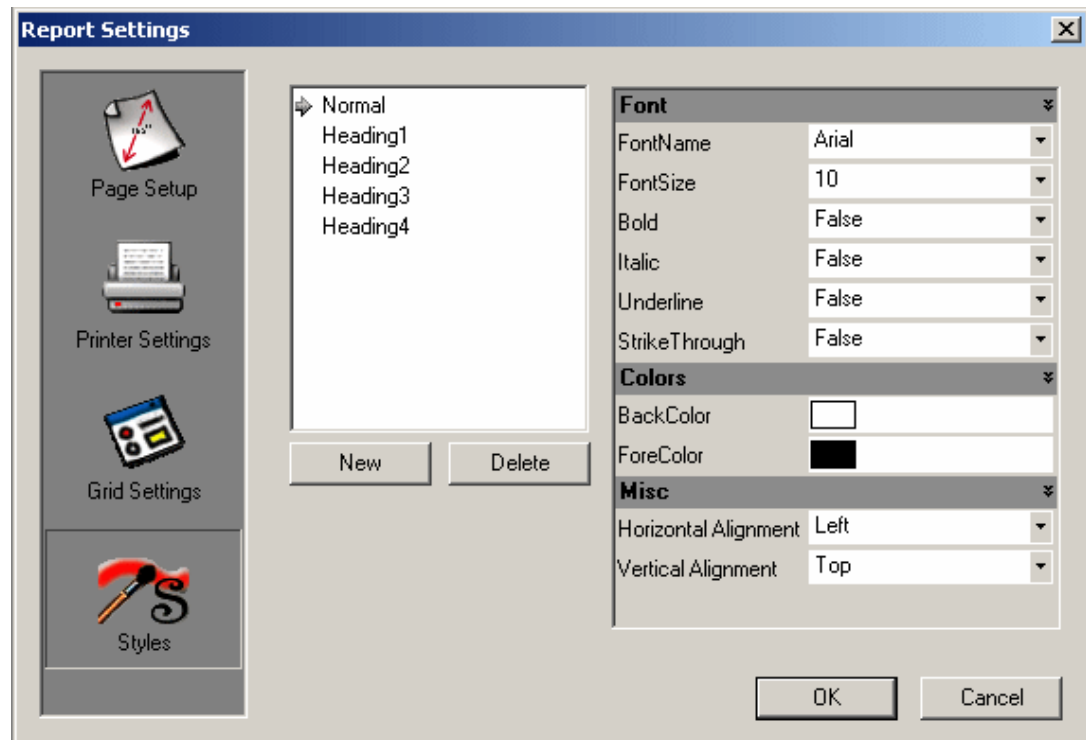


The Printer Settings section allows you modify the printing options. Here you can select the paper size from the Paper Size dropdown list box. You can manually specify the paper size by using the Width and Height vertical scroll bars. The Orientation frame allows you to specify the paper orientation. You may also choose to set the options for Collate, Duplex and PaperBin by using the appropriate dropdown list box. Selecting Printer Default for any of the printing options will assign the default setting of the selected printer, for that particular print option.



The Grid Settings section allows you to modify the grid appearance of the designer window. You can set the visibility of the grid by enabling/disabling the Show Grid checkbox. Selecting the Align Controls to Grid checkbox will automatically snap controls to the nearest grid column. Set the number of Grid columns and Grid rows by using the appropriate vertical scroll boxes.

You can change the units of the ruler that appears above the designer window by clicking on either the Inches or Centimeters radio button.



The Styles section allows you to create, remove and modify text styles, which can then be selected from the Text Style dropdown box, and applied to your text controls. Text styles are useful for applying many text characteristics (font, size, bold, italic, underline etc) to your text, in just one simple task.

Click the New and Delete button to create a new style and delete a current style, respectively. The Font, Color and Misc settings in the right frame allow you to set and modify the text characteristics of the selected style.

Using non-default page dimensions

If you wish to print to any non-default paper size (e.g plotter paper), you must first specify the page dimensions in three different areas within the Report Designer. To do so, follow the steps below:

1. In the Report Designer, select the Page Setup button from the main toolbar.

Select the Printer Settings button.

Specify the page size from the PaperSize dropdown box. Alternatively, define the page dimensions by selecting Custom Paper Size from the PaperSize dropdown box, and then entering the Width and Length values below.

Click [Ok]

2. Select the Printer Settings button from the main toolbar.

Select the desired plotter from the Name dropdown box.

Again, specify the paper size.

Click [Ok].

3. Manually define the page size within the Report Designer, by increasing/decreasing the page extents with the mouse cursor.

Now you are ready to print your report.

Limitations

Although the Report Designer provides a detailed interface for customizing reports and templates, it is limited in the following ways:

- You cannot print multiple copies within one print event
- You cannot select specific pages to print
- You cannot select a page range to print

If you wish to print your reports using these settings, you can always export the report as a PDF and print the report(s) from a PDF Reader.

## 18.5 Creating Reports

Reports for your project can be created from the various modules within HGA including:

- Data Grids
- Data Query
- Time Series Plots
- Borehole Log Plots
- Map Manager
- Cross Section Editor
- 3D Explorer

HGA comes with several prepared report templates for most database schemas. The first two report types listed above can be created through HGA's main interface, while the remaining types are created only while using the respective modules of HGA. The following few sections present detailed descriptions on creating each report type.

### 18.5.1 Creating Reports in HGA-Main Window

The main interface of HGA allows you to create reports in one of the following two ways:


- From a Grid: create a report with the data in the selected grid
- From a Data Query: create a report using the results of a query

#### Creating Reports from a Data Grid

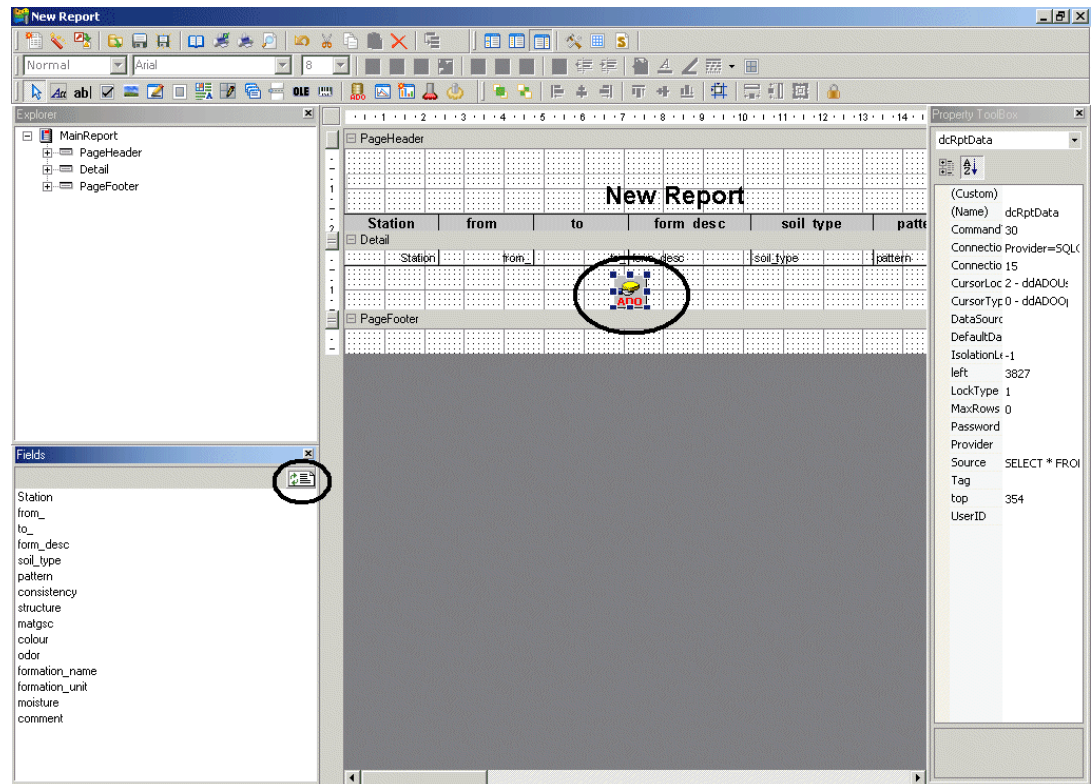
Follow the directions below to create a report containing a data grid.

Select the desired grid in HGA (for example, select the Stations List grid, or select the desired table)


Press the Print button  from the toolbar.

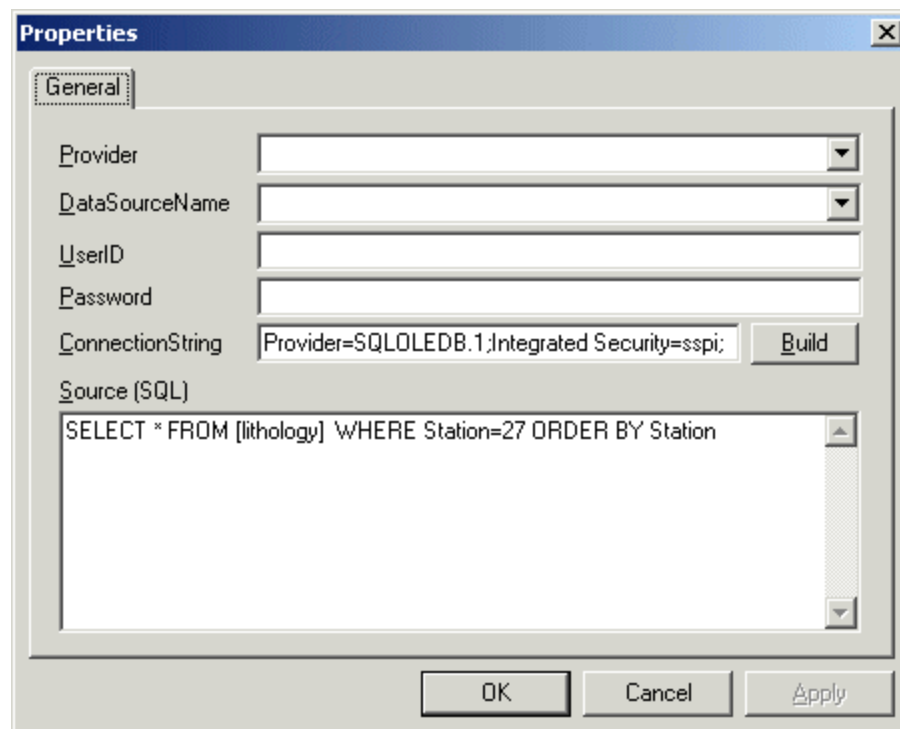
The report will be displayed in the Preview (Viewer) window, by default. To change to the Designer Window, press the  (Designer) button from the toolbar. This will allow you to make any desired modifications.

The fields in the selected grid will be added to the report designer; and the ADO data control is automatically created. An example is shown below for the Lithology table:



The layout of the report can then be modified, and unwanted fields can be removed from the design. If the fields do not immediately show up in the Design window, press the Refresh button in the Fields frame, as circled above. To see the ADO

Data control for the report, click on the button  (ADO button) in the Detail section of the Report body design (also circled above). Then, right click, and select Properties. A dialog similar to the one shown below will appear.



In the ADO properties, under Source SQL, you can see that the SQL string has been automatically created for you, based on the table selected in HGA. In this example, the SQL string basically states: Select all fields from the Lithology table, where the Station ID is 27, and order by Station. If you are familiar with the format, you may modify the SQL string here, and update the report design.



After the report is saved, a node will be created in the Project Tree, under the Reports node with the appropriate report file name. Currently HGA requires that all reports be saved under the "Reports" folder, which in turn is created within the project folder. Although the Report Manager allows you to open reports from any folder, only those saved under the "Reports" folder of your project will be displayed in the Project Tree.

### Creating Reports based on a Data Query

Follow the directions below to create a report containing a Data Query.

Select the desired Data Query from the Queries node in the Project Tree (if no queries are available, create a Query using the Query Manager).

Execute the Query in order to see the results.

Press the Print button  from the main toolbar, or select Project / Report. (This item is enabled only if a grid is visible and active and has at least one row of data.) The report will be displayed in the Preview (Viewer) window, by default. To change to the Designer Window, press the  (Designer) button from the toolbar. This will allow you to make any desired modifications.


As in the previous type of report, the report will appear in the Project Tree once it is saved.

### 18.5.2 Creating a Report Containing a Map Project

Follow the directions below to create a report containing one or more map layers from the Map Manager.

Start the Map Manager, and open a Map Project

Show/hide the desired layers in the map project (all visible layers will appear in the report)

Press the Print button  from the toolbar, or select Project / Print from the main menu of the Map Manager.

The report will be displayed in the Preview (Viewer) window, by default. To change to the Designer Window, press the  (Designer) button from the toolbar. This will allow you to make any desired modifications.

The Report Editor allows you to either create a new report for the current map project or add it to an existing one. If you choose to add to an existing report, the report editor adds the new map to the report. As such, multiple views of your map project(s) can be sent to a report one by one.

Each view of your map project is created with its associated scale bar. The map project can be resized and repositioned as desired on the runtime Report Designer. Note that resizing a map project on the runtime Report Designer adjusts the scale that is associated with that specific view of your map project.

The report will appear in the project tree once it is saved.


---

### 18.5.3 Creating a Report Containing a Cross Section

Follow the directions below to create a report containing one cross section created in the Cross Section Editor

Start the Cross Section Editor, and open a Cross Section

Show/hide the desired interpretation layers in the cross section (all visible layers will appear in the report)

Press the Print button  from the toolbar, or select File / Print from the main menu.

The report will be displayed in the Preview (Viewer) window by default. To change to the Designer Window, press the  (Designer) button from the toolbar. This will allow you to make any desired modifications.

The report editor allows you to either create a new report for the current cross section or add it to an existing one. If you choose to add the current cross section to an existing report, the report editor adds the new cross section to the report. As such, multiple cross sections can be sent to a report one by one. In order to be able to add the current cross section to an existing report, you must first open the existing report.


Each cross section is created with its associated legends and key map indicating the cross section location in plan view. The cross section can be resized and repositioned as desired on the runtime report designer.

The report will appear in the project tree once it is saved.

---

## 18.6 Managing Reports

### Opening an Existing Report

All reports saved in your project are listed under the "Reports" node in the Project Tree. To open a report, you may either double-click on the desired report or select the "Open Report" pop-up menu item by right-clicking on the desired report. All reports are opened in the Report Designer by default. The designer displays the report layout and allows you to modify it before generating the report. The print preview of the report can be generated by clicking on the  (Print Preview) button on the toolbar.


### Deleting a Report

To delete a report that is registered with HGA, select it in the Project Tree, right click on it, and select Delete from the pop-up menu. The selected report will be deleted both from the tree view, as well as from the file.

### Saving a Report

A report can be saved at any time by clicking on the "Save" icon on the runtime report designer. An existing report will be saved using the same file name. When saving new reports, you will be prompted for a file name.

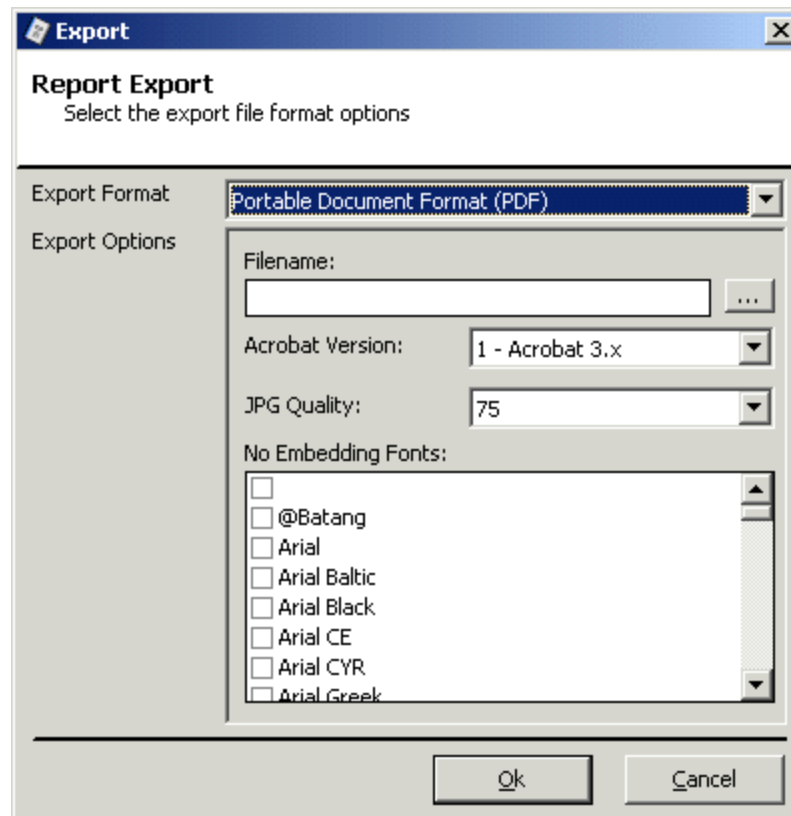
### Saving a Report As...

To save a report with a different name and/or as a report template, click on  (Save As) icon on the Report Designer's toolbar. You will be prompted for a file name and type. The report or report template will be saved to the "Reports" sub folder of the folder storing your project related information. The report or report template will also be saved in the project's database, and will be made available in the appropriate node in the Project Tree. The report or template can be deleted from the Project Tree if you choose not to store it in the database.

### Exporting generated reports

Once a report has been generated, it can be exported to various formats, as well as being saved in the Report Editor's native format. The native format stores reports with an RTF file extension.

To export a report, click on the  (Export Report) icon on the toolbar. A dialog similar to that shown in the figure below will be displayed.



Select the desired export format, provide a file name and path, specify settings relevant to the format as desired and click on the [OK] button.

Reports that are saved or exported from the report viewer are not directly managed by HGA and as such will not be listed in the Project Tree.

## 18.7 Creating and Managing Report Templates


The Report Editor contains pre-defined templates which allow users to quickly and easily create professional reports. Report templates can be edited, saved, and managed in the Report Editor, and new templates may be created and saved for future use.

This feature allows users to have different report layout options for headers and footers and to share them between two or more reports. This allows users to have as many report designs as desired. For example, one or more report templates can be prepared for each client with the specific header and footer. Another advantage of having a report template is that if the header information using a certain template changes, the change will automatically be applied to all reports that use the template without the need to reopen the report. For example, if the client company's telephone number changes, the user needs to change only the template instead of changing each report.

Each time a new report is created, previewed, or printed it will use the active report's layout unless a template is specified.

Creating A Report Template



The Report Editor allows you to save the active report's design as a report template for future use. Once you are satisfied with the design of the currently opened report's layout, click  (Save-As button) to save it as a report template. In the dialog that is displayed, provide the name for the template, check the box beside "Save as template" and click on "Save".

The template saves the header, the footer as well as the background for the detail section of the current report. The detail section may have background watermarks such as "DRAFT", "CONFIDENTIAL", etc. at desired angles and locations. The header and footer may contain: relevant information for your company and/or client including logo, name, Address, Telephone, Fax, e-mail, and web site address. The user can also configure properties such as: font, alignment, etc. for the template.

Once a report template is created, it will be listed under the "Reports" node in the Project Tree of HGA.

#### Opening a Report Template

Report templates can be opened by double clicking on them in the Project Tree of HGA. A template can also be opened using the report editor directly by selecting the

Open button  from the Designer window's toolbar and setting the file filter to "\*.WTP". Once a report template is opened, it can be edited and saved.

#### Deleting a Report Template

In HGA, right-click on a report template in the Project Tree, and select the Delete option from the menu, to delete the template. The selected template will be deleted both from the Project Tree as well as from storage.

#### Setting a Report Template as Default Template


To set a selected template as the default template, right click on the template and select the "Set as default" option from the pop-up menu in HGA. The selected template will be set as the default template.

Every time a new report is created, the default template will be used to furnish the header and footer sections.

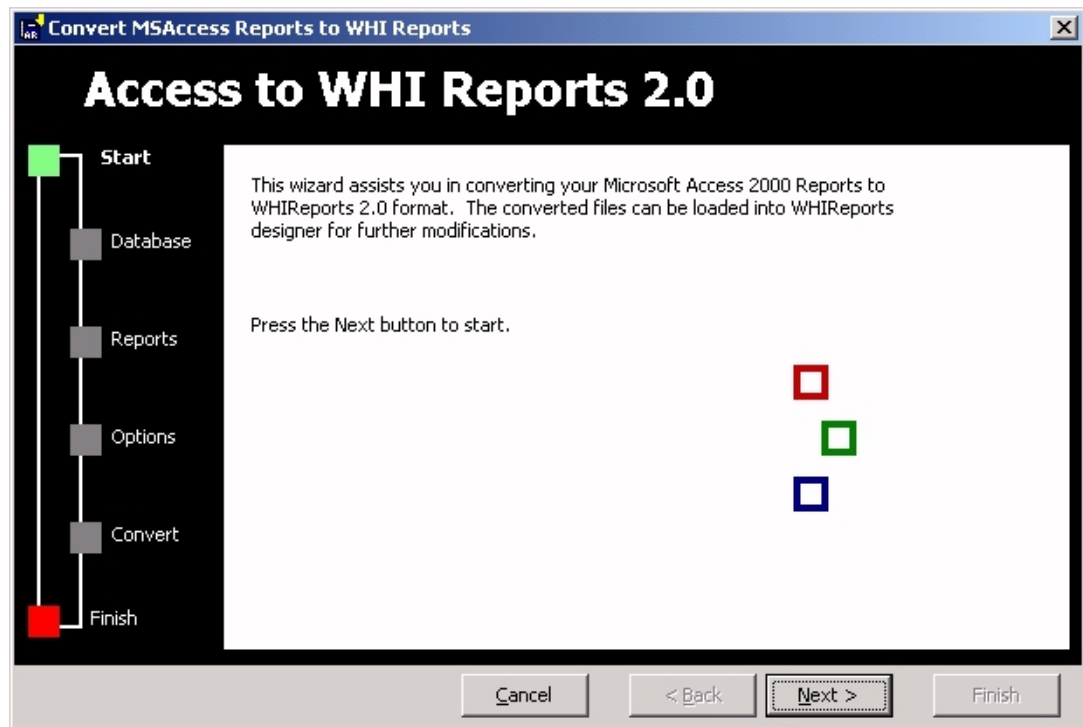
---

## 18.8 Import Reports from MS Access

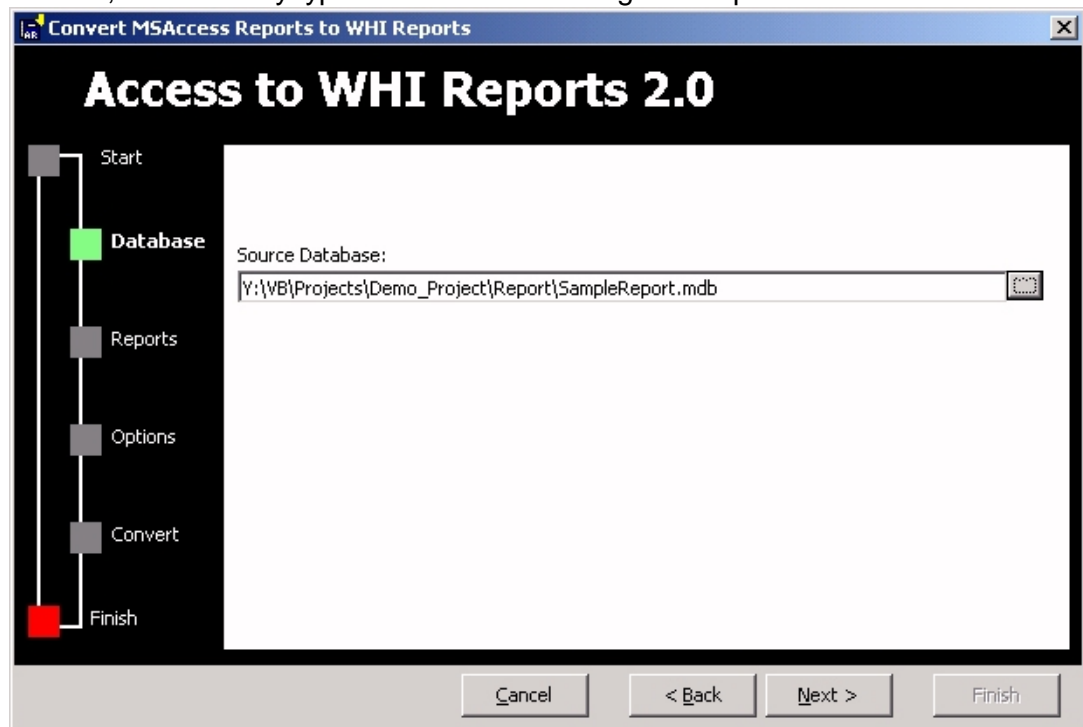
The Report Editor allows you to import reports that are created in an MS Access 2000 database environment. This may be useful in cases where you migrate existing data from MS-Access into HGA, and want to import existing reports as well.

The MS Access Importing wizard can be activated by clicking on the  (Import Access Report) button on the Designer's toolbar. The wizard guides you through a number of steps to import the desired report. These steps are explained in the following sections.

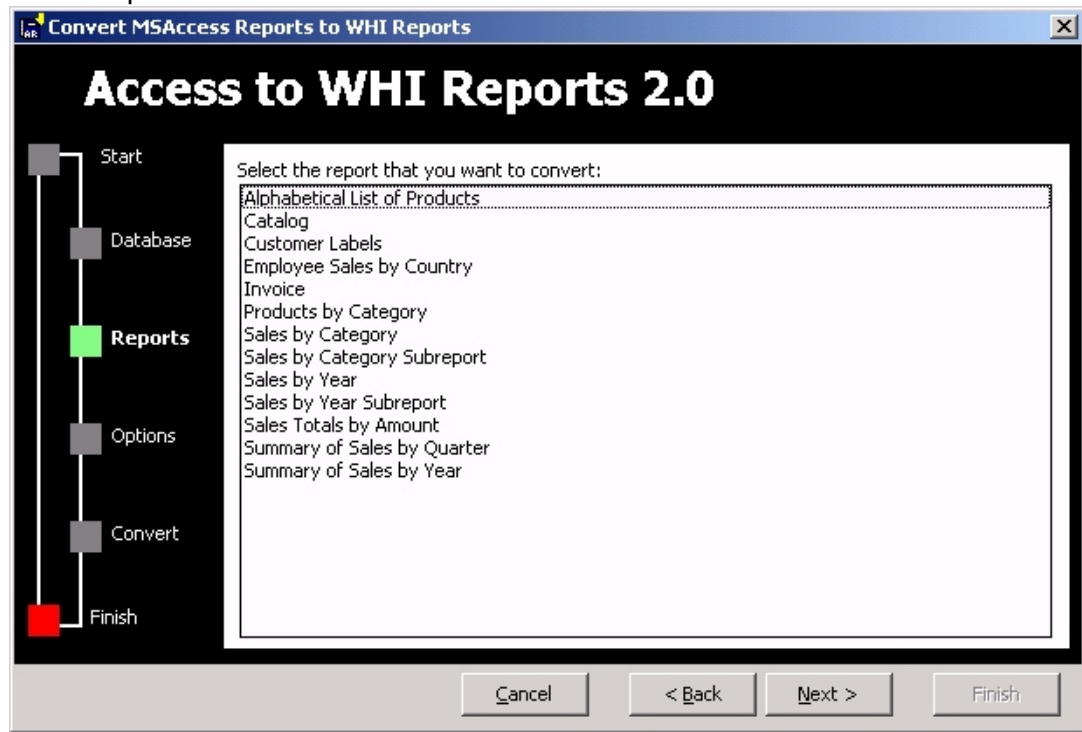
The following figure depicts the first screen of the wizard that presents some introductory text.



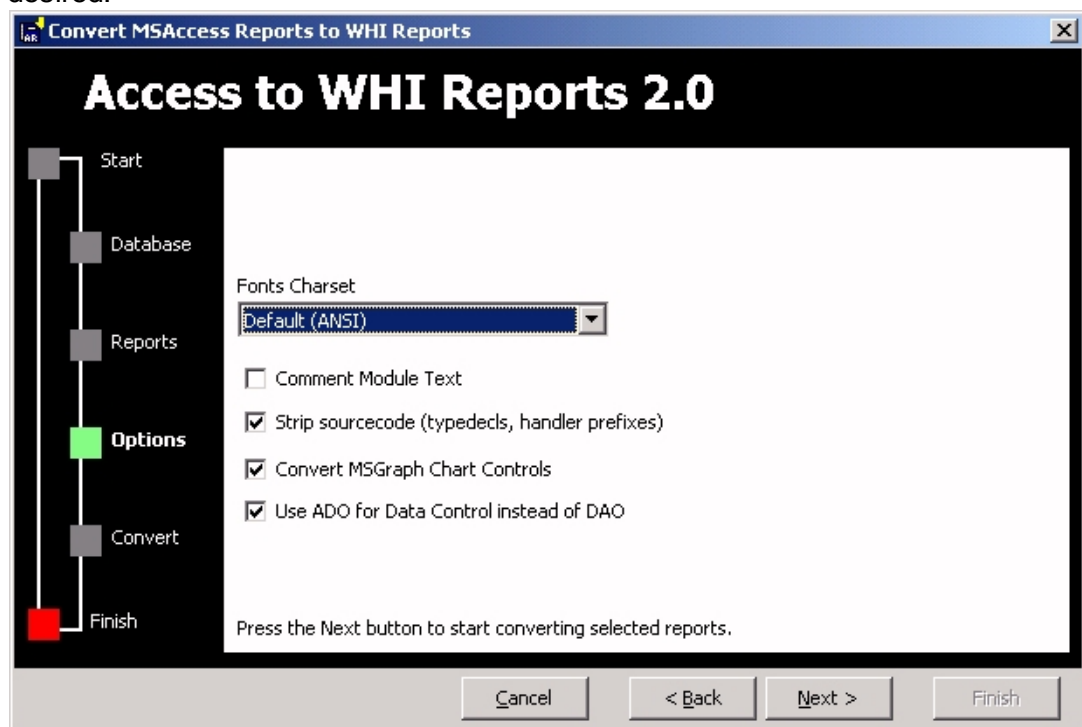
Clicking on the [Next] button displays the second dialog, requesting the MS Access database name that will be used as a source for the reports to be imported. Provide the database name by clicking on the Open Database [...] button to the right of the text box, or alternately type in the name including the full path.



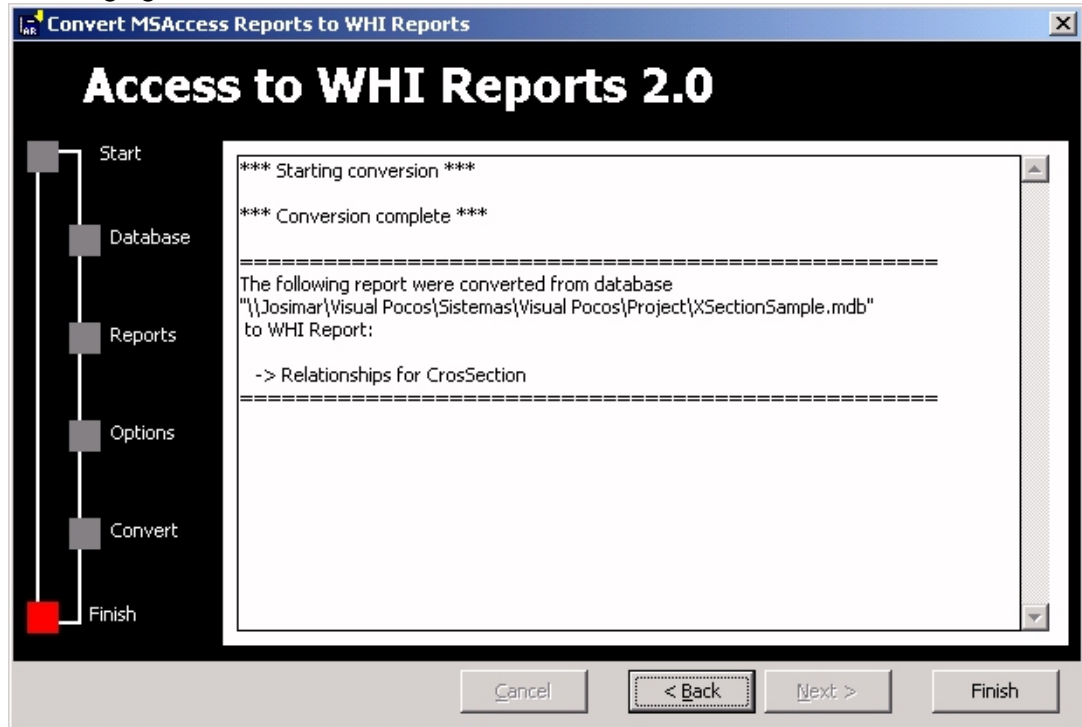
Click on the [Next] button to display the next dialog, listing all reports that are available in the selected database. Select the desired report and click on the [Next] button to proceed.




The dialog shown below will be displayed. It allows you to specify some settings that will alter the converted report. The default values are fine unless a change is desired.



Click on the [Next] button to start converting the report to the Report Editor's native format. A dialog will appear displaying the progress of the report conversion. Once conversion is completed, the dialog displays the summary report as shown in the following figure.



Click the [Finish] button and the converted report will be displayed in the runtime designer. Once all desired modifications are done to the report, it can be saved using the procedure discussed earlier.

The final report can be visualized by clicking on the  (Report Preview) on the toolbar.

## 19 Appendices

The following Appendices provide additional information and resources for working with Hydro GeoAnalyst:

- [Appendix A: Project Files and Directory Structure](#)
- [Appendix B: Advanced Interpolation Settings](#)
- [Appendix C: Map Manager: ISO Codes](#)
- [Appendix D: Online GIS Data Resources](#)
- [Appendix E: Frequently Asked Questions \(FAQ's\)](#)
- [Appendix F: Configuring Geotransformation Settings](#)

### 19.1 Appendix A: Project Files and Directory Structure

An HGA project consists of many different files and folders related to the different components within HGA. Please refer to the information below to determine what data is stored in which folder:

#### Project Folder:

---

Project.vbh is a text file and contains the information on the connection string to the HGA project, such as SQL server name, database catalog name, etc.

Project.vbh.bak is a backup of the .vbh file.

Project.vbx is a text file and contains the geotransformation settings of the project.

#### Map Subfolder:

---

The map folder contains all of the shapefiles associated with the map project. In the root, you will find MapProjectName.VMP. This is an XML file that contains details on the map project, such as the projection system, renderers, settings, cross-section lines, intersections, etc. Each map project has a unique .VMP file.

### **Selection**

When you create a new map layer from an HGA station group (or selected stations), a new points shapefile is created and saved in this directory (i.e. boreholes.shp, boreholes.shx, boreholes.dbf).

### **Data**

When you create a new map layer from an HGA data query, or a map project, a new points shapefile is created and saved in this directory. (e.g. Chem\_Exceedences.shp, Chem\_Exceedences.shx, Chem\_Exceedences.dbf)

### **Plumes Subfolder:**

---

The plumes folder contains all of the files associated with the plume data once the 3D interpolation has been conducted on a query. The created .nc files are used when viewing the plumes in the Scene Viewer.

### **Surfaces Subfolder:**

---

The surfaces folder contains all of the gridded surfaces (.GRD files) created in the map project by interpolating the current layer. The gridded surfaces can also be used in the Scene Viewer.

### **V3D Subfolder:**

---

The V3D folder was used by the 3D Explorer module which has been replaced by the Scene Viewer.

### **XSection Subfolder:**

---

The xsection folder contains all of the cross-section information from your project. In the xsection folder there is a subfolder for each cross section created in the project (i.e. AA, BB, etc.). The subfolders contain all the shapefiles associated with the cross section.

### **XInter**

The XInter subfolder contains the shapefiles from the map project for the cross-section line.

## BHLP

The BHLP subfolder contains image files for any well profiles drawn on the cross section. The images are saved as .EMF format.

## 19.2 Appendix B: Advanced Interpolation Settings

### INVERSE DISTANCE

The Inverse Distance Squared method is a very fast and efficient, weighted average interpolation method. The weighting factor applied to the data depends on the distance of the point from the grid cell, and is inversely proportional to the distance squared. Consequently, the greater the distance the data point is from the grid node, the smaller the influence it has on the calculated value.

The Inverse Distance Squared method for interpolation may generate patterns similar to a "bull's-eye" surrounding points of observations. Selecting a larger number of nearest neighboring data points may smooth this effect, but if the bull's eye pattern is undesirable, then other methods of interpolation, like Natural Neighbor and Kriging, are recommended.

The Interpolator Options for the Inverse Distance Squared method is described below.

**Start X** Minimum X co-ordinate for the interpolation grid.

**End X** Maximum X co-ordinate for the interpolation grid.

**X\_Nodes** Number of grid nodes in the X-direction.

**Start Y** Minimum Y co-ordinate for the interpolation grid.

**End Y** Maximum Y co-ordinate for the interpolation grid.

**Y-Nodes** Number of grid nodes in the Y-direction.

**Use Log Interpolation** Flag to interpolate the log values of the data. This setting is useful for where some measured values are many orders of magnitude higher than the majority of the other values. In such cases, the large values dominate the interpolation process and details in the low concentration zones are removed. If this setting is selected, the log of each data value is taken prior to performing interpolation. By interpolating the log of the data set, small values are given more weight than otherwise.

**Restrict Min Value** Flag to restrict the minimum value of the interpolated data.

**Restrict Max Value** Flag to restrict the maximum value of the interpolation data.

**Value Min** Minimum value of the interpolated data. Any interpolated data less than Value Min will be assigned a value of Value Min.

**Value Max** Maximum value of the interpolated data. Any interpolated data greater than Value Max will be assigned a value of Value Max.

**Real Min** Real minimum value of interpolated data.

**Real Max** Real maximum value of interpolated data.

**Num\_Neighbors** Number of nearest data points to use when calculating interpolated value for each grid node.

**Z\_Only** Allows the user to select between outputting the original X and Y values, plus the interpolated value  $(x,y,f(x,y))$ , or the interpolated value only  $(f(x,y))$ . Note: This has no effect on the actual contour output, and can be ignored.

### **NATURAL NEIGHBOR**

The Natural Neighbor method (Watson, 1994) is based on the Thiessen polygon method used for interpolating rainfall data. The grid node for interpolation is considered a new point, or target, for the existing data set. With the addition of this point, the Thiessen polygons based on the existing points are modified to include the new point. The polygons reduce in area to include the new points, and the area that is taken out from the existing polygons is called the "borrowed area". The interpolation algorithm calculates the interpolated value as the weighted average of the neighboring observations where the weights are proportional to the borrowed areas. The Natural Neighbor method is valid only with the convex hull of the Thiessen polygon formed by the data points, and values outside the hull extrapolation should be used with caution.

The Natural Neighbor interpolation scheme may be visualized as a taut rubber sheet stretched to satisfy all the data points. The interpolated value at any location is a linear combination of all Natural Neighbors of that location, and the resulting surface is continuous with a slope that is also continuous. Combining the gradients or slopes with the linear interpolation provides results that are more smooth, and may anticipate the peaks and valleys between data. Singularities and other undesirable effects may be lessened by incorporating the gradient factor.

The gradient influence on the results can be manipulated by two tautness parameters that the user can enter. These parameters allow the interpolated surface to vary from purely linear interpolation to one which is well rounded and has the gradient factor. In all cases the slope discontinuities are removed and the resulting surface has slope continuity everywhere.

The advanced settings parameters for the Natural Neighbor method are described below:

**Start X:** Minimum X co-ordinate for the interpolation grid.

**End X:** Maximum X co-ordinate for the interpolation grid.

**X\_Nodes:** Number of grid nodes in the X-direction.

**Start Y:** Minimum Y co-ordinate for the interpolation grid.

**End Y:** Maximum Y co-ordinate for the interpolation grid.

**Y-Nodes:** Number of grid nodes in the Y-direction.

**Use Log Interpolation:** Flag to interpolate the log values of the data. This setting is useful for where some measured values are many orders of magnitude higher than the majority of the other values. In such cases, the large values dominate the interpolation process and details in the low concentration zones are removed. If this setting is selected, the log of each data value is taken prior to performing interpolation. By interpolating the log of the data set, small values are given more weight than otherwise.

**Restrict Min Value:** Flag to restrict the minimum value of the interpolated data.

**Restrict Max Value:** Flag to restrict the maximum value of the interpolation data.



**Value Min:** Minimum value of the interpolated data. Any interpolated data less than Value Min will be assigned a value of Value Min.

**Value Max:** Maximum value of the interpolated data. Any interpolated data greater than Value Max will be assigned a value of Value Max.

**Real Min:** Real minimum value of interpolated data.

**Real Max:** Real maximum value of interpolated data.

**Mag\_X:** X co-ordinate magnification factor

**Mag\_Y:** Y co-ordinate magnification factor

**Mag\_Z:** Z co-ordinate magnification factor

**No\_Value:** Value assigned to nodes located outside the convex hull of the data points (where interpolation is not performed)

**Allow\_Extrapolation:** Is a flag to use extrapolation for nodes outside the convex hull of the polygon formed by the data points. In this case linear regression is used to fit a plane through the data set and calculate the interpolated value. This should be used with caution since extrapolation is less reliable than interpolation.

**Sdip:** Calculate the aspect and slope at each grid node. This can be used to augment the elevation information. The aspect is measured in degrees or radians clockwise from north, and the slope is measured positively below the horizontal plane in degrees or radians.

**Tautness\_1:** Controls the influence of the gradient on the results and may be used to smooth the interpolated surface.

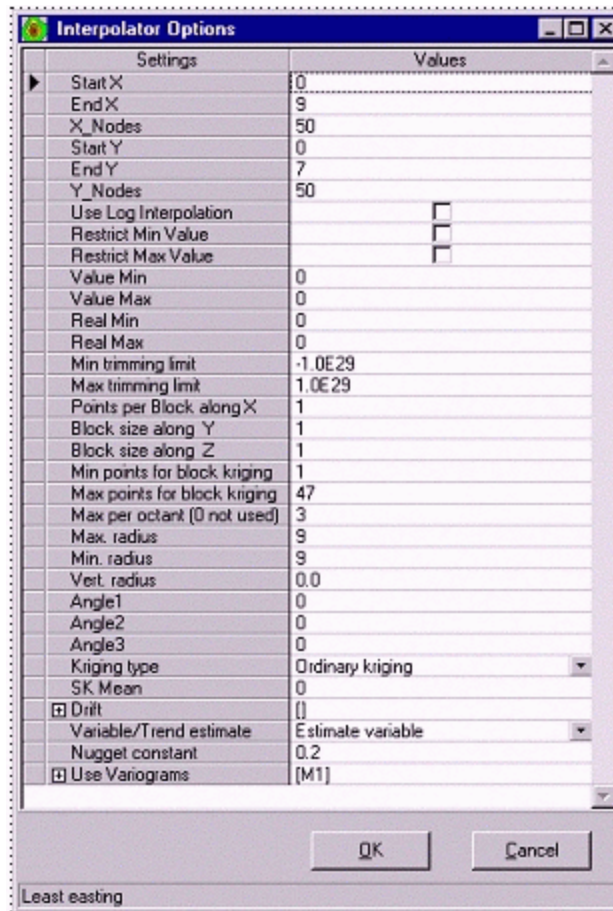
**Tautness\_2:** Controls the influence of the gradient on the results and may be used to smooth the interpolated surface.

**Use\_Gradient:** Blends the gradient calculation and the linear interpolation calculation to produce a smoother surface.

## **KRIGING**

Kriging is a geostatistical method that produces visually appealing maps from irregularly spaced data. Anisotropy and underlying trends suggested in raw data can be incorporated in an efficient manner through Kriging. The program used, called kt3d, is available in the public domain from the Geostatistical Software Library (GSLIB), distributed by Stanford University, and is well-documented by Deutsch and Journel (1998). The program kt3d from GSLIB performs simple Kriging, ordinary Kriging, or Kriging with a polynomial trend, and uses the standard parameter file used by GSLIB. If the semi-variogram components have already been modeled by the user, they can be incorporated into the program by choosing the appropriate set of parameters in the parameter file. The semi-variograms available include Spherical, Exponential, Gaussian, Power, and the Hole effect models. If the variogram information is not available, the default linear variogram with no nugget effect should be used. This option is a special case of the Power model with the exponent equal to 1.

The Interpolator Options window for the Kriging method is shown in the following figure, while each of the settings parameters is described below



**Start X** Minimum X co-ordinate for the interpolation grid.

**End X** Maximum X co-ordinate for the interpolation grid.

**X\_Nodes** Number of grid nodes in the X-direction.

**Start Y** Minimum Y co-ordinate for the interpolation grid.

**End Y** Maximum Y co-ordinate for the interpolation grid.

**Y-Nodes** Number of grid nodes in the Y-direction.

**Use Log Interpolation** Flag to interpolate the log values of the data. This setting is useful for where some measured values are many orders of magnitude higher than the majority of the other values. In such cases, the large values dominate the interpolation process and details in the low concentration zones are removed. If this setting is selected, the log of each data value is taken prior to performing interpolation. By interpolating the log of the data set, small values are given more weight than otherwise.

**Restrict Min. Value** Flag to restrict the minimum value of the interpolated data.

**Restrict Max. Value** Flag to restrict the maximum value of the interpolation data.

**Value Min.** Minimum value of the interpolated data. Any interpolated data less than Value Min. will be assigned a value of Value Min.

**Value Max.** Maximum value of the interpolated data. Any interpolated data greater than Value Max. will be assigned a value of Value Max.

**Real Min.** Real minimum value of interpolated data.

**Real Max.** Real maximum value of interpolated data.

**Min. Trimming Limit** Minimum bound for the interpolated data if the Restrict Min. Value option is not selected by the user.

**Max. Trimming Limit** Maximum bound for the interpolated data if the Restrict Max. Value option is not selected by the user.

The Points per block along X, Points per block along Y, and Points per block along Z values allow the user to choose Block Kriging used for interpolation, as compared to Point Kriging. Block Kriging is based on the premise that since Kriging is a linear algorithm, direct estimation of the block average is possible for user-defined blocks. The default values for these parameters are 1, and in this case the default method is Point Kriging. If Block Kriging is being used, the user needs to enter the Min. points for block Kriging and Max. points for block Kriging.

The Octant Search option is an exhaustive search option available to make sure that data are taken on all sides of the point being estimated, and is especially recommended for 3D data. If the user specifies Max. points per octant to be greater than 0, an Octant Search is employed to find the neighborhood of points for interpolation.

The Max. radius and Min. radius defines the search distances, in user specified units, in the maximum horizontal direction and the minimum horizontal direction for determining the neighborhood of points for interpolation. For isotropic data, the two radii are the same. Enter the Vertical Radius value if 3D Kriging is to be performed. If the total number of points in the data is large (>200), computation time for Kriging may be reduced by specifying a smaller radius for the search.

The Angle1, Angle2, and Angle3 parameters define the search ellipsoid for situations in which anisotropy is present in the data.

The Kriging type options are:

- Stationary simple Kriging with SK mean
- Ordinary Kriging
- Nonstationary simple Kriging with means from an external file
- Kriging with external drift

The following guidelines are recommended for selecting the type of Kriging.

Choose Stationary simple Kriging with SK mean, if the mean value is known and is constant throughout the area.

Select Ordinary Kriging if the mean is not constant everywhere, and needs to be recalculated dependent on the location of the neighborhood.

Choose Nonstationary simple Kriging with means from an external file if the mean is not constant and has to be read from an external file.

Select Kriging with an external drift when only the trend component needs to be estimated, and not the residual component, where the variable is assumed to be

the sum of the trend and the residual component. This option is also referred to as Universal Kriging.

For most situations, Ordinary Kriging is recommended and is the default option.

The SK Mean defines the global mean of the data if Stationary simple Kriging is performed.

The Drift term defines the drift components if Kriging with external drift is performed. Nine drift components are possible:

- X = linear drift in x
- Y = linear drift in y
- Z = linear drift in z
- Xq = quadratic drift in x
- Yq = quadratic drift in y
- Zq = quadratic drift in z
- XY = cross quadratic drift in xy
- XZ = cross quadratic drift in xz
- YZ = cross quadratic drift in yz

The Variable/Trend Estimate allows the user to choose between estimating the variable or the trend. The default is Estimate variable.

The Nugget constant quantifies the sampling and assaying errors in the data. In a Variogram plot the nugget constant is the y-intercept value.

The Use variograms option allows the user to select the type of variogram to be used. The Variogram models available include:

- Spherical
- Exponential
- Gaussian
- Power
- Hole Effect

If the variogram information is not available, the default linear variogram with no nugget effect should be used. This option is a special case of the Power model with the exponent equal to 1.

---

### 19.3 Appendix C: Map Manager: ISO Codes

None  
1250: ANSI Central Europe, Latin 2  
1251: ANSI Cyrillic, Slavic  
1252: ANSI Latin 1  
1253: ANSI Greek  
1254: ANSI Latin 5, Turkish  
1255: ANSI Hebrew  
1256: ANSI Arabic

1257: ANSI Baltic Rim  
1258: ANSI Vietnamese  
437: OEM US, Latin  
708: OEM Arabic, ASMO 708  
720: OEM Arabic, Transparent ASMO  
737: OEM Greek, formerly 437 G  
775: OEM Baltic  
850: OEM Western Europe, Latin 1  
852: OEM Central Europe, Latin 2  
855: OEM Russian, IBM; Cyrillic  
857: OEM Turkish, IBM  
860: OEM Portuguese, MS-DOS  
861: OEM Icelandic, MS-DOS  
862: OEM Hebrew  
863: OEM Canadian French, MS-DOS  
864: OEM Arabic  
865: OEM Nordic, MS-DOS  
866: OEM Russian, MS-DOS; Cyrillic II  
869: OEM Greek 2, IBM Modern Greek  
8859-1: ISO Latin 1; West European-Danish, Dutch, English, Faeroes, Finnish, French, German, Icelandic, Irish, Italian, Norwegian, Portuguese, Spanish, Swedish  
8859-2: ISO Latin 2; East European-Albanian, Czech, English, German, Hungarian, Polish, Rumanian, Serbo-Croatian, Slovak, Slovene  
8859-3: ISO Latin 3; Southeastern European-Afrikaans, Catalan, Dutch, English, Esperanto, German, Italian, Maltese, Spanish, Turkish  
8859-4: ISO Latin 4; North European  
8859-5: ISO English & Cyrillic-Based; Bulgarian, Byelorussian, English, Macedonian, Russian, Serbo-Croatian, Ukrainian  
8859-6: ISO Arabic  
8859-7: ISO English & Greek  
8859-8: ISO Hebrew  
8859-9: ISO Latin 5; Western European & Turkish  
8859-13: ISO Latin 6; Latvian and Lithuanian  
ANSI: Uses the system code page  
OEM: Uses the OEM equivalent of the system code page  
ISO: Uses the ISO equivalent of the system code page  
BIG5: Uses the ANSI 950 code page, also known as Big5; Chinese Taiwan, HongKong SAR, PRC  
SJIS: Uses the ANSI 932 code page, also known as Shift-JIS; Japanese  
EUC: Uses the EUC(ISO) equivalent of the system code page

---

## 19.4 Appendix D: Online GIS Data Resources

U.S Bureau of the Census

[http://www.esri.com/data/download/census2000\\_tigerline/](http://www.esri.com/data/download/census2000_tigerline/)

Data: Census 2000 TIGER/Line Data

Format: Shapefile

Geographic Coverage: United States, Puerto Rico, U.S Virgin Islands, American Samoa, Guam, The Commonwealth of Northern Mariana Islands, and the Midway Islands

Datum: NAD 83

Layer: Roads, Railroads, Rivers, Lakes, Legal boundaries, Census Statistical Boundaries etc.

#### NASA

<ftp://e0srp01u.ecs.nasa.gov/srtm/>

Data: Shuttle Radar Topography Mission (SRTM)

Format: Raster (SRTM)

Geographic Coverage: Global, SRTM1 (30m) for USA, SRTM3 (90m) World

Datum: WGS84/NAVD88

Layer: DEM

#### Natural Resources Canada

<http://geogratis.cgdi.gc.ca/download/>

Data: CGDI Warehouse

Format: Vector and Raster

Geographic Coverage: Canada

Datum: Various

Layer: Landsat, RADARSAT, Canada Atlas, Canadian Geographic Information Systems (Land Use), National Scale Frameworks, Census Data; Ontario Land use Cover, Canadian Conversation Areas Database, State of Canada's Ecosystem.

#### CGIAR Consortium for Spatial Information (CGIAR-CSI)

<http://srtm.csi.cgiar.org/>

Data: Shuttle radar Topography Mission (SRTM)

Format: Geotiff or Arcinfo

Geographic Coverage: Global (90M)

Datum: WGS84/EGM96

Layer: DEM

#### Global Land Cover Facility

<http://glcfapp.umiacs.umd.edu:8080/esdi/index.jsp>

Data: Land Sat. TM Images

Format: GeoTiff

Geographic Coverage: Global, Up to 30m

Datum: WGS84

Layer: Landover Images

#### Land Information Ontario

<http://lioapp.lrc.gov.on.ca/lids/welcome.asp>

Data: NRVIS Data

Format: Coverage

Geographic Coverage: Ontario, Canada

Datum: NAD83 CNT

Layer: Airport, Annotation, Building, To Scale, Building As Symbol, Concession, Contour, Crown Game Preserve; Drainage Line; Drainage Point; MNR District; MNR Region; Municipal Park, National Wildlife Area; OBM DTM; Park Zone Reg; Pit or Quarry; Provincial Park Zone Regulated; Railway Segment; Spot Height; Tank; Tower; Transport Line; Transport Point; Utility Line, Utility Site; Water Edge; Water Structure; Waterbody Segment; Wooded Area.

#### GeoCommunity

<http://data.geocomm.com/catalog/>

Data: GIS Data Depot  
Format: e00 format (coverage)  
Geographic Coverage: Each Country; USA, each State and County.  
Layer: DEM, NWI, DLG, LU/LC, and TIGER are available for free.

United States Geological Survey  
<http://seamless.usgs.gov/>  
Data: GIS Data Warehouse  
Format:  
Geographic Coverage: World, each country; USA, any scale and seamless:  
Datum: NAD83  
Layer: US National Elevation Dataset (up to 10 M), National Land Cover Dataset, High Resolution Orthoimagery, Layer extent, Transportation, Boundaries, Hydrography.

Florida Department of Environment Protection  
<ftp://ftp.dep.state.fl.us/pub/gis/data>  
Data: GIS Data  
Format: Shapefile  
Geographic Coverage: Florida  
Datum: FDEP custom Albers projection in the HPGN datum  
Layer: Environmental Data, Basemap Data

Global Forest Watch Canada Warehouse  
<http://www.globalforestwatch.ca/datawarehouse/datawarehouse.htm>  
Data: GIS  
Format: Shapefile, GRID, XLS  
Geographic Coverage: Canada  
Datum: North American Datum of 1927  
Layer: Forest related data; basemap data

GeoPlan Center, University of Florida  
<http://www.fgdl.org/>  
Data: Florida Geographic Data Library (FGDL)  
Format: Shapefile  
Geographic Coverage: Floridawide and County  
Datum: FDEP custom Albers projection in the HPGN datum  
Layer: Various

St. Johns River Water Management District  
<http://sjr.state.fl.us/programs/data.html>  
Data: GIS data  
Format: Shapefile and Raster  
Geographic Coverage: St. Johns River Water Management District, Florida  
Datum: NAD83  
Layer: Basemap, Natural Resources and Images

United States Geological Survey and USA Environmental Protection Agency  
<http://nhd.usgs.gov/index.html>  
Data: National Hydrography Dataset  
Format: Geodatabase

Geographic Coverage: USA

Layer: Surface water features such as lakes, ponds, streams, rivers, springs and wells

United States Environmental Protection Agency

<http://www.epa.gov/OWOW/watershed/landcover/lulcmap.html>

Data: Land Cover Digital Data

Format: Coverage

Geographic Coverage: USA Statewide

Layer: Satellite, Land Cover

National Atlas (USA)

<http://www.atlas.usgs.gov/atlasftp.html>

Data: National Atlas Map (Warehouse)

Format: Shapefile, Geotiff, DBF

Geographic Coverage: USA

Datum: NAD83

Layer: Agriculture, Biology, Boundaries, Climate, Environment, Geology; History, Map Reference, People, Transportation, Water.

United States Department of Agriculture

<http://datagateway.nrcs.usda.gov/>

Data: Natural Resources Data (Warehouse)

Format: Shapefile and Raster

Geographic Coverage: USA

Datum: NAD83

Layer: Orthoimagery, Soils, Common Land Units, Cultural and Demographics, Governmental Units and Place names, Elevation, Hydrography, Cadastral, Transportation (Roads), Digital Raster Graphic (DRG) Scanned USGS quads, Land Cover/Vegetation/Plants, Watershed boundaries (10-12 digit hydrologic units), Wetlands and Floodplain Easements, Climate - Precipitation and Temperature, Flood hazards, USDA Office Information Profile (OIP), Applied Conservation Practices, Water Control Infrastructure/National Inventory of Dams.

Grand River Conservation Authority

<http://www.grandriver.ca/index/document.cfm?Sec=63&Sub1=16&sub2=0>

Data: GRCA data

Format: Shapefile and Raster

Geographic Coverage: Grand River Watershed

Datum: NAD83

Layer: Airphoto, Topographic and Thematic Data

Ministry of Energy, Mines and Petroleum Resources, BC

<http://www.em.gov.bc.ca/Mining/Geolsurv/MapPlace/geoData.htm>

Data: Geology, Geochemistry

Format: Shapefile

Geographic Coverage: British Columbia

Datum: NAD83 and either BC Albers or Geographic (Decimal Degrees)

Layer: Geology, Geochemistry

Canadian Council on Geomatics

<http://www.geobase.ca/geobase/en/index.html>



Data: Geobase  
Format: Shapefile and raster  
Geographic Coverage: Canada  
Datum: NAD83  
Layer: Administrative Boundaries, DEM, Geodetic Network, Landsat, National Road Network

Ministry of Sustainable Resource Management, BC  
<http://srmwww.gov.bc.ca/gis/arcftp.html>  
Data: Warehouse  
Format: Coverage, Raster  
Geographic Coverage: British Columbia  
Layer: Administrative Boundaries, Hydrology, Forest and more.

Alberta Geological Survey  
[http://www.ag.gov.ab.ca/mapserver/map236/download/download\\_gis.htm](http://www.ag.gov.ab.ca/mapserver/map236/download/download_gis.htm)  
Data: Geology, Geochemistry  
Format: Shapefile  
Geographic Coverage: Alberta  
Datum: Geographic, NAD83  
Layer: Geology

Alberta Community Development  
<http://www.cd.gov.ab.ca/preserving/parks/lrm/index.asp>  
Data: Parks and Protected Areas  
Format: Shapefile  
Geographic Coverage: Alberta  
Datum: NAD83  
Layer: Parks and Protected Areas

Department of Provincial Treasury  
<http://www.gov.pe.ca/gis/index.php3?number=77868>  
Data: Warehouses  
Format: Shapefile and MIF (Mapinfo)  
Geographic Coverage: Prince Edward Island  
Datum: NAD83  
Layer: Administrative Boundaries, Road, Forest, Hydrology

Department of Natural Resources, Nova Scotia  
<http://www.gov.ns.ca/natr/meb/DOWNLOAD/UTMNAD83.htm>  
Data: Natural Resources Data  
Format: Shapefile  
Geographic Coverage: Nova Scotia  
Datum: NAD83  
Layer: Natural Resources

New York State GIS Clearinghouse  
<http://www.nysgis.state.ny.us/>  
Data: New York State GIS  
Format: Shapefile and Raster  
Geographic Coverage: New York State

Datum: NAD83

Layer: Provinces and territories, census divisions, economic regions, census metropolitan areas and census agglomerations, census consolidated subdivisions, census subdivisions.

Ontario Geological Survey

[http://www.mndm.gov.on.ca/mndm/mines/ogs/draftbedrock\\_e.asp](http://www.mndm.gov.on.ca/mndm/mines/ogs/draftbedrock_e.asp)

Data: Digital version of the Paleozoic bedrock of Southern Ontario compilation map

Format: Geodatabase

Geographic Coverage: Ontario

Layer: Geology

Statistics Canada

<http://www12.statcan.ca/english/census06/geo/index.cfm>

Data: Road Network file; Boundary files for provinces and territories, census divisions, economic regions, census metropolitan areas and census.

Format: Shapefile

Geographic Coverage: Canada

Datum: NAD83

Layer: Road and Administrative Boundary

---

## 19.5 Appendix E: Frequently Asked Questions (FAQ's)

Waterloo Hydrogeologic maintains an online Hydro GeoAnalyst FAQ:

<http://www.waterloohydrogeologic.com/resources/hydro-geoanalyst-resources/hydro-geoanalyst-faq>

If you cannot find the answer, please contact our technical support [support@waterloohydrogeologic.com](mailto:support@waterloohydrogeologic.com) and they will be happy to assist you.

## 19.6 Appendix F: Configuring Geotransformation Settings

### Introduction

A Geotransformation is a mathematical operation that takes the coordinates of a point in one geographic coordinate system and returns the same point in coordinates of another geographic coordinate system.

Hydro GeoAnalyst supports one stage horizontal geotransformations between different geographic coordinate systems. This is required for the following two reasons:

Hydro GeoAnalyst stores all spatial data, i.e., station x-y coordinates, in the GCS WGS 1984 projection system (lat and long coordinates). When data is imported, Hydro GeoAnalyst converts the spatial data into GCS WGS 1984 coordinates.

Likewise, when data is displayed in HGA, it converts the data from GCS WGS 1984 to the original projection system defined in the project settings. In order for HGA to store and display your data correctly, an appropriate geotransformation has to be defined.

In some cases, it may not be possible to obtain certain geographic data in a coordinate system that is consistent with the rest of your project data. In this case, a geotransformation can be applied to express the data according to your project's coordinate system.

Note: Currently, Hydro GeoAnalyst does not support vertical (elevation) datum shifting. Please ensure that your elevation data is consistent before importing into HGA.

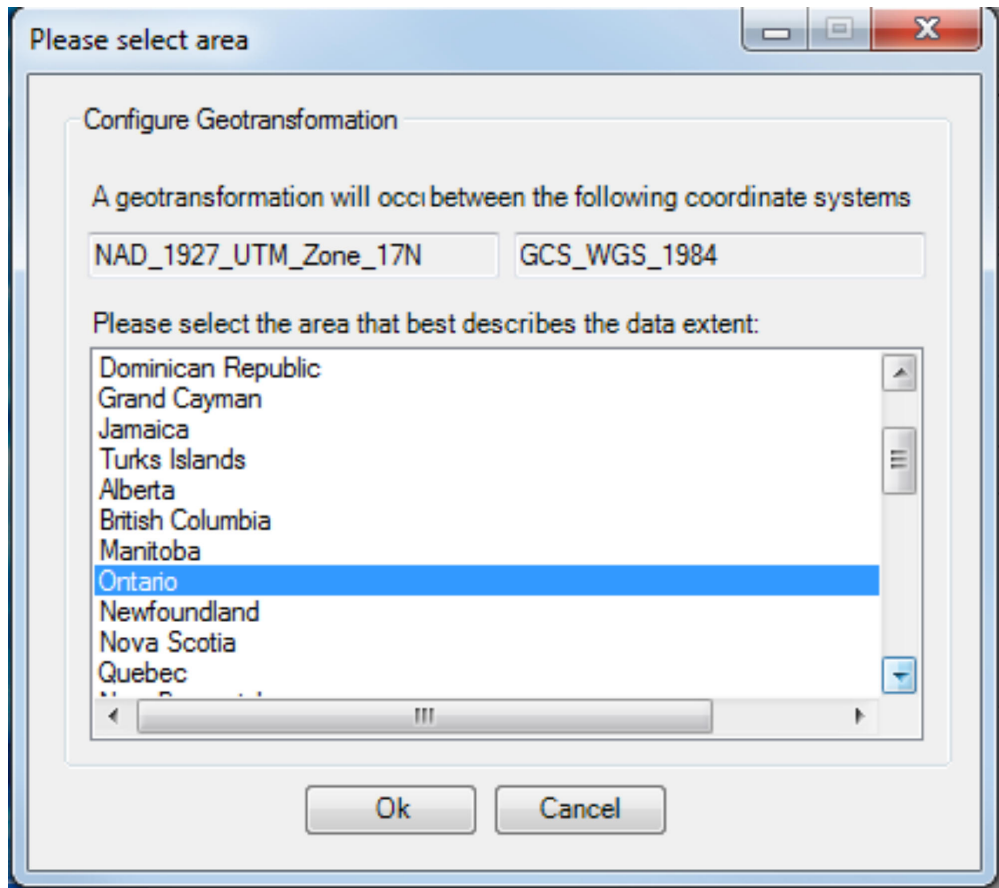
Geotransformations can potentially occur in Hydro GeoAnalyst in any of the following scenarios:

- When station data is displayed in the main Hydro GeoAnalyst window
- When data is imported into Hydro GeoAnalyst
- When data is displayed in Map Manager
- When data is imported in Map Manager
- When a projection system is defined in the new project wizard

As such, you may be prompted to specify geotransformation settings in any of the aforementioned scenarios. Configuring a geotransformation is very simple and is described in the following section.

### **Configuring Geotransformations**

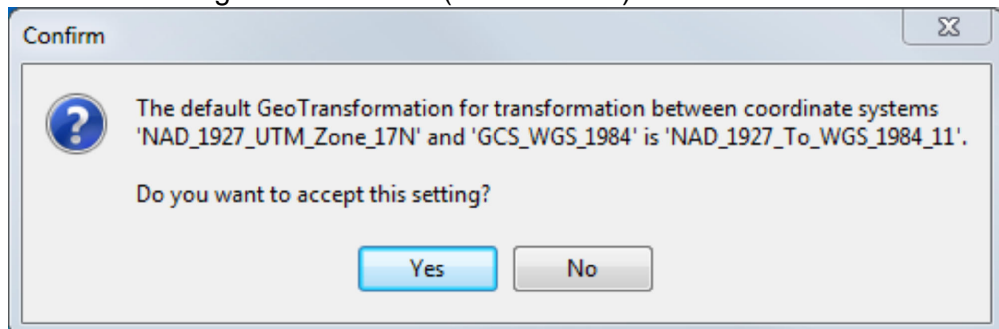
When Hydro GeoAnalyst detects that a geotransformation is required, it will check the internal geotransformation settings to determine if the geotransformation has already been defined. If not, it will prompt you with the following dialog:



From the Please Select Area dialog, choose the geographic area which best describes the data extent.

Click [Ok] to save the settings. In subsequent scenarios when this geotransformation is required, Hydro GeoAnalyst will automatically perform the geotransformation on-the-fly. In other words, geotransformations only need to be specified once for the Hydro GeoAnalyst project.

In some cases, such as importing data into HGA or loading a shapefile in Map Manager, if the geotransformation has already been defined, you may be prompted to confirm the default geotransformation (shown below).



When presented with this dialog, select [Yes] to accept the default geotransformation. Otherwise, select [No] to return to the Please Select Area dialog (shown at top of page) to select a new geographic area.

## 20 Troubleshooting

When encountering difficulties with Hydro GeoAnalyst you may try reviewing the following pages to try and resolve the issue.

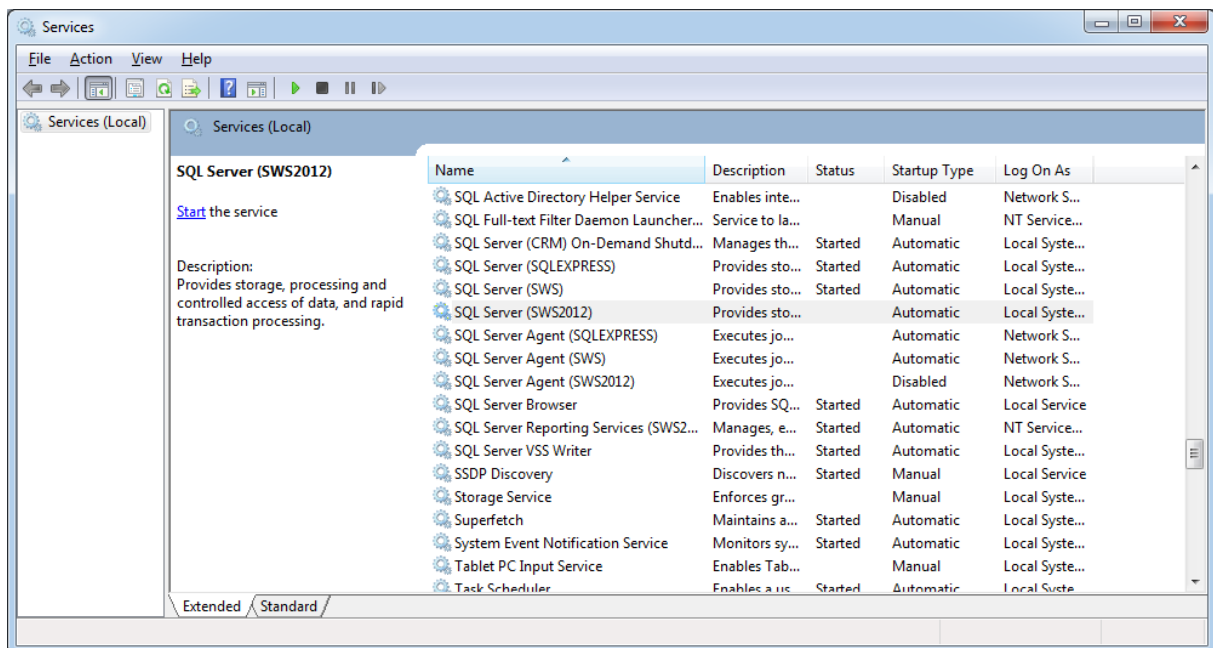
We will be updating these page with additional information on a regular basis.

### 20.1 Connection Problems

There can be several different reasons for having difficulties connecting to a SQL Server database.

#### Problem 1: Server not Running

You need to ensure that the SQL server is in face running or you will not be able to connect to it. You can do this by typing services in the start menu. If you see the prompt to Start the service that means it is not yet running.



#### Problem 2: Permissions

You need to ensure that you have permission to the SQL Server and the database you are trying to connect to. You may require your IT professional or Database Admin to give you permission to a database if you are trying to connect to a Network SQL server.

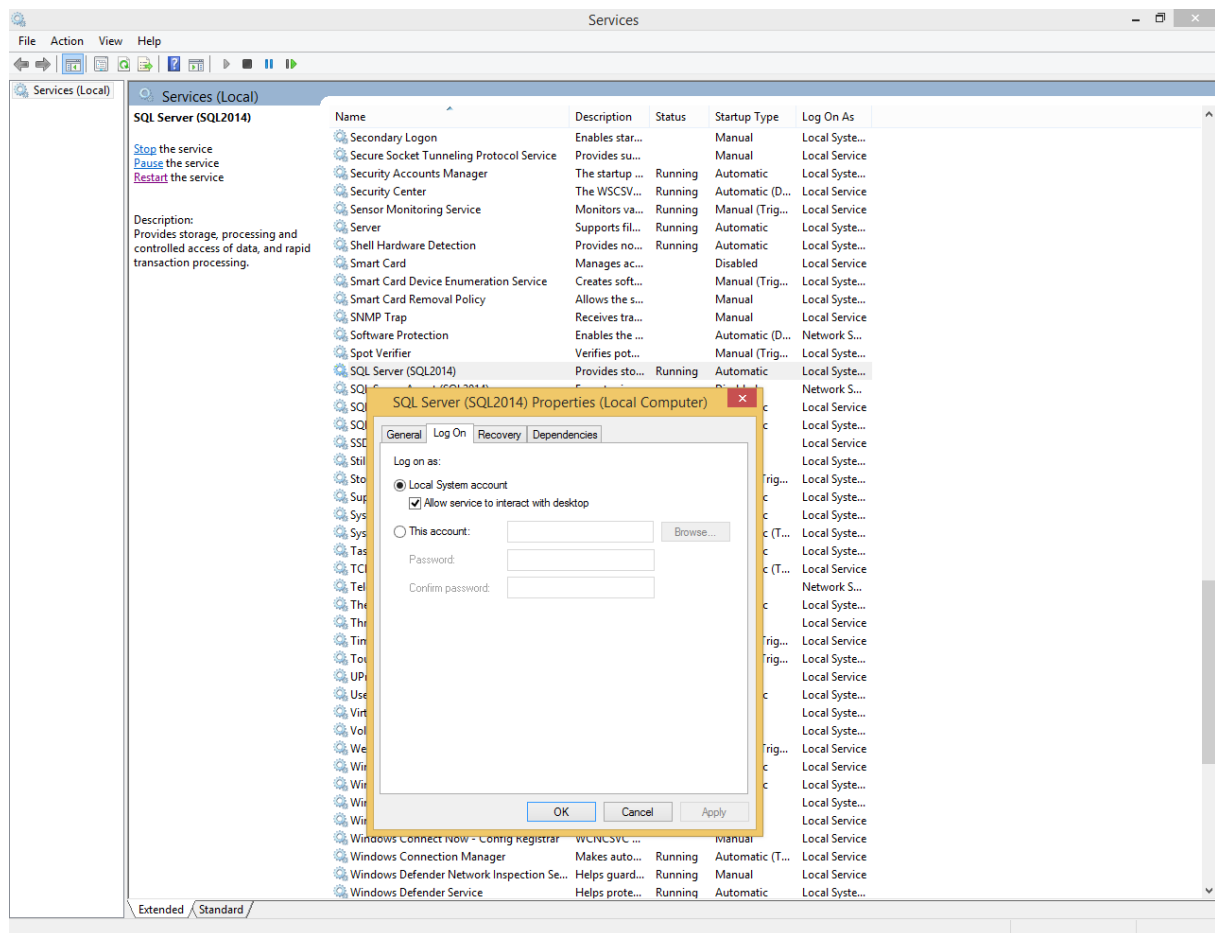
### Problem 3: Local Database

If you are trying to connect to your local database that is installed with HGA, you can do this in Management Studio just like you connect to other SQL Servers. The naming convention is : (localdb)\instance name



**Note:** You need to ensure that the localdb is within brackets.

If you are getting a message indicating your SQL Server does not have permission to restore database from specified location it may be due to your SQL Server Properties (found in your local services). Consider changing the Log On properties to Local System account and ensure Allow service to interact with desktop is checked on.



---

# Index

## - C -

channel 81

## - R -

Readme 81

## - T -

Training Options 81