



## TUTORIALS

using the ESdat Contaminated Site and Hydrogeology System

### Access Version

For use with ESDAT version 4

*(version 4 software updates available from [www.esdat.com.au](http://www.esdat.com.au))*

# ESdat

HELPING **YOU** DO, WHAT **YOU** WANT, WITH **YOUR** DATA

Produced by  **EScIS**  
EarthScience Information Systems

## ESDAT Environmental and Hydrogeology Tutorials

### Preface

ESDAT is a data management, analysis and reporting software system that is designed specifically for the management of spatial and time-series environmental datasets. ESDAT combines receipt of laboratory and field data with inbuilt data filtering, tabular reporting, graphing, GIS mapping, and outputs to commonly used data analysis and GIS software, without the need for users to manually reconfigure data file formats.

The internal functionality and range of interactivity with other environmental software packages enables users to manage data seamlessly from its source through analysis and reporting.

A number of systems can be used through ESDAT, the Contaminated Site and Hydrogeology System has been used for these tutorials. This system is available with either Access or SQL Server based systems. Access based systems offer greater ability for project specific customisation, while SQL Server based systems offer centralised multi-site/multi project data management. This tutorial refers to the Access based System.

For more detailed information on ESDAT see [www.esdat.net](http://www.esdat.net) or the ESDAT help files. If you require assistance with any problems, or have any questions you can contact support at EarthScience Information Systems.

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## Software Requirements

- Microsoft Windows NT, 2000, XP, Vista, 7
- Microsoft Excel 2000, XP, 2003, 2007, 2010

Possible links provided to software you may have on your machine:

- Surfer 7,8,9
- ArcMap 9.x, 10.x
- Mapinfo 6.x, 7.x
- gINT 8
- WinLog 4
- Access 2000, XP, 2003, 2007, 2010
- EVS

## Installing ESDAT

In order to install ESDAT and the sample files you should follow these steps:

- Download the ESDATv4Install.msi file to your hard drive
- Double Click to install (If you have restricted installation permissions you may need to obtain Admin status).

From time to time an update may be available from our web site, if you have a within-maintenance version you will be automatically notified and can download and install the update.

## Tutorial 1 - Overview

The purpose of this tutorial is to provide a quick overview of ESDAT's functionality. Subsequent tutorials address the powerful analysis and reporting tools included with ESDAT.

### Opening the Sample Database

Once you have installed ESDAT start the program by selecting ESDAT under the Windows Start – Programs Menu.

The Startup dialogue box will launch where you can open existing databases, create new databases, or go directly to the import templates. A list of recent databases appears on the left of the dialogue box. The most recent database used (Sample Hydrogeology and Contam) will be highlighted.

- Select 'Sample Hydrogeology and Contam' and click 'Open'.
- You will be asked whether you want to view the ESDAT Tutorial Documentation. Click Yes to launch the Tutorial Documentation and proceed, click No to cancel the dialogue box and continue.

### Window Navigation

The buttons at the top of the screen are Command buttons used to open different ESDAT functions such as the Integrated Workflow Manager, Import, Data Views (Outputs), QA Reports and Unit Checks.

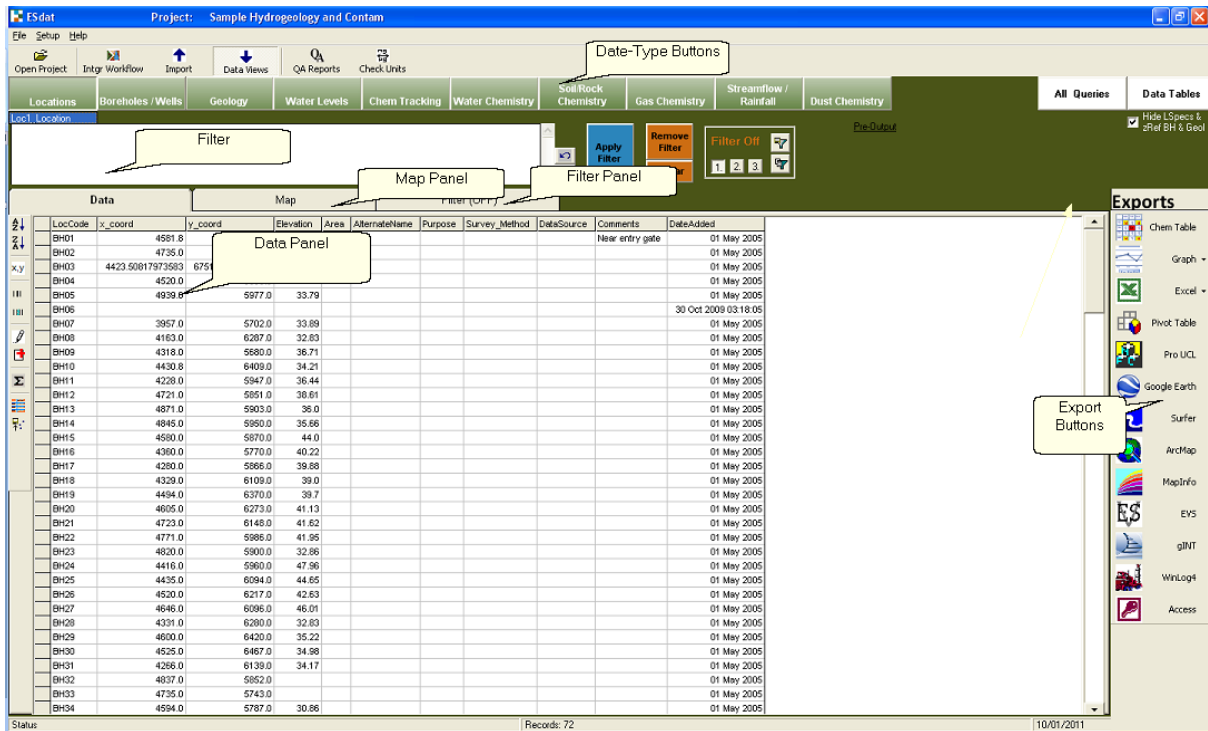
The line of green buttons below the Command buttons are the Data-Type buttons. These Data-Type buttons represent different types of data such as Water Chemistry or Location information. The Data – Type buttons can be customised if required.

Underneath the Data-Type buttons is the filter area. When you construct a filter it is displayed here. Underneath the filter is the data. The data shown relates to the selected Data-Type, with the filter (if applied). The toolbar to the left of the data relates to actions affecting the data panel (such as editing, sorting or summarising). When we open a database the Location information is displayed by default.

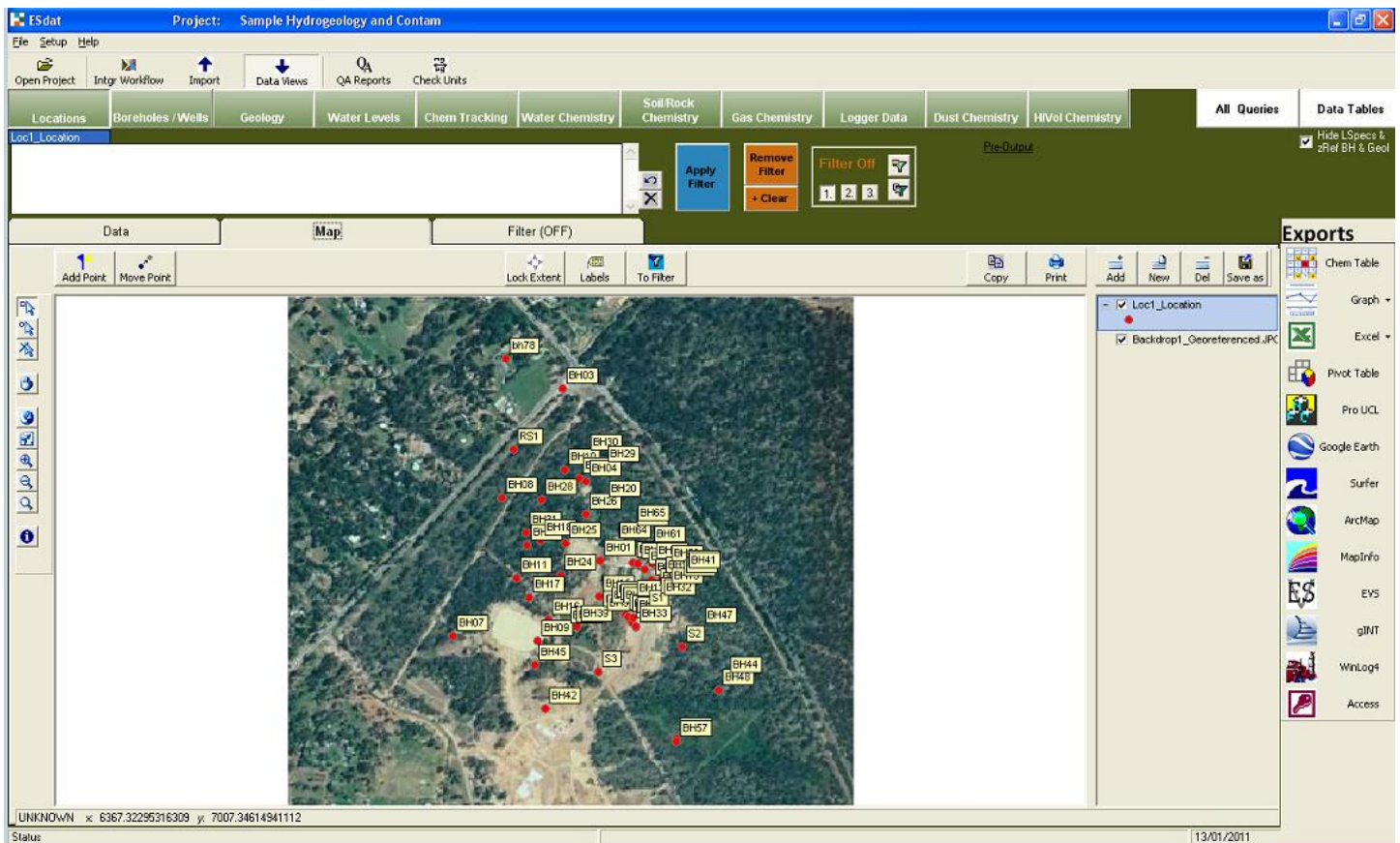
The larger toolbar on the right shows the external links, reporting and export options for data within ESDAT. Once we have selected and filtered our data we can click one of these buttons to export the data to the desired output or application.

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The major components of the Data Views screen in ESDat are shown in the Figure below.



Click on the Map Panel to see the site locations with a background map.




Click on the Filter Panel to construct a filter for your data.

## Lab & Field Chemistry

### Importing Laboratory Chemistry

Laboratory derived chemistry data can be automatically imported using an ESdat format file supplied from the laboratories.

- In ESDAT click the  Import button and in the orange “Files” box select “Laboratory”.
- Select the file " Sample01.Labmark36.Sample22.csv" located in the sample directory (you may need to navigate to the path, this will typically be C:\Program\_Files\ESDAT\Sample\_Contam )

The lab data will load in Excel, initially showing the Sample data.

There are a number of Field Duplicate Samples in the data (rows 22-24); we need to indicate which samples are the Field Duplicates, and which sample they are duplicates of. In this case the Field\_ID provides this information. Your field notes will normally be the source of this information.

- In cell I22 (Sample Type column) select “Field\_D” from the drop-down. A dialogue box will open prompting you to “click on the SampleCode of the sample for which this is a duplicate”. Click in cell A16. The cell details will be automatically entered into the Field Duplicates dialogue box. Click “OK” to save these details.

You will notice that the “Parent\_Sample” column is updated to show the SampleCode of the Parent Sample. The Location Code column is also updated with the location of the Parent Sample. The Field\_ID column remains unaltered.

In cell I23 (Sample Type column) select “Field\_D” from the drop-down. A dialogue box will open prompting you to “click on the SampleCode of the sample for which this is a duplicate”. In the Sample Code column click in cell A6 which is the Sample Code associated with the Parent Sample that is referenced in the Field ID as Field Dupe BH5B ( Loc Code BH05, Well Code B). The cell details will be automatically entered into the Field Duplicates dialogue box. Click “OK” to save these details.

Repeat this procedure for the other Field Duplicate in cell I24.


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There are two blanks in this batch. We need to specify what types of blank they are.

In the Field\_ID column you will see the Trip Blank (labelled Trip Blank) and the Rinsate (Labelled Equip Blank)

- In the row containing the Trip Blank data (Row 25), select the Sample\_Type (in column I') and from the dropdown menu, select "Trip Blank".
- In the row containing the Equipment Blank data (Row 26), select the Sample\_Type and from the dropdown menu, select "Rinsate".


Note the Field ID is left as it was specified in the field, but the LocCode, which was originally identical to the Field ID is now blank.

- In the Excel toolbar (under 'Add ins' in Excel 07/10) click on the  "Upload Data" icon, accept the defaults and click "Import".


The data will upload

- Still in the same Excel workbook change to the Chemistry Sheet and import the Chemistry data.

You will receive a small number of errors related to an invalid ChemCode (ChemCodes are used to provide an unambiguous reference for a compound. CAS – Chemistry Abstract Service numbers are used where available). This error is caused by the ChemCode provided by the lab being different from valid values in the database. To fix the ChemCode:

- click on the  "Get ChemCodes" icon in the Excel toolbar (Add Ins for Excel 2007 and above).

The "Associate ChemCodes" form will be displayed. The right panel shows all compounds in the database. The left panel shows the code we are having problems with (Potassium). The correct ChemCode for Potassium has been found automatically.

- To update the codes in the spreadsheet click the "Update" button, and then click  "import" to import the corrected data.

The laboratory data is now imported, there is no need to save changes in Excel.

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-  Close Excel.

Note: Excel is used as a tool to update the database files that ESDAT uses. The data are not stored in Excel.

### Chemistry Tables

- In ESDAT click the “Data Views” button then click the “Water Chemistry” Data-Type button.
- One of the columns will be titled “Monitoring Unit”. Double Click on “Lower Aquifer”. Click “Apply Filter”
- We have now filtered for all Water Chemistry data in the “Lower Aquifer”.
- Click the “Chem Table” export button at the top of the EXPORTS toolbar on the right of the screen.
- Accept the “Use Current ESdat Filter” option, click “Next”

We can now specify the layout of the table, and specify the Sample Fields to be included.

- For Orientation select “Chemical Names across the top”.
- For Grouping select “Group By Chem Group”
- Accept the default Sample Fields to be output.
- Ensure “Summary Stats” is selected.
- In the “Environmental Standards” section ensure “Auto-Format” is selected.
- Click “More Options” to browse additional options.
- Click 

The table is now produced in Excel. With the Auto-Format Exceedances option selected, any guideline exceedances are shown. Non-detects are displayed in a grey font.

- Repeat the table production, but try varying the layout settings. Select an orientation of 'Chemical Names listed Vertically', and deselect “Auto-Format”. Click Finish.

The table is now produced in Excel, but the guideline exceedances are not formatted.

- Select the first Guideline on the table and, in the ‘Format Guideline Exceedances’ form in the upper left corner of the sheet, click the “Bold” button.

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- Select any other guideline and click “Italic” in the ‘Format Guideline Exceedances’.  
The exceedances of these guidelines are shown in the specified format.
- Repeat the above steps playing with different options.

Headers and footers can be set up with company logo’s and project information, such as the site address and project number. Information on this is included in the Help files (Setup – Templates) available in the ESDAT Help menu.

### Chemistry QA

The most common method of reporting Chemistry QA data in ESDAT is to use the Chemistry QA Reports.

- Among the command buttons at the top of the screen click QA Reports.

The ESDAT Chemistry QA Checker will load. On the right are the different types of checks you can run and their settings. These are standard tests for Chemistry QA problems, such as violated holding times. All the settings are configurable. At the top left is a list of Sample Delivery Groups (SDG, a USEPA acronym), which are the batch numbers for a set of samples. Data for the report can be selected by SDG, or you can choose to use the Sampling Dates, or select all data.

- Click the “Export All Data” checkbox at the bottom of the list of SDG’s, then click the “QA Summary and QA Errors” button in the “Output to Excel” panel.

A report is produced in Excel. The initial screen shows the Table of Contents for the Report.

- From the Table of Contents, click on the ‘Count of Samples’ link. A summary of the number of different sample types is displayed.
- Go back to the Table Of Contents by clicking the “Contents” link (click on the link in Cell A2)
- Click on the ‘Field and Interlab Duplicates’ link and review the table.

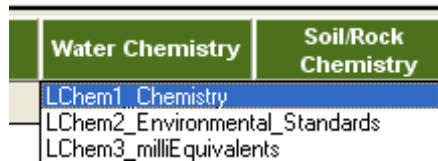
This table shows all Field Duplicate results, with the RPD (Relative Percent Difference). Any non-conformances are shown in bold.


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- Go back to the Table of Contents by clicking the “Contents” link.
- Click some of the other links to view any QA problems.
- Close the Chemistry QA Report in Excel, then close the Chemistry QA Checker by clicking the x in the top right of the dialogue box..

### Graphing Time-Series Chemistry


- In ESDAT select the “Data Views” command button then click the “Water Chemistry” Data Type button.



- Click the graph icon  Graph on the “Exports” toolbar to “Produce graph plots in Excel”.

A series of graphs showing available time-series chemistry is generated in Excel. Environmental guideline levels are included on the graphs as dotted black lines.

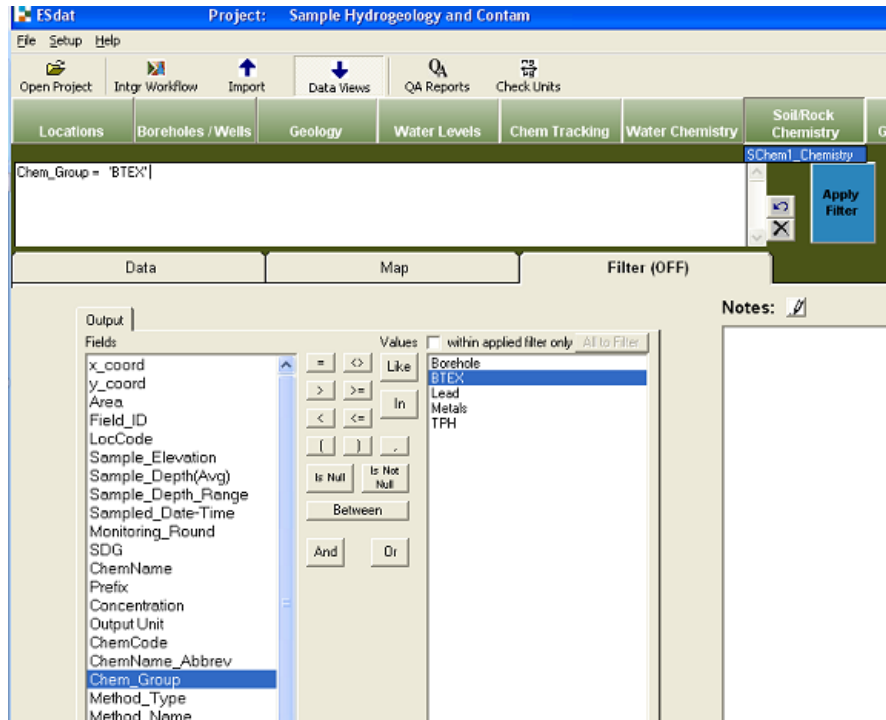
By default the graphs are plotted two to a page; all graphs show the same date range; non-detects are plotted as zero; and environmental standards are included as dotted black lines.

- Click the drop-down arrow next to the graph icon  Graph . You will see that all of the settings for the Graphs can be altered.

### Mapping Chemistry

- Select the “Soil/Rock Chemistry” Data Type button.
- Click on the “Filter” Panel.
- In the list of Output fields on the left, click on ChemGroup
- In the list of values displayed on the right double click on “BTEX”.
- In the filter area above the panel click the blue “Apply Filter” button.

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- Click on the “Map” Panel.
- Click the “Labels” button, the “GIS Layer Options” dialogue box will open. Check the “Show Location Code” checkbox and the “Show Result Table” checkbox. Click the OK button at the base of the dialogue box.

You should now see a table of BTEX results for each point on the map.

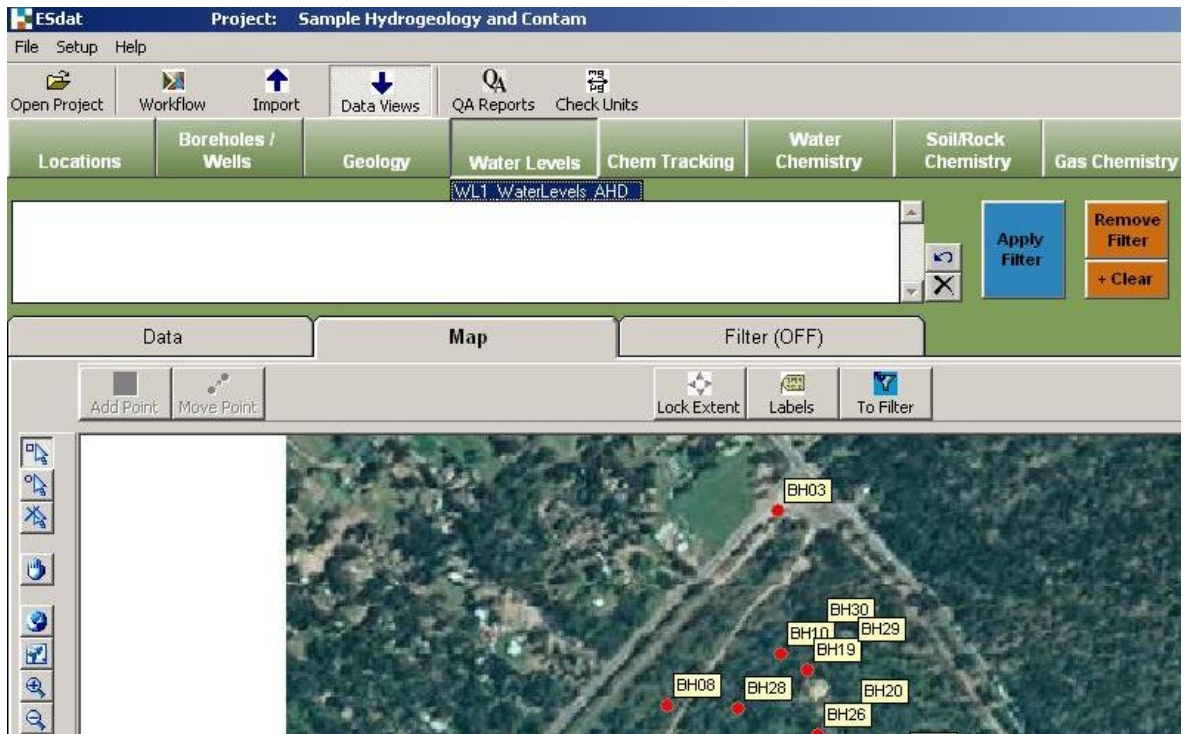
Click the “Clear Filter” button to return to the entire dataset.

## Water Levels

### Mapping Water Levels

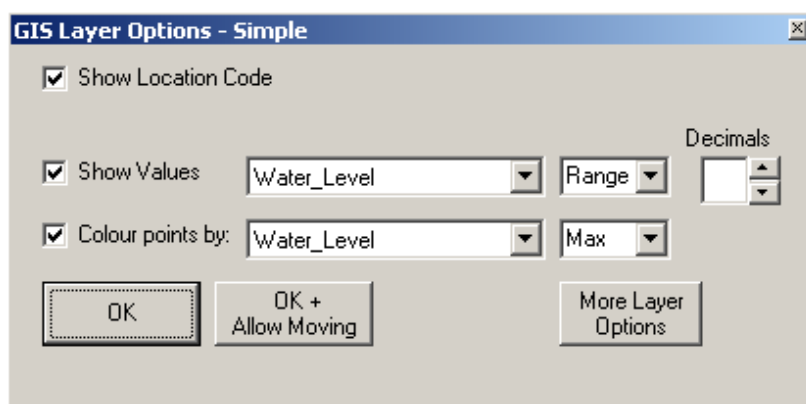
Click the “Data Views” command button. Move your mouse over the “Water Levels” data type button and click the first option in the dropdown menu (WL1\_Waterlevels\_AHD) which outputs data above height datum. Select the “Map” Panel.

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The “Map” Panel displays a basemap of the site and plots the location of the data points stored in the database. .

- Click the “Labels” button on the map toolbar and populate as shown below. Check the “Show Location Code” checkbox, then check the “Show Values” checkbox and ensure Water\_Level and Range are displayed in the drop down options. Then check the “Colour Points by:” checkbox and ensure the Water\_Level and Max options are displayed in the drop down options. Click the OK button at the base of the dialogue box.



The Location Code and values will be displayed on the map and the points will be coloured cold to hot (low values to high values). A legend is included in the toolbar beside the map.

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- Select the Northernmost 5 or 6 points by positioning the mouse toward the top left corner of the map away from the points then depress the left mouse button and drag your mouse diagonally across the map so that you create a square over the data points. When you have included all of the points you want in the square release the left mouse button.

The selected points will turn yellow.


- To add these locations to the filter click the “To Filter” button located above the map in the “Map” toolbar.

You will see that a list of these locations have been added to the filter. In the filter area above the “Map” Panel click the "Apply Filter" button


We now have only the filtered data in the “Data” Panel, and the “Map” Panel will display only the locations we have filtered for.


### Graphing Water Levels

Now we are going to graph the data we have filtered for;

- In the Exports toolbar click on the “Graph” icon  to “Produce graph plots in Excel”.

ESDAT will use default settings to plot the data using Excel (we will look at altering default settings in Tutorial 2).

- Click the  button at the bottom right of the screen. (This button appears under the ‘Add ins’ tab in Vista, Excel 2007 and above).
- In the “Change Displayed Data Series” dialogue box that opens select one data series then click the “Replace” button’. The graph will reflect this change. Click the button again, select another data series then click the “Add” button. The data series you selected are displayed in the graph. This way we can alter the composition of the graph. Play around with the options here.

-  Close Excel without saving

Remove the filter on the dataset by clicking the “Remove Filter” button then clear the filter by clicking the “Clear” button.



## Contouring using Surfer

- Using the Groundwater Water Level data (works equivalently for all data-types) we will create output in a format suitable for Surfer. You must have Surfer installed on your computer to view Surfer generated isopleths and outputs.
- Click the “Data Views” command button. Move your mouse over the “Water Levels” data type button and click the first option in the dropdown menu (WL1\_Waterlevels\_AHD) which outputs data above height datum.


Select the “Data” Panel. One of the columns is labelled “Date\_Time”. We can filter the data for a specific date/time value by double clicking on a value in the Date\_Time column.

- Double-click on the date '11 Dec 01'

This populates the filter with this date.

- To apply the filter double click the same date again or click the “Apply Filter” button.

Note that double clicking the same value twice applies the filter. When the filter is applied the tab on the “Filter” Panel displays as "Filter (ON)"

- In the Exports toolbar click on the  Surfer button to “Contour in Surfer”.

- An “Export to Surfer” dialogue box will open. Accept the default options by clicking the “Contour” button. .

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Surfer will now open and you will see the contoured water levels, with data points.

- Close Surfer without saving and go back to ESDAT.

We have had a brief overview of some of the basic functionality of ESDAT. To cover these topics in greater depth you should work through the next tutorial in sequence.

### Key Concepts in Tutorial 1

In Tutorial 1 we established the following key concepts.


- Production of Chemistry Output Tables using basic filters and different layout settings
- Use of the QA Reports.
- Import of Laboratory Data and assigning laboratory duplicates and unique codes to each compound.
- Use of the inbuilt map, labelling and colouring by values.
- Introduction to data filtering
- Introduction to Graphing
- Use of filtered data to export in a format suitable for external packages

## Tutorial 2 – Competent usage skills

This tutorial assumes previous completion of Tutorial 1, and builds on the concepts in greater depth as well as introducing new features.

### Filtering

We have seen a brief example of the use of the filter in Tutorial 1. The filter uses the following concepts:

- A double click on a value in the “Data” Panel adds the selected data to the filter. Double Clicking on the same value/point again applies the filter to the dataset.
- In the “Map” Panel click on a point on the map then click the “To Filter” button in the map toolbar  to add the selected point to the filter. Deselect a point by clicking on it again.
- Multiple points can be selected on a map by dragging a square around them.
- More sophisticated filters can be constructed using the "Filter" Panel.
- Advanced users can manually edit the filters and use the pre-output filter.

While working through the tutorial it may be necessary to refer back to these core concepts until you are comfortable with the filtering options.

**Example 1:** We would like to see what Lead Water Chemistry results are available in the ‘Upper Aquifer’.

Click the “Data Views” command button. Move your mouse over the “Water Chemistry” data type button and select LChem1\_Chemistry from the drop down menu.

In the “Data” Panel, scroll to the *ChemName* column using the scroll bar at the base of the Panel. In the *ChemName* column double click on a cell containing the value ‘Lead’. The data will be copied to the filter;

Sampled_Date-Time	ChemName	Total_or_Filtered
30 Jan 04	Nickel	F
30 Jan 04	Arsenic	F
30 Jan 04	Chromium (total)	F
30 Jan 04	Copper	F
30 Jan 04	Zinc	F
30 Jan 04	Lead	F

Scroll to the column *Monitoring Unit*. In the column *Monitoring Unit* double click on a cell containing the value ‘Upper Aquifer’. This data will be copied to the filter.

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- To apply the filter to the dataset click the “Apply Filter” button.
- Hint: A quick way to apply the filter to the dataset is to double click on the cell in the *Monitoring Unit* column with the value ‘Upper Aquifer’ (or another with the same value) again. This means double click twice on a value in the “Data” Panel to apply the filter.

We can also construct a filter from the "Filter" Panel. To do this:

- Remove the filter on the dataset by clicking the “Remove Filter” button then clear the filter by clicking the “Clear” button.



- Click on the "Filter" Panel

To populate the filter do the following:

- In the list of Output Fields on the left click once on the field ‘ChemName’ - The window on the right will populate with the list of ChemNames. Double click on the value ‘Lead’. The selected fields will be copied to the Filter.
- Now click once on the field ‘Monitoring Unit’ listed in the Output Fields on the left, the list to the right will once again populate with the list of Monitoring Unit options.
- Double click on the value ‘Lower Aquifer’. The selected fields will be copied to the Filter.

The filter string should now read:

*ChemName = 'Lead' And*

*MonitoringUnit = 'Lower Aquifer'*

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- Click the “Apply Filter” button to apply this filter to the dataset. Note: if you have made a mistake constructing the filter a dialogue box will be displayed with an error message. If an error message is displayed, click the “OK” button to close the error message then click the “+Clear” button beside the Filter and repeat the Example.
- Click the “Map” Panel to see the locations of these points.
- Click the “Data” Panel to view the filtered dataset. You can also construct the filter by editing the filter text directly. There are comprehensive guidelines on more sophisticated use of the Filter in the ESdat Help files.

Using the concepts introduced in Tutorial 1 you can now view this filtered Water Chemistry data as:

- Labels on a map
- Timeseries Charts
- Chemistry Table

Click the “+Clear” button beside the Filter to return to the complete dataset.

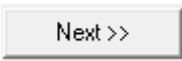
**Example 2:** We would like to see all soil chemistry data less than 3 m (or feet) in depth.

- Select the ‘Soil Chemistry’ data.
- in the ‘Filter’ tab, select the Field ‘Sample\_Depth (Avg)’
- Click once on  ‘less than or equal to’ from the operator buttons.
- When the list of average depths populates, double click on a depth that closely approximates the value you are seeking (in this case ‘3.5’).
- 
- Mouse-click in the filter panel and delete the ‘.5’ on the end. This will leave the filter reading '[Sample\_Depth(Avg)] <= 3'.
- Apply the filter by clicking the “Apply Filter” button.

To Export this data to a Chemistry Output Table:

- Click the “Chem Table” button on the EXPORTS toolbar

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- Check the  Use Current ESDAT Filter checkbox, then click the Next button .
- Accept the default settings in the Chemistry Output Tables dialogue box by clicking the “Finish” button.

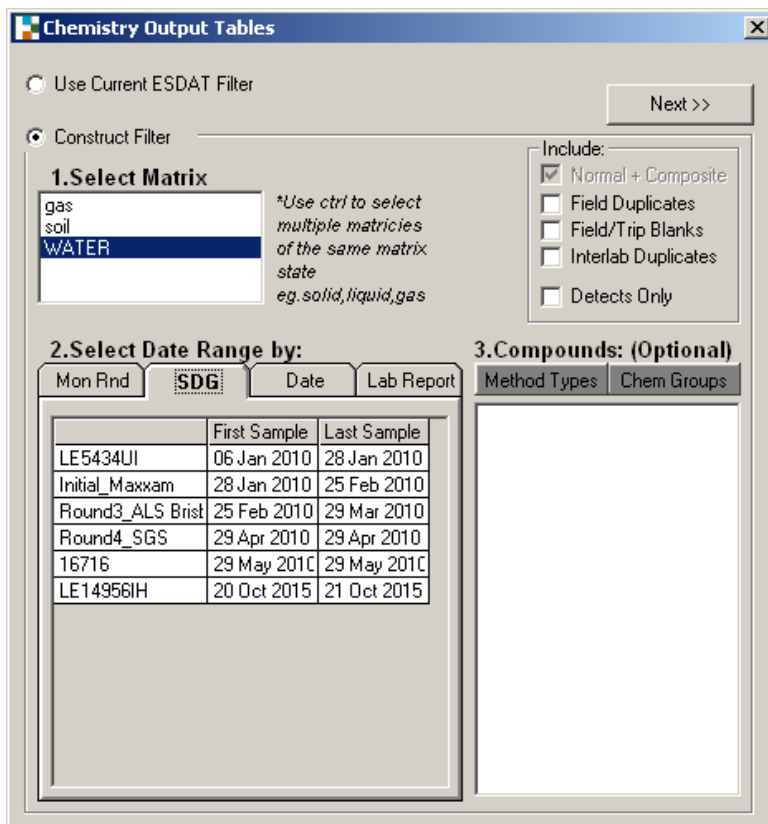
ESDAT will now construct your Chemistry Output Table in Excel.

Close the Excel spreadsheet. Clear the filter in ESDat by clicking the “+Clear” button.

### Filtering data by Sample Batches for output to Chemistry Tables

When producing Chemistry Output Tables ESDat provides two options – check the “Use Current ESDAT Filter” checkbox or check the “Construct Filter” checkbox. The “Construct Filter” option is a sample “batch” approach to data filtering.

The “Construct Filter” option is commonly used when reporting the results received from a laboratory as it provides a more direct set of menu filtering options.



**Chemistry Output Tables**

Use Current ESDAT Filter Next >>

Construct Filter

**1. Select Matrix**

gas  
soil  
**WATER**

*\*Use ctrl to select multiple matrices of the same matrix state eg. solid, liquid, gas*

**Include:**

Normal + Composite  
 Field Duplicates  
 Field/Trip Blanks  
 Interlab Duplicates  
 Detects Only

**2. Select Date Range by:**

Mon Rnd **SDG** Date Lab Report

	First Sample	Last Sample
LE5434UI	06 Jan 2010	28 Jan 2010
Initial_Maxxam	28 Jan 2010	25 Feb 2010
Round3_ALS Brist	25 Feb 2010	29 Mar 2010
Round4_SGS	29 Apr 2010	29 Apr 2010
16716	29 May 2010	29 May 2010
LE14956IH	20 Oct 2015	21 Oct 2015

**3. Compounds: (Optional)**

Method Types Chem Groups

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- To use the Construct Filter approach to export a specific batch of laboratory results in a Chemistry Output Table:
- Click the “Chem Table” button in the Exports toolbar. Check the “Construct Filter” checkbox. Select the appropriate “Matrix”. Select a batch of samples from the list on the “SDG” Panel, then click the “Next” button. Accept the default options on the Chemistry Output dialogue box by clicking the “Finish” button. ESDat will produce a Chemistry Output Table using the laboratory sample batch(s) you selected and export the table to Excel. You may also choose to filter data by Monitoring Round (“Mon Rnd” Panel; by date on the “Date” Panel; or by Laboratory Report using the “Lab Report” Panel.

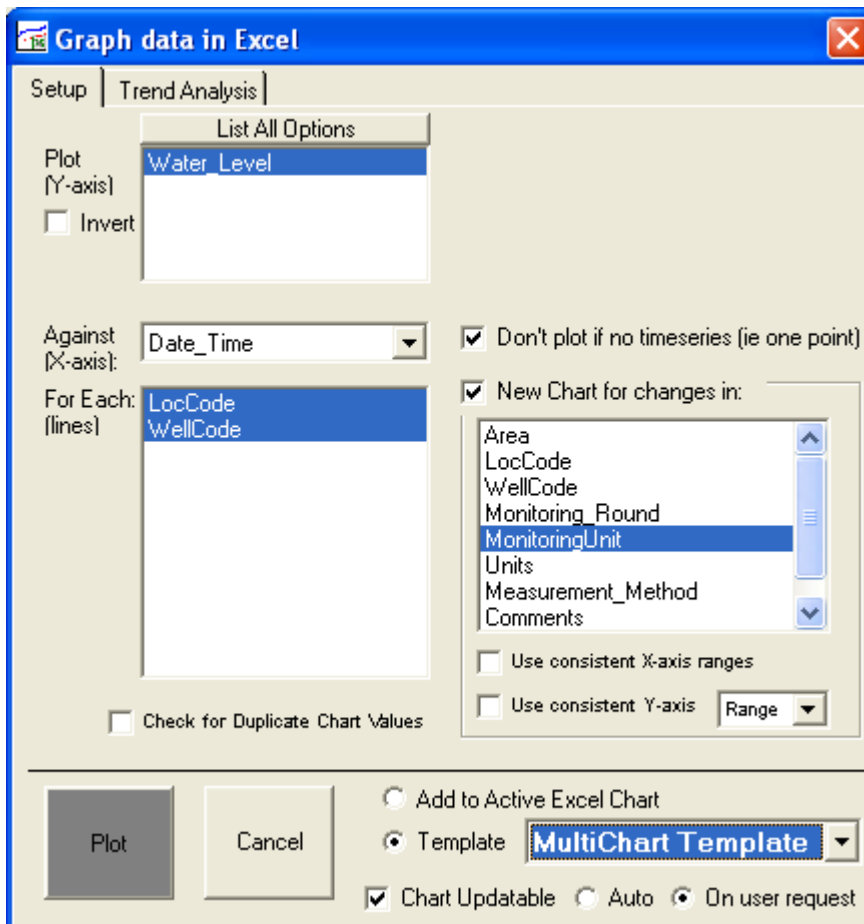
## Graphing and Trend Analysis

### Water Levels

Select the Water Level (AHD) data, and if necessary, remove the filter.

To see the default graph settings, click the drop-down arrow next to the “Graph”

button in the Exports toolbar  .




Note that the form indicates the Water Level will be plotted on the Y-axis, the Date-Time on the X-axis, and that a new series (ie a line on the graph) will be generated for each combination of LocCode and WellCode.

- Click the check box which reads “New Chart for changes in” and select “Monitoring Unit”
- Change the Chart Format to “MultiChart Template”
- Click “Plot”

Excel will open and the data will be plotted. Confirm that the data is plotted as specified in the chart settings you used. As there is a lot of data you may find it hard to distinguish any trends (we will look at how to identify trends shortly).

The data used to create this graph is in the worksheets "Data\_Upper\_Aquifer" and "Data\_Lower\_Aquifer" in the same Excel book.

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- Click on one of the Data sheets and as an exercise delete part of the data. Switch back to the graph and some data will be missing.
- Click the  button (This button appears in the bottom right or the 'Add Ins tab in Excel Vista) then click "Update". The data table will be repopulated with data from the database, and the graph will once again be complete.

We can use the same approach to update graphs to reflect new data imported into the database. We will do this later using this graph.


- Save this excel workbook in a location you will remember.

### **Analysing trends in the dataset**

ESdat includes modules to calculate Mann Kendall Trend Analysis and Linear Regression Analysis on your dataset.

- Select the Water Level (AHD) "Data-Type" button, and if necessary, remove the filter.
- Click the drop-down arrow next to the "Graph" button in the Exports toolbar.
- Click the check box which reads "New Chart for changes in" and select "Monitoring Unit"
- Change the Chart Format to "MultiChart Template"
- Click the "Trend Analysis" tab then check the box beside "Include Linear Regression Trend".
- Click the "Setup" tab then click the "Plot" button to generate the Excel Output..

When the Excel Workbook launches the first worksheet is the Trend Summary Table

- Change to the "Chart" sheet.
- There is a lot of data on the graphs. We will modify the graph to only include the data series that display a trend:
- Select the Lower Aquifer graph then click on the  button. (This button appears in the bottom right or the 'Add Ins' tab in Excel Vista)
- A dialogue box launches entitled "Change Displayed Data Series". Under the "Data Worksheet" select Data\_Lower\_Aquifer from the drop down options. This will populate the "Data Series" list. In the list of "Data Sries" select the series which are

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labelled as having a trend (LH stands for Last Value is Highest, TUp stands for Trending Up) then click the “Replace” button.

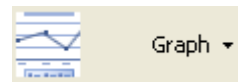
The series of interest are now much easier to study.

- You can now  close Excel

### Chemistry

- In ESDAT, Select ' Water Chemistry' data

- Click the drop-down arrow next to the graph icon



You will see the settings that can be altered, these include environmental standards; what to do with non detects; to use a uniform date range or fit each chart individually; to do a trend analysis; and the Chart Template to use.

- Change the settings so that you are not including environmental standards; include a trend analysis; and change the chart template to “MultiChart”.
- Click “Plot”.

You will see the charts as they are generated. Once the charts have been generated, the first worksheet is displayed showing the trend statistics for the dataset. The trend for each data series is also indicated on each chart.

- In ESDAT, again click the drop-down arrow next to the graph export button. Change the template to “Tiled”. Click “Plot”. This layout is suitable when assessing large numbers of compounds.

### Mapping and GIS Exports

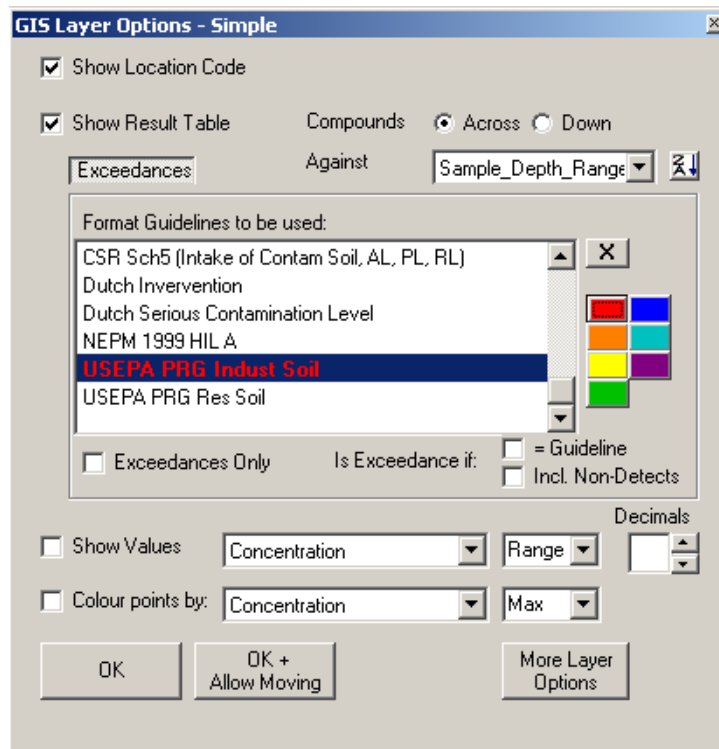
Tutorial 1 introduced mapping and labels, including non-chemistry parameters. This section will focus on Chemistry Outputs.

#### Soil Chemistry Mapping

To map Soil/Rock Chemistry data on a map:

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- Click the “Soil/Rock Chemistry” Data-Type button.
- Click the “Filter” Panel.
- Filter for the following compounds Benzene, Toluene, Ethylbenzene, Xylene Total.  
Hint: In the list of Output Fields click “ChemName”. In the list of Values click Benzene, Toluene, Ethylbenzene, Xylene Total. The filter string should look like this:
  - “ChemName In( 'Benzene' , 'Toluene' , 'Ethylbenzene' , 'Xylene Total' )”
- Click the “Apply the Filter” button.
- Change to the Map view by clicking the “Map” Panel.
- Click the “Labels” button
- Check the “Show Result Table” checkbox
- Click the “Exceedances” button
- Scroll down and select “USEPA PRG Indust Soil”. Click the red button (on right) to colour the Exceedance data.



- Click OK

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The results for these compounds will be shown as tables at each point on the map. Exceedances of the selected guideline will be shown in the format specified (red coloured text).

Note that only font colouring options are available as most GIS systems (including ArcGIS & MapInfo) don't support background fills. Italic and underline are too difficult to see on these tables.

- If you have ArcGIS or MapInfo click the "ArcMap" button or the "MapInfo" button in the Exports toolbar to export data in a format suitable for your application.



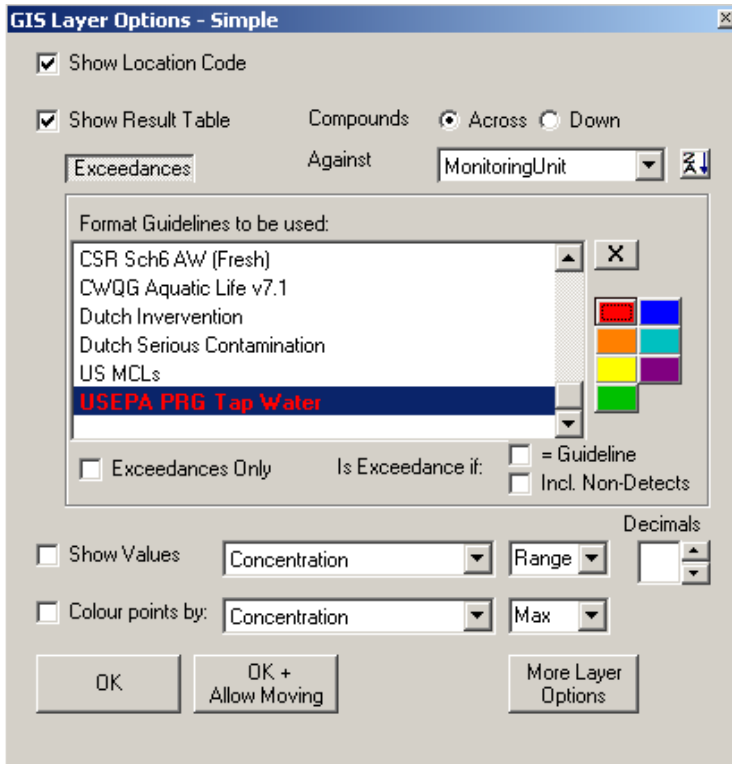
The data will be exported as formatted on the map (ie consolidate per point). If you want to export all data (potentially multiple records per location) deselect the "Summarise by Location" button included on the ArcMap export dialogue Box or the MapInfo export dialogue box.

Clear the filter if you have done so already.

### Water Chemistry Mapping

To display Water Chemistry data on a map:

- Select the "Water Chemistry" data-type button.
- Filter for ChemName = 'Zinc'
- Change to the Map view by clicking the "Map" Panel.
- Click the "Labels" button
- Check the "Show Result Table" checkbox
- Click the "Exceedances" button then format exceedances of the US EPA Tap water guideline.
- Click "Ok"



- Select “Exceedances Only”, then click “OK”
- Change the “Against” value from “MonitoringUnit” to “Sampled\_Date-Time”, then click “OK”

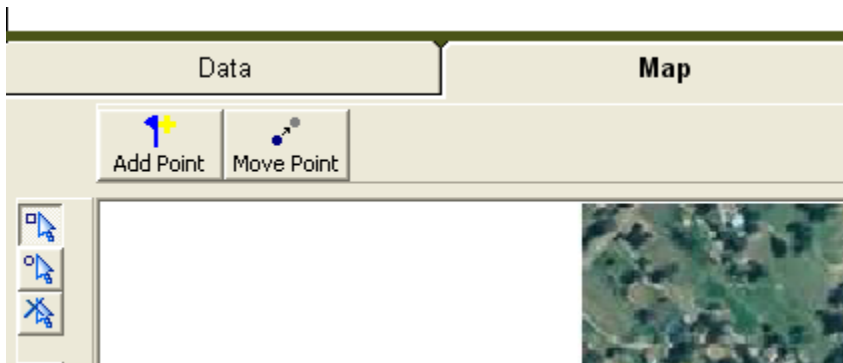
In this set of exercises we have seen most of the options for labelling water chemistry data. Clear the filter to return to the full data set.

### Adding / editing locations through the map


Select the “Location” data-type button to view Location data.

To change the position of an existing location on the map

- Click the “Move Point” button on the map toolbar.
- Select a point and drag it to a new location (mouse-click once on the point to select, then click and hold onto the point whilst dragging it to the new position before releasing the mouse-button).



To add a new point on the map

- Click the  "Add Point" button on the map toolbar.
- Click on the map
- When prompted enter a location code (eg BH New)
- When prompted add any other desired information to the Location Table and click OK

This method isn't the only way to add location data to the database. If you have a spreadsheet of survey co-ordinates the whole spreadsheet can be imported by creating a "Location" Import Template. See the "Importing" function for this approach.

## Zooming, Interrogation, Selection Functions

Buttons for controlling map zoom, panning, selection style or interrogation are included on the toolbar to the left of the map.



The selection buttons include: Select by Square, Circle, or Clear Selection.

A "hand" button allows you to move the map (within the map extents)

Zoom functions allow you to zoom to: "World" (whole extent); "Current Layer" (the extent of the layer selected in the map layer list (on the right of the map)); Zoom In, Zoom out; Zoom to a rectangle.

The information button provides information when you click on a point.

- Play with the different functions to ensure you are comfortable with their use.

## Adding a basemap

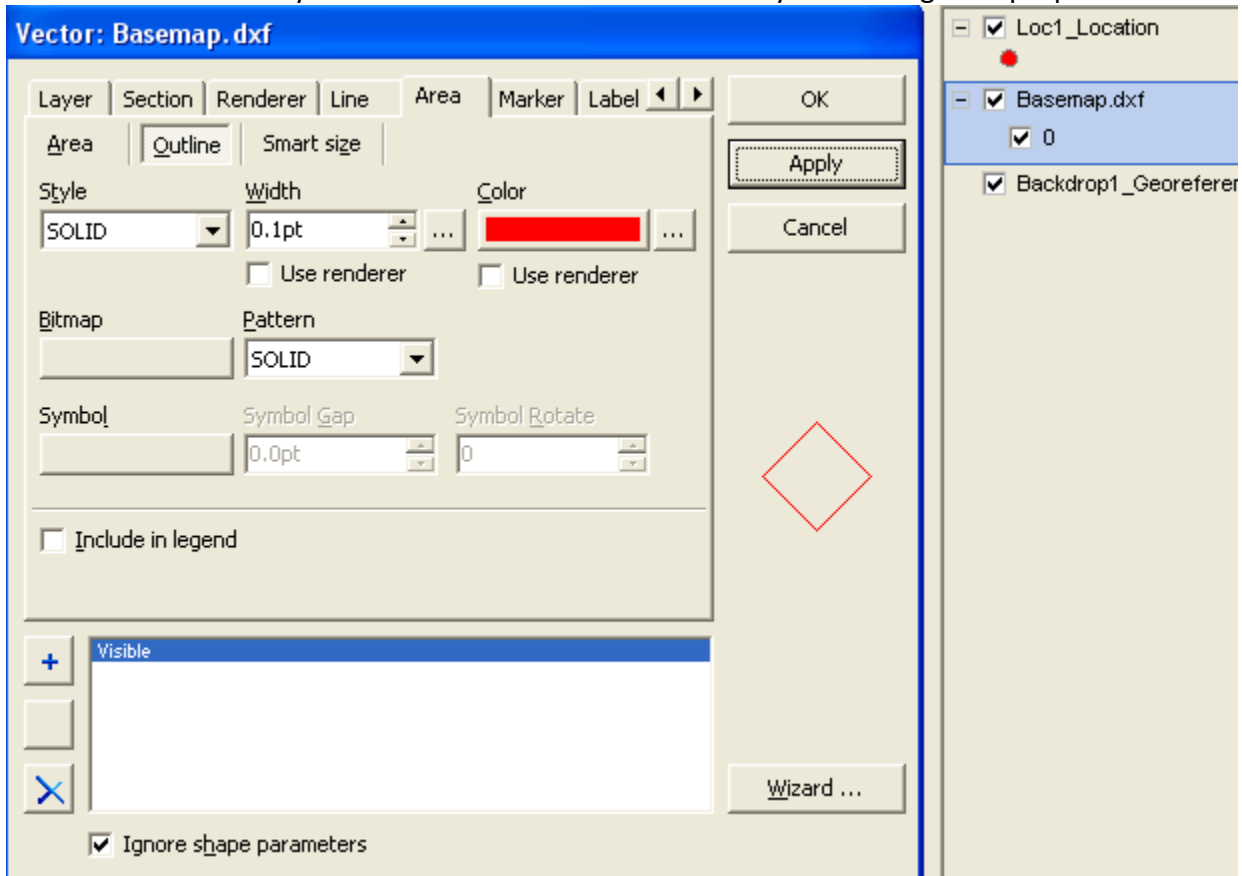
Basemaps in most GIS formats can be added to the Mapping Panel in ESdat. To add a basemap click the “Add” button on the map toolbar:



- Navigate to the file “C:\Program Files\ESdat\Sample Contam\Basemap.dxf” (file location may vary if ESdat is not installed in the default directory).

The dxf file will load, and some black lines will be shown on the screen.

- Re-order the layers as shown and double click the layer to change the properties.



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- Select the “Area” tab, and the “Outline” Sub-tab. Change the Color to Red and click “OK”

The outline of the areas in the layer will be shown in red.

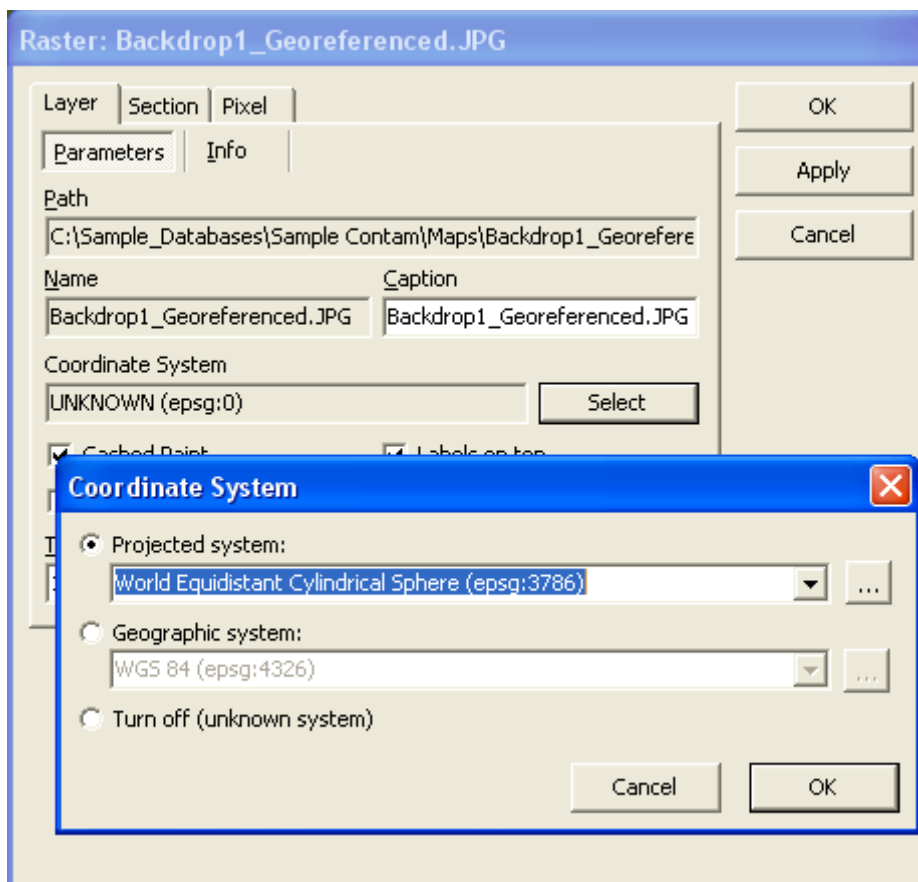
## Co-ordinate Systems

If the co-ordinate system of the data in ESdat isn't specified, or is site-specific, then all GIS Layers must be in the same co-ordinate system as the ESdat data. However, ESdat has the ability to overlay data in different co-ordinate systems. The co-ordinate system for the data in ESdat is specified in the "Project" table (or "Site" table in SQL Server versions).

- Hover the mouse over the "Data Tables" button and click on the "Project" table.

The "Co-ordinate System" for this dataset isn't specified (we don't want to implicate any particular site), but if you put ESdat into "Edit" mode you can select from a list of co-ordinate systems.


- The co-ordinate system for your basemap layers is often automatically associated with the basemap. However, in some cases it may not be. To assign a co-ordinate system to a basemap do the following:
  - Double Click on the "Backdrop1\_Georeferenced" map layer
  - Click the Layer Tab and the "Select" button as shown.



The Coordinate System can be specified as shown above.

- As this data is in a "Site Specific" system click "Turn off" & OK.

### Excel Export

- In ESDAT use any data and click the drop down arrow beside the Excel button  in the Exports toolbar

An "Export to Excel" dialogue box will open showing a number of options: to only export selected rows, to maintain the link to the database, or to produce a Pivot Table or Pivot Chart.

Pivot Tables and Charts are tools available through Excel, and Excel has comprehensive documentation on their use. ESDAT links to a superior Pivot-Table to that available in Excel (discussed later), so Excel Pivot Tables are not recommended unless you are already familiar with their use.

ESDAT provides some tools for use within Excel.

- In the "Export to Excel" dialogue box click the "open ESDAT tools in Excel" button at the bottom right of the form.

This will activate the ESDAT functionality buttons within Excel, which we will come back to.


- Click in the 'Maintain Link to Database' checkbox then Click the "Export" button.

Selecting "Maintain Link to Database" also formats cells with no visible boundaries, (this is an Excel convention to indicate that the cells are linked to an external database), and the data can be updated as new data is loaded into the database.



In Excel you will notice that the ESDAT icon should now appear in your toolbar (Add Ins toolbar for Excel 2007 and above). This is your access point for ESDAT: Charting; Importing; Utilities. These will be investigated in more detail later.

## PivotTable List Export

Although factual reports are provided for chemistry data, sometimes users need to restructure other chemistry or other data in a specific manner. ESDAT provides two tools

for this. The easiest to use is the PivotTable List  located in the Exports toolbar.

The PivotTable List is a tool hidden within Microsoft Office (you will need to have Office). When linked with ESDAT the PivotTable List can be a useful tool to restructure filtered ESDAT data.

- In ESDAT Select some Water Level data and click the  PivotTable List button.
- Click the  Field List button (second from the right in the top toolbar)
- Select the Location Code and drag it to the Column Fields on the Table.  
Drag the Date/Time to the Row Fields  
Drag the Water Level to the Detail Fields

Using this you can add extra fields to the table. You will see that for some locations there are two measurements for each date.


- Drag the Well and the Monitoring Unit before the Date/Time
- Try dragging the fields to different positions to generate different layouts.

The data will be restructured to suit this new layout.

- From the Menus select Edit – Copy All, and click OK on the messagebox.
- Paste the data into Excel

This tool is quite handy, and easy to use, but copying from it to Excel can be quite slow when used with large output tables. Data should be filtered to the data you want to work with prior to copying the data to the clipboard. ESDAT's Cross-Tab summary (described later) is more successful when restructuring large tables, but is sometimes not as intuitive to use.

## Data Importing

Click on the  “Import” Command button, then click on the “GW/NAPL” button. ESDAT will produce a template in Excel, we are going to paste or enter data into this template and then import the data into ESDAT.

Some sample data for import has been provided to illustrate certain features.

In Excel:

- Open the file “New Data.xls” in the Sample directory (this will typically be C:\Program Files\ESDAT\Sample Contam).


The Excel Book “New Data” contains some water level data (in the water level sheet), but it’s not in the format we’re looking for.

To enter the data into the Water Level table:

- Copy and Paste the water level data from the “New Data.xls” file to the relevant sheets in the “WaterLevel” workbook you just created (make sure your data matches the template type you are using) Hint: you are using the WaterLevel template.
- Arrange the data in the correct columns.

## Unique Records:


You will notice that some columns in the import template have double green cells in the header. The combination of these double green cells is known as the “Primary Key”. Only one record can exist for each combination of values in the “Primary Key”. In the case of Water Levels this means that we can only have one record for a combination of Location, Well, Date/Time and measurement method. Measurement method is included as it is possible that a dip measurement and logger measurement may occur at the same time in the same well.

- Click on the  icon in Excel, accept the defaults on the “Upload Data” form by clicking the “Import” button

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The second data row will be imported (shaded a pale shade of green) to the database, but the first will generate an error telling you that the record already exists (ie data already exists in the database for this “Primary Key”).


To compare the data you are trying to import with the data already in the database:

- Click on the  icon in Excel, select the option checkbox “Show comparison if the data being imported already exists”, then click “Import”.

A new (separate) worksheet will be created and shown. The new data will be shown next to the existing data (some of the data will be off the screen; scroll to the right). Differences will be highlighted in purple (some differences are fields which have been filled in with a default).

### Overwriting Existing Data

To overwrite the existing information

- Change back to the sheet from which we are importing;
- Click on the  icon in Excel, change the “Action” option from “Add New” to “Overwrite Existing”, and click Import.

The overwriting option instructs ESdat to find the existing record for that “Primary Key” and overwrite the values for that record.


- Close Excel without saving.

Update differs from overwrite in that any blank cells will be ignored, thus previous values will be retained in that column, if they exist. Overwrite would overwrite any existing value with a blank. Add New and Update Existing will add new records to ESdat and if records are found with the same Primary Key, then update the record with new data from the import template.


If you need to re-import a laboratory report we recommended deleting the laboratory report from ESdat and then import the replacement laboratory report. This is a more efficient approach than using the “Overwrite” option.

### Laboratory Chemistry


In ESDAT import the laboratory data "Tute2.LaboratoryAA.Sample22.csv".

Click on the  "Import" Command button, then click on the "Laboratory" button. In the "Select ESDAT Sample or Chemistry Result EDD File" dialogue box, navigate to C:/Program Files/ESDAT/Sample Contam/ Tute2.LaboratoryAA.Sample22.csv. Click the "Open" button

On the Chemistry Samples worksheet you will see that your Location and Depth data are concatenated in the Field ID.

- Click the  (Spilt Field ID) button. Click "OK" on the "ESDAT Field\_ID Splitter" dialogue box.

You will see that the location and the depth range are specifically defined. This works for a specific variety of formats and extras can be added upon request.

- Nominate your QA data. QA1 is a Field Duplicate of the shallow sample at BH05. QA2 is a Field Blank.
- Import the data, correcting any errors.
- Change to the Chemistry Sheet and import this data. You will notice that the first few ChemCodes are missing.
- Assign the missing ChemCodes using the lookup list in ESDAT, or if you cannot find the compound (due to different naming conventions) use the links to NIST (US National Institute of Standards), or IPCS INCHEM (International Program on Chemical Safety). Click the  "Get ChemCodes" icon in the Excel toolbar ("Add Ins" for Excel 2007 and above)
- Import the data that was rejected previously.

### Field Chemistry

In ESDAT click on the  "Import" command button then click on "Field Chemistry".

You will be presented with an excel worksheet for importing field chemistry data. Some predefined field parameters have been loaded, and the CAS Code is given above (or a surrogate code if no CAS code is available).

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- Type in some sample data as shown below:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
3										E.CONDUCTIVITY	PH	Redox	Temp	TOTALALKALINITY	UNKO
4	SampleCode	Field_ID	LocCode	Sampled_Date-Time	WellCode	Sample_Depth_From	Sample_Depth_To	Matrix_Type	SampleComments	Electrical	pH	Redox	Temp	Alkalinity	Diss
5										uS/cm	pH_Units	mV	oC	mg/l	mg/l
6	BH1_01Jan04_3	BH1		1/01/2004		3		8 soil		500	8.1			21	
7		BH10		1/01/2004		5		10 soil		700	7.7			20	

The Fields available for import can be customised by selecting from the drop-down that appears when clicking on a Field Name. The default Sample Fields and Compounds can be modified by selecting options within the Setup menu which is accessed via the Program buttons along the top of the Esdat interface. This is covered in the help files.

It is important to understand the function of the SampleCode. Please refer to the following section titled “Chemistry SampleCode”

- Import the data (click the  button on the toolbar).

You may receive an error indicating that a missing parent sample is required in relation to the Location. Check that the nomenclature for the Location Code BH1 is consistent with that already used in the database.

### Chemistry SampleCode

The Primary Key for Chemistry Sample is the “SampleCode”. Thus the “SampleCode” always needs to be unique for each Sample. A formula for creating the SampleCode is automatically provided and combines fields that would normally constitute a unique sample (ie Location, Well, Date/Time, Depth).


However, you can manipulate the SampleCode as required. It is important to remember that data at the same Location/Well/Date/Depth can be imported twice if a different SampleCode is used. Similarly, data at a different Location/Well/Date/Depth may trigger a “Record Already Exists” Error if the one SampleCode is used for both Samples. Thus it is prudent to be systematic in your generation of the SampleCode if you don’t use the default.

## Historical Chemistry

Historical chemistry can be imported into ESDAT in one of two formats:

- 1) A tabular (Cross-Tab) format which is the same layout as the field import above and is similar to the presentation of data in reports. The Cross-Tab format is convenient if importing data from report tables.
- 2) A columnar format, where the chemicals are listed in a single column and the sample information is repeated for each chemical result. The Columnar format is convenient if transferring data obtained from other databases.

To import in the Cross-Tab format do the following in ESDAT:

- Click on the  "Import" Command button, then double-click on "Historical Chemistry".
- Copy the chemistry data from the Historical Chemistry WorkSheet in the "New Data.xls" file (in the default location is C:\Program Files\ESDAT\Sample Contam) and paste the data into the Historical Chemistry Import Template.
- Arrange the data so that the chemical names are along the top (where Analyte1, etc.. are originally), the units are filled in, and the sample information is in the correct column. Your screen should look like the image below.

SampleCode	LocCode	Sampled_Date-Time	WellCode	Sample_Depth_From	Matrix_Type	Arsenic	Chromium	Cu
						mg/L	mg/L	mg/L
	BH1	08-Jan-04			water	0.17		
	BH1	30-Jan-04			water	0.004	0.21	1.05
	BH2	08-Jan-04			water	0.002		
	BH2	30-Jan-04			water	0.17	0.064	0.005



The Fields available for import can be customised by selecting from the drop-down which appears when clicking on a Field Name. Different or additional default Sample Fields can be specified using the Setup menu in ESdat.

It is important to understand the function of the SampleCode. Please refer to the preceding section titled "Chemistry SampleCode"


- Click the  "Get ChemCodes" icon, which will attempt to automatically assign CAS Codes or allow you to assign them manually.

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Arsenic and Chromium will be found automatically,

- Select Cu and type in “Cop”. The code for Copper will be found in the right panel. Double click this and click “Update”.
- In Excel click the  “Upload Data” icon, resolve any issues, and import the data.
-  Close Excel.

### Logger Data

In ESDAT click on the  “Import” command button then click on "Logger Files" button.

In the “Select Logger File ...” dialogue box select the file “GPL\_Weather Stn\_Daily.csv” stored within the default installation folder (C:\Program Files\ESDAT\Sample Contam), then click the “Open” button. In row 5 enter an event ID for this logger event, we will use the information in Column A5 of the Worksheet. Typically the logger will provide a unique ID for each datafile and the correct locations, in this example worksheet the unique ID is included in Row 5.

Logger_Event	LocCode	WellCode	Matrix_Type	Monitoring_Round	Collected_By	Installation_Date	Recovery_Date	Comments	Equipment_ID	Original_Data_File
TOA5	WS1		AIR		Alex	8/05/2009 0:00	7/10/2009 0:00			C:\Sample_Datab

Follow the prompts to align the logger data correctly, as follows:

Date_Time	RECORD	ETToday	SolarMjm2_Tot	WSpeedmps_Avg	WSpeedmps_Ma	AirTempC_Max	AirTempC_Min	AirTempC_TMn	AirTempC_Avg	RHpe
	RECORD	ETToday	SolarMjm2_Tot	WSpeedmps_Avg	WSpeedmps_Ma	AirTempC_Max	AirTempC_Min	AirTempC_TMn	AirTempC_Avg	RHpe
	RN	mm	MJ/m^2			degC	degC	degC	degC	%
8/05/2009 0:00	70	0.423	0.226	0.515	3.075	31.7	20.99	7/05/2009 6:26	25.69	
9/05/2009 0:00	71	0.495	0.179	0.71	3.038	31.99	22.83	8/05/2009 6:33	25.9	
10/05/2009 0:00	72	0.509	0.23	0.624	3.138	31.67	21.7	9/05/2009 6:26	25.87	
11/05/2009 0:00	73	0.538	0.248	0.57	3.375	32.67	22.17	10/05/2009 3:36	25.83	
12/05/2009 0:00	74	0.316	0.179	0.67	3.25	30.19	21.95	#####	24.77	
13/05/2009 0:00	75	0.195	0.188	0.405	5.013	29.99	21.29	12/05/2009 5:29	23.99	

You may run into some issues during importing. These are:

- A Location and Well Code need to be specified (if a WellCode isn’t relevant a “-“ should be used). These may not already be in the database, so “Create Parent Records” may have to be used.
- The Matrix Type of “Weather” or “Air” may not be valid. It will need to be added in ESDat under “Setup – Chemistry – Matrix Types – Add”. Hint: Select “NA” as the Matrix State.
- Some units are missing in the data, but are implied in the parameter name. Ensure that units are included in Row 14 for all parameters. .

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- ChemCodes for these parameters are not in the database. They will need to be added using the “Get ChemCodes” tool.. Click the “Get Chem Codes” tool. An “Associate Chem Codes” dialogue box will open. If you can not find a matching ChemCode by searching the Chemistry Lookup table or the web site links to International databases, add the ChemCode to the Chemistry Lookup table by clicking the “Add Code” button.

### Graph Logger Data


- Move your mouse over the “Logger Data” data-type button and select “Daily” from the drop down options.
- In the Export toolbar click the “Graph” button.

A graph will be produced showing the Avg and Max results for the data (noise).

### Borehole Data

Importing borehole data provides the data for WinLog and gINT outputs, as well as for use in other data reporting and analysis. For example, indicating that a particular screened interval monitors a particular aquifer can be useful when filtering for data in that aquifer. Lithology information can be useful if included in the Chemistry Output Tables.

To import Borehole data

- click on the  "Import" command button then in the blue Blank Import Templates area click the "Standard" button beside "Borehole / Geological Logging".

This will load the relevant Excel Import templates. These appear as sheets (Location, Boreholes, Borehole\_Advancement, Geology\_Logging, Borehole\_Penetration\_Resistance, Borehole\_WaterStrikes, Borehole\_SPT, Borehole\_Depth\_Comments, Borehole\_Samples, Borehole\_Backfill, Wells)

- Obtain a borehole log from a recent project and work through the Excel Import Templates adding the data that you typically collect. Use the drop-down arrows where available, for example; LocCode.

Once you have imported this data, click the "Data Views" command button. To view the data select a relevant "Data-Type" button for example the "Borehole/Wells" data type button or any of the options available within the "Geology" or "Borehole/Wells" drop down menus.

To view the data in WinLog/ gINT, select an option from the Data-Type buttons like "Borehole/Wells". Click the "gINT" button in the Exports toolbar. An "ESdat gINT Export" dialogue box will launch. Select the options to produce the output in your required format. Similarly, to produce output in WinLog format, click the "WinLog4" button in the Exports toolbar. Note: you must have gINT or WinLog installed to view these outputs. You can now



close Excel again.

## Borehole Logging Exports

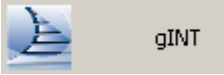
We are going to create an export of all borehole logs that contain either “Asphalt” or “Fill” in the geology description.

- Click on the “Geology” data-type button.
- Filter for “Asphalt” or “Fill”. Apply the filter.

## gINT Export

\*Complete this only if your organisation uses gINT 8 or higher for geological logging.

With the above Geology filter:

- Click on the “gINT” button in the Exports toolbar .  
The image shows a button with a blue icon of a staircase and the text 'gINT' on a light grey background.
- Select the “Use current filter” option within the “Boreholes to be exported” box .
- Click “Produce Logs”. The ESDAT borehole data for those locations will now be shown in gINT.
- This export uses standard gINT reports, which can be customised.

## WinLog4 Export

\*Complete this only if your organisation uses WinLog4 for geological logging.

With the above Geology filter:

- Click on the “WinLog4” button in the Exports toolbar ().



- Select the “Overwrite previously exported data” and “Filtered Locations Only” checkboxes.
- Click “Send Data to WinLog”.

A new WinLog database will be created (if it didn’t already exist) and it will be populated with borehole information from ESDAT.

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- Click “Launch WinLog”.

WinLog will launch and you will see the WinLog borehole map.

- Within WinLog you can open a borehole log by double clicking on the borehole on the map, or clicking the “Open a borehole log” button.

If you find that data in WinLog is incorrect or incomplete you should enter or edit the data in ESDAT and re-export the data to WinLog. Note: if the data is in both ESDAT and WinLog, but is slightly different the data needs to be deleted from WinLog before it can be updated from ESDAT.


WinFence can also be used on this data in the same way WinFence is traditionally used with WinLog data.

### Updateable Charts

We previously created and saved a chart of some water levels, and subsequently imported some water level data. To see how the data within the chart is updated with data from ESDAT:

- Switch to, or open the Excel file we saved earlier containing the water levels graph.

Either: A)

- Click the ESDAT icon in the Excel toolbars.
- The ESDAT Excel controls form will appear
- Select the “ESDAT Charting” checkbox, and click “OK”
- Select the graph
- With the graph selected, click on the  button and click “Update”

Or B)

- Switch to the data tab
- Right click on the data and click “Refresh Data”

Notice that the new data for BH8-A or BH8-B is now represented on the graph.

## Chemistry and Data Logger Output Units

Results in ESDAT are converted to a consistent unit for each compound, this allows results imported in various units (eg. ug/L and mg/L) to be output in one consistent unit. This makes tables, graphs, and maps easier to produce and read. The calculation raises the possibility however that a conversion between the measurement unit and the output unit does not exist in the database. ESDAT checks the units for each compound via the “QA Reports” command button and the “Check Units” command button. Under the “Check Units” command button options are provided to add a conversion or to change the output units.

- In ESDAT click the “Check Units” command button.

There is one conversion problem from PPB\_W to mg/g. We can either change the output units (for example to mg/kg) or add a conversion. In this case we will add a conversion.

- In the “Unit Conversion Problems” panel Click in the box titled “Conversion”
- select “Add Conversion”
- The “Conversion” dialogue box will appear
- Type in a conversion (0.0000001).
- Click ‘Ok”

ESDAT automatically checks that the most appropriate unit is used for a compound. For example if mg/L is the output unit, but the concentrations are low ESDAT will recommend that the output units be changed to ug/L.

The ESDAT recommendations for output unit changes are displayed on the “Recommended Output Unit Changes” panel. Click the “Check Units” command button. Click the “Recommended Output Unit Changes” panel and review the recommended output unit changes. To accept the recommendations click in the column titled “Change?” for the row associated with the compound you would like to change. An “x” will be added to the field you selected. When you have made your selections click the “Update Checked Compounds” button.

Close the dialogue box by clicking the x in the top right corner.

## Chemistry Lookup Table

All the settings for each compound are stored in the reference table “zRef\_Chemistry\_Lookup”. Select this table under the “Data Tables” button.

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This Table contains the following information.

- ChemCode,
- ChemName (which is used for output in preference to the name given with other data, such as from the lab, or with the environmental standards. The ChemCode is used to match the ChemName with the correct data)
- ChemName\_Abbrev (Used where short names are required – eg in GIS labelling)
- Output Units
- Chem Groups (Custom groups can be specified to enable grouping of compounds in output tables, or filtering in ESDAT)
- Alternative Names (Used for finding CAS numbers during import)
- Volatility (Used for identifying violations of holding times)
- Equivalent Weight (Used for GeoChemical outputs in milliequivalents)

Editing these values has a direct effect on the outputs. This enables you to easily change the name that is used for a compound, the units in which it will be reported and the compound grouping in which it will be arranged in the Chemistry Output Table.

Reference and Lookup tables have names starting with “zRef...” Click the “Data Table” button to view the list of tables in ESDAT. The Reference and Lookup tables are at the bottom of the list. These tables can be edited as required.


### Editing and Deleting Data

To delete the laboratory data we previously imported into ESDAT select the “Chemistry Samples” option from the drop down menu under the “Chem Tracking” data type button. You can filter by the Sample Delivery Group (SDG), which is typically unique for each lab file (1266 for this batch); or the “Data Added” Field where the date is today, or you can filter by any other field.

- In the “Filter” panel double click on the "Date Added" parameter in the list of Output Fields.
- The Dates that data were added to ESDAT will be listed appear in the “Values” box.
- Click the "=" button, and double click on today’s date in the right panel.
- Click “Apply filter”.

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To edit or delete data you need to enter Edit Mode,

- Click the “Data” panel then click the  “Allow Editing” icon (in the Data toolbar along the left edge of the screen). The button should turn red to indicate you have entered edit mode.
- Select the top left corner of the data grid (to select all the data), right click, and click on Delete Row(s).

You will be prompted to ensure you want to delete the data, select yes. The laboratory data we imported today and the associated chemistry results have now been deleted.

### Aggregate Summary

The Aggregate Summary can be used to obtain statistics and summaries of your data. We are going to look at water chemistry concentrations covering the whole site and portions of the site.

- Select the “ “Water Chemistry” Data type button.
- click on the  “Summarise Data” button in the “Data” panel toolbar.

The “Summarise Data” dialogue box will launch.


- Click the “Aggregate Summary” tab. Double click on “LocCode”, “WellCode”, “ChemName” then double click “Concentration” four times so you have four entries for the “Concentration”

The “LocCode”, “WellCode”, “ChemName”, “Concentration” fields will appear on the summary construction table with the instruction “Group By”.

- Underneath the four Concentration labels click on the “Group By” text and change the text to Min, Avg, Max, and Count respectively.
- Click the “View Summary” button then click the “Close” button.

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You can now see a summary of the minimum, average, maximum, and the count for concentrations of each chemical at each well and location.

- Click the  “Summarise Data” button again. Select the text LocCode and WellCode in the bottom panel, right click and select “delete” . Click “View Summary” button then click the “Close” button.

You can now see the aggregate summary of the minimum, average, maximum and the count for concentrations of each chemical over the entire site.

## Tutorial 3 – Further Competant Usage Skills

This tutorial assumes previous completion of Tutorial 1 and 2. Tutorial 3 builds on this knowledge, but is not necessary for general use of ESDAT.

### Post Import Chemistry Calculations

Often you will need to report chemistry results that do not correspond with the data that has been imported. Examples of this are:


- Units will need converting to match those of environmental standards, or other data
- Concentrations will need to be summed (eg Total PAH's, TPH C10-36)
- Calculations will need to be applied (eg concentration ratios)

Unit conversion is discussed in Tutorial 2. The sections below deal with summing and calculating compounds.

### Combined Compounds


ESDAT can automatically sum compounds to create an output for the sum. ESDAT comes with a summation of Aldrin + Dieldrin and TCE + DCE + VCE.

We are going to add another compound to ESDAT - Total N

Select the  "Import" Command button. In the list of Data Tables select the "zRef\_Combine\_Compounds" table then click the "Generate for Selected" button. –Enter the following data into the Excel Worksheet.

Nitrate (as N)	Total N
Nitrite (as N)	Total N
Ammonia as N	Total N

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- Click the  “Get ChemCodes” icon. Match the names you have used with those used by ESDAT. Click Update, the new names will replace those initially typed.
- Import the data

The combined compound will be calculated whenever chemistry data is imported, or when instructed from the ESDAT menu Setup – Chemistry – Combined Compounds, where some options for the calculation can be specified.

### Calculated Compounds

In some cases you will need to manipulate results prior to output. Examples of this include:

- Chemistry Results imported for SO<sub>4</sub> in mg/L, but outputs required for SO<sub>4</sub> (as S) in mg/L
- Comparing results with Interlab Duplicates or Environmental Standards where results are reported in different oxidation states. (ie BiCarbonate vs BiCarbonate as CaCO<sub>3</sub>)
- Cr (III) and Cr(III + VI) data imported by an output of CR(III) (% of Total) (required for NEPM)

ESDAT Calc files are available, which, when loaded into the database, will perform these calculations on imported data. These files are in text xml format and contain calculation instructions in the form of SQL. While custom Calc files can be created by any user, we recommend contacting ESDAT support staff for assistance in customising these files as knowledge of SQL is required.

We are going to import some CrIII and CrVI data and then run a Post Import Calculation on the data.

- Click the “Import” Command button. Under “Blank Import Templates” click the “Historical/Other” button beside “Chemistry”.
- Add CrIII and Cr VI data in accordance with the sample below. Hint: you will need to use the “Get ChemCodes” button in Excel to specify the correct ChemCodes.

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A	B	C	D	E	F	G	H
SampleCode	LocCode	Sampled Date-Time	WellCode	Sample Depth	From Matrix_Type	CR 3	Cr6
BH01_01Feb 07_	BH01	1/02/2007			soil	mg/kg	mg/kg
						6	7

- Click the “Data Views” command button.
- Produce a Chemistry Output Table for Soil using all data. Leave the Table open so you can compare your results after importing and executing the Post Import Calculation.
- Add and run an ESDAT Post – Import Custom Calculation for converting Cr (III) to Cr (III %).
- In ESDAT click “Setup”, then select “Chemistry” then “Post Import Calculations and Combined Compounds” from the drop down menu.
- In the “Post Import Calculations and Combined Compounds” dialogue box click the “Add” button under “Post Import Calculations”.
- Navigate to the “Post Import Calcs” directory and select the ESDAT Post – Import Custom Calculation entitled “calculate Cr (III) as % of Total Cr for NEPM Soil Guidelines”. Click the “Open” button. A dialogue box will open indicating the success of the import.
  
- Produce the same Chemistry Output Table as above.

Note that Cr (III %) is now included in the results.

### Adding extra Matrices

By default the Hydrogeology and Environmental system comes with matrices of 'Soil', 'Water' and 'Gas'. Extra matrices can be added if desired.

- In ESDAT select Setup – Chemistry – Add Sampling Matrix
- In the “Sampling Matrix Types” dialogue box select the matrix state which best describes the new matrix. In this example we will double click “Solid”
- Describe the new matrix as 'Sediment ', then click “Submit” button.


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Sediment and other solid matrix Matrix Types will be output with soil results in the main screen, and users can filter for the matrix type to be used. When importing chemistry data from now on users will be able to select from water, soil, gas, and sediment.

- Create an import template for field chemistry and verify this.

## Location Groups

ESDAT has the ability to assign locations to a number of zones (called Location or Spatial Groups) for the purpose of filtering. To create your own group:

- Select a number of the locations on the map then add these locations to the filter by clicking the “To Filter” button then click the “Apply Filter” button. Alternately filter the data by any criteria in the “Filter” panel then apply the filter.
- On the “Data” panel click the  “Assign Filtered Locations to a Spatial Group” button located in the “Data” toolbar. When prompted enter a meaningful name for the group.
- Clear the filters.
- On the "Filter" panel select “Group” from the list of “Output Fields” A list of names should appear on the right panel. Double click the name you entered.
- Apply the filter.

Click the “Map” panel the locations you included in the “Group” are displayed. Try applying and removing the filter and note the change.

## ESDAT Database Interaction

Complete this section if you would like to use Access databases and make your own modifications and customisations to ESDAT outputs.



In ESDAT Click on the "Access" button in the Exports toolbar. ESDAT will open the current database in Access.

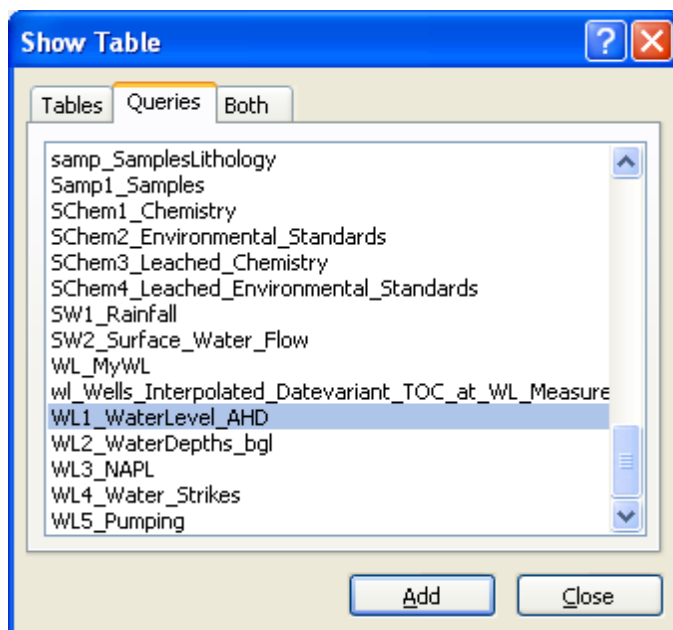
In Access, in the Objects form on the Left, click the 'Queries' button

Examine the list of Queries (click the Queries button on the left) and you will notice that the queries match those appearing under the Data-Type buttons in ESDAT. If you open them in Access you will see exactly the same data. If you alter and save them in Access you will see the changes when looking at them through ESDAT.

The example below shows a modification of the query WaterLevel\_AHD query so that only one result (the average) is returned per day per Well. This may be useful if using a data logger.

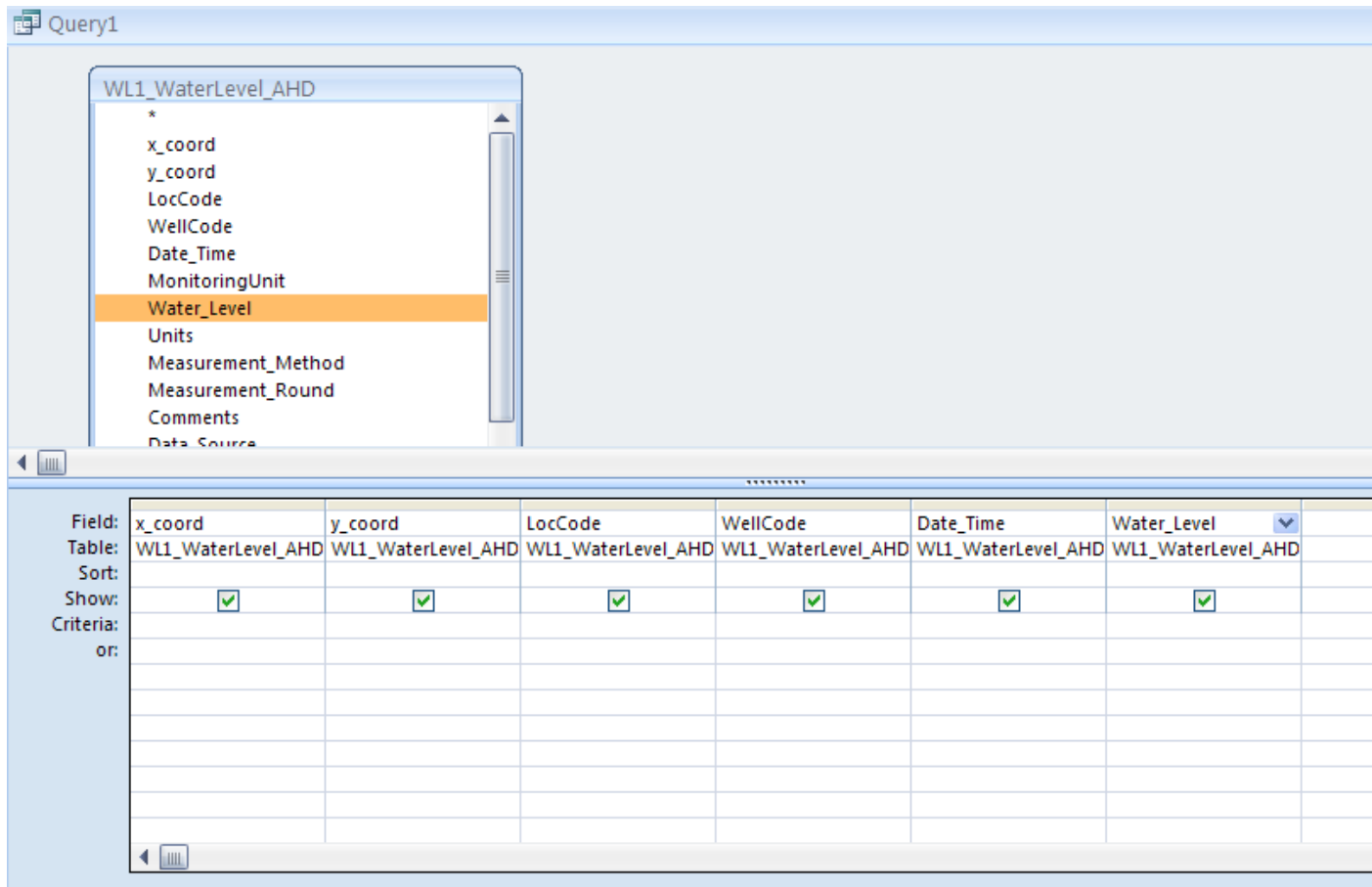
Create a new Query (In Access 200/2003 click the 'New' button next to the 'Design' button, In Access 2007 - Select the Create menu, then Query Design)

Add the WL1\_WaterLevel\_AHD query as shown.



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From the list of fields in WL1\_WaterLevel\_AHD double click on the Field names we want to see as shown below (x\_coord, y\_coord, LocCode, WellCode, Date\_Time, Water\_Level). This will populate the columns in the lower half of the screen.



Click the 'View' button on the top left of the screen to see the data. We have not yet made any changes to it, we just have a sub-selection of the columns originally in WL1\_Waterlevel\_AHD. Click 'Design' view.

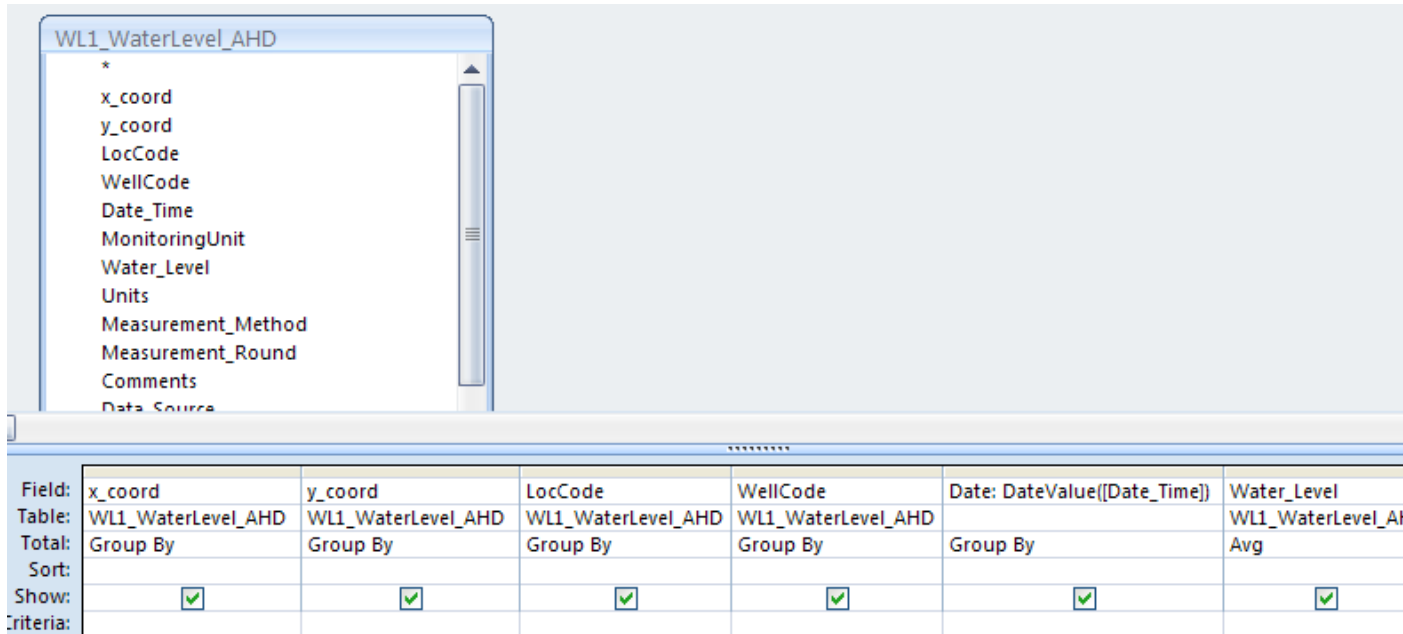
Click the  Totals Button

Modify the design as follows:

Use the DateValue formula to remove the time portion of the Date\_Time and rename as Date as shown below ie Date: DateValue([Date\_Time]). The Group By instruction will now group the results by each date rather than each date\_time record.

In the Water\_Level Column change the Group By to Avg.

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Preview the results and save the new query.

To immediately view the new query in ESDAT you may have to refresh the connection to the database. Select (in ESDAT) Setup->Refresh Connection.

Using this approach you can customise the interface for any data types or database, or to create new queries. Try opening one of the other queries which you can see through ESDAT to see how the data is manipulated. If you wish to make these modifications yourself you should research Access functions and Queries.

You may now close Access.

# END