



Government of **Western Australia**  
Department of **Mines and Petroleum**



RECORD 2009/17

# PROCEDURE FOR LEGACY POINT AND DATA CAPTURE

by  
S Sheppard, RE Green, TR Farrell, and L Kelly



Geological Survey of  
Western Australia



**GEOLOGICAL SURVEY OF  
WESTERN AUSTRALIA**

**Record 2009/17**

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**Perth 2009**

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#### **REFERENCE**

**The recommended reference for this publication is:**

Sheppard, S, Green, RE, Farrell, TR and Kelly, L 2009, Procedure for legacy point and data capture:  
Geological Survey of Western Australia, Record 2009/17, 27p.

**National Library of Australia Card Number and ISBN 978-1-74168-270-0**

**Grid references in this publication refer to the Geocentric Datum of Australia 1994 (GDA94). Locations mentioned in the text are referenced using Map Grid Australia (MGA) coordinates, Zone 50. All locations are quoted to at least the nearest 100 m.**

**Published 2009 by Geological Survey of Western Australia**

**This Record is published in digital format (PDF) and is available online at [www.dmp.wa.gov.au/GSWApublications](http://www.dmp.wa.gov.au/GSWApublications). Laser-printed copies can be ordered from the Information Centre for the cost of printing and binding.**

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## Abstract

This document explains the rationale and procedure for the capture of old Geological Survey of Western Australia (GSWA) field sites. The document consists of two main parts: 'Point capture from aerial photographs', which discusses transferring data from aerial photographs into real world coordinates in a digital environment using ArcMap; and 'Entry of field observations into WAROX', which concerns the entry of data from GSWA field notebooks, sample ticket books, and petrographic reports into GSWA's WAROX database.

## Introduction

Legacy field observations, made during GSWA mapping prior to the routine use of the WAROX database, are an important information source that can be used to: design mapping programs and research questions of interest; more efficiently target remapping; and provide customers with all existing information at the start of the remapping program. However, these observations are currently scattered amongst aerial photographs, field notebooks, sample ticket books, petrographic reports, and the printed maps, providing a major impediment to their efficient use. In addition, sample site locations recorded before the availability of GPS units in 1991 and migrated from the old ROCKMIN database into WAROX, are at best accurate to no more than several hundred metres (and a kilometre or more at worst), while GPS observations recorded before 1 May 2000 typically have an uncertainty of  $\pm 100$ –200 m. This uncertainty commonly means that the rock samples and thin sections in GSWA collections cannot reliably be linked back to a rock type in the field. As such, it is important to capture these older field sites and enter the associated data into WAROX.

There are two basic steps involved in entering old GSWA field sites and data into the WAROX database:

1. capture of field site locations from hardcopy aerial photographs into a standalone copy of WAROX using ArcMap, followed by
2. entry of field notes, lithologies, structures, samples, scanned photographs, and petrographic reports into the captured field sites within WAROX.

Although the first step does not require a person with geological training, experience has shown that, at minimum, a third year student is necessary for the correct entry of geological information from the field notebooks into WAROX. The most important attributes for someone capturing the field sites are the ability to match patterns from the aerial photographs with the imagery on screen, and an attention to detail.

The legacy capture process is based on the premise that the geologist's original field site was accurately located on the hardcopy aerial photograph. Experience has shown that this assumption is correct for the vast majority of sites. The importance of giving accurate, real world coordinates to these field sites cannot be overstated, because all of the observations (field notes, structural readings, and photographs) and derived data (e.g. petrography, microprobe analyses, whole-rock chemical and isotopic analyses, and geochronology) relate back to the field site and its location. Nevertheless, it may not be possible to accurately relocate every point. Reasons for this may include poor quality or deteriorated aerial photographs, faded or crowded markings on the aerial photographs, an inability to identify the originator, or featureless terrain.

# Point capture from aerial photographs

## Preparation

### Project folder

Each 1:250 000 map sheet to be captured requires a folder labelled *MapSheetName\_250k* in the directory [V:\GS53\\_Tetrapak\Projects\Legacy\\_Data\\_Capture\Legacy\\_Arc project data](V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy_Arc_project_data). Within this *MapSheetName\_250k* folder, a separate folder must also be created for each set of aerial photographs attributable to that map — for example, Ninghan 1962, 1968, and 1980. If points from a 1:100 000 sheet are to be captured, then a new folder *MapSheetName\_100k* is needed; this should be placed within the appropriate 1:250 000 sheet folder. These folders will also store the ArcMap project used for data capture, and the Warox\_2k.mdb file into which the captured points will be uploaded.

### Documentation of aerial photographs and Site IDs

Before point capture can begin in ArcMap, the hardcopy aerial photographs must be checked for completeness. To do this, compare the numbers on the aerial photographs supplied with the flight-line diagram for that map sheet. If the flight-line diagrams cannot be obtained from the library, they may be held at Geoscience Australia in Canberra, and accessible via the following link: <http://www.ga.gov.au/nmd/products/photos/photo.jsp>. The numbers of any missing photographs should be entered into the file *Template\_Marked & Missing\_photos.xls* in [V:\GS53\\_Tetrapak\Projects\Legacy\\_Data\\_Capture\Legacy\\_Documentation](V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy_Documentation). Open this template and use the “Save As” command to create a file named *MapSheetYr\_Marked & Missing\_photos.xls* in the appropriate folder. If all photos for a given run are present, then enter ‘NIL’ against that run number.

Next, make a list of the field sites recorded on each set of aerial photographs. This is very useful for picking up duplicate Site IDs, and, if points need to be checked later, then it is easy to go back to the required photograph. Enter the Site IDs into the “Marked photos” tab in *MapSheetYr\_Marked & Missing\_photos.xls*; if none of the photos in a run are marked, ‘NIL’ should be entered under the “Photo” column. Once this list is complete, consult the Project Manager or Terrane Custodian as to whether Site IDs for any particular geologists will not be captured. Points may not be captured for many reasons, including inadequately marked sites, illegible field notes, lost field notebooks, an unknown geologist, or, in the opinion of the Project Manager or Terrane Custodian, a geologist with insufficient experience in the rock types mapped.

If a geologist has points numbered from 1 to ‘X’ on each photograph, then *each* of the repeated point numbers will need to be assigned a new Site ID in the “Duplicate Site IDs” tab of the *MapSheetYr\_Marked & Missing\_photos.xls* spreadsheet. The purpose of this is to prevent duplicate Site IDs, which are not permitted by ArcMap’s Warox Tool. For each aerial photograph then, the original points starting from Run 1 should be listed in the “Duplicate Site IDs” worksheet, along with a new corresponding Site ID.

***This step is extremely important, as it is the only way to link the points listed in the geologist’s field notebook with the new Site IDs in WAROX during the data entry process.***

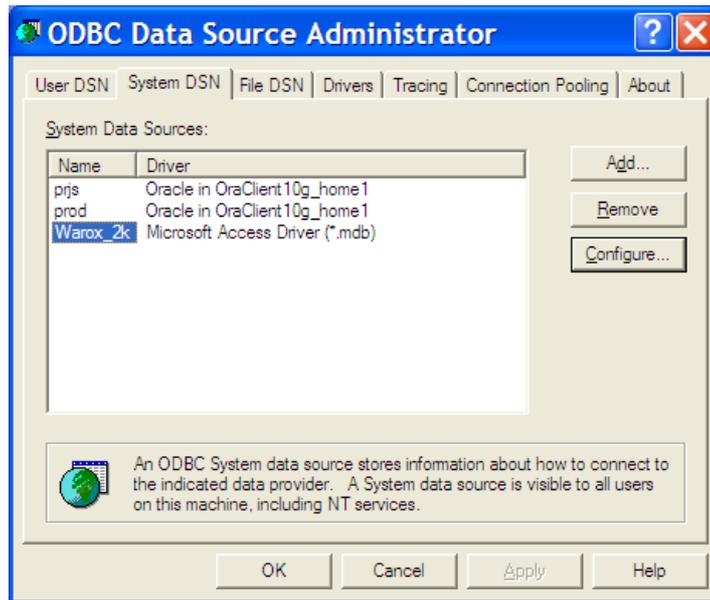
A project in ArcMap can now be created to capture the points listed in the *MapSheetName\_Marked & Missing\_photos.xls* spreadsheet. A separate project file will be required for each set of aerial photographs.

### Set up of MS Access database for data capture

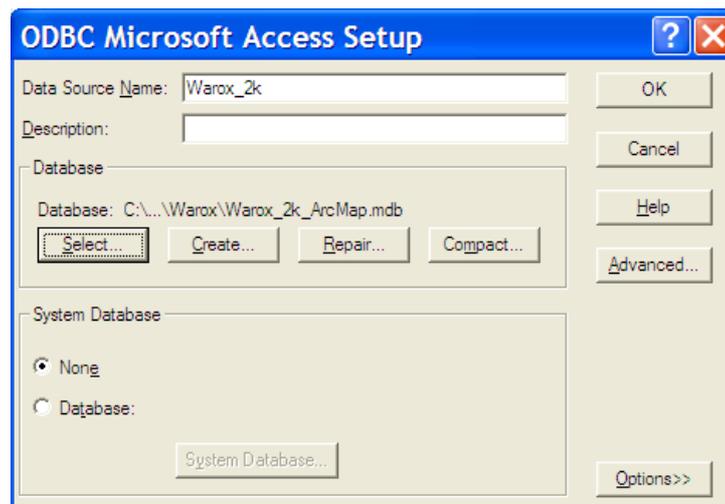
Copy the Warox\_2k.mdb file from [V:\GS53\\_Tetrapak\Projects\Legacy\\_Data\\_Capture](V:\GS53_Tetrapak\Projects\Legacy_Data_Capture) into the map sheet folder (i.e. [V:\GS53\\_Tetrapak\Projects\Legacy\\_Data\\_Capture\Legacy\\_Arc project data\MapSheetName](V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy_Arc_project_data\MapSheetName)). Points captured in ArcMap will be saved into this file.

By default, the DoIR ArcGIS 9.2 Warox Tool will write data into C:\Program Files\Warox\Warox\_2k.mdb. The following procedure, which directs this tool toward a file in another location, is reproduced from page 17 of [DoIR ArcGIS 9.2 Warox Tools User Manual.pdf](C:\Program Files\Department of Industry and Resources\DoIR ArcGIS 9.2 Warox Tools) (located in <C:\Program Files\Department of Industry and Resources\DoIR ArcGIS 9.2 Warox Tools>).

Go to “Start” > “Settings” > “Control Panel” > “Administrative Tools” > “Data Sources (ODBC)” (Note: If you cannot see “Administrative Tools” in the Control Panel, then click on “Switch to Classic View”). In the “ODBC Data Source Administrator” window, select the “System DSN” tab. Click on “Warox\_2k” and then “Configure...”:



Then click on “Select...”:

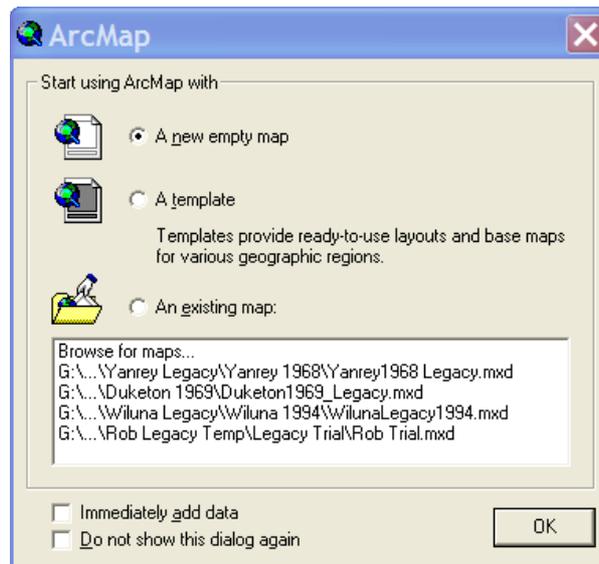


Navigate to the Warox\_2k.mdb file in V:\GS53\_Tetrapak\Projects\Legacy\_Data\_Capture\Legacy Arc project data\MapSheetName, and then click “OK”. This procedure will need to be repeated each time a new project is started.

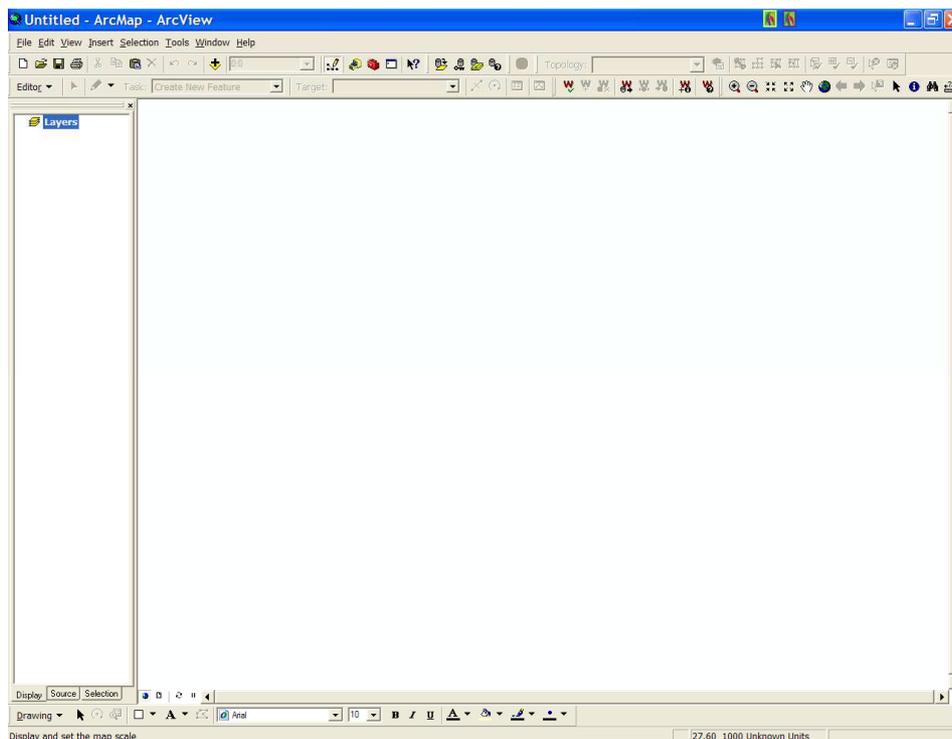
Copy the file WAROX\_gdb.mdb from [V:\Resources\Databases\WAROX\WAROX\\_ARCGIS9\\_TOOLS](#) into the folder [C:\Program Files\Department of Industry and Resources\DoIR ArcGIS 9.2 Warox Tools](#). The Warox\_gdb.mdb file is a holding place for all points captured in ArcMap, and is useful for locating and correcting duplicate Site IDs. At the conclusion of a project, this database file should be copied into V:\GS53\_Tetrapak\Projects\Legacy\_Data\_Capture\Legacy Arc project data\MapSheetName.

## Project set up in ArcMap

The next step is to set up a new project in ArcMap to capture points from the aerial photographs. To do this, either double click on the shortcut to ArcMap on your desktop, or go to “Start” > “Programs” > “ArcGIS” > “ArcMap”. When the following screen appears, select the option “A new empty map”, and click “OK”.

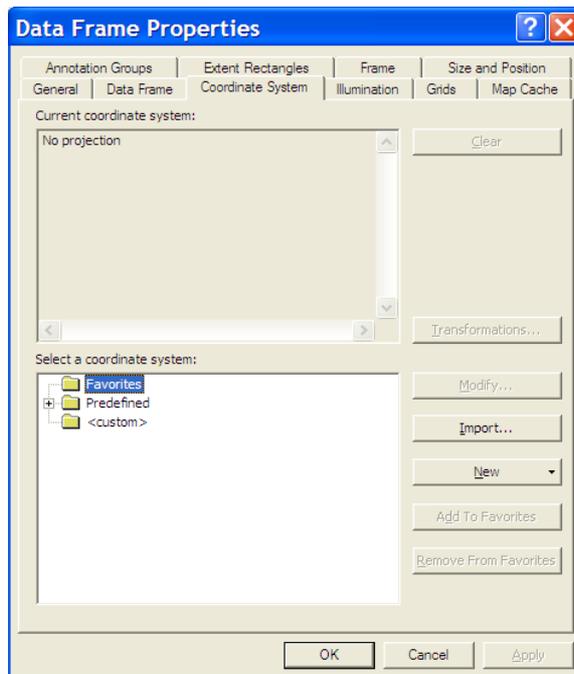


Selecting this option will open the following window:

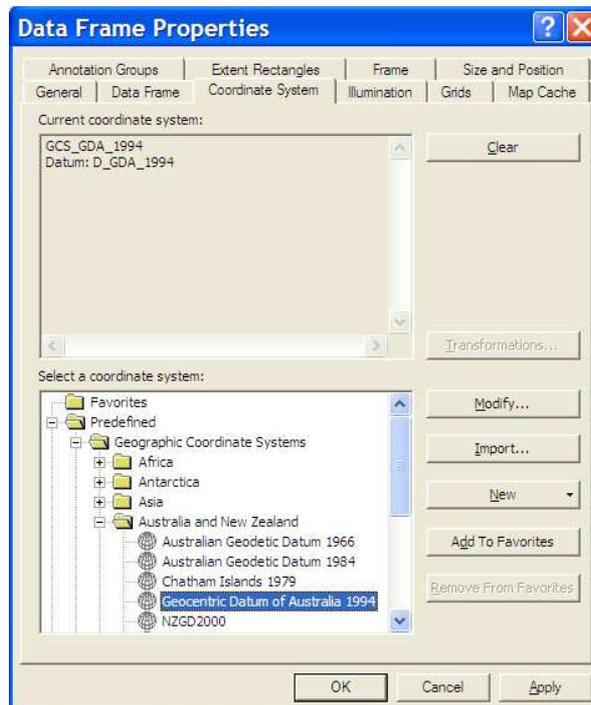


We now need to set the coordinates and select the datum for the project. There are two basic sets of coordinate systems that may be used: projected or geographic. If projected coordinates are to be used, then the correct zone must be selected. The problem with this approach is that if the map sheet is adjacent to a zone boundary, any points that plot just off the sheet may fall into the adjacent zone, and will not display correctly in the ArcMap project. To avoid this, it is best to select geographic coordinates.

To select the coordinates and datum, right click on "Layers", then select "Properties" from the resultant drop-down list. This brings up the following screen:



In the part of the window titled “Select a coordinate system”, select “Predefined”, then “Geographic Coordinate Systems”, then “Australia and NZ”, and “Geocentric Datum of Australia 1994”.



Then click “OK”. This will return you to the blank view in ArcMap.

***Selecting the correct datum is crucial: point capture in the wrong datum may require the deletion and recapture of all points. Regardless of whether or not geographic or projected coordinates are used, only the GDA 1994 datum must be used.***

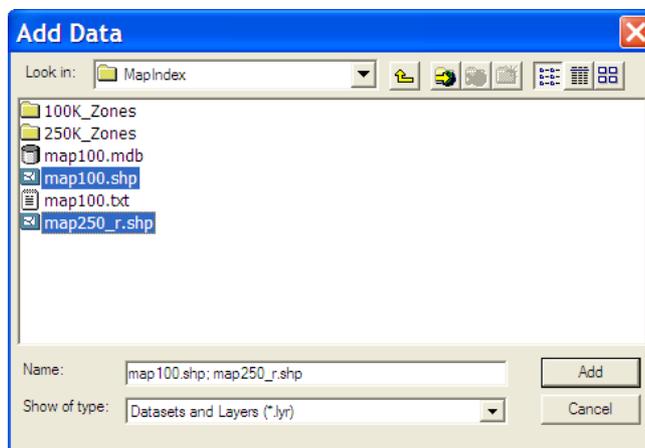
We now need to add some imagery to the project, which will be used to match the field sites on the aerial photographs with the same position on screen. Many areas in Western Australia will have orthophotography coverage, but those areas without will require the use of SPOT or LANDSAT imagery instead. We also need to add reference layers so that the spatial accuracy of this imagery can be checked. All GSWA digital images are stored on the [Spatialimages on 'Internal\Corp' \(I:\) drive](#).

## Reference data

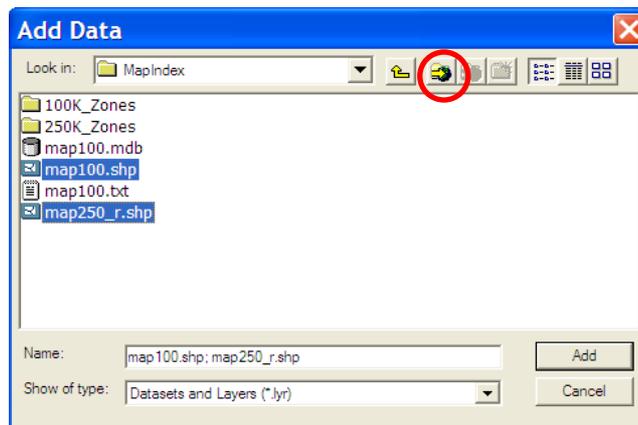
To add reference data to a project file, select the “Add Data” button:



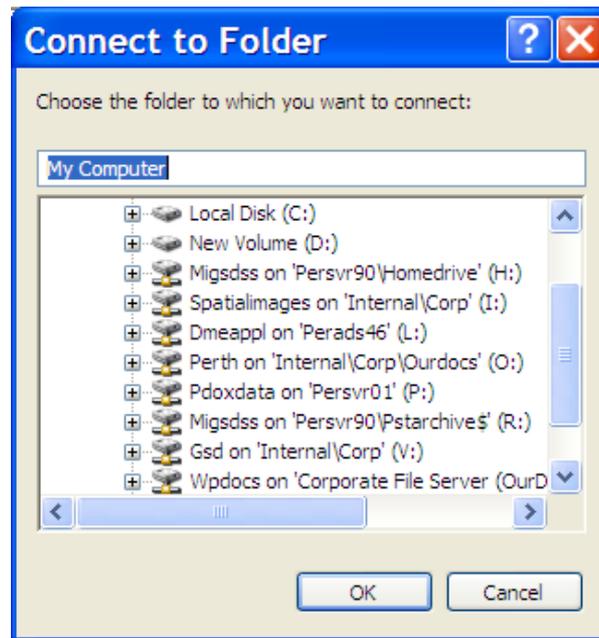
For the 100K map sheet index and 250K map sheet index, navigate to [I:\ReferenceData\MapIndex](#), select both map100.shp and map250\_r.shp using the “Ctrl” key, and then click “Add”.



If the I:\ drive is not visible in the window, then it will need to be connected first. To connect to the I:\ drive (or any other drive), click on the “Connect to folder” button, circled below:

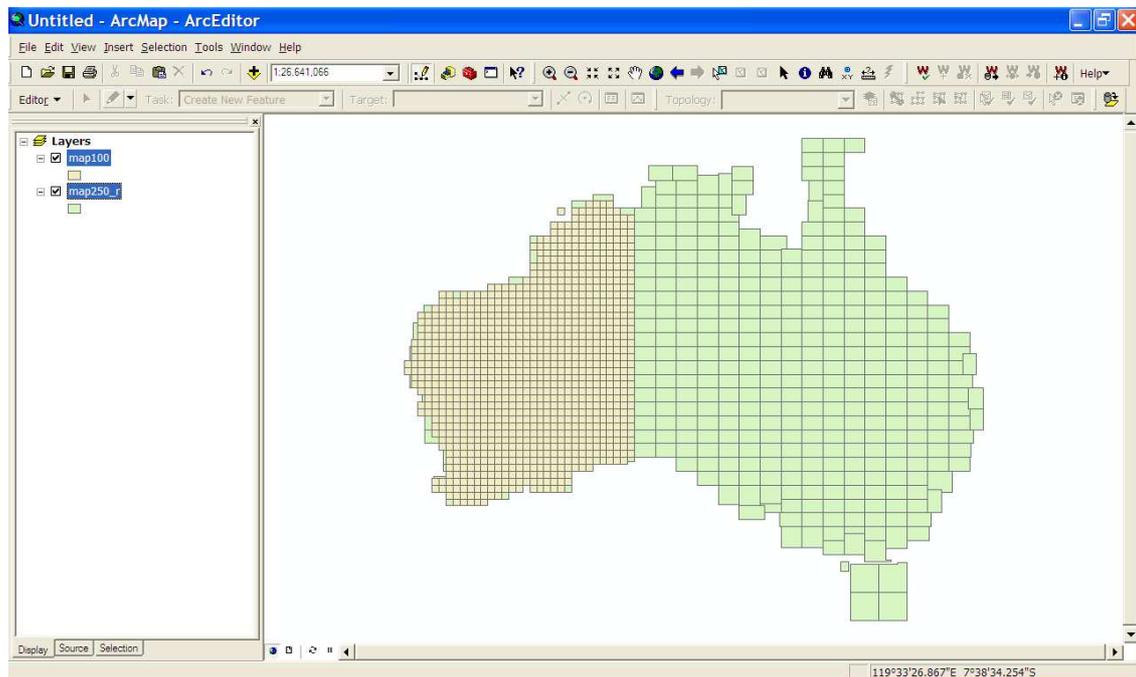


Select the required drive, and click “OK”.

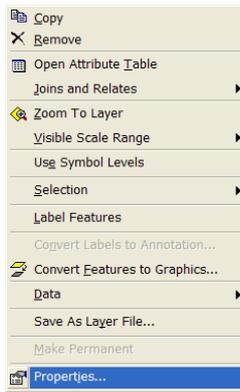


Double clicking on any of the drives will display the list of folders within each drive. However, it is best to select an entire drive rather than an individual folder, so that all folders within the drive will be accessible.

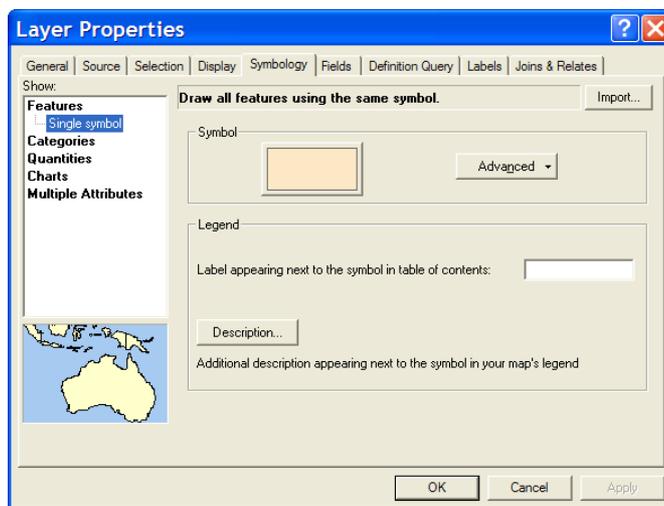
After adding the map sheet indexes, the following window will become visible:



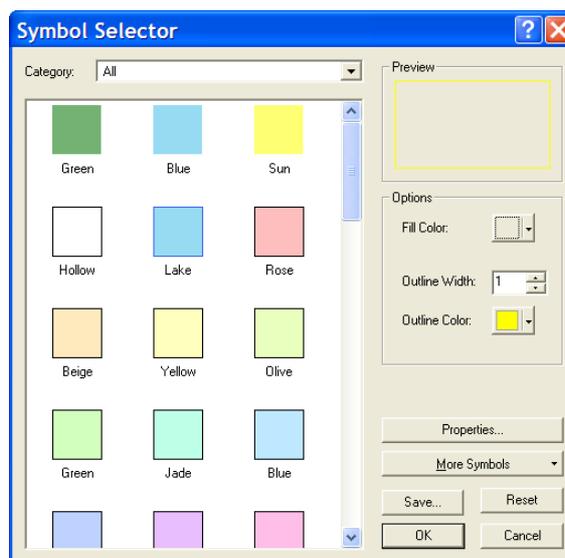
For each layer added, some properties need to be changed so that underlying layers, such as the orthophotography or LANDSAT images, will still be visible. To do this, right click on each layer in turn, and select "Properties":



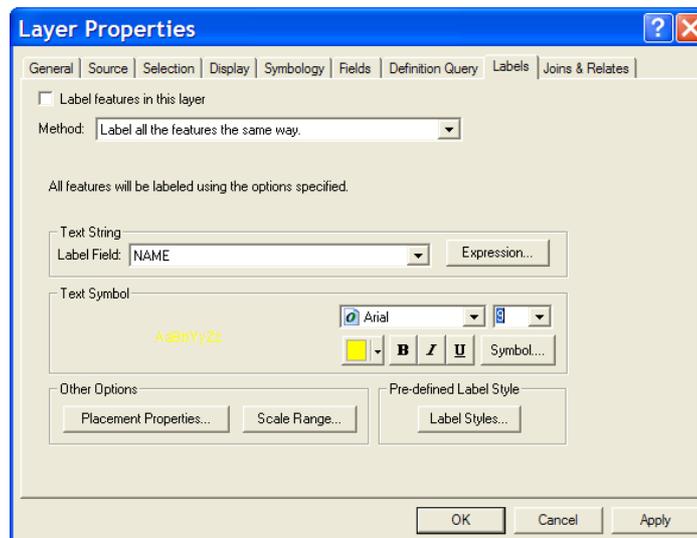
In the “Layer Properties” window that appears, click on the “Symbology” tab, followed by the “Symbol” button.



In the “Options” box, set “Fill Color” to “No Color”, “Outline Width” to 1, and “Outline Color” to whatever you like, then select “OK”.



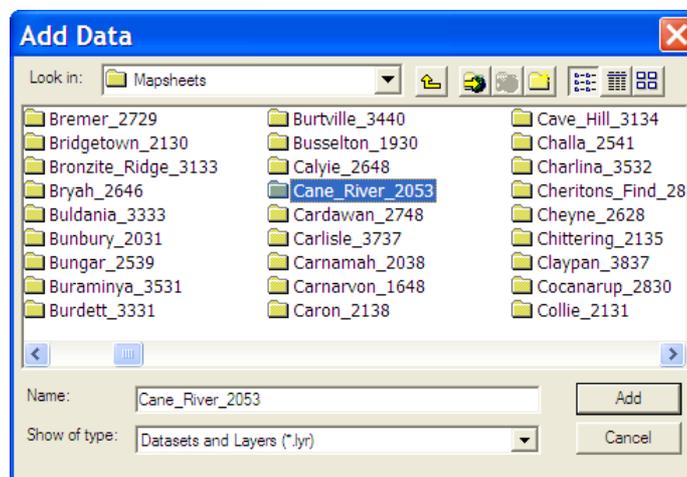
Now select the “Labels” tab, and change the “Text Symbol” colour to match the outline; adjust the font size according to your preference. Select “Apply” and then “OK”.



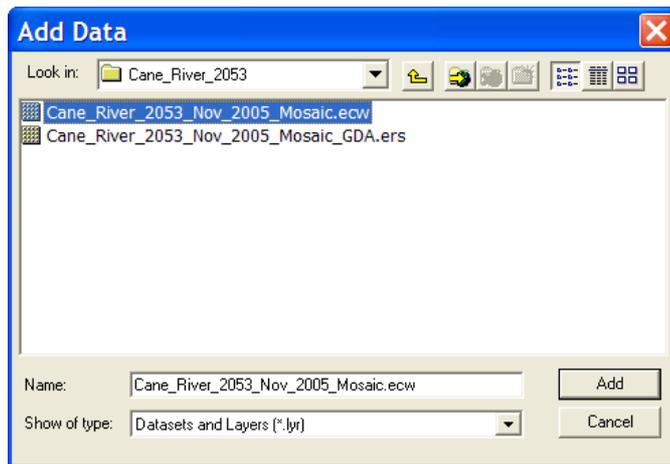
## Imagery for data capture

Now we need to add orthophotography, LANDSAT, or SPOT imagery to the project file, so that points on the hardcopy aerial photographs can be matched on screen.

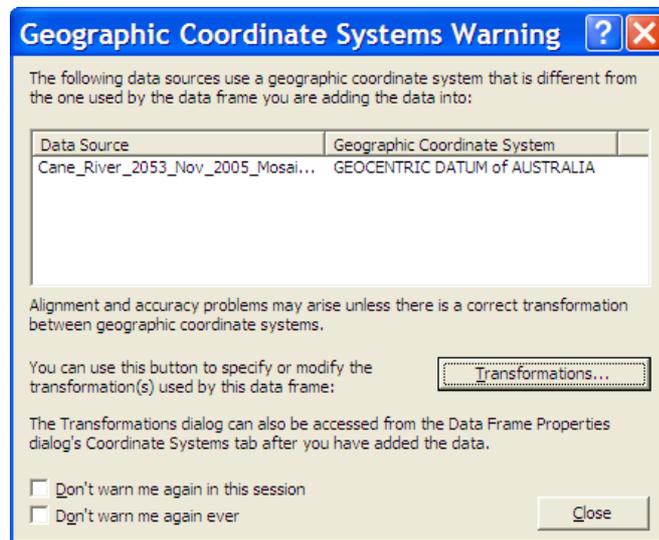
In ArcMap, press the “Add Data” button and navigate to the appropriate imagery in the [I:\Orthophotos\Mapsheets](#) folder. In this example, we are searching for the Cane River 1:100 000 sheet orthophoto.



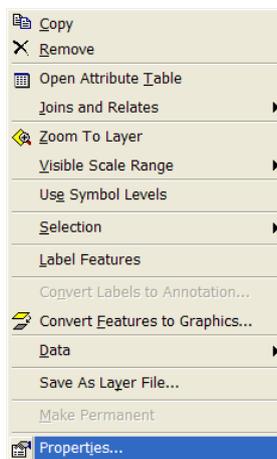
In the relevant map sheet folder, select the required .ecw or .jp2 file and click “Add”.



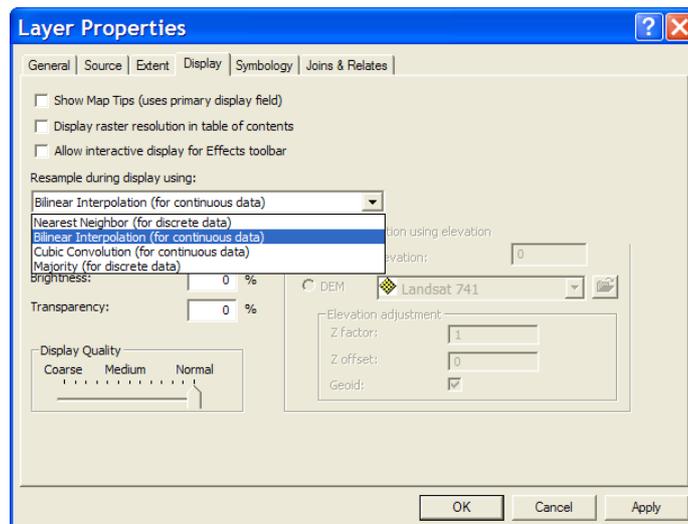
If the following screen appears, click on “Close”.



When zooming in on a small area, each newly imported orthophoto, LANDSAT, or SPOT image will appear pixelated. To smooth these images, right click on each layer in turn, and select “Properties”.



In the “Layer Properties” window that appears, select the “Display” tab. In the drop-down list under “Resample during display using:” set as “Bilinear Interpolation (for continuous data)”. Then select “Apply” and “OK”.



## Accuracy of imagery

An important part of the data capture process is to have some independent means of checking that the orthophotos and other imagery is spatially correct *before* capture of the field sites begins. This is best done using shape files derived from GSWA field mappers’ GPS track logs, or differential GPS track logs from the Department of Main Roads.

To import track log files, use the “Add Data” command to go to [I:\ReferenceData](#). Track log files may be held in one of the following folders: GPS\_Track or MainRoadsDGPS\Shapefiles.

The imagery can then be checked against any track logs that cross the sheet. This is best done by zooming in to an area — or areas — where the track logs run roughly east–west and north–south so that both the X and Y coordinates can be verified.

Once image accuracy has been verified, the ArcMap project can be saved into: V:\GS53\_Tetrapak\Projects\Legacy\_Data\_Capture\Legacy Arc project data\MapSheetName.

## Data capture

Now that we have set up and saved the project, we are ready to start capturing points from the aerial photographs. This process requires the “DoIR ArcGIS 9.2 Warox Tools” toolbar (shown below):



If this toolbar is not visible in ArcMap, right click anywhere on the menu bar at the top of the screen. If “DoIR ArcGIS 9.2 Warox Tools” does not appear in the drop-down list, it will need to be installed. To install the toolbar, click on the hyperlink: [\\Internal\Corp\Gsd\Resources\Applications\ARCGIS\\_TOOLS\DoIRArcGIS92WaroxTools\DoIRArcGIS92WaroxTools\\_QuickInstall.vbs](#). Right clicking anywhere on the menu at the top of the screen in ArcMap should then show the “DoIR ArcGIS 9.2 Warox Tools” as an option. Select this to activate the toolbar, then drag it onto the menu bar.

## Open WAROX editing session

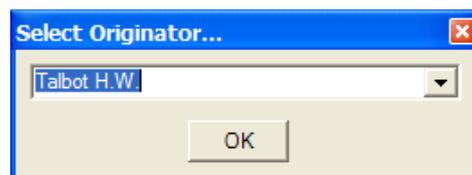
The following section is, in part, a summary taken from the DoIR ArcGIS 9.2 Warox Tools User Manual by BP Falletti, which can be accessed through the “Help” button on the “DoIR ArcGIS 9.2 Warox Tools” bar in ArcMap, as shown below:



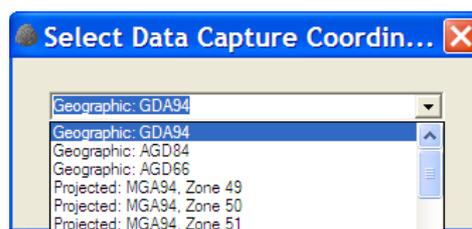
To begin entering points in ArcMap, select “Open Warox Editing Session”.



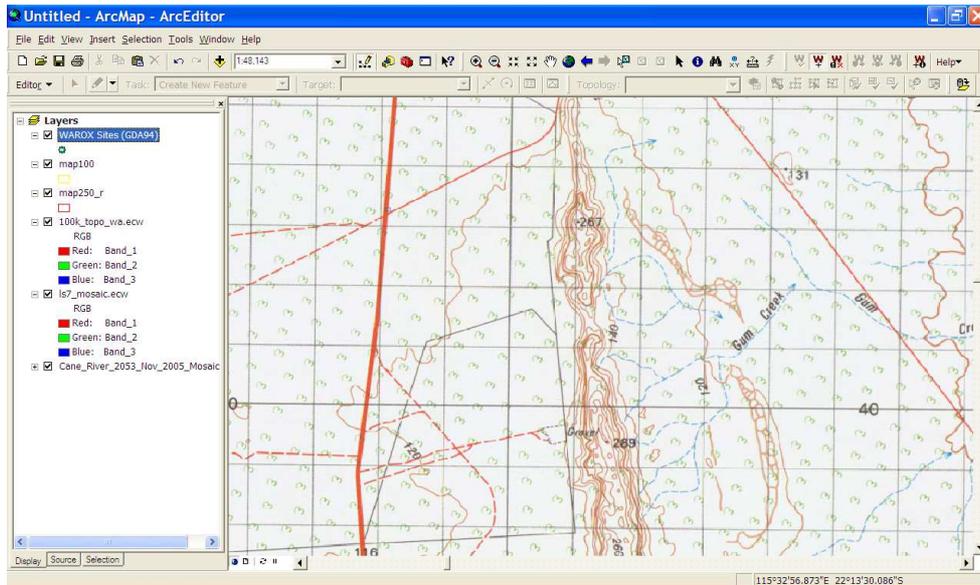
Select an Originator, using the three letter codes recorded in [V:\GS53 Tetrapak\Projects\Legacy Data Capture\Legacy Documentation\GSD\\_ORIGINATORS\\_PROD.xls](V:\GS53 Tetrapak\Projects\Legacy Data Capture\Legacy Documentation\GSD_ORIGINATORS_PROD.xls), and click “OK”.



To set the coordinate system, choose “Geographic GDA94” in the next window, and click “OK”:



A new layer called “WAROX Sites (GDA94)” is created as a result.



The “Capture Warox Points” tool is then enabled, and set as active. The button “Close Warox Editing Session (Load Edits To Warox)” is also enabled, and the mouse arrow is changed to cross hairs.



Points can now be entered by left clicking the location on screen that corresponds with the same point on the aerial photograph marked by a field site. A small window pops up, into which the user is asked to enter a Site ID for the new point. The Site ID must be 12 characters long, of which the first three characters are the originator’s three letter code, the second set of three characters are for the project code or map sheet initials, and the last six characters are for the point number on the aerial photograph.

The three characters for the project code could relate to a particular generation of mapping (e.g. 1960s vs. 1970s) or to a particular tectonic unit (e.g. Gascoyne Province, Carnarvon Basin). Consult the Project Manager or Terrane Custodian for the correct project code. This approach to site numbering makes the search and retrieval of data related to a particular project more straightforward. Additionally, using this method all the points for a given originator in a given project will be grouped together when Site IDs are listed in ascending or descending order in WAROX, and missing Site IDs can then be easily identified.

Alternatively, a three letter code for each 1:100 000 map sheet can be used instead of a project number. The standard three letter code for each sheet is listed in: [V:\GS53\\_Tetrapak\Projects\Legacy\\_Data\\_Capture\Legacy\\_Documentation\MAP SHEET CODES.xls](V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy_Documentation\MAP SHEET CODES.xls).

If the format of the Site ID entered is correct, a new point is added to the database, and the user can capture another field site.

## Close WAROX editing session

The steps listed above need to be followed for each new originator listed on a project. When changing originators, and before closing an editing session, it is important to save your work. To close and save an editing session, click on the “Close Warox Editing Session (Load Edits to Warox)” button:



The newly captured sites are uploaded into the Warox\_2k.mdb database located in V:\GS53\_Tetrapak\Projects\Legacy\_Data\_Capture\Legacy Arc project data\MapSheetName.

## Load existing WAROX sites

To view all records existing in the Warox\_2k.mdb file, click the “Load Existing Warox Sites” button:

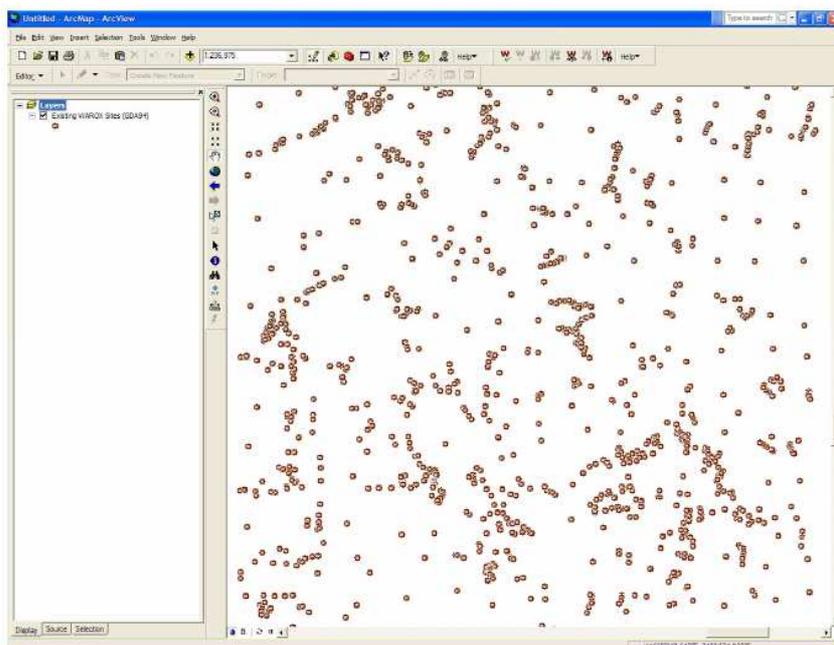


If the format of a Site ID is incorrect, or if a Site ID is duplicated, the sites cannot be displayed, and the following error message appears.



Regardless of the type of error, these points will need to be edited in the WAROX\_gdb.mdb file in <C:\Program Files\Department of Industry and Resources\DoIR ArcGIS 9.2 Warox Tools>, before they can be loaded into the Warox\_2k.mdb file.

Upon loading the existing sites, a new layer “Existing WAROX Sites (GDA94)” is added to ArcMap:



## Moving WAROX sites

Once the existing WAROX sites have been loaded into ArcMap, any points which have been incorrectly located can be moved using the “Move Existing Warox Points” button:



In order to do this, left click on the point to be moved, then left click on the new desired location. Once a point is moved, the “Save Changes to Warox” button becomes enabled; be sure to click this button after every change.

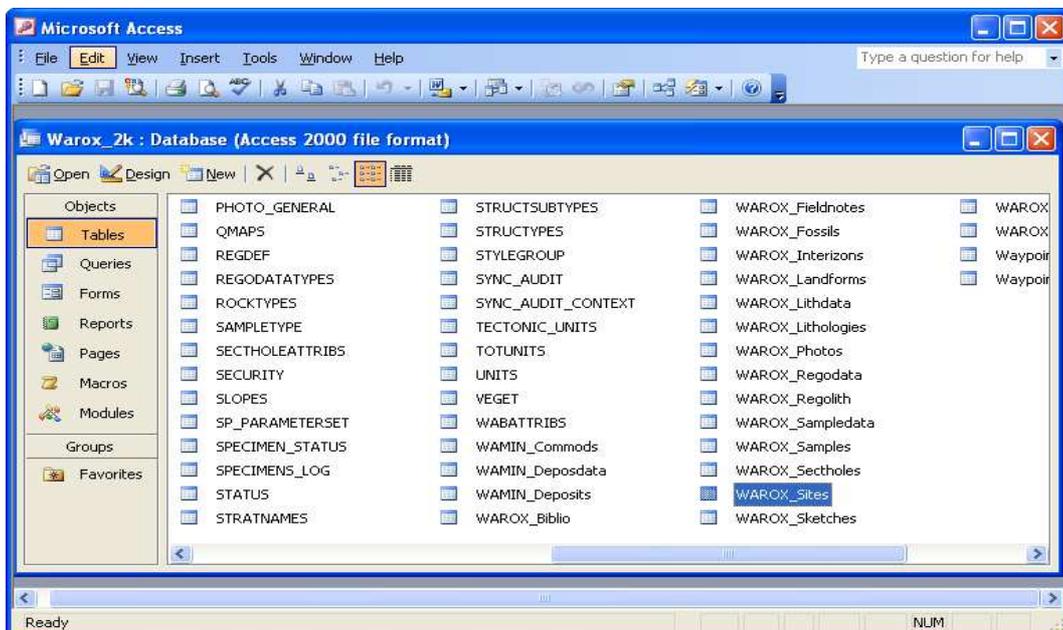
## Assigning observation dates to captured points

Once all the points for a project have been captured, the observation date needs to be entered into the Warox\_2k.mdb file for each point. In order to do this, the field notebook is usually required. If the exact date for the observation is not recorded, but the year can be obtained from the notebook, aerial photograph, or published map, then a nominal date (preferably 01/07/yyyy) may be entered.

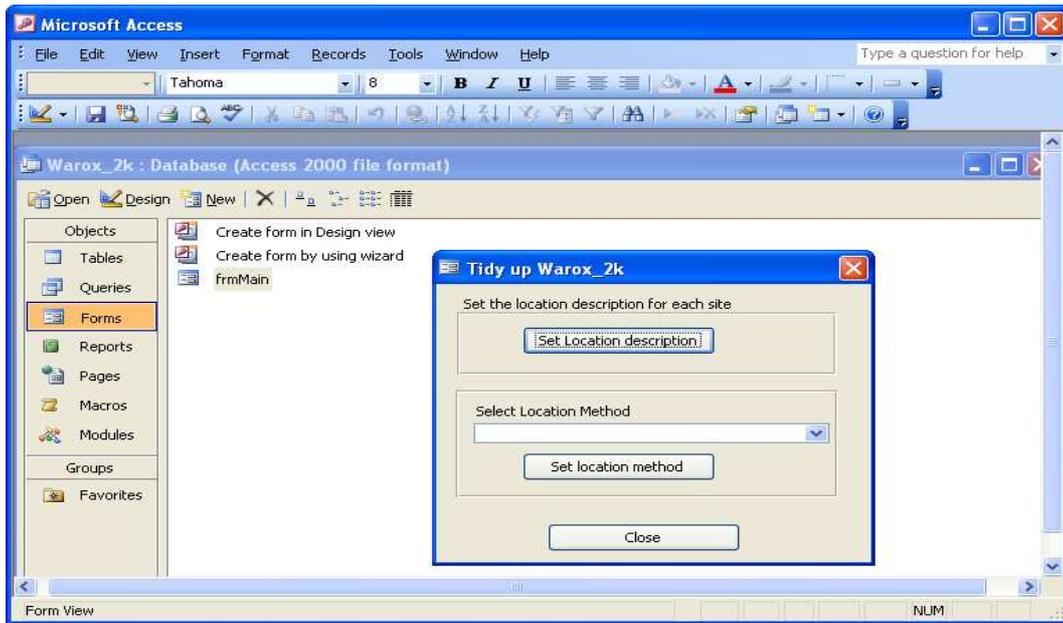
To enter these observation dates, open the relevant Warox\_2k.mdb file, and then double click on the “WAROX\_Sites” table to open it. In the “OBSDATE” column, enter the date for each observation in the format ‘dd/mm/yyyy’.

## Setting the location description and location method

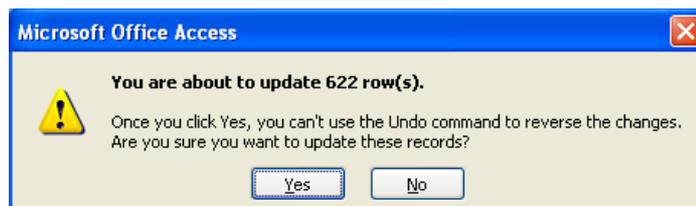
To enter the location description and location method, double click on the Warox\_2k.mdb file in the project folder. The following screen will appear:



From the menu on the left side of the screen, select “Forms”, then “frmMain”. The following screen will appear:



In this dialog box, select “Set Location description” and enter the relevant information (which is listed on the aerial photographs) into each field, clicking “OK” after each. When the following screen appears, select “Yes”:



Next, using the drop down menu under “Select Location Method”, choose the type of imagery used to capture the points in ArcMap; then click on “Set location method” button and select “Yes” to update the information.

## Re-assigning samples from old sites to newly captured sites

All rock specimens allocated a GSWA number (equivalent to the “SAMPLEID” in WAROX) before routine entry of data into the WAROX database, are linked to a field site location with an accuracy of no better than  $\pm 100\text{--}200$  m. The site locations for older GSWA sample numbers, migrated into WAROX from the defunct ROCKMIN database, were mainly estimated from small-scale topographic maps, many of uncertain accuracy. When the real site locations for these samples have been captured in ArcMap, the sample numbers need to be linked to these new sites. This is done by the Specialist, Database Geologist using a script that takes a list of GSWA sample numbers and their matching new Site IDs, transfers all the existing data to the new Site IDs, and deletes the old Site IDs. The resulting data can then be edited during the data entry process.

Sample IDs for any given project are located by doing a sample query using the SmartQuery application. See the relevant Project Manager to obtain a copy of this application; the Project Manager will also explain how the query tool works. The sample query should be saved into: V:\GS53\_Tetrapak\Projects\Legacy\_Data\_Capture\Legacy Arc project data\MapSheetName.

To help the Specialist, Database Geologist re-assign Sample IDs to new Site IDs, use the sample ticket books (and field notebooks, if necessary) to construct an Excel spreadsheet with “Sample IDs” in one column and the corresponding new “Site IDs” in a second column. If a sample cannot be attached to a new Site ID, then enter “?” into the relevant cell.

## Upload of data points into the Oracle version of WAROX

Once the capture of points, including observation dates, is complete for a project, and Sample IDs have been reassigned to new Site IDs in an Excel spreadsheet, these data need to be uploaded into the Oracle version of WAROX by the Specialist, Database Geologist. To do this, send the Specialist, Database Geologist a link to the *ProjectName.mdb* file on the network. Include in this email a link to the spreadsheet containing the Sample IDs and new Site IDs.

It is also *necessary to save* the WAROX\_gdb.mdb file from C:\Program Files\Department of Industry and Resources\DoIR ArcGIS 9.2 Warox Tools into V:\GS53\_Tetrapak\Projects\Legacy\_Data\_Capture\Legacy Arc project data\MapSheetName as a back-up in case an editing session is accidentally closed without points being uploaded. These points can then be retrieved from the file and uploaded into WAROX, without having to be recaptured.

## Updating data capture progress

Once the Warox\_2k.mdb file has been finalized and all possible samples reassigned to new Site IDs in the Excel spreadsheet, the Specialist, Database Geologist will update the Excel spreadsheet [V:\GS53\\_Tetrapak\Admin\Legacy\\_stuff\Legacy\\_point\\_capture\\_progress.xls](#) and the ArcMap project [V:\GS53\\_Tetrapak\Admin\Legacy\\_stuff\Legacy\\_points & Notes\\_progress\\_WA.mxd](#). Both the spreadsheet and project will then show the current status of legacy data capture, with entries classified as to whether sites have been uploaded into WAROX or are awaiting checks prior to upload.

## Sending a summary of marked photos to the library

The library catalogue for Mineral House (OLIB) contains records relating to aerial photographs, including details on which runs and photos are held by the library, which photos are missing, what year the photographs were flown, and if the photos are available to borrow. What the catalogue does *not* contain are details of whether a set of photos were used during regional mapping or not, and if they were, who generated the field sites. Thus, it is commonly unclear which set of photographs are of greatest interest for any given map sheet. In order to reduce the number of unnecessary photo requests, a template has been devised in which a summary of the originators and marked photos can be sent to the library when an ArcMap project has been completed. This will then be entered by Library staff into the “notes” field in OLIB.

The template in question can be located using the following link: [V:\GS53\\_Tetrapak\Projects\Legacy\\_Data\\_Capture\Legacy\\_Documentation\template\\_AirPhotos\\_Fieldsites.doc](#). Open this document, select “Save As”, and save a copy with a name like ‘AirphotosNameyyyy\_forOLIB’ into the ArcMap project folder just completed. In the template, the “Sheet name etc.” should include the name, year, and type of photography (for example, ‘CAF’ or ‘WA’). Then enter the surnames of the geologists who created field sites on the photo set, and numbers of the marked photos arranged by run. There is no need to list missing or unmarked photos (except where a whole run is unmarked), nor mention all marked photos individually. For example, rather than recording ‘Run 1: 5024, 5026, 5028, 5030, 5032, 5034, 5040’, the more concise ‘Run 1: 5024–5034, 5040’ can be used.

When the template is complete, attach the file to an email, and send it to the Reference Librarian, who will upload the new details into OLIB.

## Possible point capture complications

This section attempts to offer solutions to some of the most common problems encountered during field site capture. As it cannot cover all eventualities, the best solution is to approach the responsible Project Manager or Terrane Custodian if in doubt — this may save you considerable time and effort in the long run!

## **Duplicate field site numbers**

There are two main sources of duplicate field site numbers: accidental duplication, typically on different photographs; and the practice of systematically repeating point labelling (1, 2, 3, etc.) on each marked photograph. For the latter case, see the section 'Documentation of aerial photographs and Site IDs' on page 3.

## **Different locations for the same field site number**

Many traverses in the field cover more than one photograph, and it was common practice when moving from one photograph to the next to mark a point near the edge on both photographs. However, on occasion, the points were inadvertently marked in somewhat different locations. No general guide can be given as to which point is correctly located; the best approach is to speak with the responsible Project Manager, who may be able to identify the correctly located point from information in the field notebooks, or by some other means.

More rarely, field site numbers from the same originator may have been marked in different locations on different sets of photographs. If this occurs systematically, then the value of the subsequent observations and data are compromised, and the sites probably should not be captured. Again, speak with the responsible Project Manager for a solution.

## **Field site numbers with no originator**

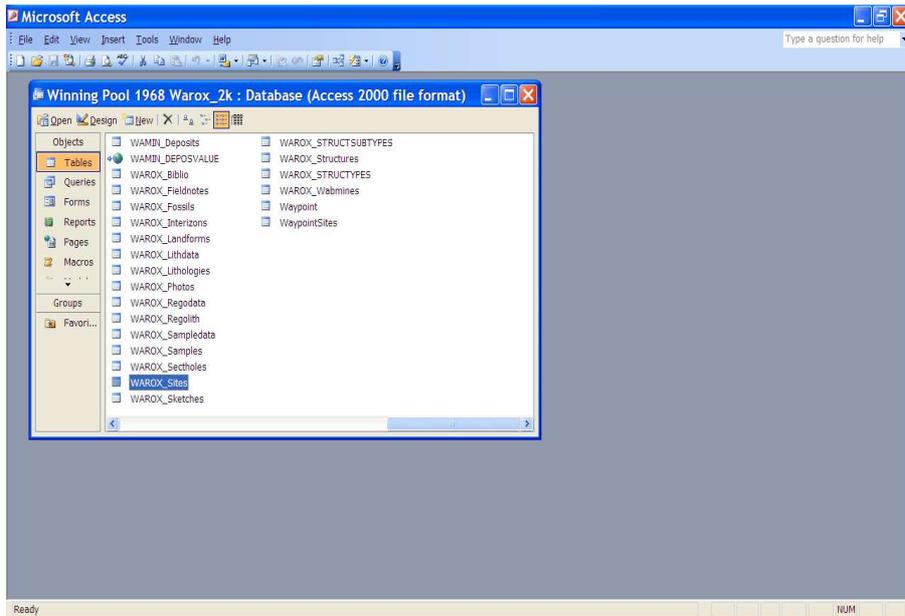
If the originator cannot be identified, there is no way of relating any observations or data to the location, and the points should not be entered. However, the points should still be noted in the *Marked\_Photos.xls* spreadsheet for future reference.

## **Field sites marked with a number and letter(s)**

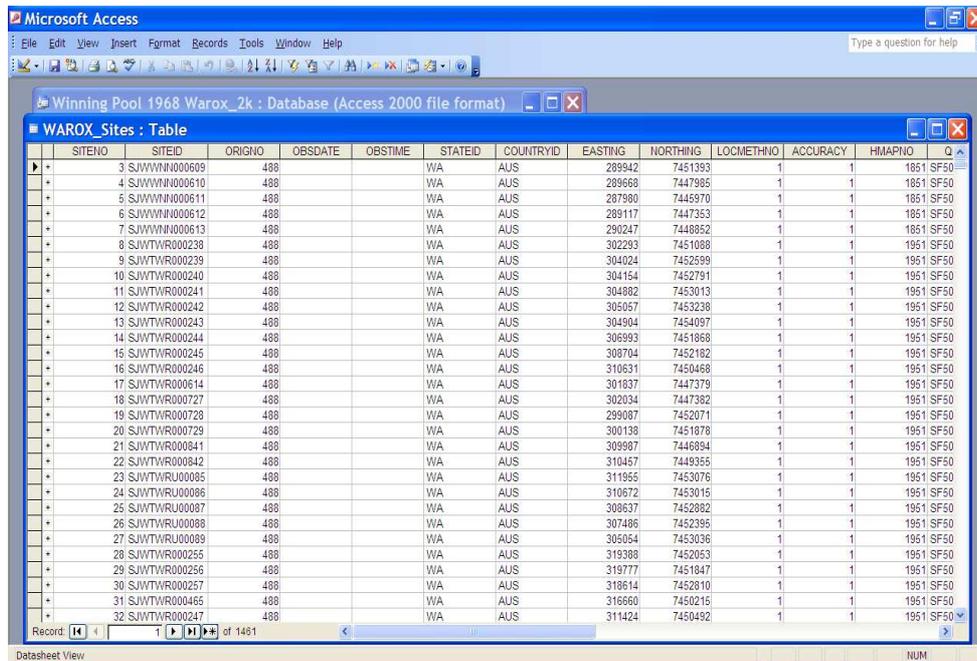
In some instances, geologists have marked points with combinations of numbers and letter(s): for example, 4133A, 4133B. As the Warox Tool in ArcMap conforms to the data entry constraints of the WAROX database, letters cannot be part of the numeric component of the Site ID or the points will not load into the *Warox\_2k.mdb* file.

As an example, Site IDs marked on an aerial photograph as "500", "500A", and "500B" for originator "ABC" on the "XYZ" 1:100 000 sheet could be entered into ArcMap as "ABCXYZ000500", "ABCXYZ100500", and "ABCXYZ200500", respectively. The *Warox\_2k.mdb* file (in *V:\GS53\_Tetrapak\Projects\Legacy\_Data\_Capture\MapSheetName*) must be then opened, and the Site IDs "ABCXYZ100500" and "ABCXYZ200500" changed to "ABCXYZ00500A" and "ABCXYZ00500B". It is important to keep a list of the original and new Site IDs of any sites to be changed on a notepad or spreadsheet.

To edit a Site ID, double click on the relevant *Warox\_2k.mdb* file:



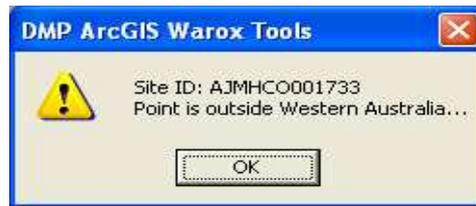
And then double click on the “WAROX\_Sites” table to bring up the table of Site IDs.



The Site IDs of interest can now be located and edited. When the editing is complete, click on “Save”, and then close the file.

## Field sites outside of Western Australia

The WAROX ArcMap tool will only accept field sites with coordinates within Western Australia. If a field site plots outside of Western Australia, the following message will appear when the editing session is closed:



In this case, the field site in question will still appear in ArcMap, but will not load into the database file. The coordinates for these field sites will need to be loaded manually into the project's Warox\_2k.mdb file; to do this, see the relevant Project Manager.

## Deleting field sites

If a field site needs to be deleted for any reason, make a note of the site number. After the editing session has been closed, and the points uploaded to Warox\_2k.mdb, this database can be accessed as described in the section above ('Field sites marked with a number and letter(s)'), and the point deleted from the "WAROX\_Sites" table.

# Entry of field observations into WAROX

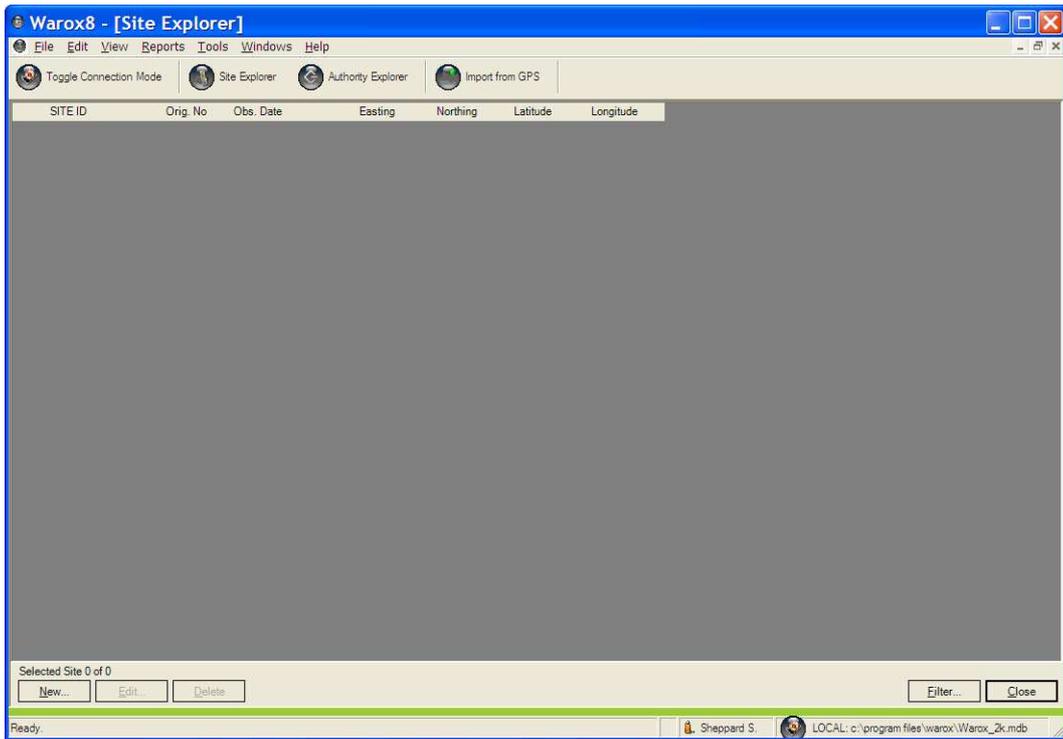
## Field observations

The data entry component of the legacy data capture process involves extracting field notes, lithologies, and structures from the field notebooks; obtaining details of the sample type and purpose from sample ticket books (if entered); and the addition of any associated petrographic descriptions.

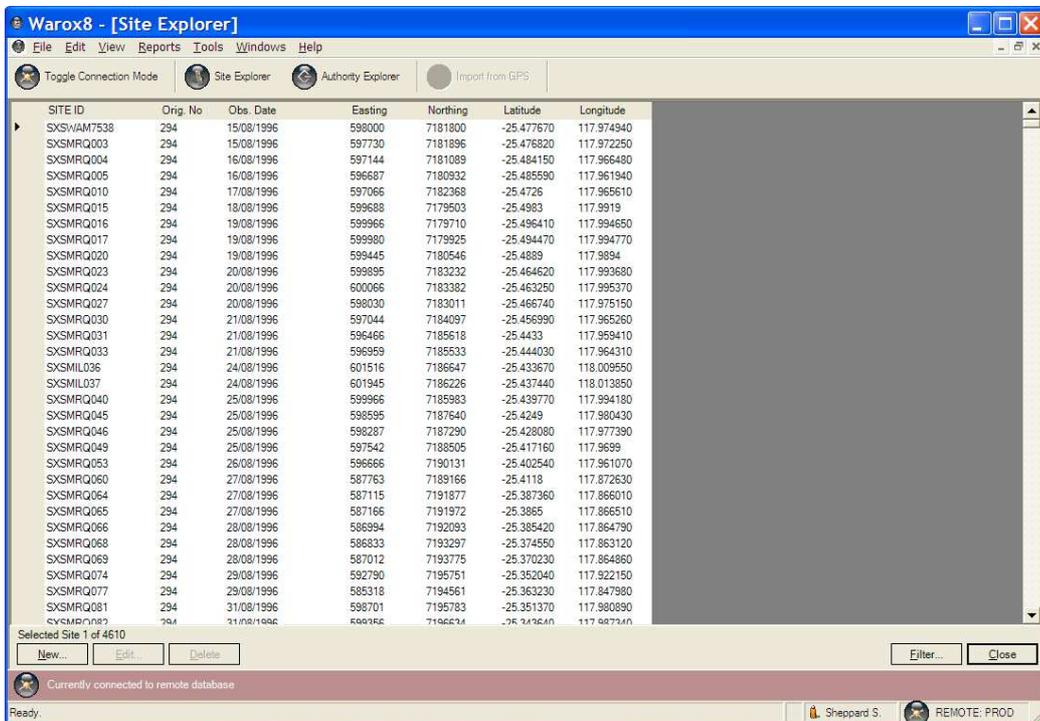
The following is intended as a general guide only, as it is not possible to cover all possible problems or ambiguities in converting field observations, which may contain invalid or antiquated terminology, incomplete descriptions, ambiguous structural measurements, or obscure abbreviations, into the standardized terms or names controlled by drop-down lists in WAROX. If in doubt, approach the relevant Project Manager or Terrane Custodian for guidance.

## Field notes, lithologies, and structures

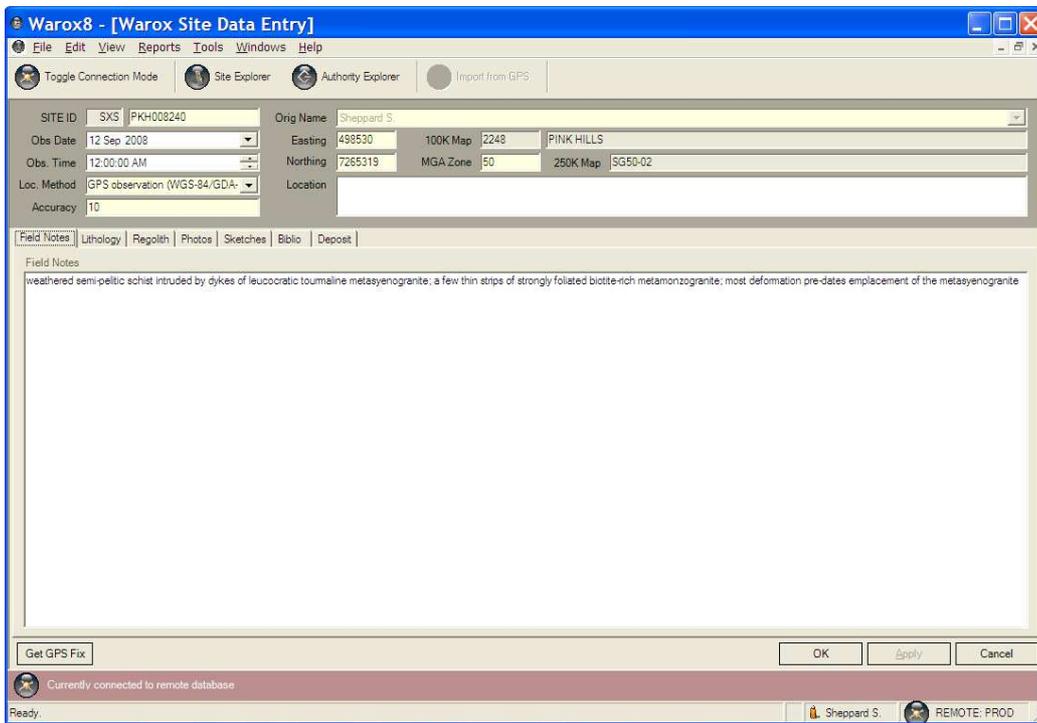
There are two modes of WAROX operation: one that writes data to a Warox\_2k.mdb file on the C:\ drive, and a second that writes data to the Oracle version on the network. In order to be able to enter data into the Oracle version, the local Warox\_2k.mdb file must be empty. If it is empty, then the following screen will appear after the "Warox8" icon on the desktop is double clicked:



The green bar along the bottom of the window indicates that the database is in local mode. To connect to the Oracle version, click on the “Toggle Connection Mode” button at the top of your screen, and enter your Username and Password. If successful, a similar screen with a list of Site IDs from the default originator will appear, but with a red bar along the bottom of the screen and the text “Currently connected to remote database”:



The rows of data can be arranged in ascending or descending order for any of the fields on screen by clicking on the relevant field header. In addition, the list of sites can be filtered according to different search criteria by clicking on the “Filter” button (bottom of screen). Once the Site ID of interest has been located in WAROX, double click on the record to start entering data from the field notebook. The following screen will appear:

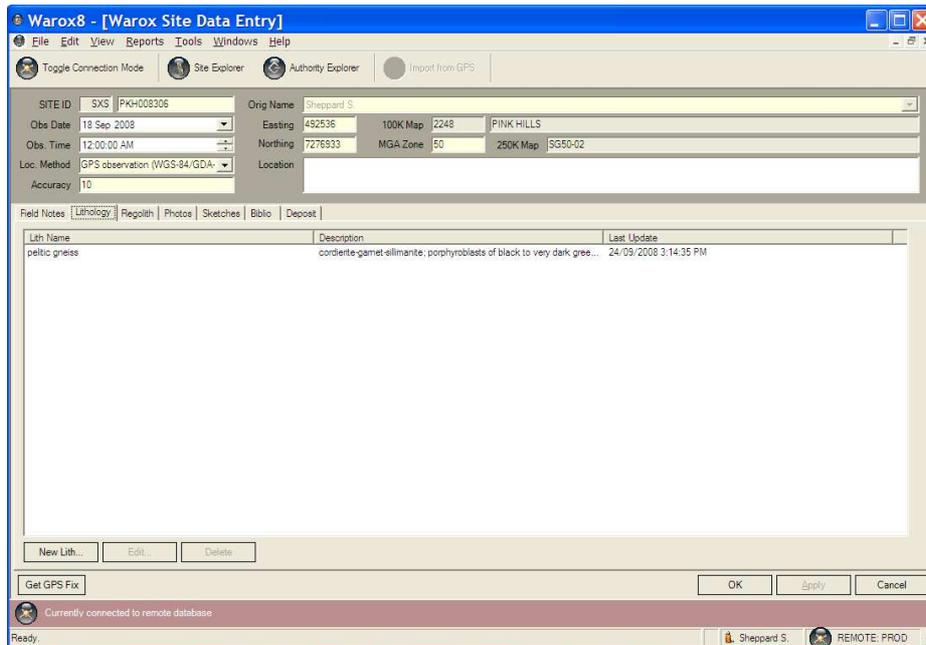


Currently, WAROX does not automatically record the operator who entered the field observations, only the originator who made the observations. As such, the person doing the data entry should put a statement, such as ‘Entered by...’, into the “Location” field.

The main tabs of interest on the main screen are “Field Notes” and “Lithology”. Most legacy sites will not contain associated photographs; for those that do, consult the relevant Project Manager or Terrane Custodian. The “Field Notes” tab should contain overall impressions of the area, range and distribution of rock types, and relationships between rock types. It should not contain detailed descriptions of the individual rock types — this information should be placed in the “Lithology” tab. All words and phrases should be typed out in full; avoid retyping acronyms or abbreviations used in the field notebooks.

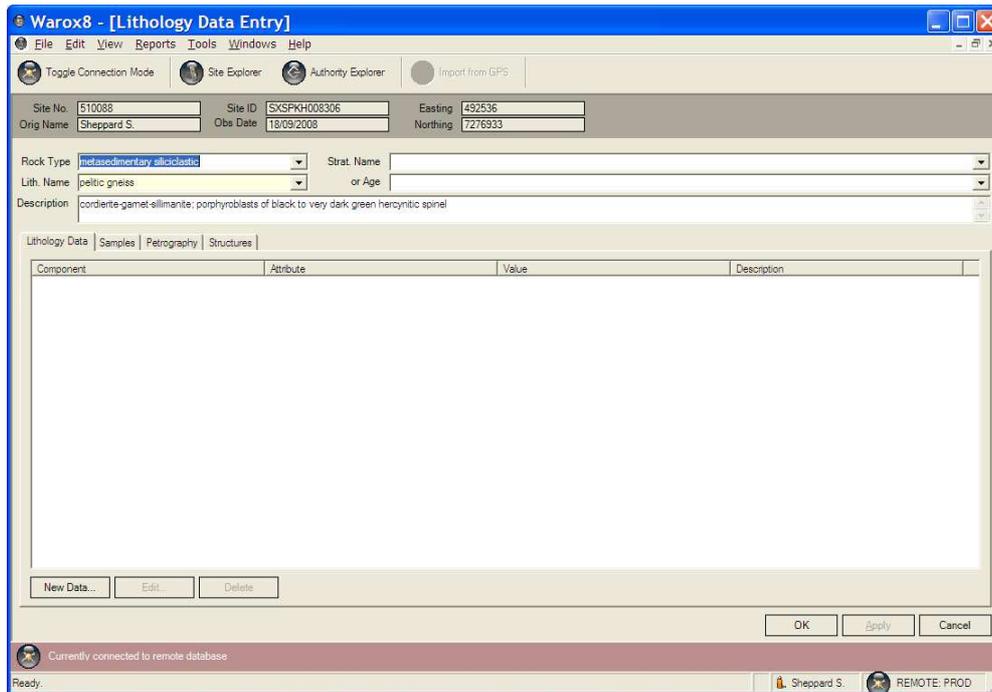
Although the “Field Notes” field contains free text, and invalid or superseded terms, such as adamellite, can be inadvertently entered, the “Lithology” field is controlled by drop-down lists restricted to IUGS terms, such as monzogranite.

Lithologies are mandatory if structural measurements and sample information are to be entered, as these ‘hang off’ a lithology in WAROX. To enter a new lithology, click on the “Lithology” tab, and then the “New Lith...” button near the bottom left of screen:



Permissible lithologies are controlled by two drop-down lists, “Rock Type” and “Lith. Name”. A lithology can either be selected directly from the list in “Lith. Name”, in which case the “Rock Type” is automatically completed; or a “Rock Type” can be selected first, which then filters the list of related lithologies in the “Lith. Name” menu. It is possible to enter the same broad rock type in a number of ways, depending on how much information can be gleaned from the entry in the notebook. For example, a schist containing mainly quartz and mica could be entered with a “Lith. Name” of “schist”, “micaceous schist” or “quartz-mica schist” (“Rock Type” = “metamorphic protolith unknown”), “felsic schist derived from volcanic rock” (“Rock Type” = “meta-igneous felsic volcanic”), “granitic schist” (“Rock Type” = “meta-igneous felsic intrusive”), or “pelitic schist”, “semi-pelitic schist” or “siliciclastic schist” (“Rock Type” = “metasedimentary siliciclastic”) depending on the context and completeness of the observation in the field notebook. A “Rock Type” of “metamorphic protolith unknown” conveys much less information than the alternatives, and is probably best not used if there is an observation or inference that points to a more specific “Rock Type”.

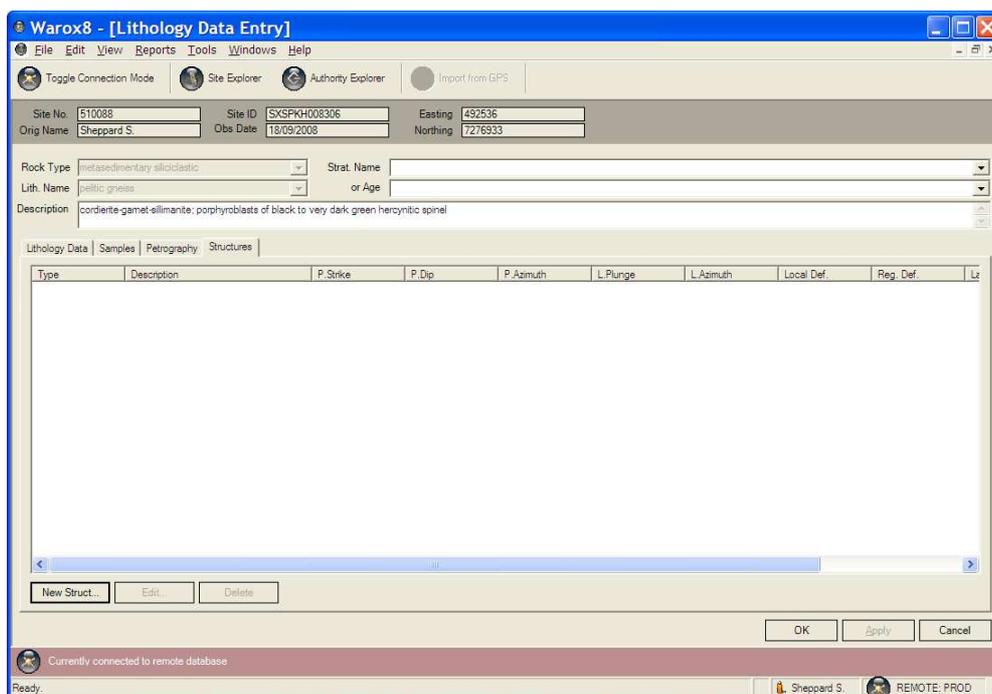
Observations relating to features such as texture and grain size, can be entered into the free-text “Description” field, as shown in the example below.



However, observations relating to the lithology can also be placed into searchable drop-down lists using the “New Data” button near the bottom left of screen. The advantage to this approach is that attributes such as metamorphic assemblages or key minerals can be searched and extracted from WAROX, and then placed into ArcMap for the construction of, for example, metamorphic index maps. This is particularly useful when petrographic descriptions have been made, and the identification of fine-grained or metamorphic minerals is more certain.

The “New Data” button remains greyed out until the “Apply” button, located near the bottom right of screen, is selected. The “Apply” button must also be clicked before the “Samples”, “Petrography”, and “Structures” tabs become active.

To enter a new structure, select the “Structures” tab, and then select the “New Struct...” button near the bottom left corner of the screen:



The following window is displayed:

Structure Data Entry

Site No: 510088    SITE ID: SXSPKH008306    Easting: 492536  
Orig Name: Sheppard S.    Obs Date: 18/09/2008    Northing: 7276933

Type: [ ]    Description: [ ]    Polarity: [ ]    True Azimuth: [ ]  
Log Plot Code: [ ]    LocalDef: [ ]    RegDef: [ ]  
 Plot100K     Plot250K

Planar features: Strike [ ], Dip [ ], Azimuth [ ]  
Linear features: Plunge [ ], Azimuth [ ]

Comments: [ ]

OK    Apply    Cancel

The structure can then be entered either by selecting an option first from the “Type” drop-down list and then from the “Description” list, or by using the complete drop-down list in “Description”, in which case “Type” will be completed automatically. Depending on the type of structure, the “Planar features” or “Linear features” areas will be greyed out to prevent the accidental population of the “Linear features” field for planar structures, or information on lineations being entered in the “Planar features” field. Note that when features such as “Bedding; vertical” or “Cleavage; vertical” are entered, a value of ‘90’ *must* be entered into the “Dip” field.

The “LocalDef” and “RegDef” fields on the right-hand side of the window are controlled by drop-down lists. The “LocalDef” field, which records the type and generation of local deformations and structures (e.g. F1, L1, S1), can be completed from the notebooks, but the “RegDef” field, which assigns a deformation to an orogenic event, should be left blank as a rule. It is best to uncheck the “Plot100K” box, although the “Plot250K” box can be left in its default setting.

## Sample numbers

To enter or edit sample details for a particular site, select the “Lithology” tab, click on a “Lith. Name”, and click on the “Edit” button from near the bottom left corner of the screen.

Warox8 - [Warox Site Data Entry]

File Edit View Reports Tools Windows Help

Toggle Connection Mode    Site Explorer    Authority Explorer    Import from GPS

SITE ID: SXSPKH008306    Orig Name: Sheppard S.  
Obs Date: 18 Sep 2008    Easting: 492536    100K Map: 2248    PINK HILLS  
Obs. Time: 12:00:00 AM    Northing: 7276933    MGA Zone: 50    250K Map: SG50-02  
Loc. Method: GPS observation (WGS-84/GDA)    Location: [ ]  
Accuracy: 10

Field Notes    Lithology    Regolith    Photos    Sketches    Biblio    Deposit

Lith Name	Description	Last Update
Pelitic gneiss	cordierite-garnet-sillimanite, porphyroblasts of black to very dark gree...	24/09/2008 3:14:35 PM

New Lith...    Edit...    Delete

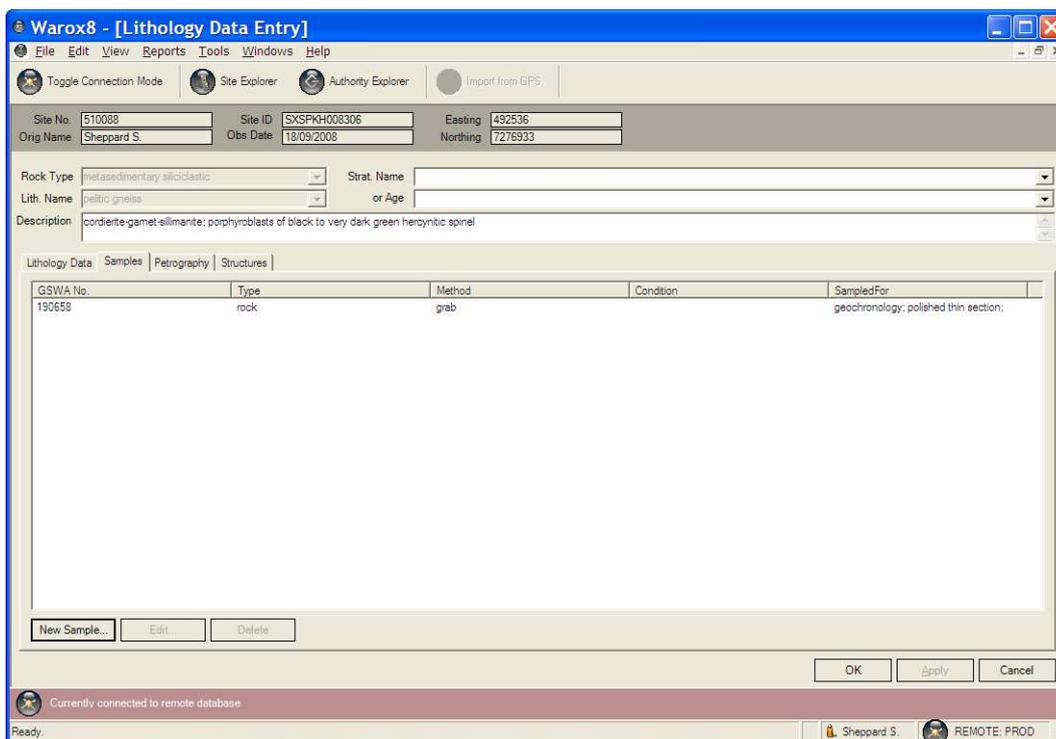
Get GPS Fix

OK    Apply    Cancel

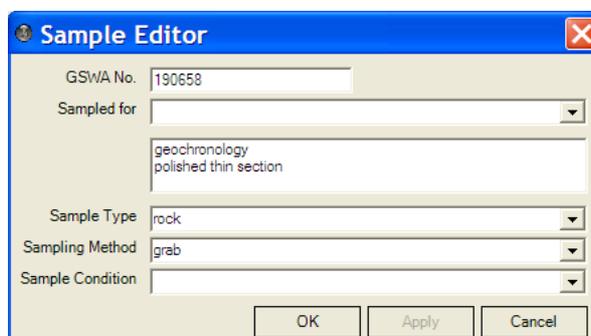
Currently connected to remote database

Ready    Sheppard S.    REMOTE: PROD

On the next screen, click on the “Samples” tab, highlight the “GSWA No.,” and again click the “Edit” button near the bottom left corner of the screen:



This will bring up the following window:

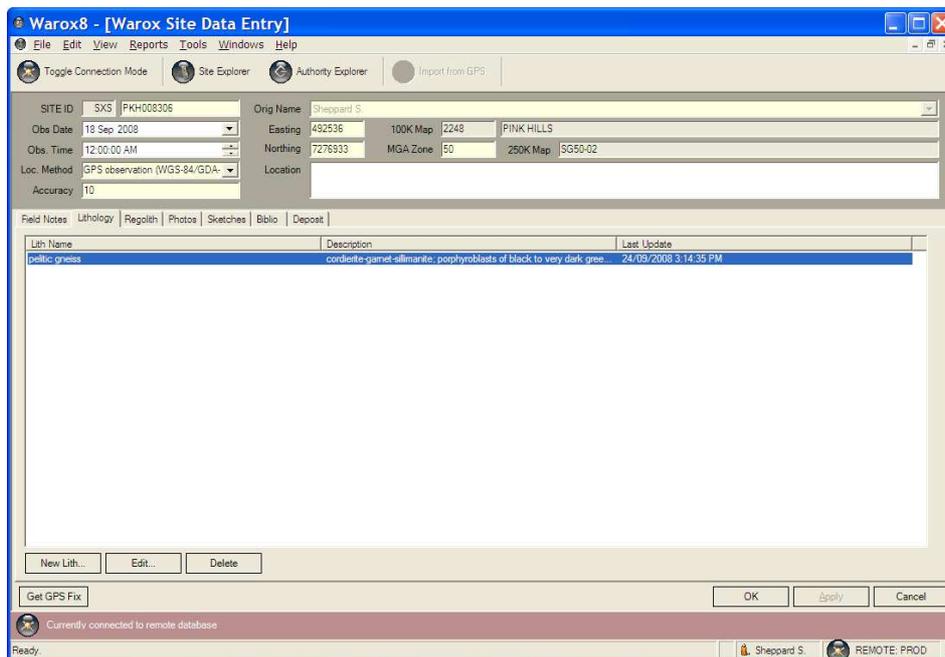


The GSWA sample number is displayed at the top of the box and should be checked for correctness. If the reasons for sampling are known, then one or more options can be selected from the drop-down list next to “Sampled for”; the “Sample Type”, “Sampling Method” and “Sample Condition” can also be entered in this screen.

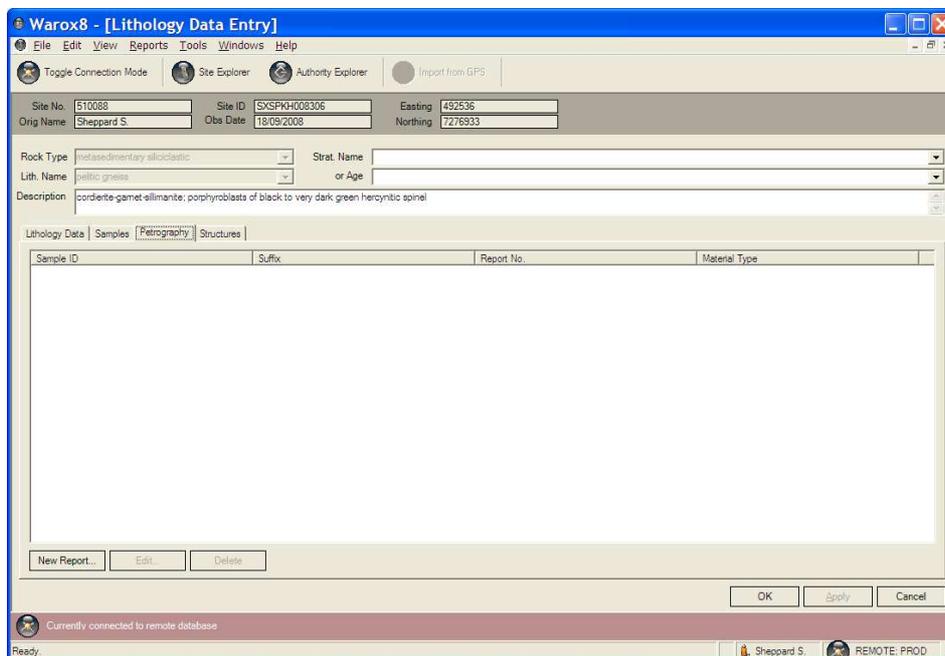
## Petrographic descriptions

Most of the older GSWA sample numbers for which there are thin sections also have petrographic descriptions. Report numbers can be linked to a GSWA sample number using SmartQuery (again, see the relevant Project Manager for help with this application); the relevant reports, which have been scanned as PDFs, can then be selected from <V:\ProductArchive\PUBLICATIONS\Petrology Reports>. Text from the reports can be copied and pasted into WAROX as follows.

Under the “Lithology” tab, highlight the lithology for which you wish to enter the petrographic description, and click the “Edit” button:



Select the “Petrography” tab, and click on the “New Report” button:



Select the correct “Sample ID” from the drop-down list, enter the “Report No.”, and select the “Material Type” from the drop-down list.

The screenshot shows a dialog box titled "New Pet. Sample Data Entry". It contains the following fields and controls:

- Sample ID:** A dropdown menu.
- Report No:** A text input field.
- Material Type:** A dropdown menu.
- Petrography Descriptions:** A table with columns: ID, Originator, Description, and FinalName. The table is currently empty.
- Buttons:** "New Desc...", "Edit...", and "Delete" are located below the table. "OK", "Apply", and "Cancel" are at the bottom of the dialog.

Click on "Apply" to enable the selection of the "New Desc..." button. In the window that subsequently appears, select the "Petrographer" from the drop-down list, paste the thin section description into the "Description" field, and enter the final rock name into the "Final Name" field.

The screenshot shows a dialog box titled "New Pet. Description Data Entry". It contains the following fields and controls:

- Petrographer:** A dropdown menu with "Sheppard S." selected.
- Description:** A large text area for entering the thin section description.
- Final Name:** A text input field for the final rock name.
- Buttons:** "OK", "Apply", and "Cancel" are located at the bottom of the dialog.

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