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GanFeld User Guide: A Map-Based Field Data Capture System for Geoscientists

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GANFELD USER GUIDE: A MAP-BASED FIELD DATA CAPTURE SYSTEM FOR GEOSCIENTISTS

TGI-3 CORDILLERA (FOR GANFELD VERSION 2008.0)

Kazuharu Shimamura, Stephen P. Williams, and Guy Buller
26 November 2008

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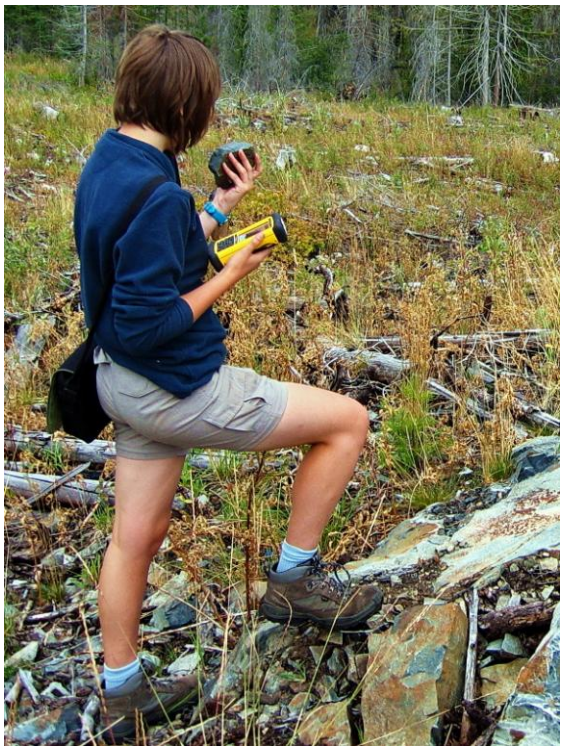
INTRODUCTION

Handheld computers are more powerful, mobile, and affordable than devices of just a few years ago. Specifically, Windows Mobile devices (handheld device running Microsoft Windows Mobile operating system) are now an economical and portable option for geoscientists to consider when digital field data are required. The same trend is seen with Global Positioning System (GPS) technology with respect to size and price. In fact, there are some Windows Mobile devices with GPS built-in.



The software gives the device its purpose. Geographic Information System (GIS) software is another technology that is available to the geoscientist for their Windows Mobile device to input, display, and query field data collected as digital map layers. The convergence of technologies in hardware and software has made it into the consumer market and there are now many options for geoscientists to choose the right tool to fit their needs and budget.

Field work in Canada is expensive and the time to do the field work may be short and weather dependant. For that reason, geoscientists are always trying to find innovative and efficient methods for complete and accurate field data entry because the opportunity to revisit an area may not be an option. **GanFeld** is one solution developed at the Geological Survey of Canada (GSC) to help geoscientists collect digital field data. Collecting field data digitally with GanFeld provides many benefits for the geoscientists including:

- saving time and money with digital data entry done on-site
- easy to use graphical interface with data entry forms and pick-lists
- systematic collection of data for completeness
- consistent semantics of geologic terms
- automatic and accurate location input with a GPS
- map-based interface for easy visualization of data
- easy data sharing with other geoscientists
- ease of data import into other GIS systems to build geologic maps

There are some challenges to consider:

- Significant change for many geoscientists, especially for those new to this technology and have used paper and pen exclusively in the past and will require an investment in time to learn the hardware and software
- Rigidity of forms-based data input
- Initial costs are relatively expensive compared to paper and pen but not if your project require digital field data
- GIS expertise may not be available to create customized reference maps for GanFeld
- If further customization of GanFeld is needed then programming knowledge of VBScript or Jscript scripting language, and the ArcPad object model is required.

If you are new to digital mapping technology, plan to learn this new tool one step at a time and consider practicing using GanFeld before you arrive in the field. If you are completely new to mobile technology then expect a learning curve, but this documentation will help accelerate your learning. Getting comfortable using the hardware and software technology is the key to using GanFeld efficiently and accurately. From our experiences gained from working on previous field projects, the best implementation of GanFeld involves planning and training among your field party members well before the field season commences. We hope that using GanFeld will help you meet the objective of your next mapping project.

WHAT IS GANFELD?

*"**Gan**" means **traverse/march/walk** and "**Feld**" translates to **field** in Old English.**

*Source: http://www.websters-online-dictionary.org/translation/Old+english/

The capture of data digitally in the field is not a new concept for the GSC with the development of GanFeld. In fact, this has been done since 1991 with the development of the Fieldlog application (Brodaric 1997) and the use of the early handheld computer (Struik et al 1991; Broome 1993). For most GSC geoscientists, Fieldlog was the first introduction to collecting field data in a relational database with a mapping component through AutoCAD. Using Fieldlog was an excellent introduction for many geoscientists on how to abstract the field activities into a relational database. Since then, development of digital field data capture has been an ongoing activity, evolving with the changing technologies, and GanFeld is currently one tool available for geoscientists.

GanFeld is a map-based field data capture application for geoscientist incorporating customization of commercial GIS software called ArcPad by Environmental Systems Research Institute, Inc. (ESRI). Customizing an off-the-shelf product such as ArcPad saved time and money and enables support for the widely accepted ESRI shapefile format for maximum data portability to other GIS systems.

The GSC is not alone in developing digital field data capture systems. Doug Irwin with the Northwest Territories Geoscience Office has implemented ArcPad for their bedrock mapping crew (Irwin 2003). Evan Thoms of the United States Geological Survey has created an application called GDA (Geologic Data Assistant) built on ArcPad (Thoms 2006). Currently, GanFeld is being piloted in other provincial and territorial geological surveys including British Columbia, Manitoba, Saskatchewan, Ontario, and Yukon. In addition, individual consultants and private exploration companies are using GanFeld for their field work.

For Microsoft Windows users, GanFeld looks similar to a typical desktop version of a Windows application that includes toolbars, buttons, and data entry forms. GanFeld enables geoscientist to use a GPS to mark and describe the location of a site of interest in a form of point features on a digital map. In addition, GanFeld enables the user to enter data about the general site, rocks, samples, structural measurements, and photographs. GanFeld utilizes buttons and drop-down lists for quick data entry, thus minimizing the amount of typing and errors. In addition, GanFeld has the flexibility to allow geoscientists to enter in notes to capture free-form thoughts and other information that may not fit in the database format.

GANFELD REQUIREMENTS

To get started you will need to acquire the software and hardware, digital base maps, and the developers time if further customization is required. Purchases include ArcPad from ESRI, a Windows Mobile device and a GPS that meet the hardware requirements of ArcPad. Follow the recommendations provided by ESRI in their user manual. Base maps are needed for visual reference and can provide additional information for the geoscientist in the field (e.g., a mineral deposits or geophysical layer).

SOFTWARE

ArcPad is a mobile GIS software designed to run on both Windows desktop computers and mobile devices running Windows Mobile operating system. This flexibility provides geoscientists with a wide range of choices to suite a variety of needs and preferences. ArcPad was our choice because

1. Saved time and money with off-the-shelf solution with customization capabilities.
2. GIS staff at the GSC use ESRI ArcGIS, thus integration of existing data layers is easier, especially integration of existing base maps.
3. ArcPad file format is the widely used shapefiles.
4. Permits a view of raster and vector map layers.
5. Support for GPS and laser range finder is built in.
6. ArcPad supports common map projections and datums.
7. Geoscientists can use ArcPad to navigate to a destination with the GPS and an accurate base map layer.
8. Point, line and polygon features may be input with a GPS or directly on the display screen.
9. Customize using VBScript or Jscript to create a more focused and specialized application within ArcPad for field data entry.

ArcPad has scripting capability through VBScript or Jscript language. VBScript is used to create GanFeld so ArcPad is a more specialized tool for geologic field data capture. For further customization of GanFeld, we recommend the purchase of ArcPad Application Builder because documentation for the ArcPad object model is not available unless you purchase ArcPad Application Builder. Additionally, ArcPad Application Builder does save some time building the user interface and, as well as, providing sample code snippets.

Microsoft ActiveSync should also be installed on your computer to setup ArcPad on your Windows Mobile device and may be used to synchronize your GanFeld field data from your mobile device back to your computer.

Software checklist:

- ✓ Install and setup Microsoft ActiveSync (included with the purchase of a Windows Mobile device)
- ✓ Purchase and install ArcPad
- ✓ Setup Bluetooth wireless connection between the external GPS and Windows Mobile device
- ✓ Install GanFeld
- ✓ Learn how to use GanFeld
- ✓ Pre-field work check on interoperability of hardware and GanFeld

HARDWARE

MOBILE COMPUTER

Growth in the use of handheld devices in the workplace follows the ever decreasing cost of hardware and increasing processing power and capabilities. ArcPad will run on handheld devices using the Microsoft Windows Mobile operating system including Windows Mobile 2003, Windows Mobile 5, and Windows Mobile 6. For geoscientists this is a great time to get started with GanFeld because the costs are relatively affordable and there are many Windows mobile devices to choose from depending on their needs and preferences.

Other mobile computers include notebook PC, Ultra Mobile PC (UMPC), and tablet PC. However, Windows Mobile devices have many attributes that a mapping geoscientist would prefer, and they include the following:

1. **Portable**
   Most Windows Mobile devices are handheld size and have display screens with a resolution that is commonly 240 x 320 pixels. Though Windows Mobile devices are lighter and more portable than a notebook PC, the obvious disadvantage is that the screen size is quite small.
2. **Solid State**
   Windows Mobile devices have no moving parts, i.e., no hard disk drive (HDD) because the Windows Mobile operating system is embedded in read-only memory (ROM) and is thus more rugged than computers with HDD that can fail.
3. **Instant On**
   With a Windows Mobile device, the power button turns off the Windows Mobile device (actually place it in a sleep mode), and allows you to resume work where you left off when turned back on.

4. **Affordable**
   Prices of Windows Mobile devices vary with respect to their functionality and intended use, but most consumer-grade devices are around $500. Rugged versions of Windows Mobile devices are available, and more adapted to field work but are much more expensive ($1,000 to $3000).
5. **Familiar Windows Interface**
   Windows Mobile for Windows Mobile device has the same "look" but a different "feel" compared to the desktop version of Windows. Windows Mobile devices have the familiar "start" menu and icons of a desktop Windows PC, but most applications for the mobile devices are trimmed of familiar features and tools. As well, the use of a stylus on the touch sensitive screen replaces a full-size keyboard and mouse.
6. **Technological Convergence**
   One trend in mobile computer devices such as the Windows Mobile device is having one device that replaces many devices. There are Windows Mobile devices that go beyond the functionality of a personal digital assistant of managing appointments and personal contacts. Specialized microchips are getting smaller and Windows Mobile device makers are creating all-in-one devices. There are Windows Mobile devices with wireless phone capabilities, wireless network adapter for internet and e-mail, built-in GPS for personal navigation, and faster processors to view movies and listen to music.

General consideration in choosing a device:

1. Rugged device versus a consumer grade device – costs are significantly higher for rugged devices which may cost three times as much as a consumer grade device, however rugged devices are designed to be used in bright sun-lit areas, typically have longer lasting batteries, are weather resistant, and withstand numerous drops.
2. Handheld operating system should be Windows Mobile 2003, 2003 Second Edition, Windows Mobile 5.0, Windows Mobile 6.0 or later with 64MB of RAM, but check ESRI ArcPad user manual for the latest requirements.
3. Chose Windows Mobile devices with ARM-based processor including Intel XScale, Samsung processor, and Texas Instrument OMAP.

4. Look for transflective (TFT) screen which is better in bright sunlight, but test in the shade and direct sun light before buying.
5. Battery life may vary from one device to another thus consider carrying additional batteries with you in the field, or a portable charger.
6. Verify if the device has a built-in GPS or includes wireless Bluetooth capability to wirelessly connect to an external Bluetooth GPS.

GPS

There are many GPS devices to choose from and the choice depends on the intended accuracy required for the type of field work. The use of consumer grade GPS receiver with accuracy around 10 m to 20 m is adequate for most mapping at scales between 1:50,000 to 1:250,000. If more accuracy is required then consider a GPS that is Wide Area Augmentation System (WAAS) enabled, or a GPS that enables logging of GPS data for post-processing. Typically, the cost of a GPS receiver increases with improved accuracy.

GPS considerations:

1. GPS receiver that supports one of the following protocols accepted by ArcPad:
    a. National Marine Electronics Association (NMEA) 0183
    b. Trimble Standard Interface Protocol (TSIP)
    c. DeLorme Earthmate binary protocol
    d. SiRF binary protocol
    e. Rockwell Precision Lightweight GPS Receiver (PLGR) GPS binary protocol
2. External or internal GPS? If equipment loss in the field is likely, choose a Windows Mobile device with a built-in GPS, because most external GPS are smaller than a deck of cards and an internal GPS is much easier to setup than an external GPS.
3. Greater accuracy requirements (< 3 m accuracy) requires high priced GPS receivers, however a consumer grade GPS is more than adequate for regional mapping with mapping scales smaller than 1:50,000.

Hardware checklist:

- ✓ 2GB or greater Flash memory cards for your Windows Mobile device for daily backups, e.g. Secure Digital Card (SD Card) or a Compact Flash Card (CF Card), or other types but check the specifications of your mobile device before purchasing flash memory cards.
- ✓ Protective case for business-grade Windows Mobile devices and screen protector, such as an aluminum case or a ruggedized case such as the OtterBox however most geoscientists have found them quite bulky.
- ✓ Get protective case for external GPS that can attach to either you or a backpack to prevent loss or damage.
- ✓ Extra batteries for both Windows Mobile device and GPS, or carry a portable charger such as the Powerstick by Ecosol.
- ✓ Notebook PC to synchronize/copy data in base camp.
- ✓ Highly recommend having a spare Windows Mobile device and GPS at base camp just in case you or one of your field crew loses or damages a device, especially if you are located in a remote area and replacing a device would be very difficult and time-consuming to ship a new replacement.

BASE MAPS

Adding a base map to GanFeld gives the geoscientists another set of tools to locate themselves or navigate to an area of interest based on various thematic map layers. There are many GIS thematic layers, including topographic, satellite imagery, and geophysical layers, available on the internet and most are compatible with ArcPad. Please see the Appendix: Where to get base maps for free GIS data.

Base Maps checklist:

- ✓ Gather as much GIS based information such as topographic layers, existing geology, satellite imagery, geophysical, or geochemical layers that will be useful as a map reference for you field work.
- ✓ Copy the base map layer files that are compatible with ArcPad to your device's storage card.

PEOPLE AND PROCESS

This last requirement, training of personnel, is an important one and will determine the success of GanFeld in the mapping project. For some, just the thought of a digital field data capture system, such as GanFeld, is an uncomfortable consideration. Using GanFeld is a paradigm shift for most geoscientists with many years of field work experience using a notebook and pen. In the past, we have found that using GanFeld in the field without proper training and practice will likely lead to frustration with the user returning to what they are comfortable with, i.e. pen and notebook, which is ultimately counter-productive.

To facilitate the successful transition from notebook and pen to GanFeld requires a project leader initiate a discussion among project members and consider the following plan of action. First, introduce GanFeld to the users early in your project life cycle, i.e. before heading out in the field. This provides users an opportunity to become comfortable with the system in a non-critical situation. Second plan of action, as soon as the user is comfortable with the system, is to discuss any required changes to GanFeld database to meet your project's needs. These changes may range from simple edits to the list of geologic terms used for data input or the addition of specialized data input forms. Please note that you may need a GIS developer that knows Visual Basic for further customization depending on the level of changes required.

Developing a participatory approach among the field workers in the early stages of the project is crucial for the successful implementation of GanFeld. Geoscientists can use this pre-planning stage to discuss the common geologic glossaries they would like to use to describe their rocks and then provide the glossary list to the GanFeld developers to meet their specific requirements. This empowers the geoscientists so that they have control on how they would like to describe their geology and facilitates faster acceptance of the technologies.

Field data requirements that the end-users should verify:

- ✓ Are the fields that describe each of these activities adequate or is their a need to extend/add more fields?
- ✓ Determine the type of geologic glossary that will be used for your project.
- ✓ Are there other field activities that need to be added to GanFeld as a separate project layer and form?

GANFELD CONCEPTS - FIELD ACTIVITIES ABSTRACTED

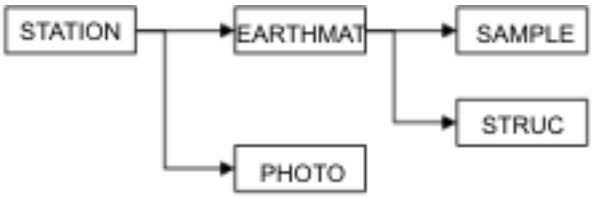
An important concept in GanFeld is the abstraction of field data gathering into defined themes by asking the question of what are the data types a geoscientist would collect in the field. These derive from field geoscientists describing their location, and rock attributes, taking samples, and/or measuring a structural feature are abstracted into separate shapefile map layers. Taking this modular approach in designing GanFeld with separate layers maximizes flexibility to expand GanFeld for the end user. Adding a new field activity is accomplished by adding a new layer, associated data entry form, and adding a button to the toolbar. A closer look at the GanFeld application illustrates the nature of the data types captured in GanFeld.

GANFELD MAP LAYERS

GanFeld data structure represents field data abstracted into map layers linked to point features on the map. Each map layer represents a discrete field data type and each layer is provided with an easy to use series of data entry forms. Here are the major GanFeld layers:

1. **STATION**: this layer is the starting point for any field observation and a station includes a description of the geographic location, date, general site information, and observation type.
2. **EARTHMAT**: once a STATION point is entered, then the geoscientist may describe as many earth materials (e.g. rock types) observed at this site and this layer would contain points that describe the rocks at this station location.
3. **SAMPLE**: samples may be entered for each EARTHMAT type described. You may not describe a sample until an earth material is described.
4. **STRUC** includes measured data such as structural measurements. Like SAMPLE, data for STRUC is related to EARTHMAT.
5. **PHOTO**: this layer is for entering captions for any photographs taken at that station.

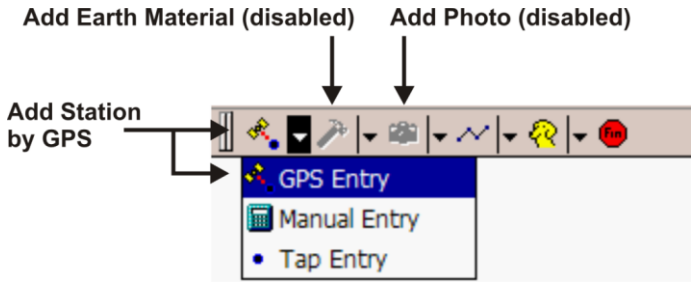
In GanFeld, the user must follow a workflow that always starts with the entering of station stop information. Field activities are related to one another in a parent-child relationship like a relational database. The diagram to the right illustrates the GanFeld relationship between the field data type map layers. For example, to enter data into the sample layer you must have the earth material described beforehand.



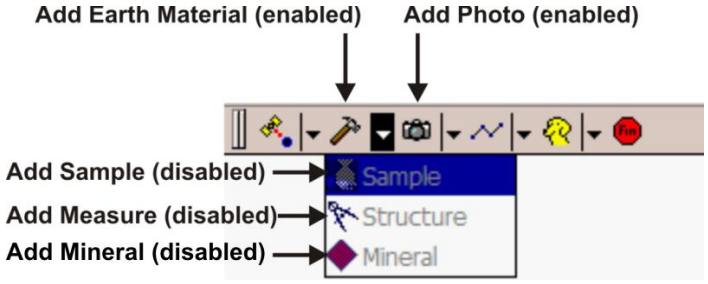
GANFELD TOOLBAR AND BUTTONS

GanFeld works within ArcPad represented by a toolbar that contains buttons (icons) specific for geologic field data collection (bottom row toolbar). Please read the ESRI documentation included with ArcPad, "ArcGIS 9: Using ArcPad" for detailed information about ArcPad default toolbars (top two: Main and Browse toolbar).

The buttons on the GanFeld toolbar represent field data types described previously. GanFeld follows a workflow moving from left to right and top to bottom along the toolbar and drop-down menu items. Field data capture always starts with the recording of the Station location using the "**GPS Entry**". Adding a new STATION is the starting point for a geoscientist to enter field data before describing data from the other field activities such as describing rocks (earth material) or entering samples.



Once a Station has been added then Earth Material and Photo buttons are enabled. However, Sample and Structure may not be added until an Earth Material is entered.



Summary of GanFeld toolbar buttons:

	Station - GPS entry	Add station to capture location information with GPS (recommended method)
	Station - Tap entry	Add station by user tapping on the screen to mark location, if GPS is not working
	Station - Manual entry	User manually enters in coordinates of the location to add station
	Earth Material	Allows user to describe one or many rocks at the current station
	Sample	Allows users to add samples for each rock described at the current station
	Structure	Add structural measurements for each rock described at the current station
	Mineral	Describe one or many minerals for each rock at the current station
	Photo	Add information for each photograph taken at the current station
	Mineralization	Add information about the mineralization affecting the rocks at the current station
	Alteration	Add information about the alteration affecting the rocks at the current station
	BioGeo	Add information about tree (bark and twig) samples taken at the current station
	Traverse	Summarize station stops as a grouped description in a line feature
	Linework	Sketch in a rough line feature such as a contact or a fault
	Fetch	User selects a previous station to edit or add new information
	End Session	Tap this to end the data collection session at the current site

USING GANFELD: STEP BY STEP

You are traversing along a ridge and you have come across an interesting outcrop and assess that this site is worth describing.

1. You take out your Windows Mobile device and turn on the external GPS attached to your pack and turn on your Windows Mobile device.
2. Start the Bluetooth application on your Windows Mobile device to read data wirelessly coming from your Bluetooth GPS (built-in GPS users go directly to step 3).
3. Once you have established a connection to the GPS then you can start ArcPad.
4. When ArcPad starts up, GanFeld will load the project setup form for you to select an existing GanFeld project or you may create a new project.
5. The GanFeld toolbar is loaded as soon as you have selected your project.
6. You then start your data collection by first locating your station stop through the GPS and from there the data collection begins.

This section will provide you with more detailed instructions on using GanFeld in the field. It is recommended that you understand how the GanFeld workflow is structured. The previous section "GanFeld Concepts" describes how the field data types and GanFeld data structure are related to one another.

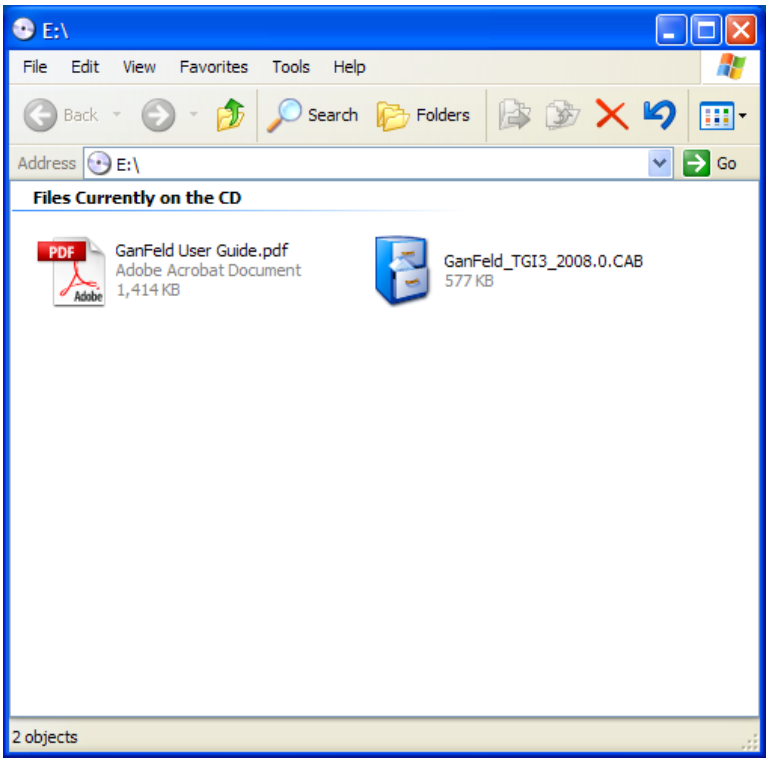
INSTALLING GANFELD

This user guide assumes you have setup your Windows Mobile device, installed and configured Microsoft ActiveSync on your computer, and installed ArcPad on your Windows Mobile device. The steps above can be accomplished by consulting the user manuals for each product.

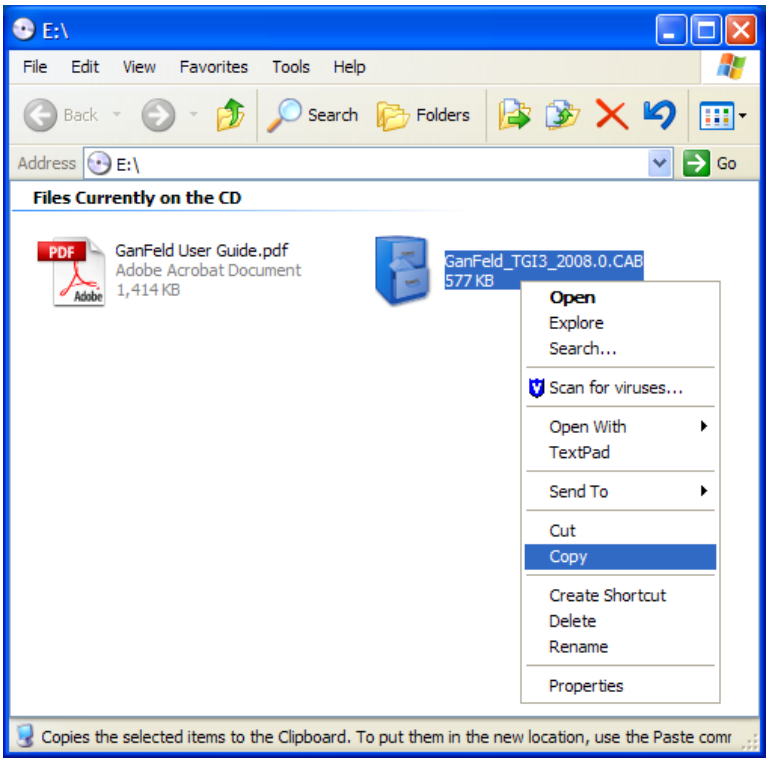
Begin the GanFeld installation process by establishing a connection or "partnership" with your computer and Windows Mobile device through ActiveSync.

On your desktop PC do the following:

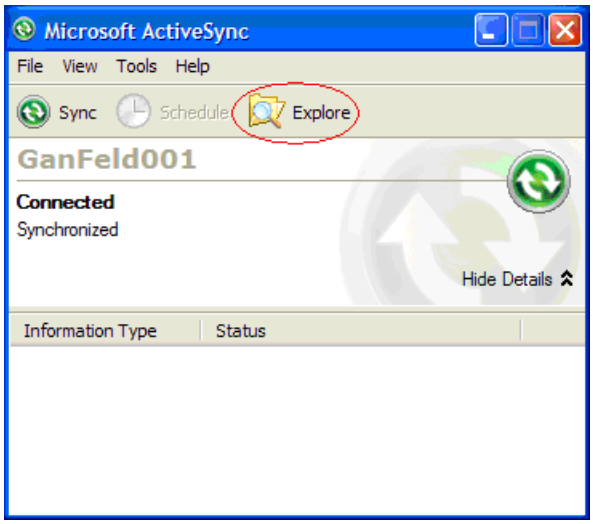
1. Open up Windows Explorer and navigate to where the GanFeld_TGI3_2008.5.cab file is located.



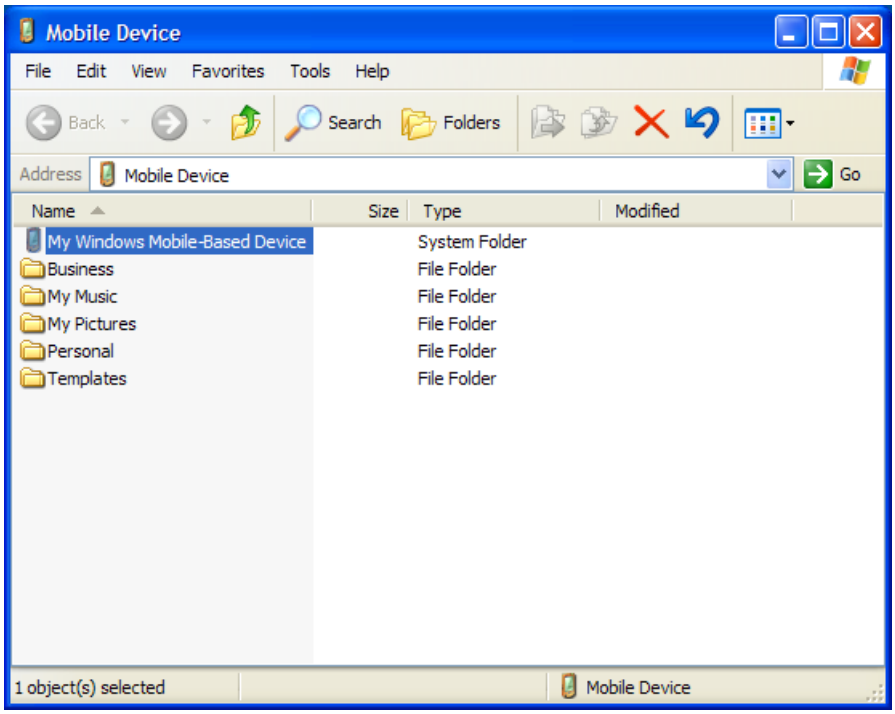
2. Copy the GanFeld Cab file.



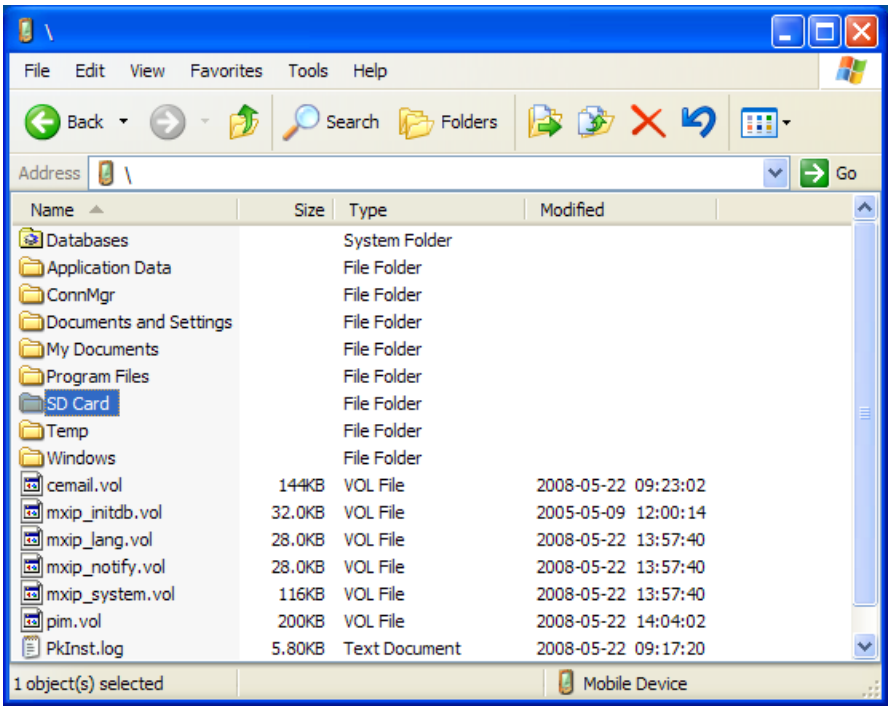
3. Open Microsoft ActiveSync window and click on the **Explore** icon.



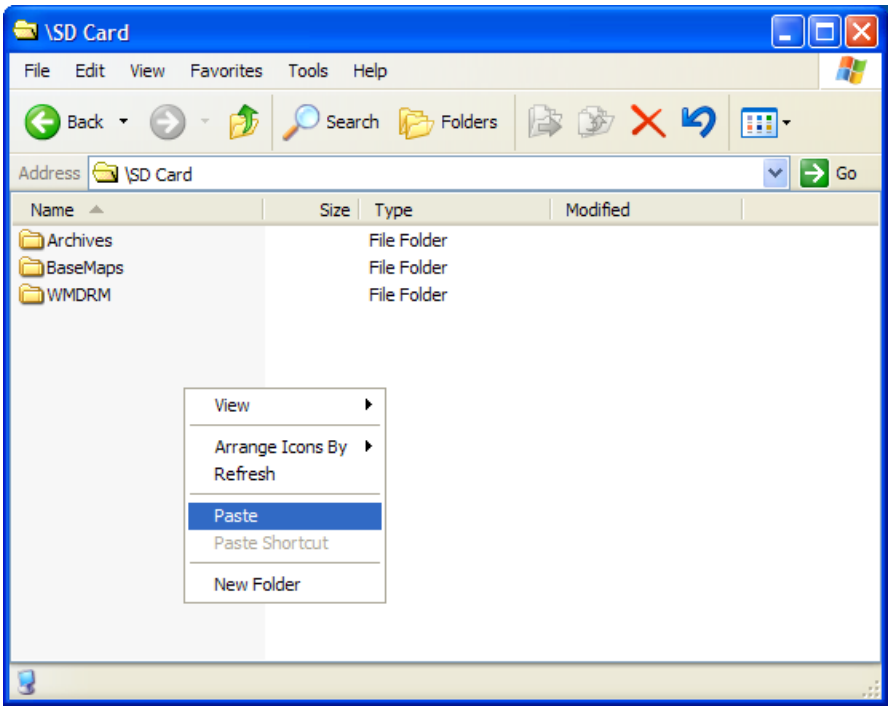
4. Double-click "**My Windows Mobile-Based Device**" (highlighted in blue).



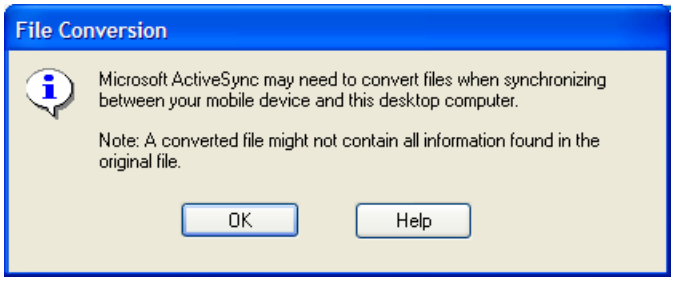
5. Double-click on the memory card folder, which will appear as **SD Card**, **CF Card**, or **Storage Card** depending on which one is installed on your Windows Mobile device.



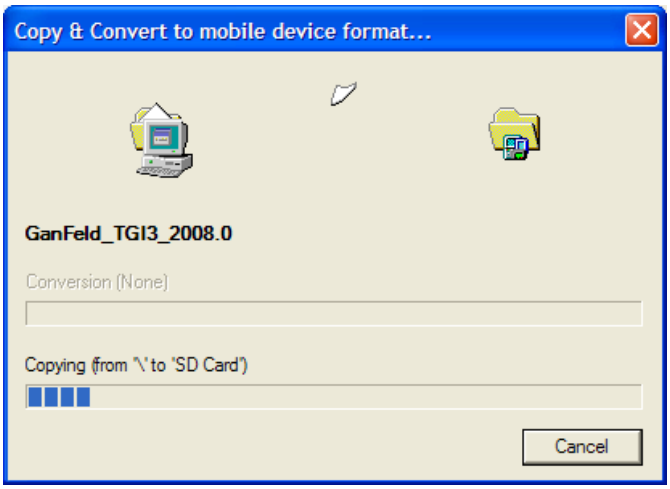
6. Paste the GanFeld cab file in the memory card folder (SD Card, CF Card, or Storage Card).



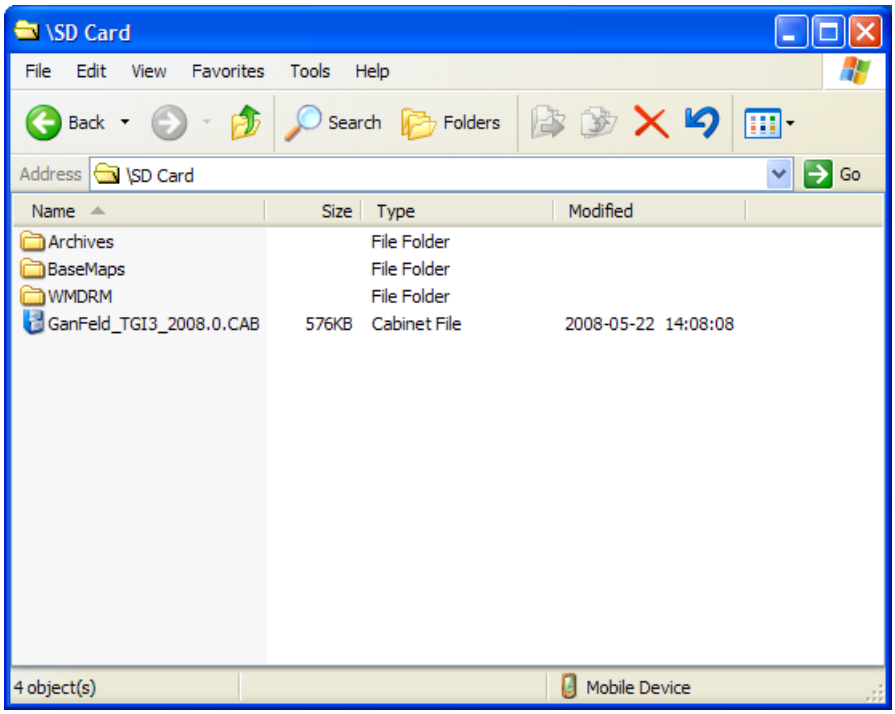
7. When you paste the cab file to your device, Windows will display a File Conversion message box. Click "**OK**".



8. Next you will see the Copy & Convert progress window.



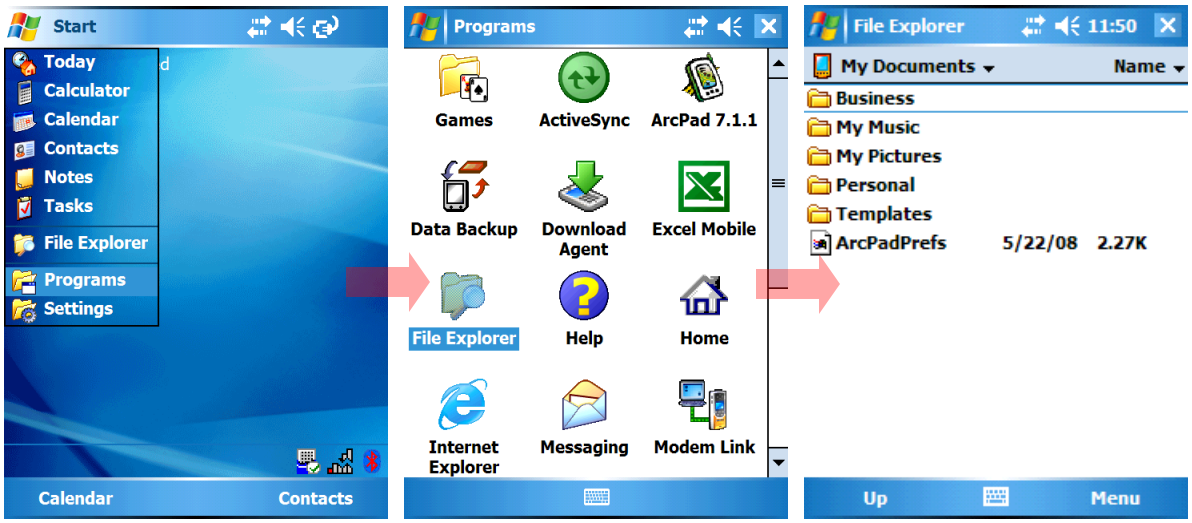
9. When copy is complete you will see the cab file in your memory card folder.



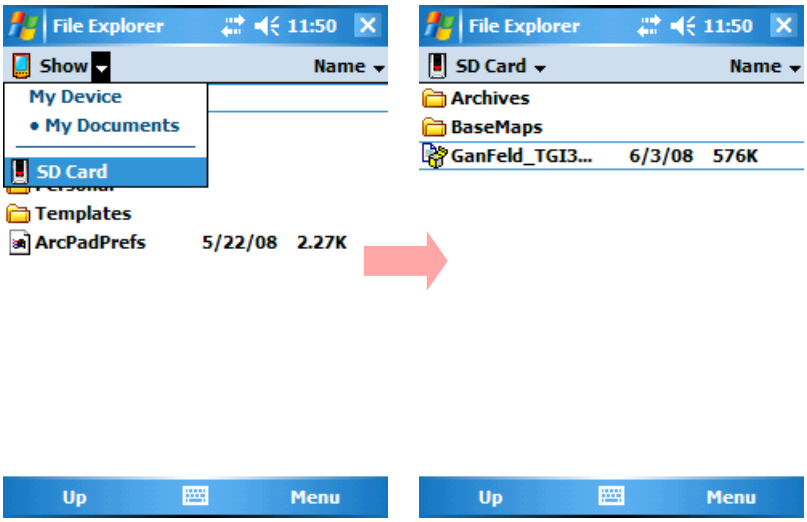
10. Disconnect the Windows Mobile device from your computer now and we will now focus on the Windows Mobile device.

On your Windows Mobile device do the following:
(Note: screen shot taken from a Windows Mobile 5 device. You may see something different for older Windows Mobile Operating Systems)

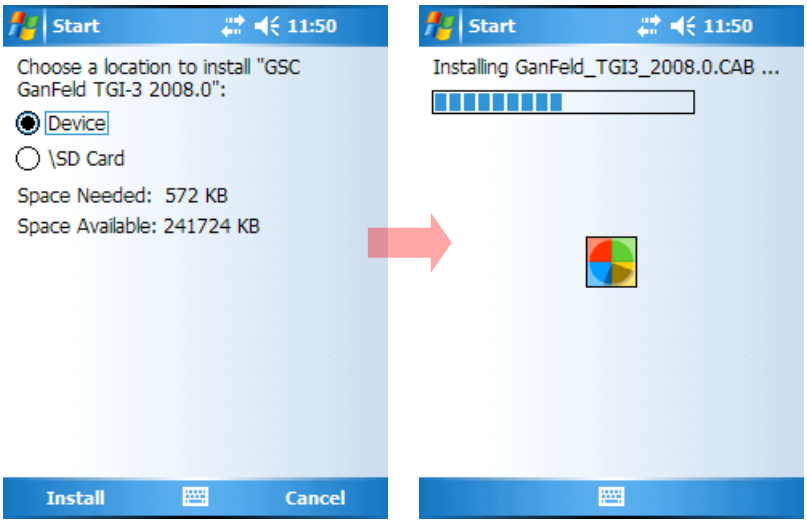
11. Start up File Explorer.



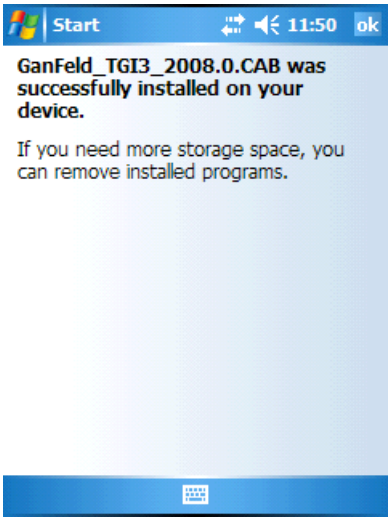
12. In this example we will navigate to the SD Card on the Windows Mobile device where the GanFeld cab file was copied. Tap on the GanFeld cab file to start the installation.



13. Go with the default of installing GanFeld on “**Device**” (assuming that ArcPad is also installed on the “Device”)



14. GanFeld is installed successfully when you see the message below. Then tap on the “**ok**” button on the top right corner.



15. Next step will be setting up your GanFeld project.

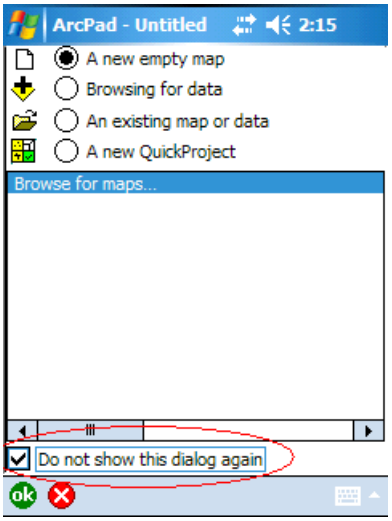
PROJECT SETUP

Each user needs to set up a project on their devices before they use GanFeld. Setting the project will require you to add in metadata to describe your field work project before GanFeld creates the necessary folders and to get you started with your data collection. The field data that you collect in GanFeld are stored in a workspace folder you will define in the GanFeld project setup form.

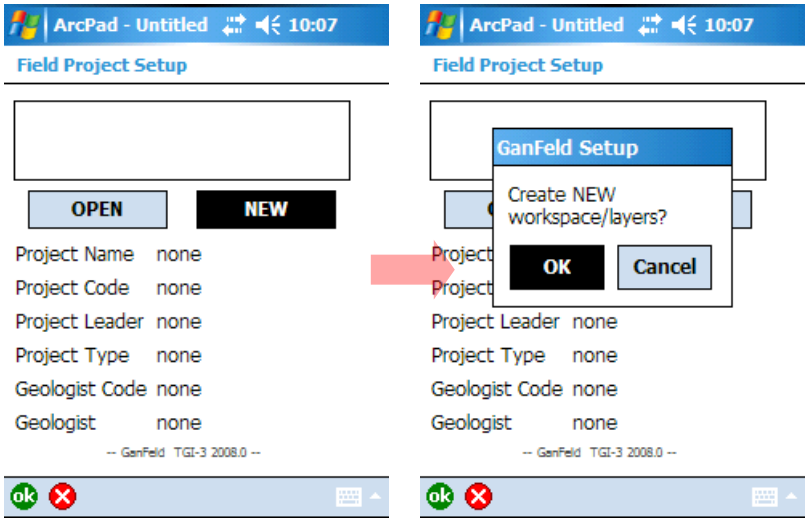
Before we begin creating a GanFeld project make sure that you disable ArcPad Startup dialog form by following step 2.

1. Start up ArcPad.

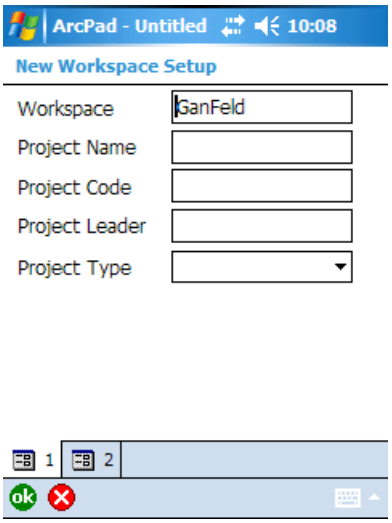
2. By default ArcPad displays **Start Form** upon ArcPad start up. If you see this form then **check** the box that says "**Do not show this dialog again**" located near the bottom of the screen. Then tap the ok button. The next time you start ArcPad you will go directly to the Field Project Setup form (see step 3).



3. To create a new GanFeld Project, tap on the "**NEW**" button and you will be prompted to confirm if you want to create a new workspace, tap ok.

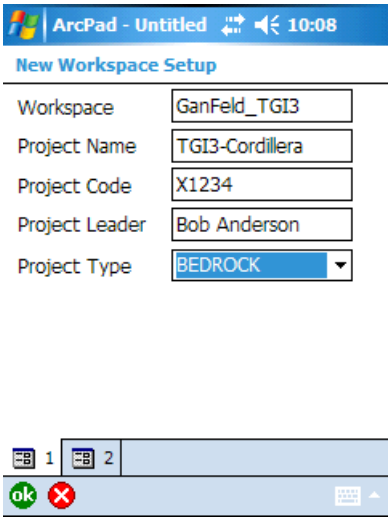


4. The New Workspace Setup form appears and this is where you enter in metadata about your project and establish settings to create your new GanFeld workspace. **Workspace** is where you enter a folder name in which your files will be stored. By default a folder named "**GanFeld**" will be created in your "**My Documents**" folder in your Windows Mobile device. You may change the folder name to something more meaningful for your project.



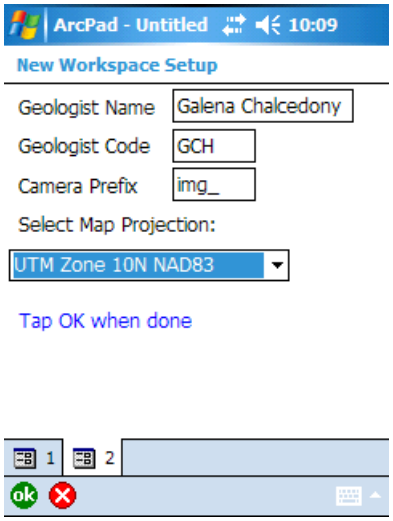
5. Enter in the **Project Name** and the next time you start GanFeld you will see this project name in the listbox.

- **Project Code** could be your project's financial code.
- **Project Leader** would be the name of the person with financial responsibilities and/or project leader.
- **Project Type** determines if GanFeld should display the bedrock or the surficial application. However, the TGI 3 version of GanFeld only includes the bedrock application.



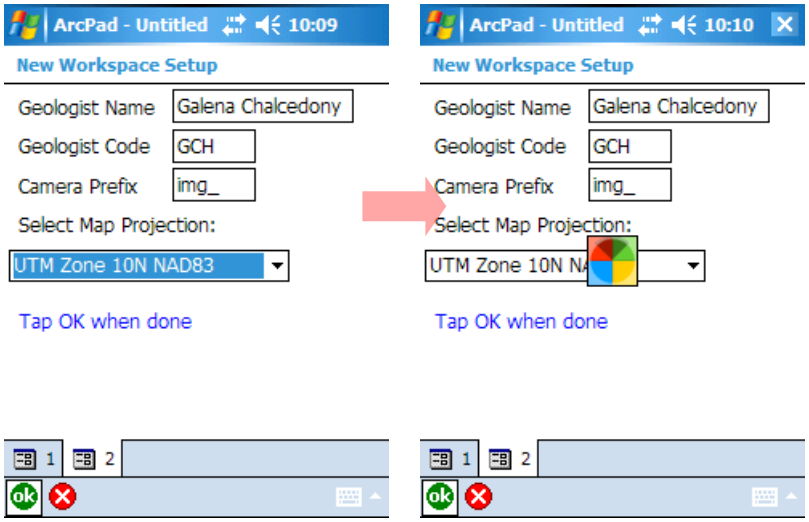
6. Go to page 2 of this form by tapping on the tab labeled "**2**" in the lower left corner.

- **Geoscientist Name** is where you enter your name as the field geoscientist using this device as the data collector.
- Enter a moniker for **Geologist Code**. At the GSC each geoscientist is given a monicker that uniquely identifies the information they collect (e.g. 08**GCH**001).
- **Camera Prefix** is for your digital camera files that often have a prefix and incrementing number (e.g. Canon cameras have an "img_" prefix). GanFeld assumes that the incrementing number contains four digits (e.g., 0012).
- **Select a map projection** of either Universal Transverse Mercator NAD83 (UTM) with respective zones for northern hemisphere, or Geographic WGS84 (latitude and longitude). If your project spans across 2 or more UTM zones then it would be wise to select Geographic.

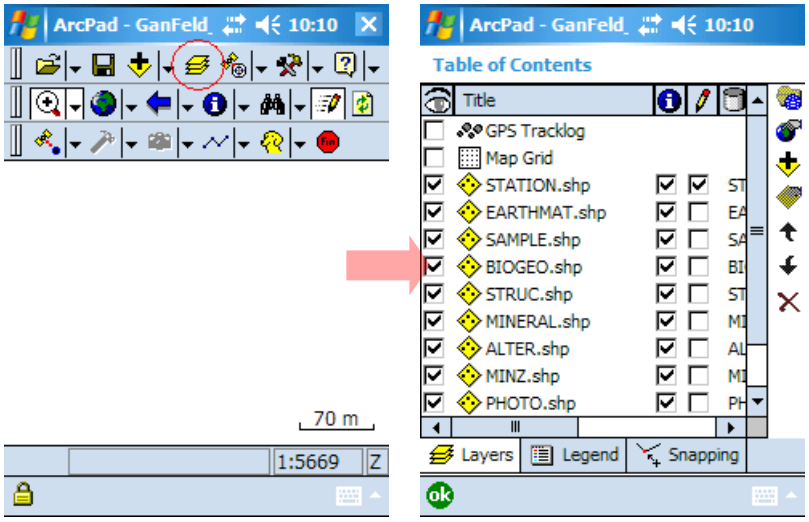


"Galena Chalcedony" is a fictious geoscientist

7. Tap ok when you have entered in all the information and then GanFeld will create a new workspace (folder) with all the necessary files in your "**My Documents\GanFeld_TGI3**" folder for this example.



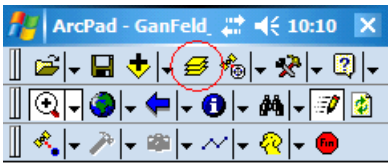
8. The next step will be to check if all the layers have been created for your new GanFeld project workspace. To do this tap on the "**Table of Contents**" icon on the top.

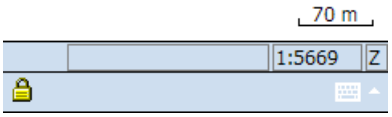


LOADING BASE MAPS

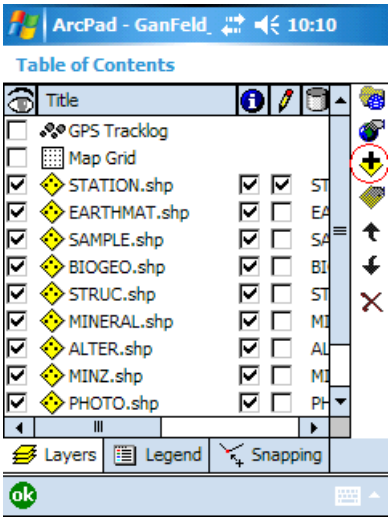
The next step will be adding a base map layer. Please see [Appendix: Where to get base maps](#) for links to free digital base maps.

1. Tap on the "**Table of contents**" icon located on the top toolbar.

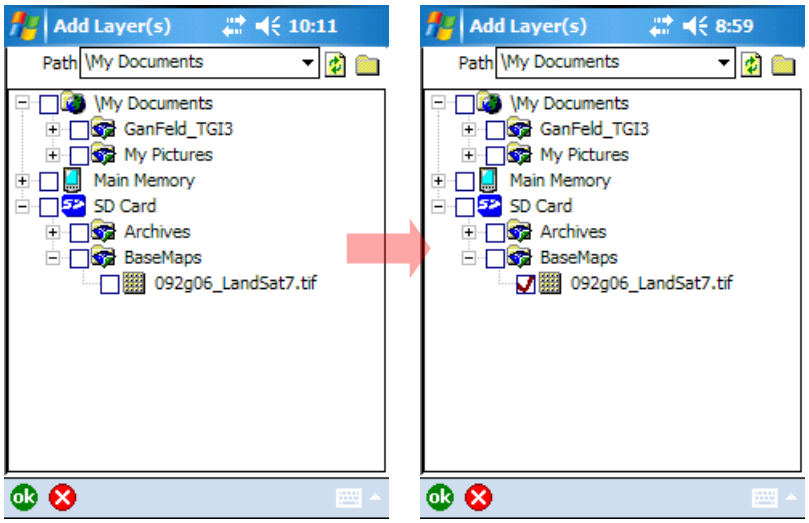




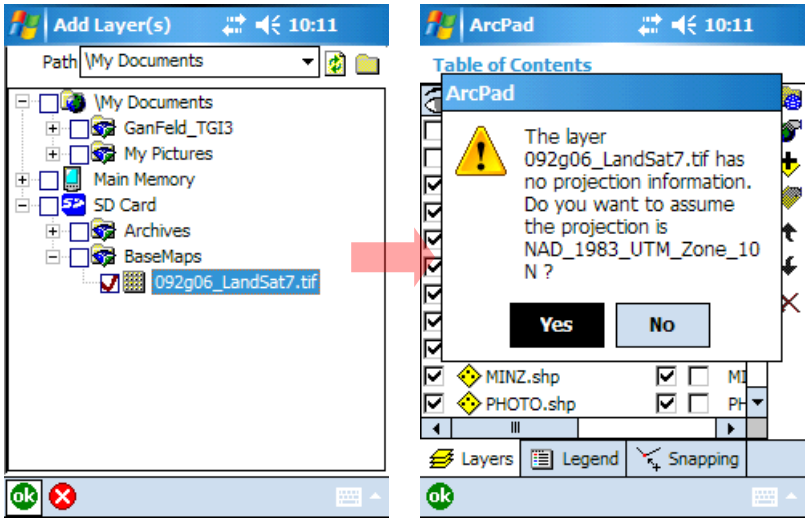
2. You will then see the Table of Contents and a listing of the newly created shapefile layers. To add a base map, tap "**Add Layer**" icon.



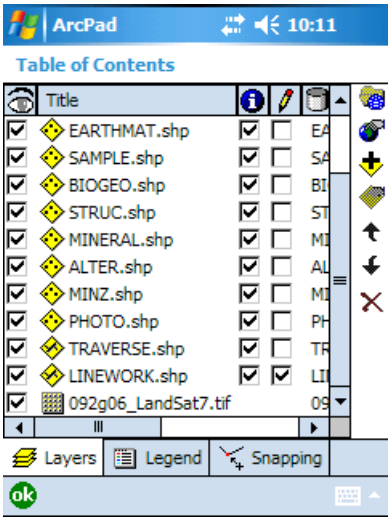
3. Navigate to the folder containing your base map layers, assuming you have already copied the base maps on either your device or memory card. In this example, a CanImage (free Landsat 7 image) tif file was previously copied to the SD Card called "092g06_LandSat7.tif" in the BaseMaps folder. Tap on the checkbox next to the image file "092g06_LandSat7.tif".



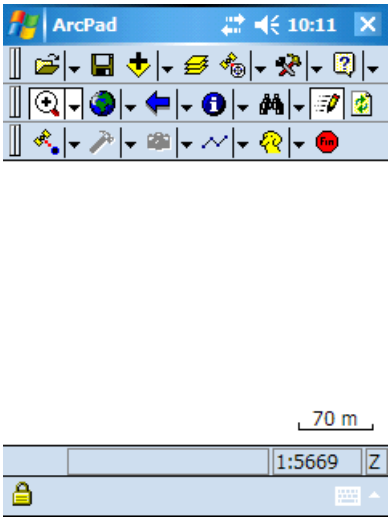
4. Tap ok and ArcPad will prompt you to accept that this image file is a UTM zone 10 (NAD83) projection. Although this TIF file is a georeferenced to UTM zone 10 ArcPad isn't always able to extract the projection information from the image file. Tap "**Yes**" if you are certain that the image is indeed UTM NAD83 zone 10 projection.



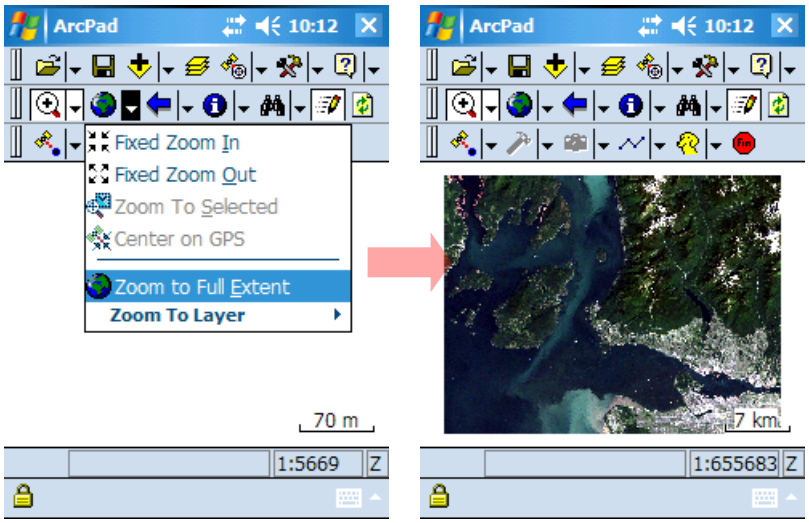
5. In the **Table of Contents** you will now see “092g06_LandSat7.tif” base map layer at the bottom of the listed layers. In ArcPad the layer at the top of the list is drawn last while the layer at the bottom is drawn first. Scroll down to the bottom to check if the layer is there. If it’s there then tap on the ok icon.



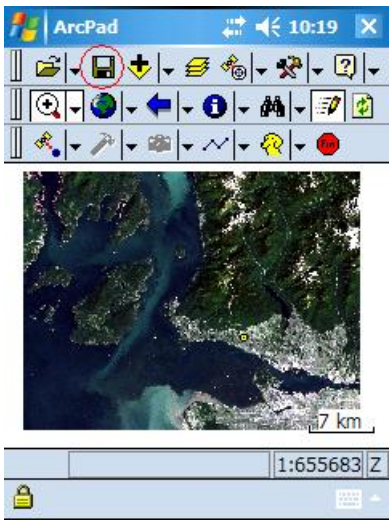
6. Now you are back to the ArcPad map window, but the image is not currently displayed because the view has not been set to the extent of the image.



7. Tap on the drop-down arrow to the right of the icon on the middle toolbar and tap on "**Zoom to Full Extent**" to set the map view to the extent of the base map image.



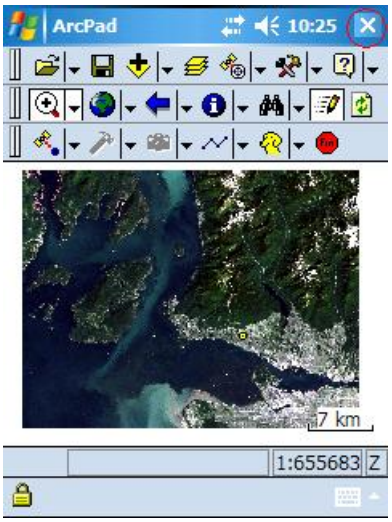
8. Now, tap on "**Save Map**" icon. This only saves the current ArcPad settings and the current map view.
Note: field data you will enter is saved automatically when you "save and exit" out of a form.



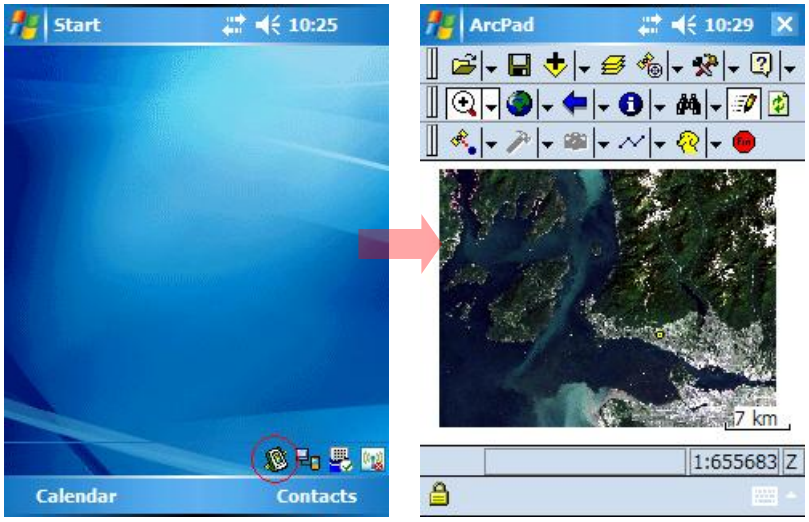
CLOSING & QUITTING ARCPAD

Windows Mobile applications behaves differently from a desktop Windows application. The difference is how applications close and quit in the Windows Mobile operating system.

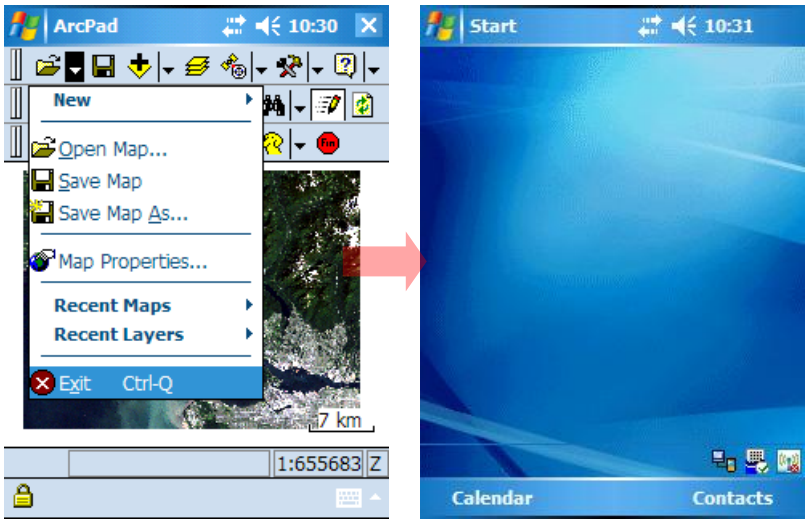
1. It is important to know that the "**x**" button on the top right-hand corner does not behave similar to that of a desktop Windows application that a user would expect the application to quit. But rather, ArcPad minimizes the window and ArcPad still remains in memory. Tap on the "**x**" button now.



2. Notice that an ArcPad icon is located at the bottom of the Windows Today screen and if you want to resume a GanFeld session then you need to tap on the ArcPad icon.



3. To completely quit ArcPad and remove it from memory, tap the **drop-down menu** besides the button and tap on "**Exit Ctrl-Q**". Notice that the ArcPad icon is no longer displayed on the Today Screen.



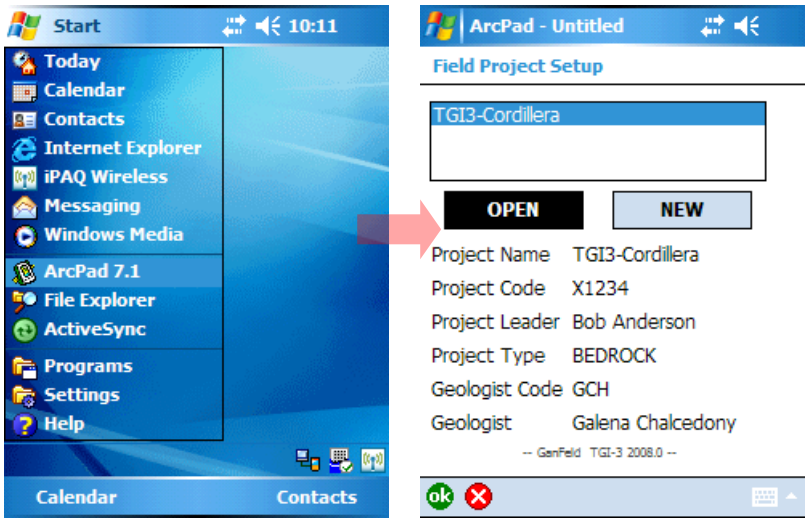
Important: While on a traverse, you do not have to Exit ArcPad because you will have to start up ArcPad again that could take time so tap on the "**x**" button on the top right to close (minimize) ArcPad. A better method while you are traversing is to simply press the power button on your Windows Mobile device and the device will remember the last state it was in when you power it on again.

SETTING UP THE GPS IN ARCPAD

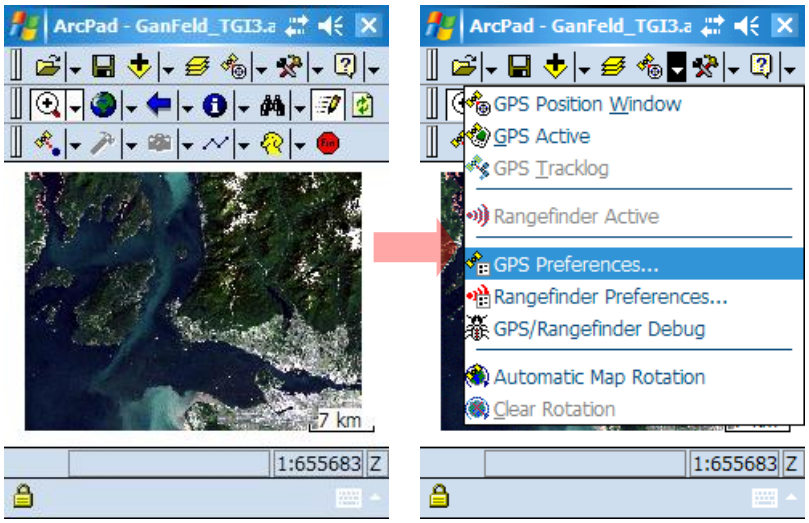
Once your GPS is correctly communicating with your Windows Mobile device you can proceed with setting up the GPS in ArcPad. Please read the GPS user manual on how to setup your GPS. Also, please consider a Windows Mobile device with a built-in GPS because it is easier to setup than a Windows Mobile device wirelessly linked to a Bluetooth GPS because there is no need to startup a Bluetooth connection every time you want to establish a location in ArcPad.

1. If you have an external GPS then please turn it on and turn on your Windows Mobile device and make sure to establish the connection before starting up ArcPad (see your user manual that came with your GPS or you can read the Appendix: Setting up / trouble-shooting Bluetooth GPS with your Windows Mobile device). Please exit any programs using the GPS on our Windows Mobile device now (even those with built-in GPS devices).

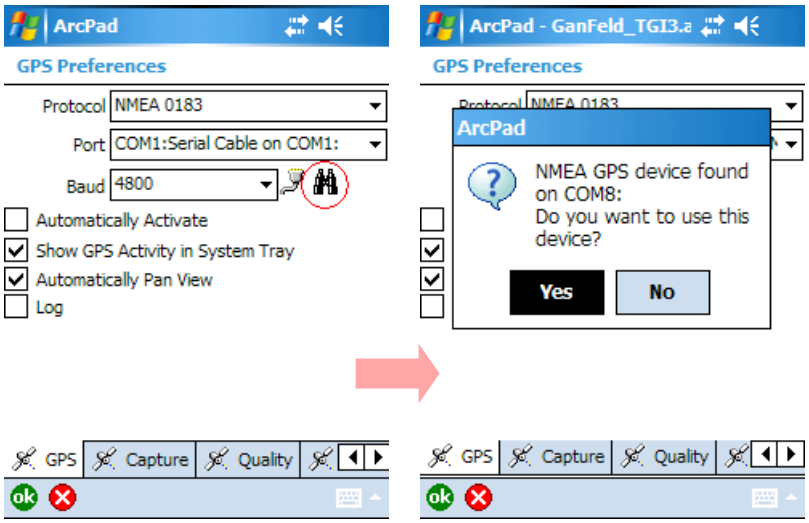
2. Start up ArcPad and select a GanFeld project that you have setup (see Project Setup if you have not done so already).



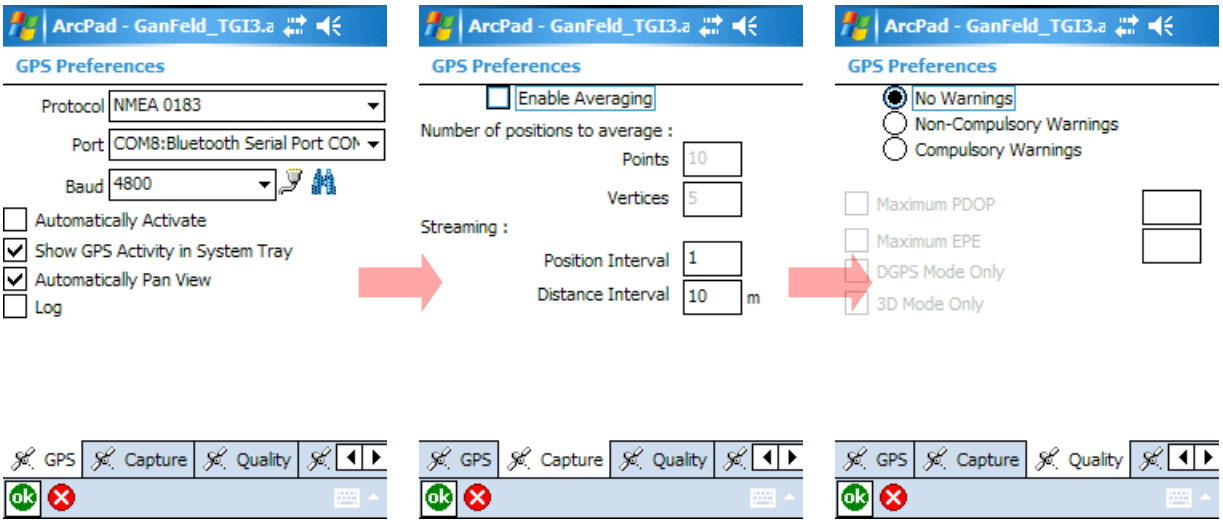
3. To setup the GPS to work with Arcpad go to the drop-down menu to the right of the button and select "**GPS Preferences…**" to startup the GPS Preference Form.



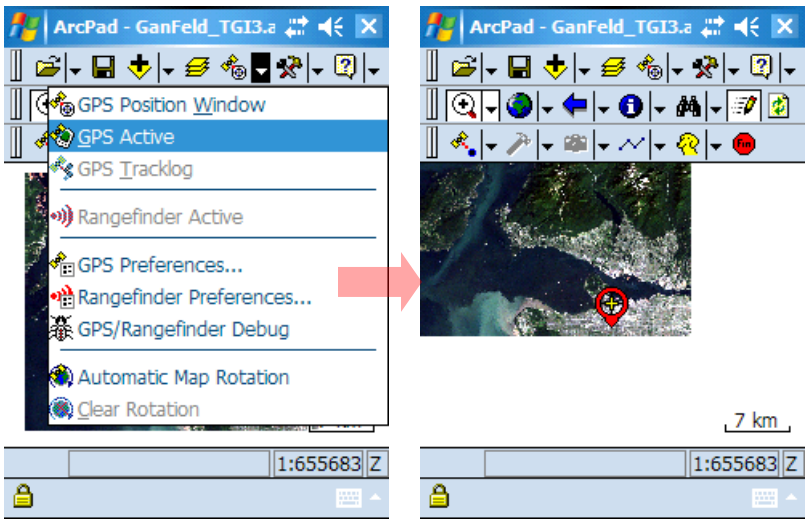
4. Tap on the icon to search for a GPS automatically to find the GPS and set the serial port and baud rate as well. As soon as a GPS connection is found you will get a message asking if you want to use this and tap "**Yes**" and now the settings are saved in ArcPad so you don't have to search again for a GPS.



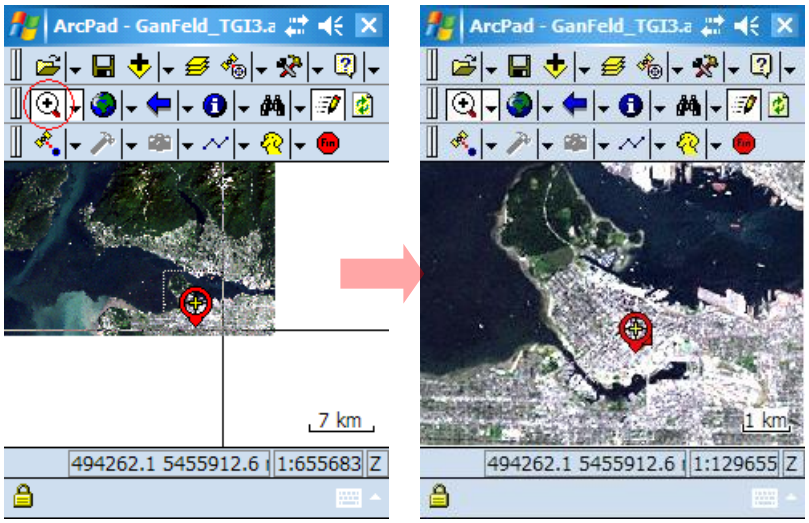
5. Leave the other GPS setting as it is and tap the button.



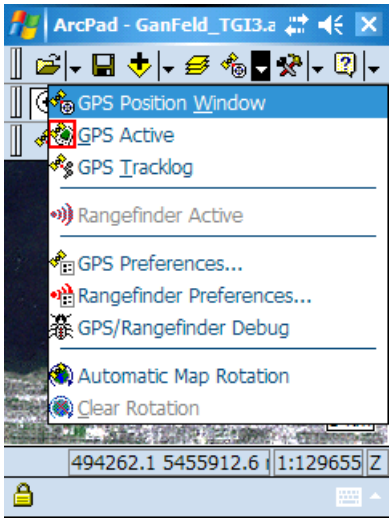
6. Now, tap on the drop-down menu beside the GPS icon and tap "**GPS Active**". You will then see the GPS cursor icon located at the current GPS fix.



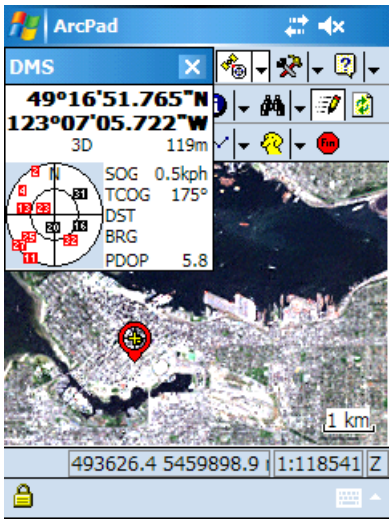
7. Zoom in on the area where the GPS is located to get a better view. You will notice that by default the "**zoom in**" button is set because it is highlighted by a box in a lighter background, so all you have to do is to draw a rectangle of the area you want to zoom in to by tap-hold-drag motion with your stylus.



8. Select "**GPS Position Window**" in the same drop-down menu from Step 6 to help you to assess the quality of the position by looking at the GPS position window (right figure).



9. Use the **GPS Position Windows** to evaluate the quality of the GPS position. For best possible position check the PDOP (Position Dilution Of Precision) value is less than 7 (ideally around 2, if possible), and that you have a 3D position.

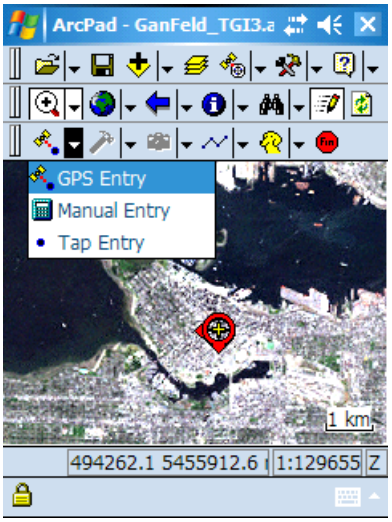


10. As soon as you are satisfied with the GPS results then tap the "x" button of the **GPS Position Window** and we are now ready to record our first station stop in the next section!

FIELD DATA COLLECTION IN GANFELD: ESTABLISHING A STATION STOP

Finally, we will start collecting field data in GanFeld! Assuming that there was no problem setting up the GPS from the previous section we can now enter in our first station stop. The station stop describes the geographic location and general information about the locality of interest. Entering in information for the station stop is the starting point for GanFeld data entry. You can not enter information about a rock before establishing a station stop. Please refer back to the section on GanFeld Map Layers for an explanation of the relationships of the field data types such as describing station, earth material, sample, and structure data.

1. From the previous section, on setting up a GPS in ArcPad, we had a GPS fix on position and we are satisfied with GPS readings so the next step is to add a Station stop. Tap on Add Station by GPS "**GPS Entry**" button.

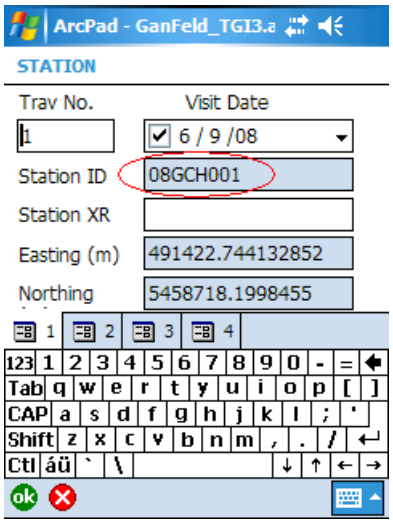


Note: if you can't obtain a position with the GPS then you may enter a station using the two alternative ways:

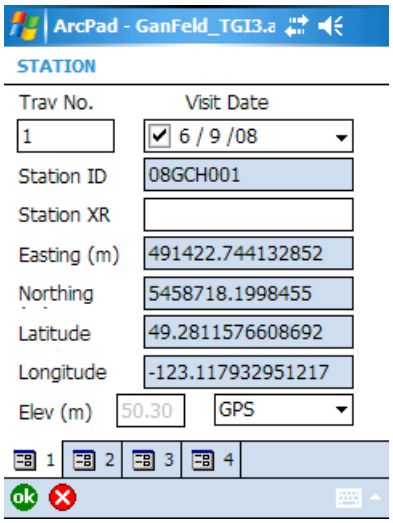
i) " **Tap Entry**" – you may tap directly on the map to establish a station stop but the location will only be as good as the base map accuracy

ii) " **Manual Entry**" – manually type in the coordinates (obtained from an independent GPS) to establish a station stop but double check coordinate values

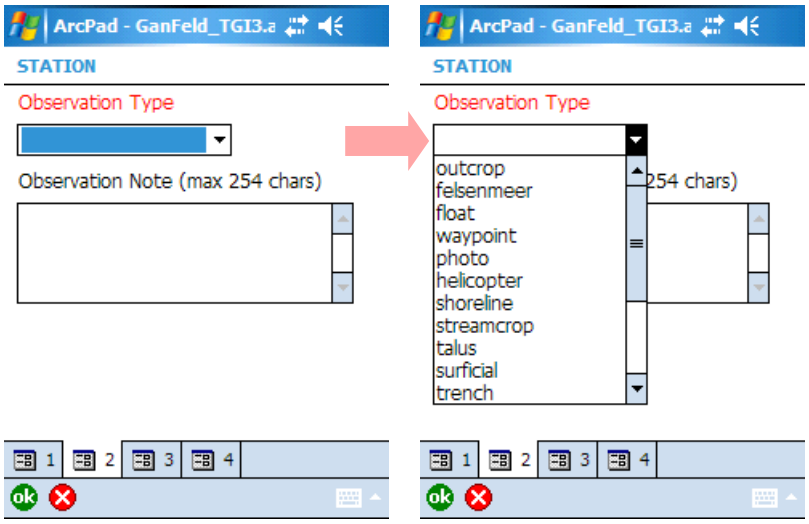
2. Station edit form appears and location coordinates are recorded automatically, as well as the current date and time. Take a look at the value besides the Station ID label circled in red. This is the unique key that will identify each station stop based on year (2008 = 08), your moniker (e.g. "**GCH**" for geoscientist Galena Chalcedony), and an incrementing number up to 999 stations for one field year.



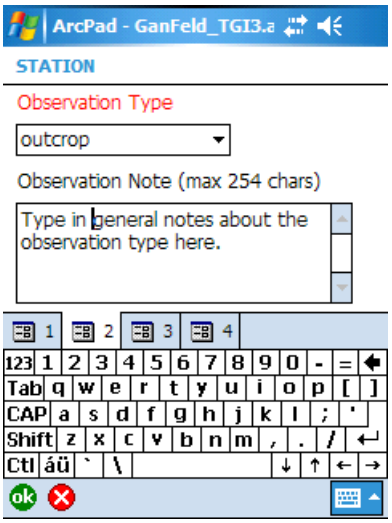
3. If you hide the keyboard you will see more information. However, for other pages we designed GanFeld so that the input fields are not obscured by the keyboard panel. Please note the "tabs" at the bottom of the form (numbered 1 to 4) represent pages.



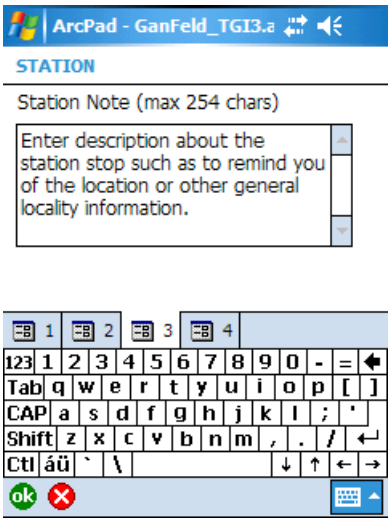
4. Tap on page **2**. On page 2 of the Station form you will notice the text "Observation Type" in red. If you see any labels in red, then the associated field is required and must be filled in. In this case the user must select a value for the observation type by tapping on the drop-down list.



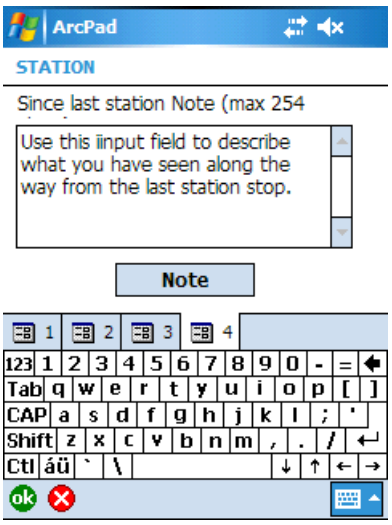
5. In the input box below the drop-down list is where you may type in a few more sentences about the observation type, such as the quality of the outcrop for example. These note fields have a maximum length of 254 characters.



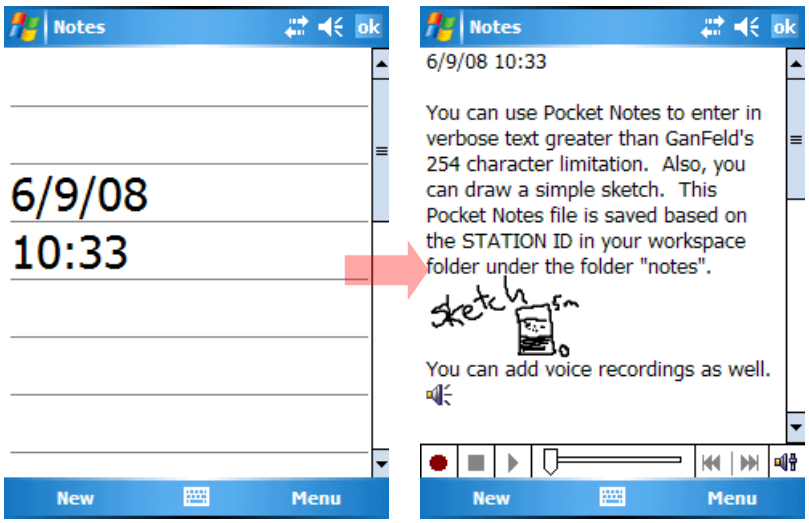
6. Tap on page **3**, and you will notice another note field but this is to input general information about the site itself.



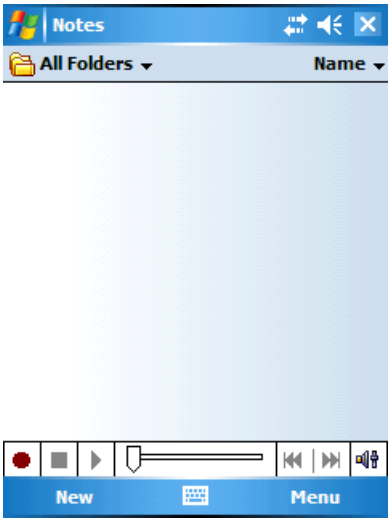
7. Tap on page **4** and you will see another note field to capture observations made since the last station stop. Also, notice the "**Notes**" button. Tap on the "**Notes**" button and go to the next step.



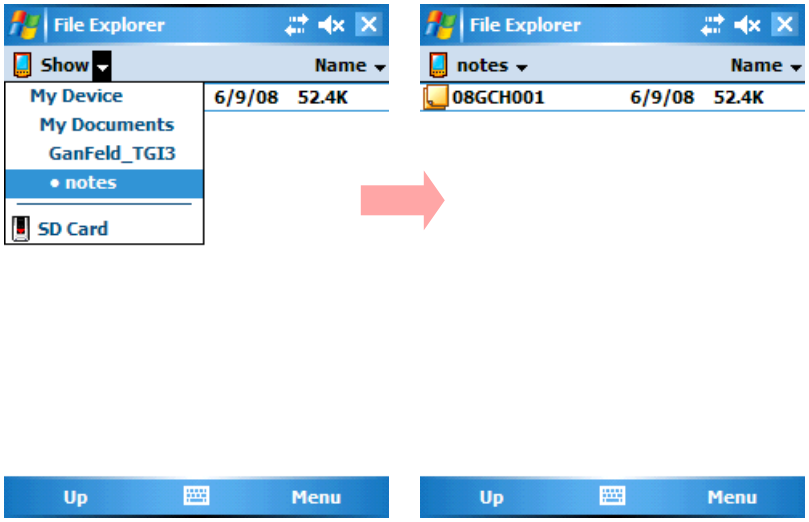
8. Microsoft Pocket Notes should startup a new file with the date and time. With Pocket Notes you do not have the maximum character limitation of 254 characters and you can draw a sketch and add a voice recording. Tap "**ok**" on the top right corner to save the Pocket Notes file.



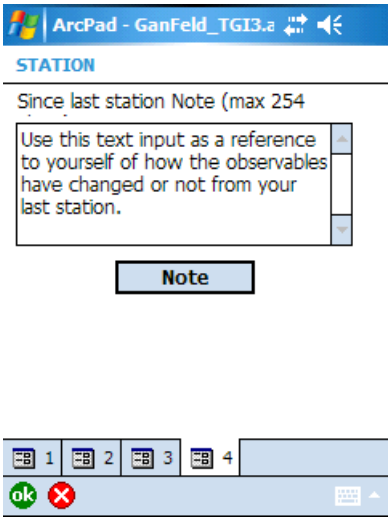
9. You should now see the folder view window of Pocket Notes. However notice that your new Pocket Note file is not listed because it is located under your "**\my documents\<*your workspace*>\notes**" folder. It is a limitation with Pocket Notes that it only displays files down to 2 levels of the directory tree and the "notes" folder is located 3 levels down.



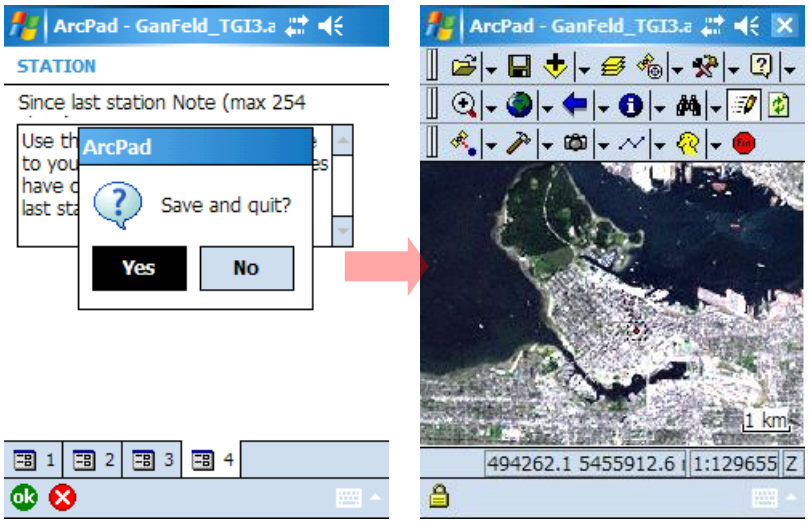
10. To view the newly created Pocket Notes file run "**File Explorer**" on the Windows Mobile device (see step 11 in the section: Installing GanFeld on starting up "File Explorer"). On the left screen shot is a view navigating in "File Explorer" and as you can see the file is there on the right screen shot. Now close "File Explorer" by tapping the "x" button on the top right-hand corner.



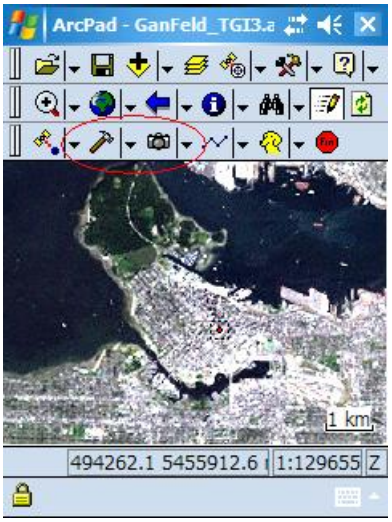
11. You should be back to the station form where you last left off before hitting the Notes button.



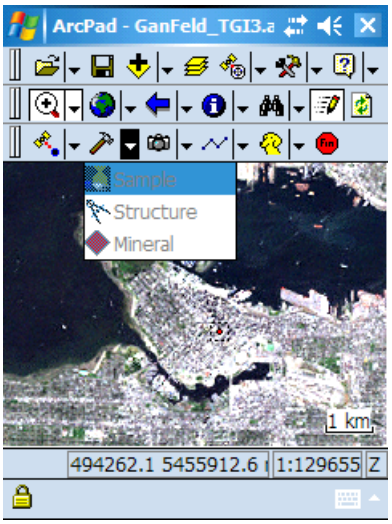
12. If you have completed describing your station then tap on the ok button. You will be prompted to confirm that you want to Save and Quit out of the station form. If you tap "**Yes**" then the station information will be saved and the form will be closed. If you tap "**No**" then the station form will remain open for further editing. You may also cancel the whole process by tapping the button.



13. The GanFeld toolbar now has the icon for earth material and the photo icon activated because a station stop has been established.



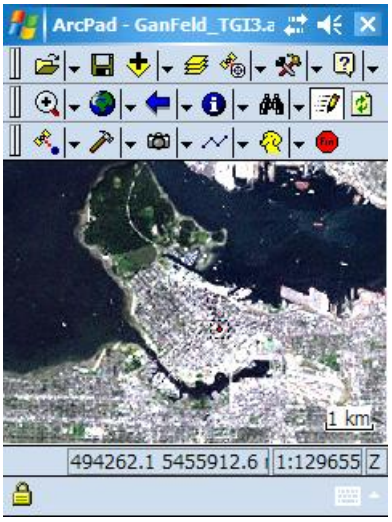
14. Now tap on the drop-down menu beside the icon. The **sample**, **structure**, and **mineral** menu-items will remain de-activated unit the earth material is described.



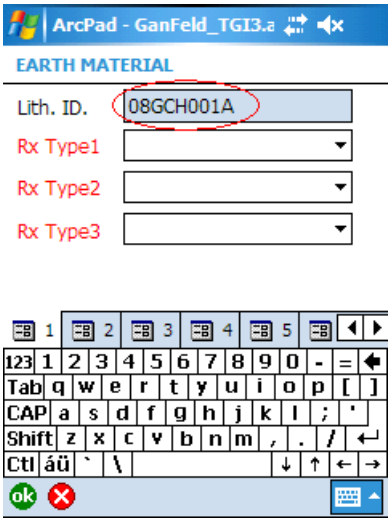
FIELD DATA COLLECTION IN GANFELD: DESCRIBING ROCKS

After establishing a station stop you are now ready to describe a rock at the location. Note that you can describe many rock types at one station stop. In other words, there is a one-to-many relationship between a station and the rock types. Working with GanFeld is easier if you first describe one rock, note the samples from that rock, record structural measurements, and describe the mineral components before proceeding to describe another rock type at that same station stop.

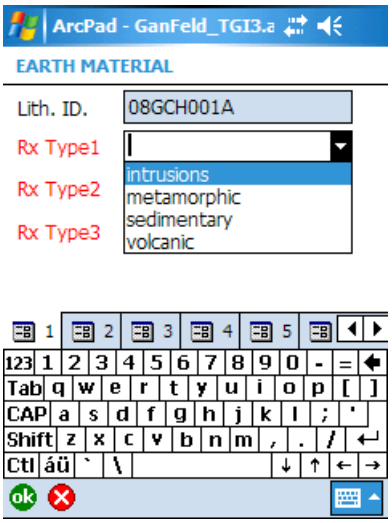
1. Tap icon on the GanFeld toolbar to launch the earth material form.



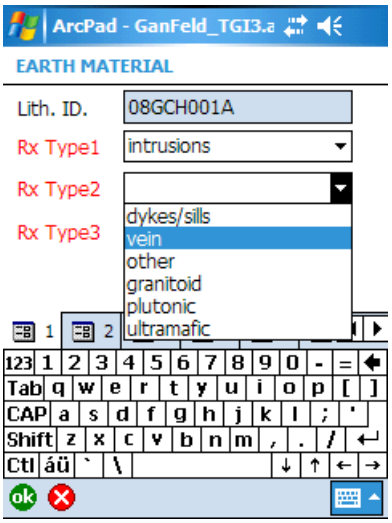
2. You will now see the Earth Material form and notice that it has many pages. Let's take a look at the first page. The **Lith.ID.** label is the unique ID for the rock you are about to describe and it is created by appending a single letter of the alphabet to the Station ID.



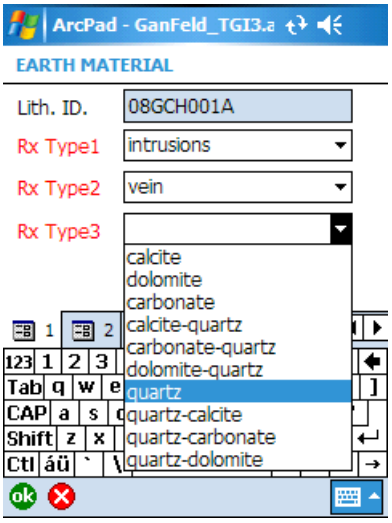
3. There are three drop-down lists used to describe a rock from "the general" to "the specific". The three **Rx Types** are assocated with one another in a hierarchy with the user starting at **Rx Type1** for general value, then select values for **Rx Type2** that is associated with the value in Rx Type1, and finally select more specific values for **Rx Type3** that is associated with Rx Type2. To help illustrate let's go through an example and tap on the Rx Type1 drop-down list. As you can see it starts at the most basic rock classification. So I'll tap on "instrusions".



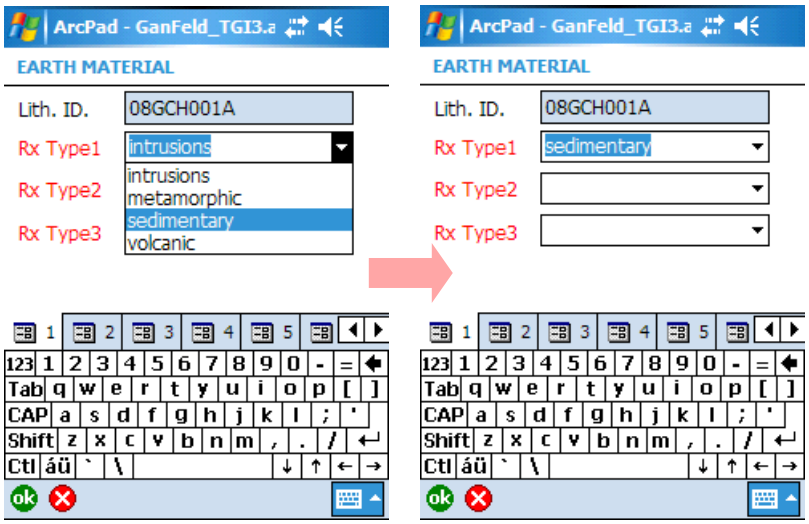
4. The drop-down list for Rx Type2 is populated based on what was selected for Rx Type1, in this example it was intrusions; so let us select "**vein**" for **Rx Type2**.



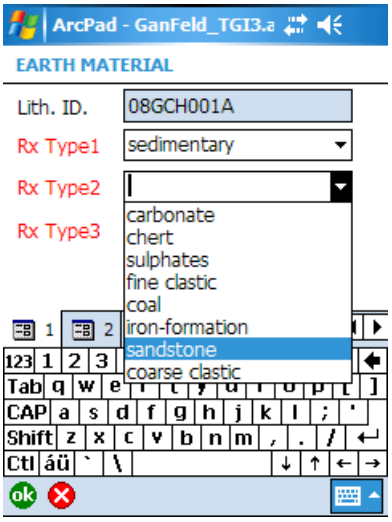
5. Based on what was selected for Rx Type 2, GanFeld then populates the drop-down list for Rx Type3. Select "**quartz"** for **Rx Type3**. If you change a value, GanFeld may refresh the associated drop-down list. Go to the next step and see what happens when you change a value.



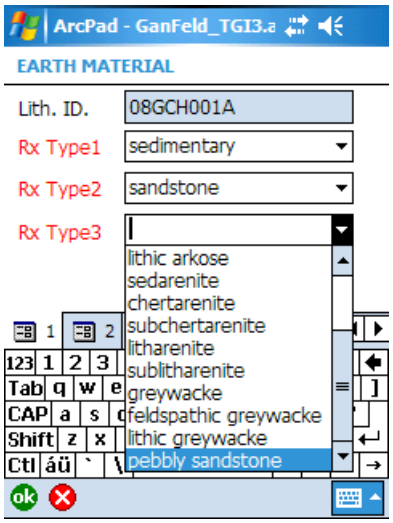
6. Let's assume that the rock you are looking at is in fact "**sedimentary**". Tap on the **Rx Type1** drop-down list and select "**sedimentary**". Now, see the image on the right. GanFeld cleared the values for Rx Type2 and Rx Type3 because we are starting a new rock classification.

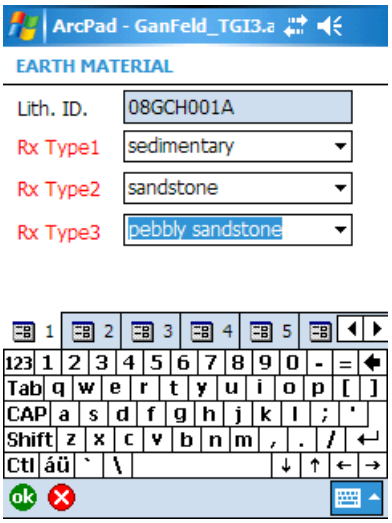


7. Tap on the **Rx Type2** drop-down list. Notice that the values are different compared to that of the previous example. Select "**sandstone**".

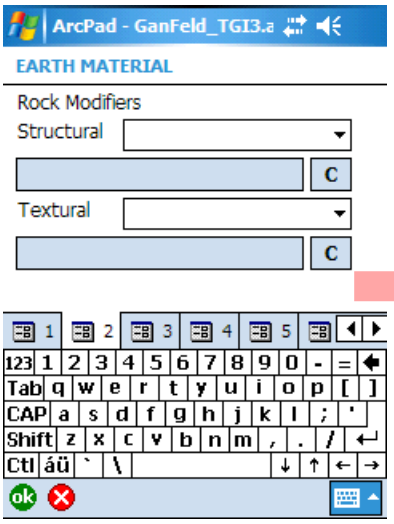


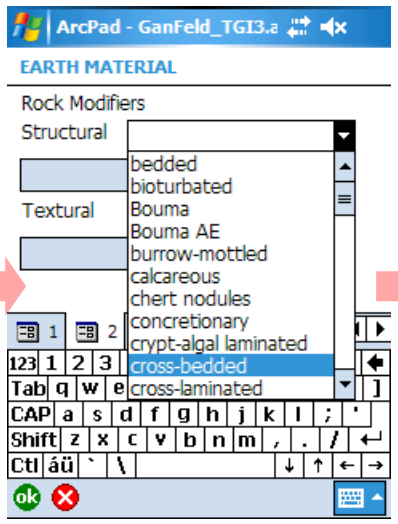
8. Tap on the **Rx Type 3** drop-down list and, as in Rx Type2, the values are different than in the previous example. The values in these drop-down lists are driven by a lookup table. *To customize a look up table see [Appendix: Editing the Lookup Tables](), but be very careful in doing this!* Now let's take a look at some of the other pages of the earth material form.

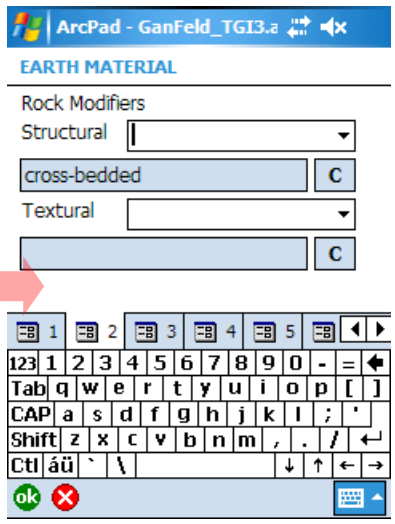




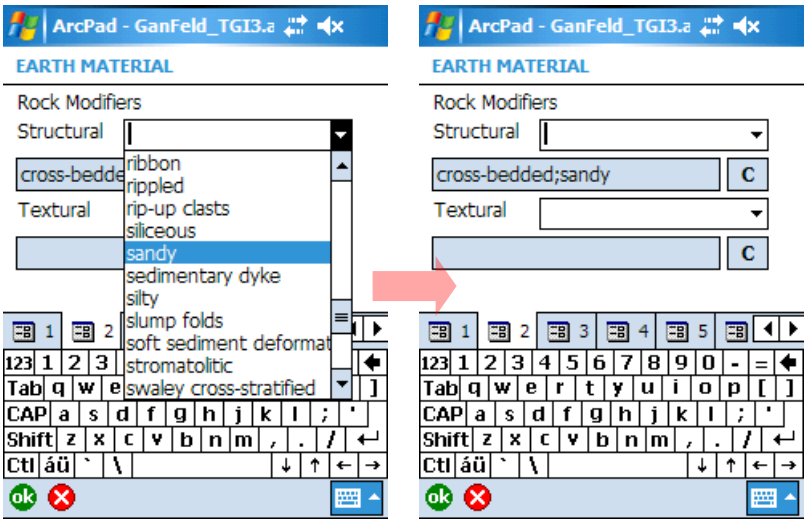
9. Tap on page **2** of earth material. This is where you can further describe the rock with modifiers based on structure and textural terms. There are two drop-down lists and two grey text boxes with button labeled "**C**" beside grey each text box. In GanFeld, the convention we use for multi-value text box is a long grey text box with the clear button "**C**". Let's see how this works. Tap on the **Structural** drop-down list and you will see a list of values and select the value "**cross-bedded**". Notice that the value is displayed in the long grey text box. Go to the next step to see why.



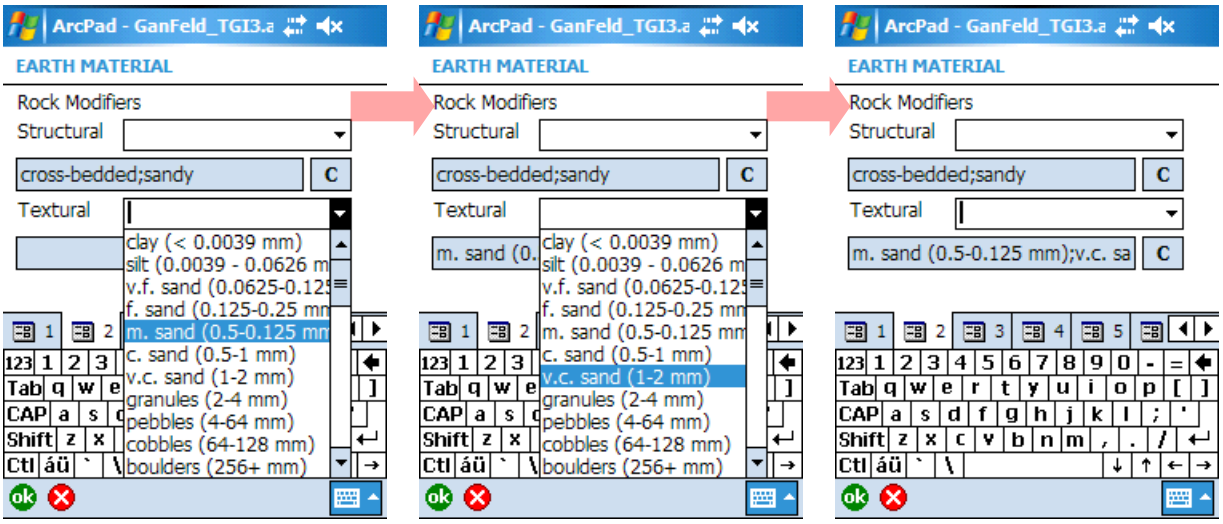




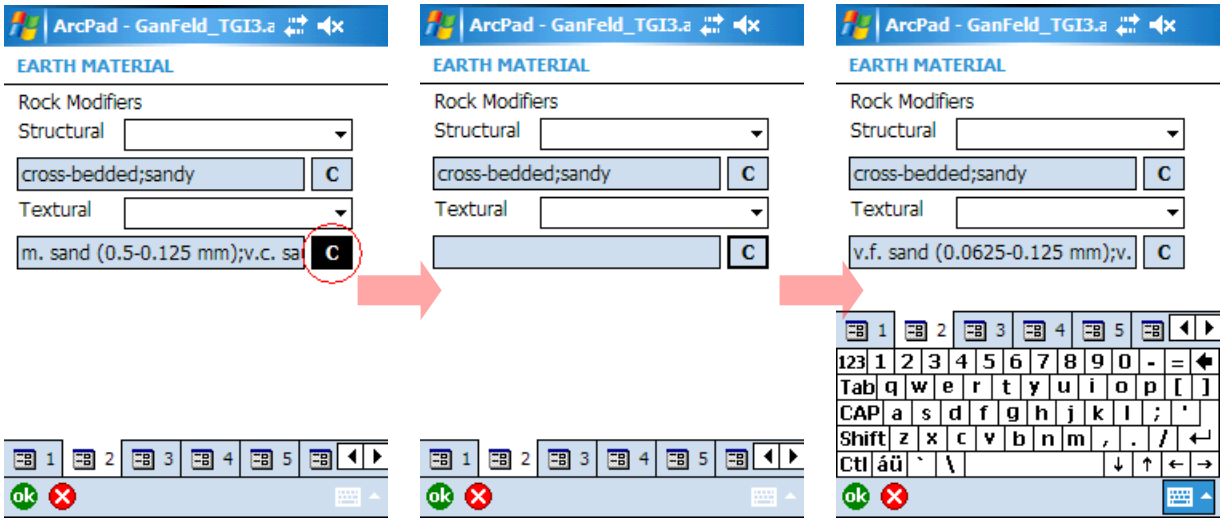
10. Tap on the **Structural** drop-down list again and select "**sandy**". The new value has been appended to the existing value in the long text box. These concatenated fields are limited to entries of 254 characters.



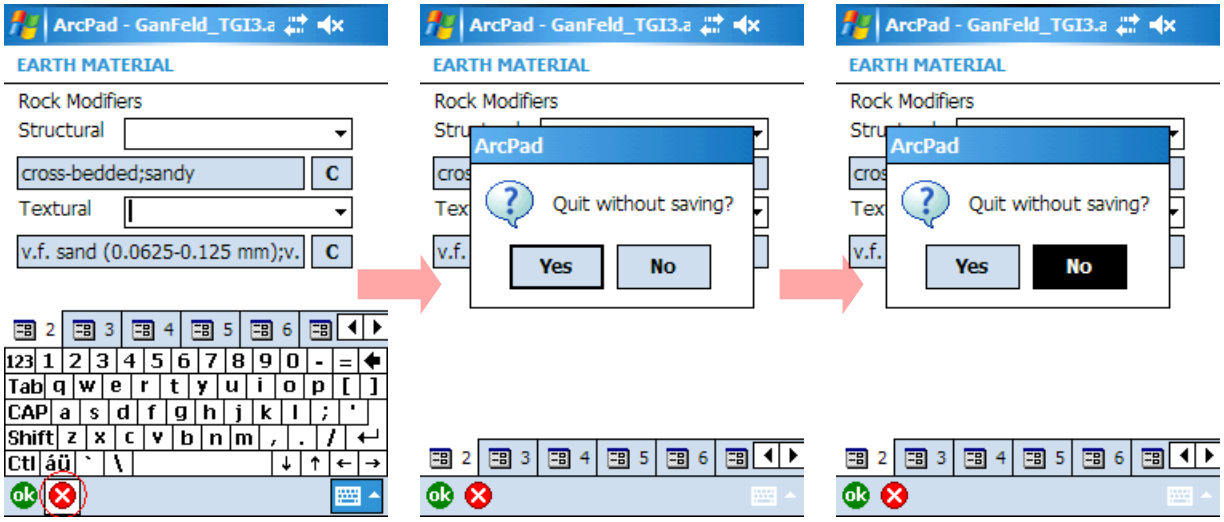
11. **Textural** operates in the same way as the structural control. Below, select grain size range from medium sand ("**m.sand (05-0.125)**") to very coarse sand ("**v.c. sand (1-2mm)**").



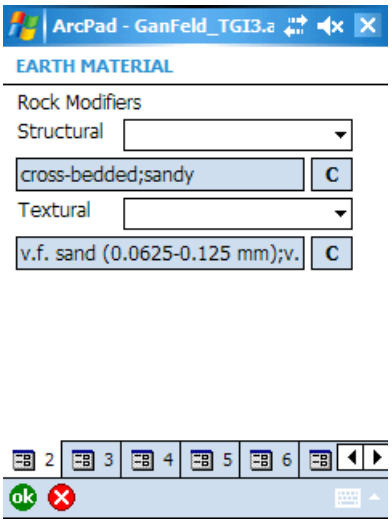
12. If a mistake was made (e.g., the grain size was actually fine sand to very coarse sand), use the "**C**" button to clear the values and start again. Tap on the "**C**" button beside the **Textural** text box and this will clear the values allowing you to start over.



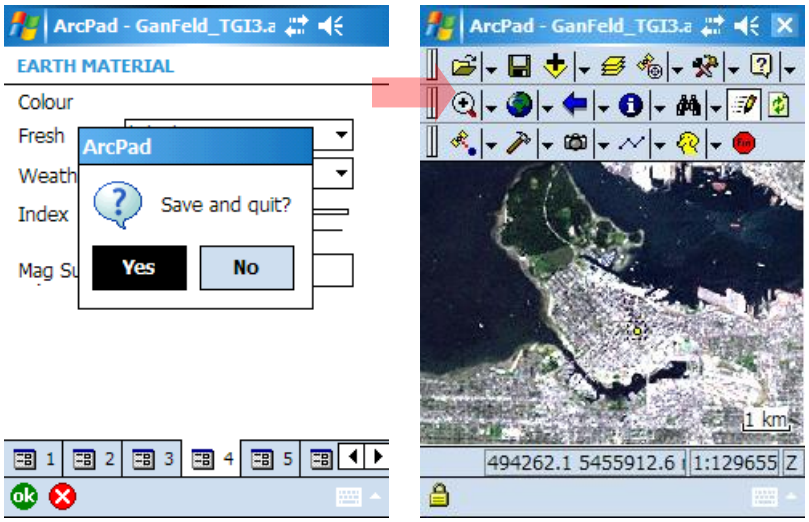
13. With the earth material form you do not have to fill out every detail except for the first page with Rx Type1, Rx Type2, and Rx Type3. One other button you should be aware of is the ⊗ cancel button on the bottom left corner of the form to cancel out of the form. Tap on the ⊗ button now. GanFeld then displays a warning message asking if you want to quit without saving. If you tap "Yes" then you lose all your data that you entered in the earth material form. We will tap "**No**".



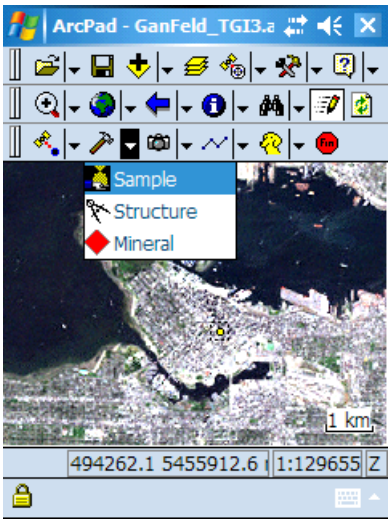
14. Now we've returned to the earth material form as it was before we tapped the cancel button.



15. There are many pages associated with the earth material form but let's assume we are finished describing the rock. Tap on the ok button and tap "**Yes**" when prompted to Save and quit. This operation saves the data which was not saved up until this point. After that you will return back to the map view in ArcPad and a yellow dot is added to the earth material layer with the information you entered on the earth material form.



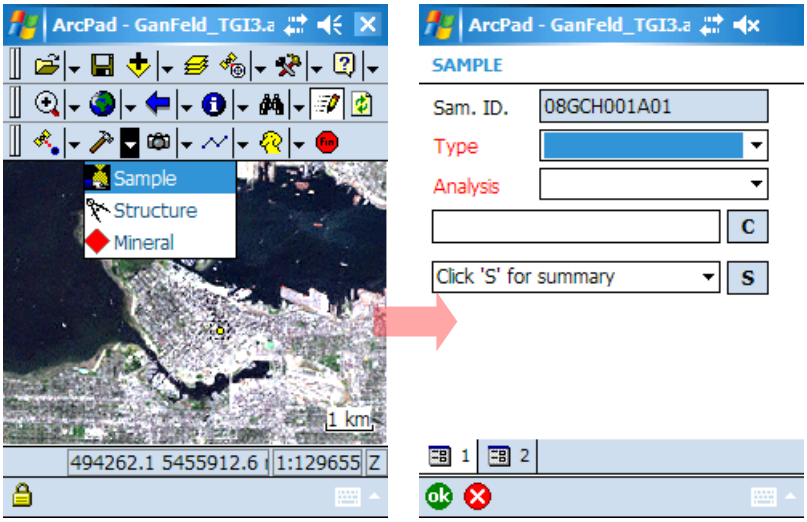
16. Now, if you tap on the drop-down menu next to the earth material icon you will see that the sample, structure, and mineral icons have been activated. You can now add in samples, structural measurements, and minerals for the earth material you just described in the previous steps.



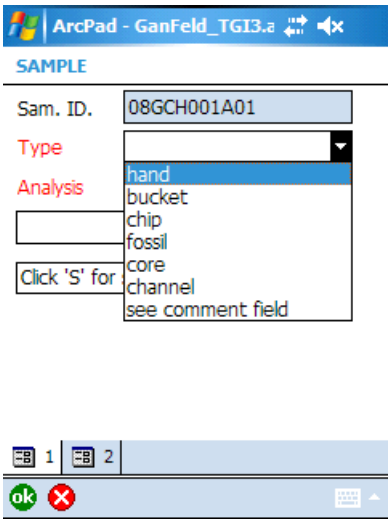
FIELD DATA COLLECTION IN GANFELD: ADDING SAMPLES AND STRUCTURES

After the earth material description is complete you may add in samples, structures, and minerals associated with that earth material. The relationship between earth material to sample, structures and minerals is one-to-many. In other words, we can add in many samples, structures, and minerals for the rock we have described in the previous step.

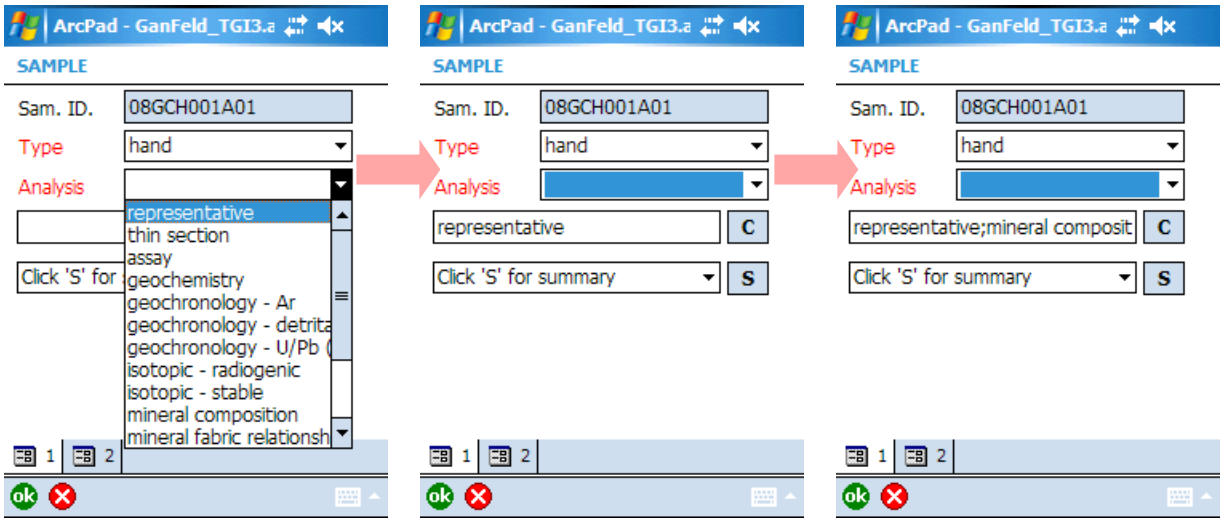
1. Tap on the "**Sample**" icon and you will now see the sample form.



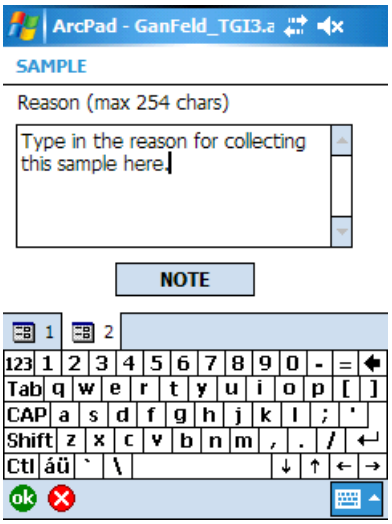
2. There a two labels in red on the form which means that you have to enter in a value for the two fields. Tap on the sample **Type** drop-down list and select "**hand**".



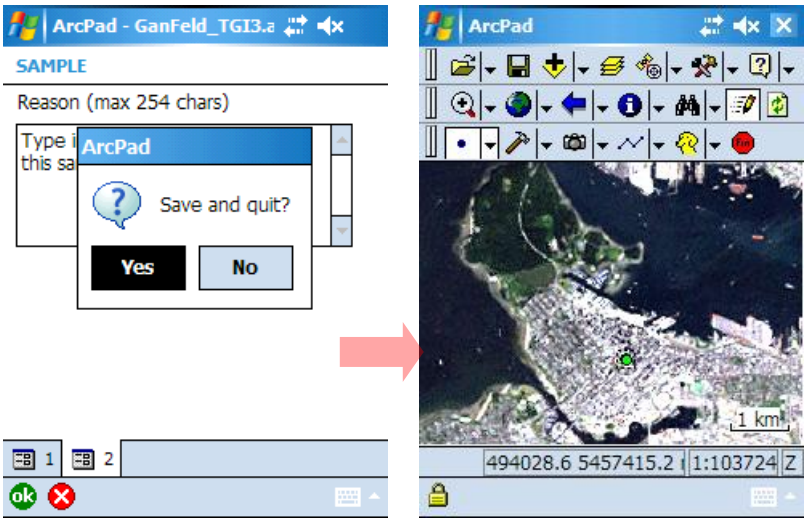
3. Now tap on the **Analysis** drop-down list and select "**representative**". Notice that the value "**representative**" is populated in the long text box below the drop-down list. The text box is a concatenated field that allows you to enter multiple analyses for the one sample. The "**C**" button is used to **clear** the values from the text box.



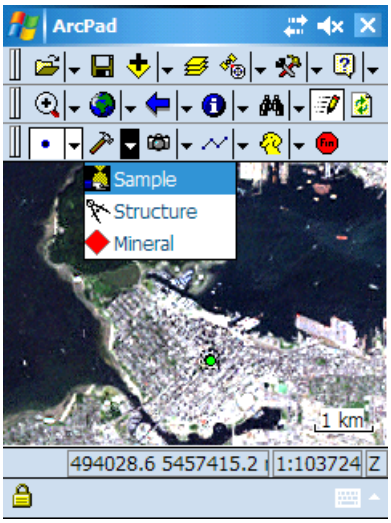
4. On page **2** of the sample form you may type in a more descriptive reason why you collected the sample. Remember, if you are going to type something longer than 254 characters then use the "**Notes**" button and add your description in a Pocket Notes file.



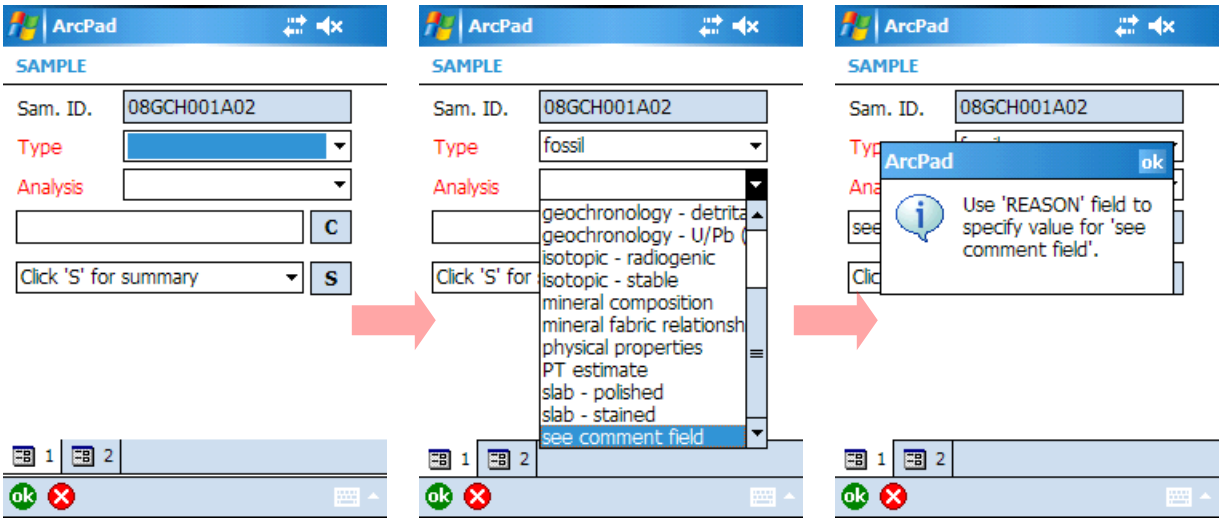
5. Tap ok button and then tap "**Yes**" to save and quit. You will notice a green dot on the map and that represents a sample point that you have just saved in the sample shapefile layer.



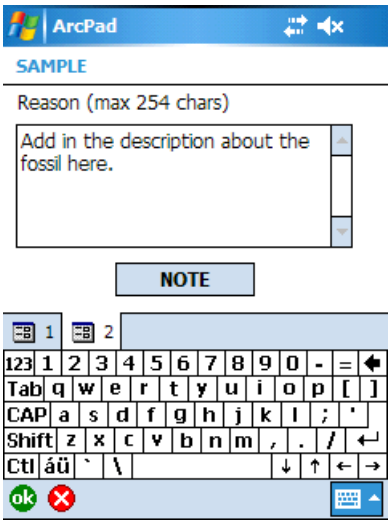
6. Now add another sample for the same rock by selecting the "**Sample**" icon like we did back in step 1.



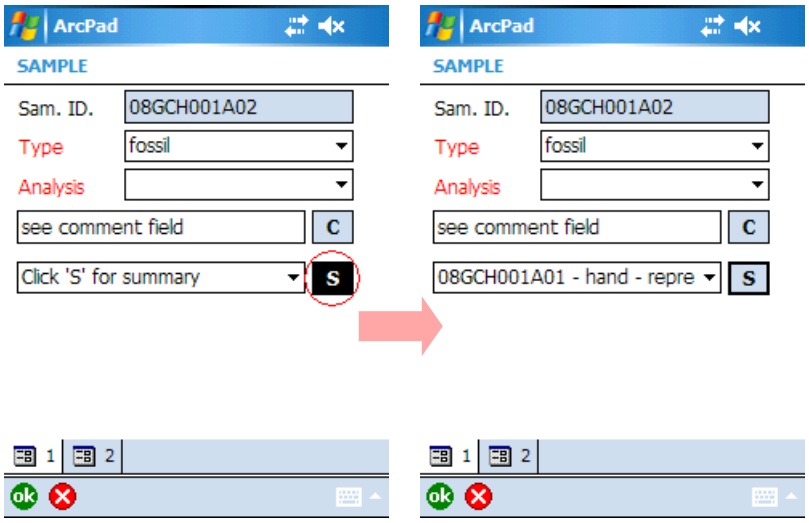
7. The sample form will appear but notice that the Sample ID (Sam. ID) has incremented and displays "**08GCH001A02**". The last two digits represent the incrementing sample number portion. This time we will imagine that we found a fossil. Select "**fossil**" for sample Type and then tap "**see comment field**" for sample analysis. GanFeld will show a message box to remind you to add in a description in the **reason** field. Tap "**ok**" on the message box.



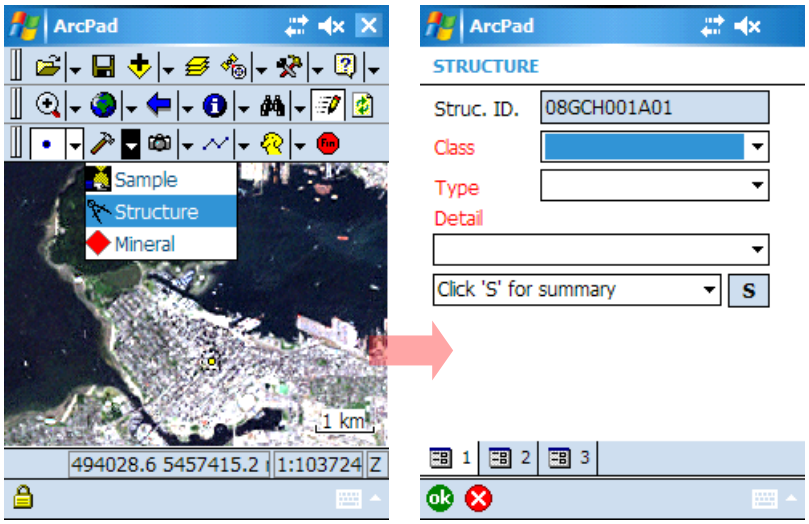
8. Tap on page **2** and you will see a text input box for adding in a reason for the collection of the fossil or you may add in more information about the fossil here.



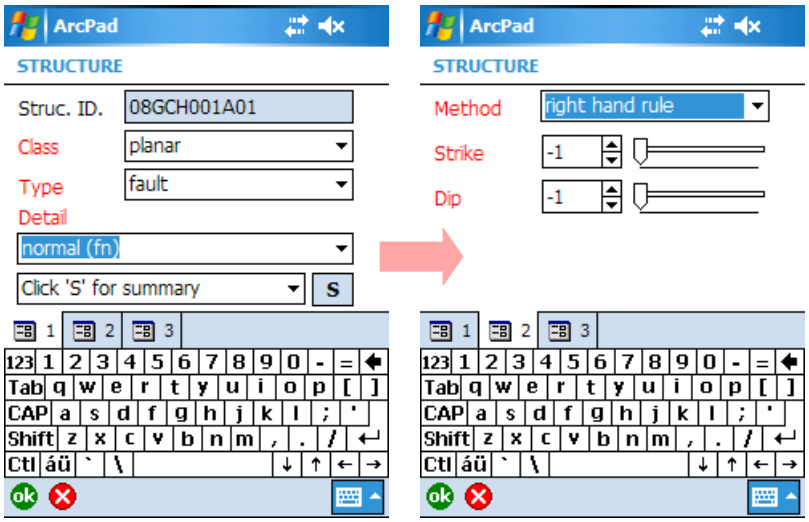
9. Tap on page **1** now. Let's take a look at what the "**S**" button is all about. Tap on the "**S**" button now. What you will see besides the "**S**" button are all the samples collected so far under the current rock description, and that is the first sample "08GCH001A01". This drop-down list is meant to summarize what sample types you have collected so far. Tap ok button to save and quit this sample record.



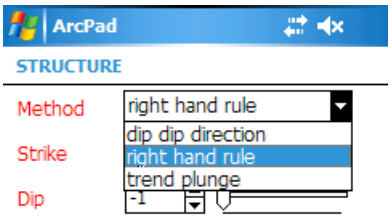
10. Let's add in a structural measurement for the rock we have described thus far. Tap on the "Structure" icon to display the structure form.

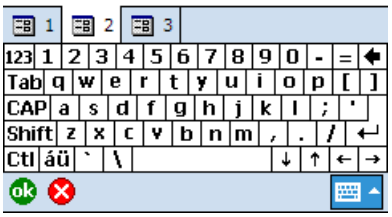


11. You will see the red labels indicating required fields as with other forms. For the structure form there are required fields in both page **1** and **2**. For page **1**, we'll add in a "**planar**" measurement for a "**fault**" type that is "**normal**". We add in the orientation measurements on page **2**.

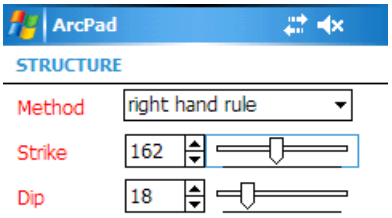


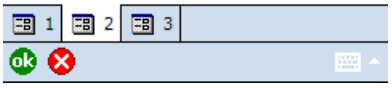
12. By default, the measurement method is right hand rule. However, if you tap on the drop-down list you will notice there are other methods available. Choose whichever method is appropriate with your project's standards.



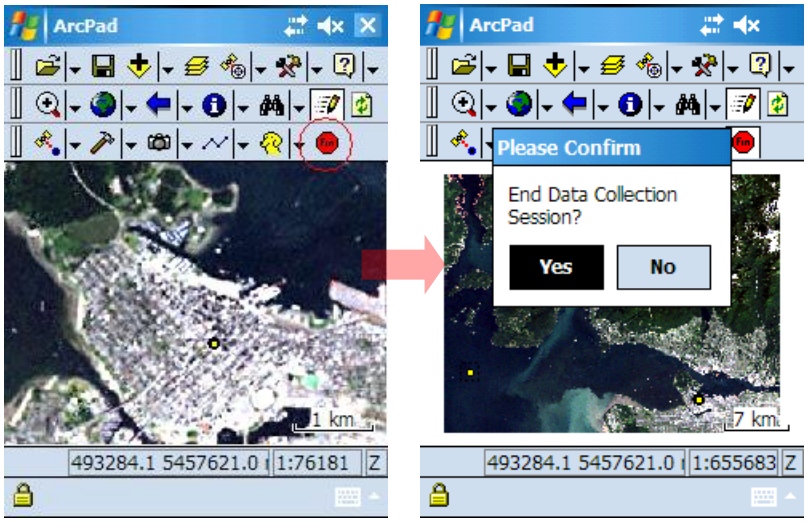


13. You can then enter a value using the slider bar, up/down arrows, or typing in the values.

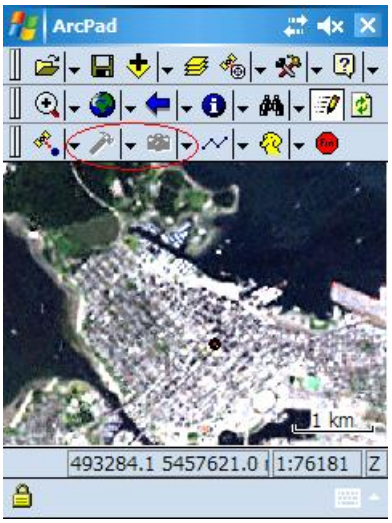




14. When you are done you can tap the button to save and quit the structure form. If you want to describe another rock at this station then you tap the icon for adding in another earth material and repeat the previous steps to then add in samples, structural measurements and minerals associated with the new rock. By now, you have a good idea how to use GanFeld. Let us assume that you are finished at this station stop so we are ready to continue your traverse elsewhere. Before you move on, tap on the button to have GanFeld close data collection at this station stop. When prompted to confirm this action, tap "**Yes**".



15. After ending the data collection at this station stop you will notice that the earth material and photo icons have been de-activated. You are now ready to start the field data collection process for a new location by describing the station stop first, then earth material, and then sample, structure, and mineral.

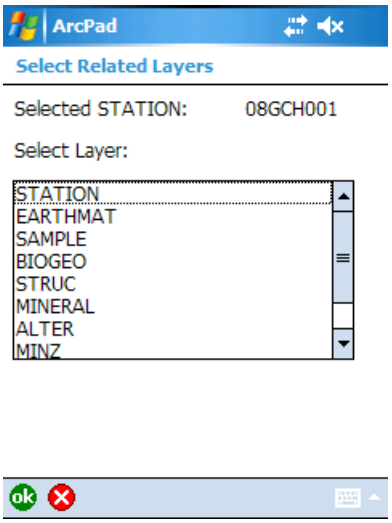


USING THE FETCH TOOL

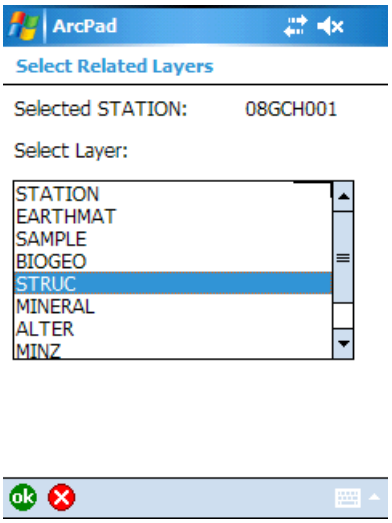
The Fetch tool allows you to edit or add existing data. This process will be demonstrated by adding a new structural measurement, as well as editing an existing one.

1. Tap on the "**Fetch**" button now. On the map, tap on the station stop you want to edit or add data to.

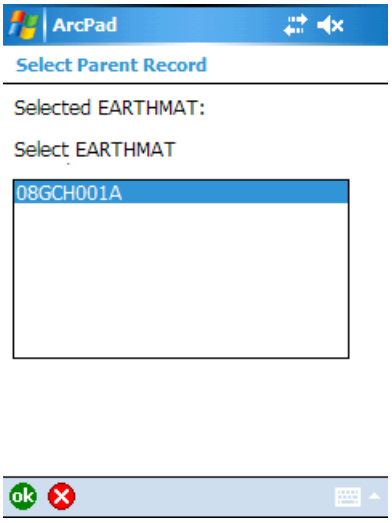
2. The Fetch form will appear indicating the station selected and the available layers to which edits or additions can be made.



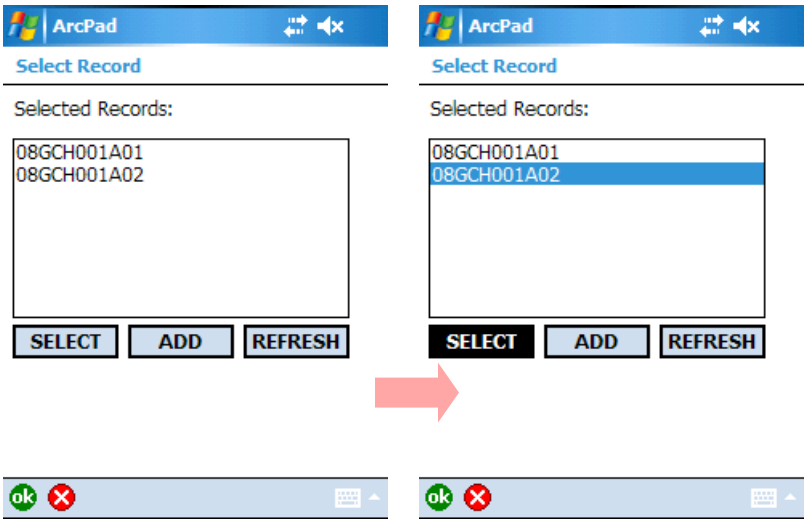
3. Tap on "**STRUC**" which is the layer containing structural measurements. Tap the ok button.



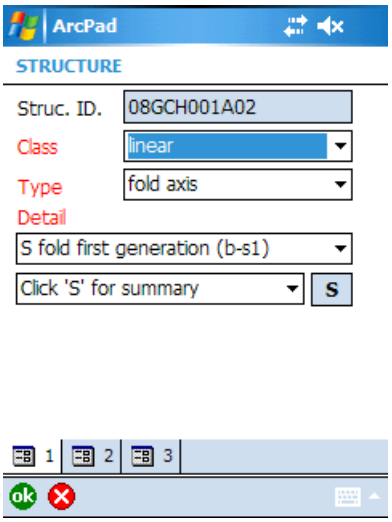
4. A form listing the different earth materials (rocks) will be displayed. Remember there can be more than one earth material at a station stop. In this example only a single earth material has been recorded. Tap on the earth material record "**08GCH001A**".



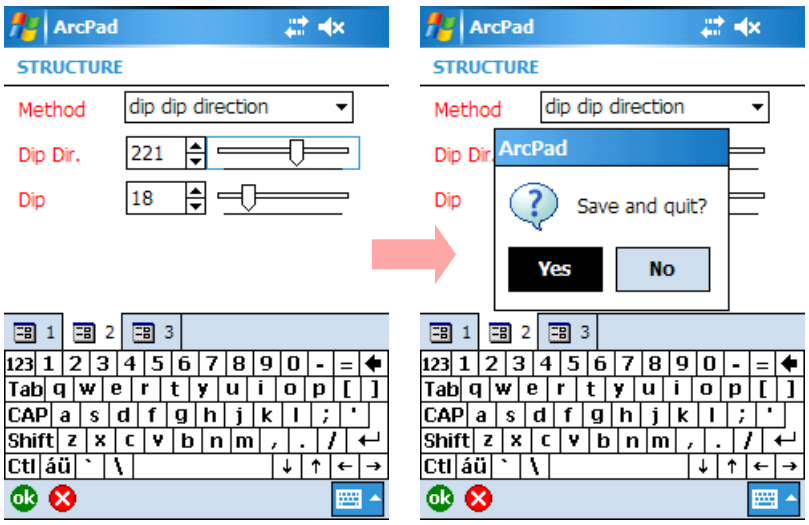
5. Finally a form listing the structural measurements for the selected earth material at the selected station stop is displayed. Tap on an entry "**08GCH001A02**", then tap the "**SELECT**" button to edit the record.



6. The Fetch tool will then retrieve the selected structural measurement record and display the structure form.

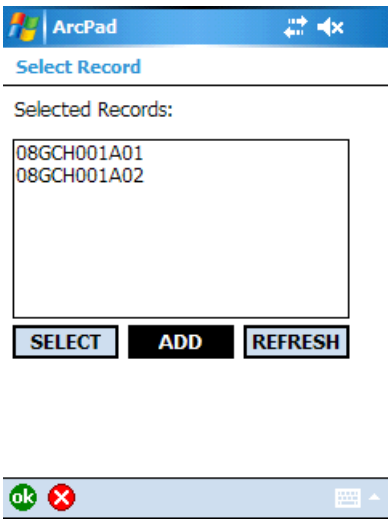


7. Entries within this record can now be edited. To save the edits and quit editing, tap on ok button.

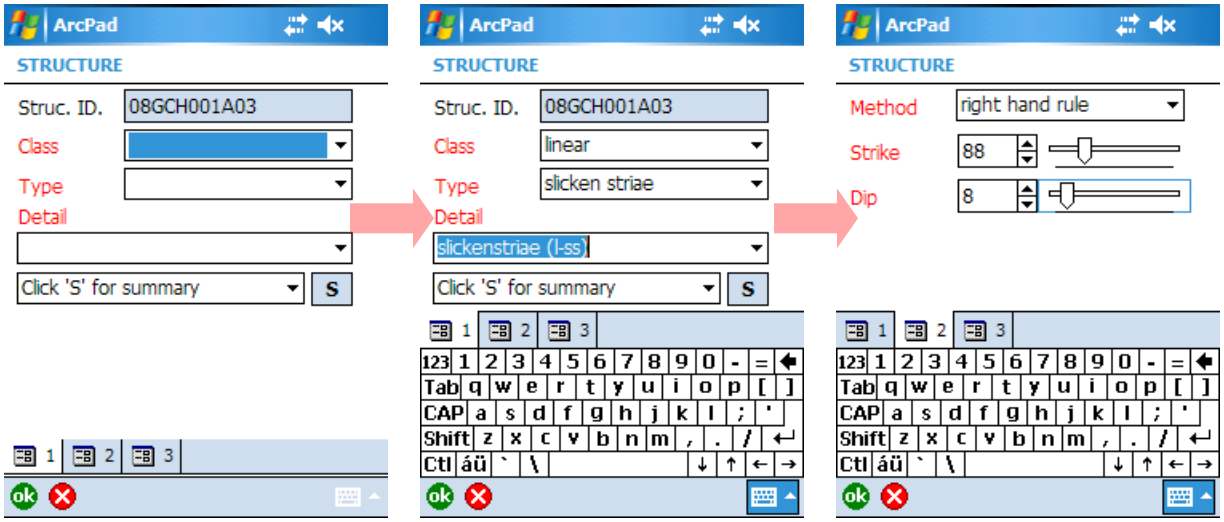


8. Then we are brought back to the Fetch form.

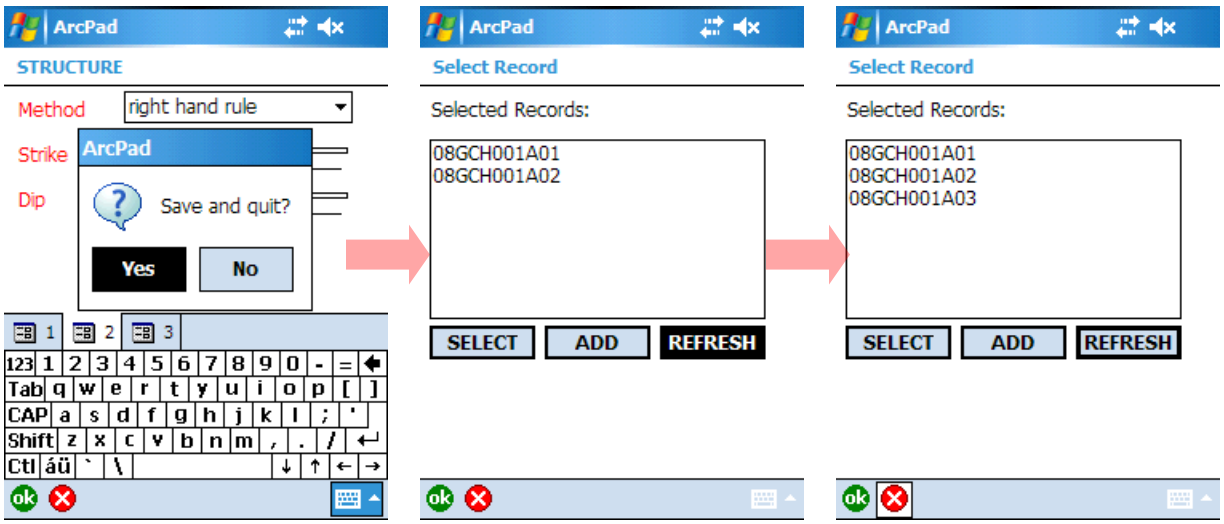
   Alternatively, the Fetch tool can be used to add a new record. Continuing on with the example above, to add a new structural measurement to the selected earth material, tap the "**ADD**" button.



9. Fetch will then open a new structural input form to add in new entries for this new structural measurement.



10. Tap the button and select "**Yes**" to save and quit. After saving, control returns to the fetch form. To display structural measurement record name that was added, tap on the "**REFRESH**" button.



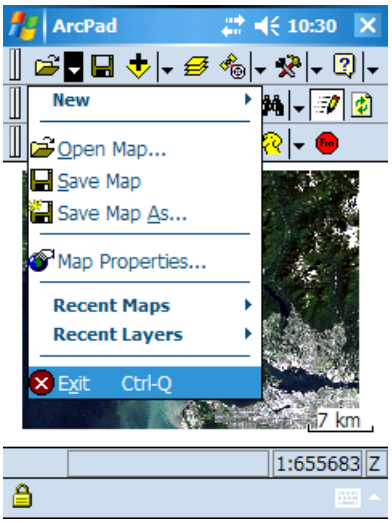
11. To close the "Fetch" tool tap on the button.

BACKING UP YOUR DATA

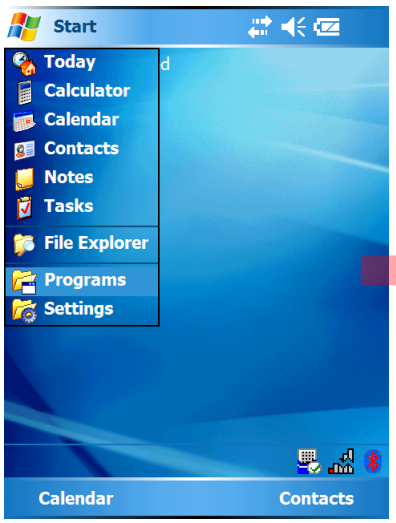
To safe guard the field data collected using GanFeld it should be backed-up regularly. This is a two part process. Part one consists of archiving the data to a memory card installed on your Windows Mobile device. Part two consists of archiving the data to a computer at base camp.

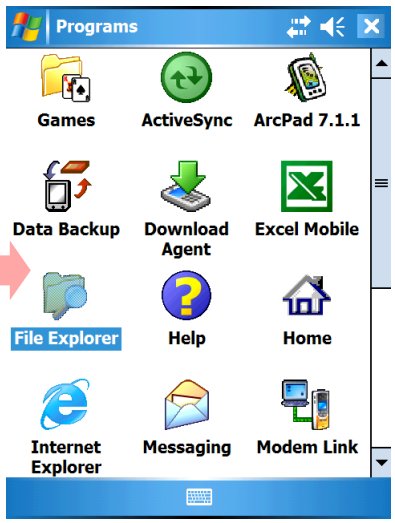
Part one, is accomplished solely with the Windows Mobile device and is therefore appropriate to do at the end of the day prior to returning to base camp. The exact steps are described below:

1. Exit out of ArcPad

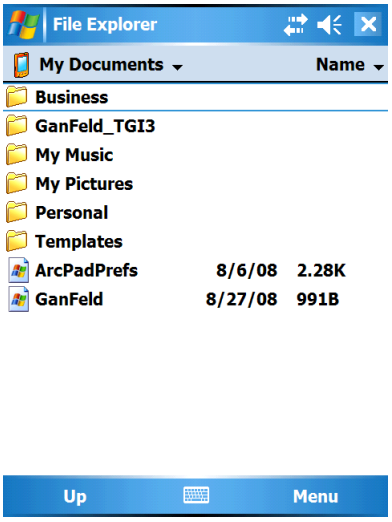


2. Tap on "**Start**", then tap on "**Programs**", then tap on "**File Explorer**".

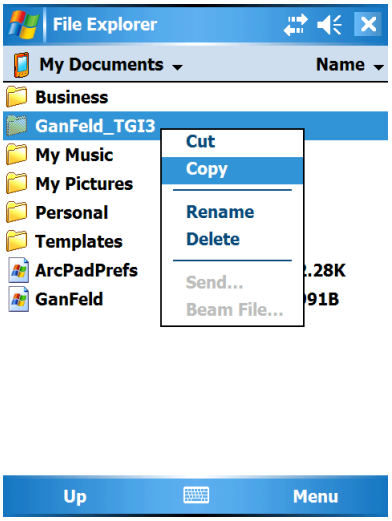




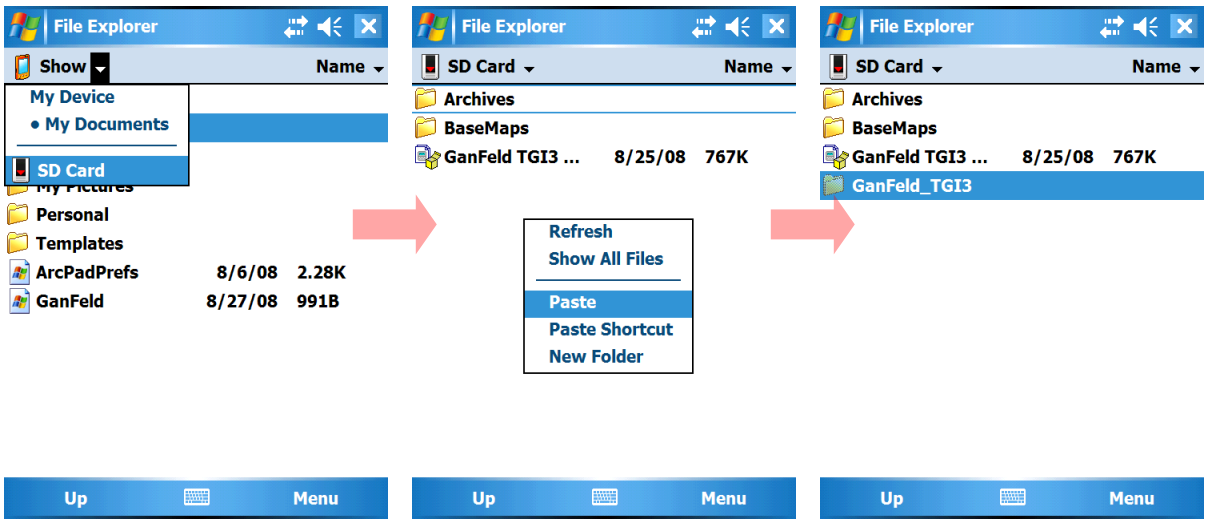
3. In File Explorer navigate to “**My Documents**” folder and locate your workspace folder containing the field data (by default this folder is called GanFeld, but will be whatever the workspace folder was called during the project setup).



4. Tap-hold on the folder until the context menu appears and select “**Copy**”.



5. Navigate to the memory card, tap-hold until the context menu appears and select "**Paste**".

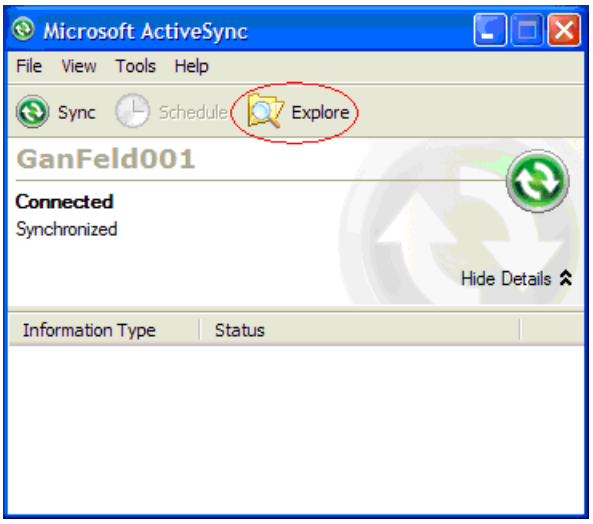


Tip: You may want to keep a backup of the workspace folder for each day rather than overwriting the same folder on your memory card. Rename the folder on the memory card by appending the date, e.g. "**GanFeld_TGI3_20080827**" so the workspace folder is uniquely named for each day.

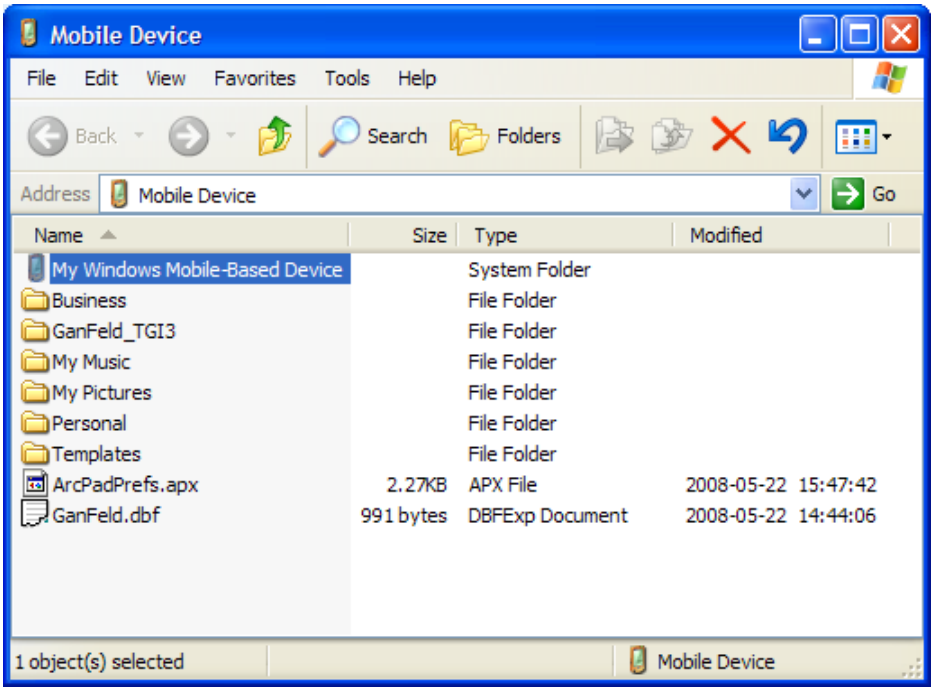
Part two, requires a Windows Mobile device and a computer and is therefore appropriate as a base camp operation. The exact steps are described below:

1. Exit out of ArcPad (if it is still in memory on your mobile device).

2. Establish an ActiveSync connection between the device and computer and click on "Explore" button



3. Open File Explorer and copy the folder containing the field data from the Windows Mobile device to the computer.



APPENDIX

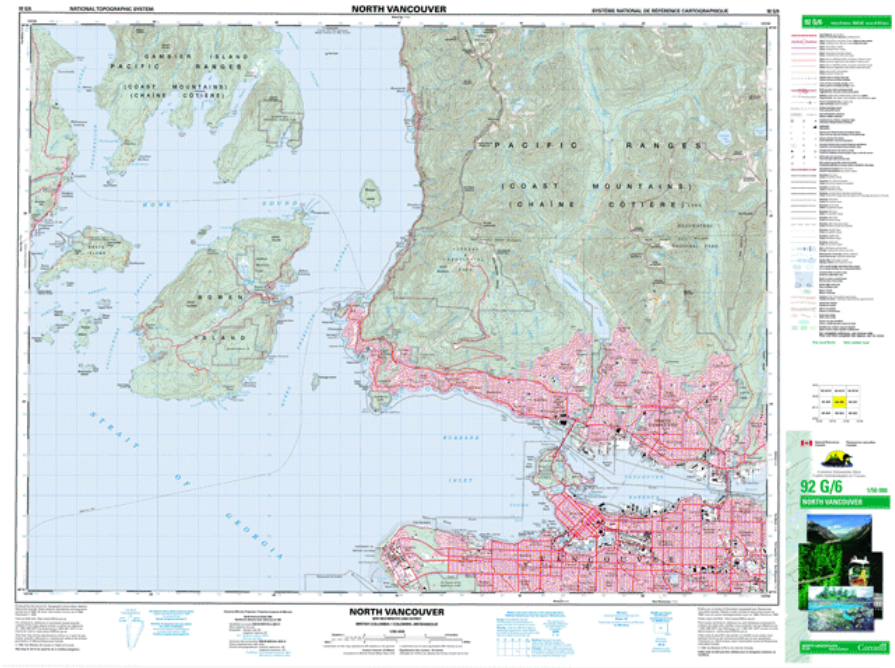
WHERE TO GET BASE MAPS

With ArcPad you can include a wide variety of base map information. ArcPad supports shapefile format for vector data and several georeferenced raster formats including JPG, BMP, TIF, PNG, SID, and GIF. The ECW image format is also supported provided you install the extension from ER Mapper.

Free base maps from Natural Resources Canada
GeoGratis (http://geogratis.cgdi.gc.ca/)
This internet site supplies free data to anyone and includes a wide variety of thematic and topographic maps and satellite imagery for download. Listed below are some of the available products:

1. CanMatrix (link: http://geogratis.cgdi.gc.ca/geogratis/en/product/search.do?id=10119)

   This link will allow you to access georeferenced (UTM projection) images of scanned maps of the National Topographic System (NTS) in NAD83. 1:250,000 and 1:50,000 NTS map sheets of Canada are available for download. Note: some of the maps scanned were from NAD27 hardcopy maps but all CanMatrix maps have been transformed to NAD83. Therefore, ignore the map border and UTM grid lines of a scanned NAD27 hardcopy map because it is not the correct reference to NAD83, however all the topographic features such as contours, lakes, roads, etc should be correct.



2. CanImage (link: http://geogratis.cgdi.gc.ca/geogratis/en/product/search.do?id=10757)

Landsat 7 orthoimages that have been processed based on the National Topographic System (NTS) 1 :50,000 index.

3. National Topographic Data Base (NTDB), (link: http://geogratis.cgdi.gc.ca/geogratis/en/product/search.do?id=8147)
   Vector topographic files such as contours, hydrology (rivers and lakes), vegetation, roads, and etc.

GeoBase (http://www.GeoBase.ca)

1. Canadian Digital Elevation Data (http://www.geobase.ca/geobase/en/data/cded/index.html;jsessionid=29D4CA0F631C7292DFCCCF8AB9307F22)

2. National Hydro Network (http://www.geobase.ca/geobase/en/data/nhn/index.html)

3. National Road Network (http://www.geobase.ca/geobase/en/data/nrn/index.html)

Free base maps from the Provincial Government of British Columbia
Land and Resource Data Warehouse (http://www.lrdw.ca/)
TRIM Raster base maps as tif files are available in UTM projection.

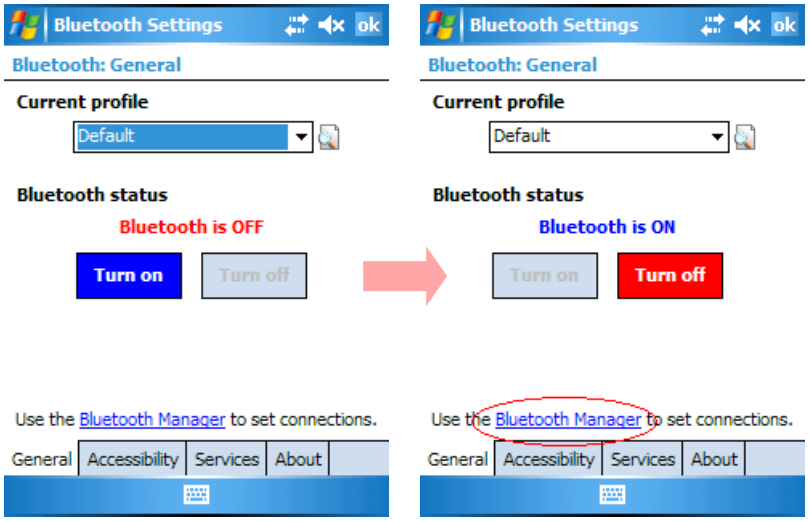
SETTING UP AND TROUBLESHOOTING BLUETOOTH GPS WITH YOUR WINDOWS MOBILE DEVICE

Please refer to the manufacturer's manual first to see if you have configured your GPS device correctly. Setting up an external Bluetooth GPS requires that you establish a connection between the GPS unit and your Bluetooth capable Windows Mobile device. The exact setup procedure varies with each Windows Mobile device and GPS. Below are the steps required to link an HP Ipaq hx2790b Windows Mobile device and a US GlobalSat BT359W Bluetooth GPS.

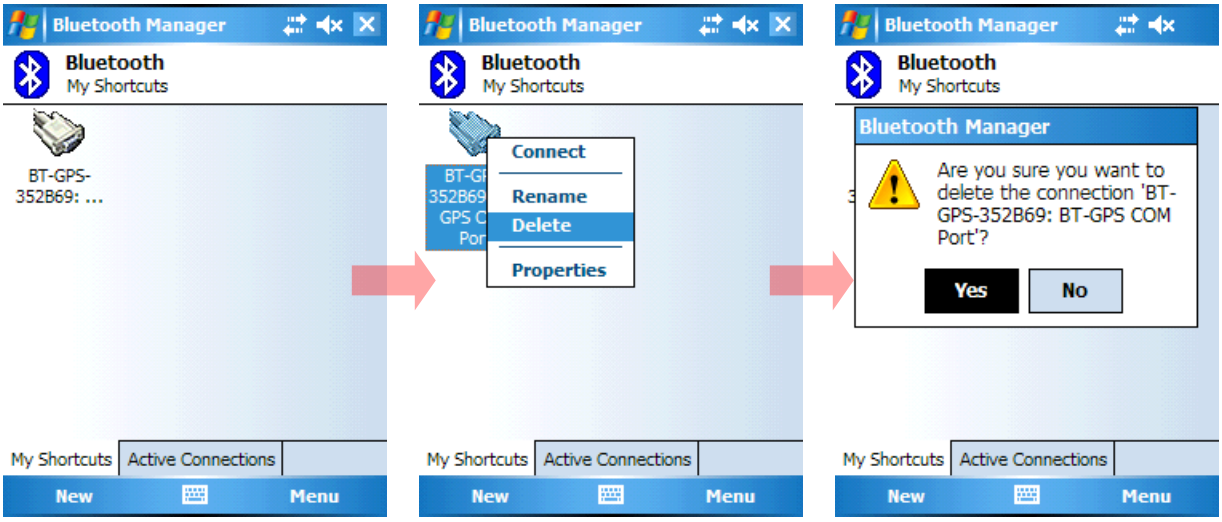
1. Turn on both the Windows Mobile device and Bluetooth GPS.

2. On the Windows Mobile device tap "**Start**". Tap on "**Settings**". Tap on the "**Connections**" tab. Finally, tap on the **Bluetooth** icon to display the Bluetooth Settings section.

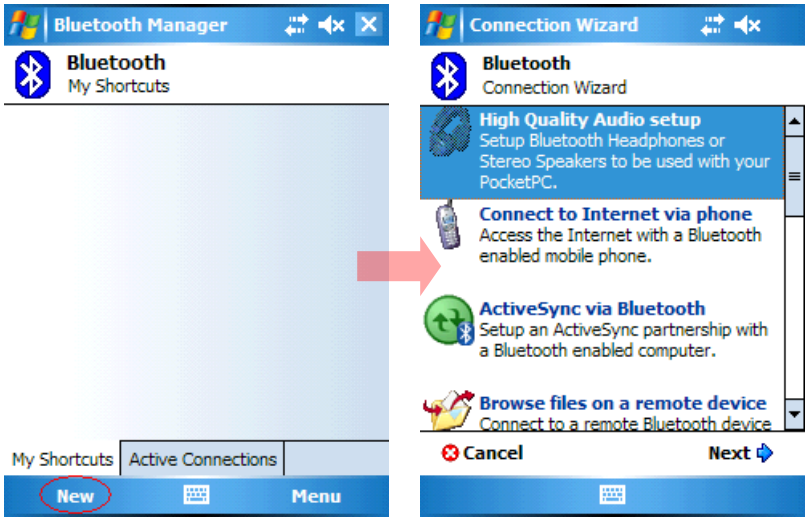
3. Tap on "**Turn on**" button to begin transmitting a wireless signal. This will be indicated by a blinking blue LED light on your Windows Mobile device. Next, tap on the "**Bluetooth Manager**" link



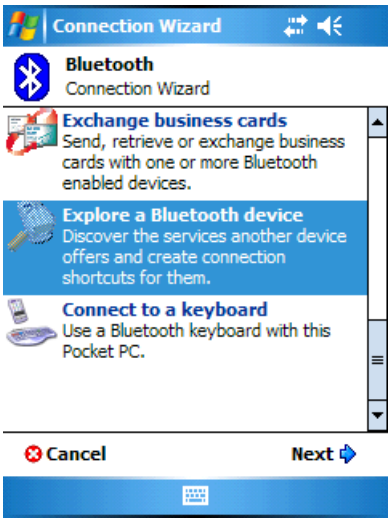
4. If a GPS shortcut icon exists on the **Bluetooth Manager** screen then delete the shortcut. If there are no shortcuts displayed then go to step 5. To remove an existing connection tap-hold on the shortcut until the context menu appears, then select "**Delete**". A confirmation message box will appear, tap on "**Yes**" to delete.



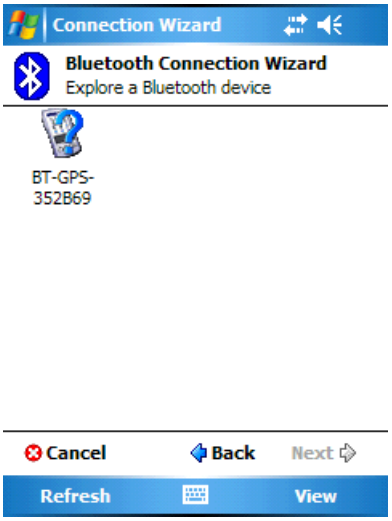
5. To create a GPS connection, tap on the "**New**" button located on the bottom left and the Connection Wizard form will appear.



6. Select "**Explore a Bluetooth device**" and tap on "**Next**".

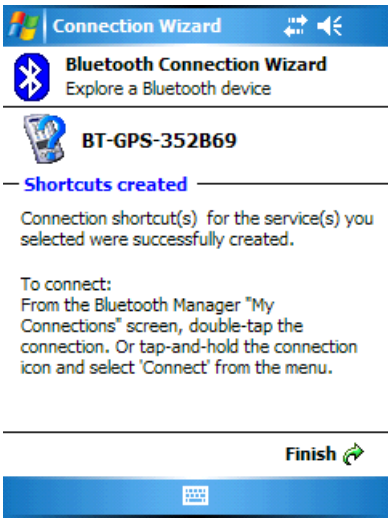


7. The Connection Wizard will search for your Bluetooth GPS. Once a connection has been established a connection shortcut (BT-GPS-xxxxxx) will appear. Tap on "**BT-GPS-xxxxxx**". Please note that both the GPS and Windows Mobile device are Class 2 Bluetooth devices so the broadcast range is around 10 m.

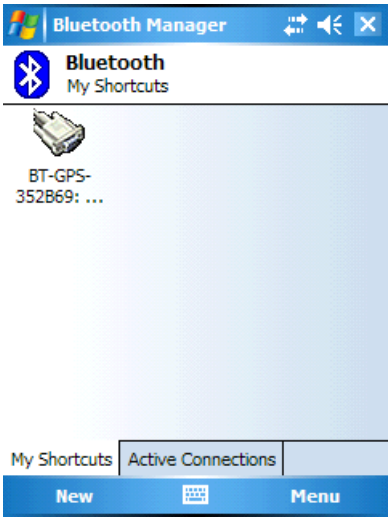


8. The Connection Wizard will assign the Bluetooth GPS a serial port and select "**BT-GPS COM port**". Tap on "**Next**".

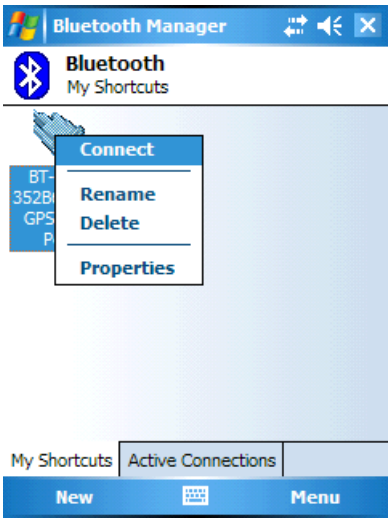
9. At this point a communication link has been established between your Windows Mobile device and GPS. Tap on "**Finish**" to save this link to a shortcut.



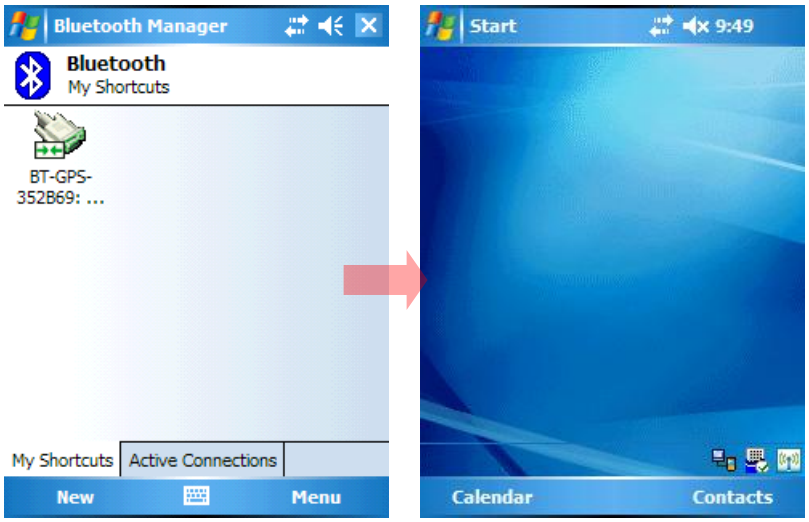
10. We are back at the Bluetooth Manager screen and now you will see your Bluetooth GPS connection shortcut.



11. Double-tap the shortcut to connect to the Bluetooth GPS, or tap-hold the shortcut and a menu will appear, select "**Connect**".



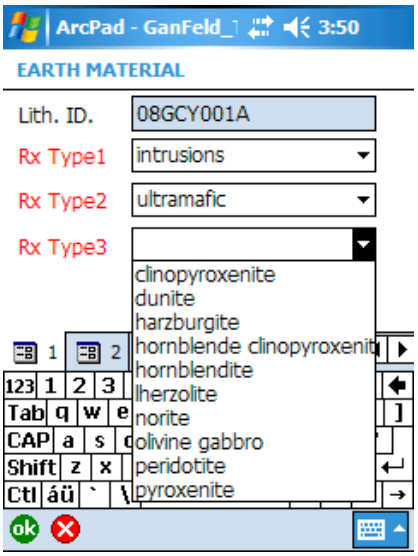
12. Once you are connected you should see your shortcut icon with two green arrows pointing at each other and this indicates that there is a live communication link between the GPS and your Windows Mobile device. Tap on the "**x**" button to close this screen. Close all the other screens until you get back to the Today screen on your Windows Mobile device.



13. Start up ArcPad and select your GanFeld project and follow the previous steps outlined in section: Setting up the GPS in ArcPad.

EDITING THE LOOKUP TABLES

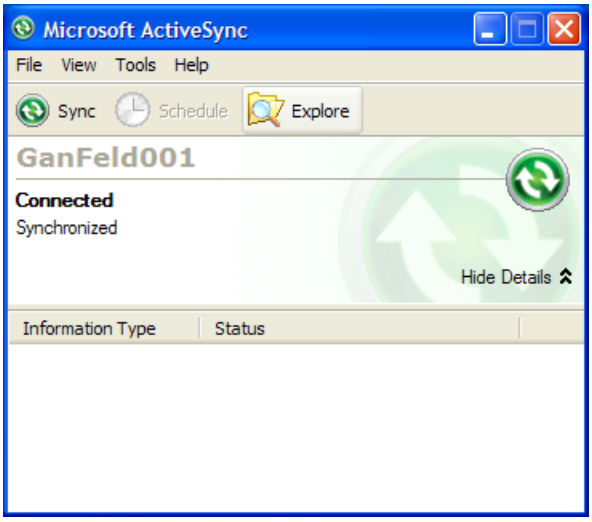
CAUTION! Please follow the methods below carefully if and when you decide to change the values in GanFeld lookup table. Remember that you cannot add another field or a new pick-list in GanFeld using the process described below. This method is restricted to editing existing lookup tables for populating hard-coded fields. Any additional fields you may want to add will require further programming.



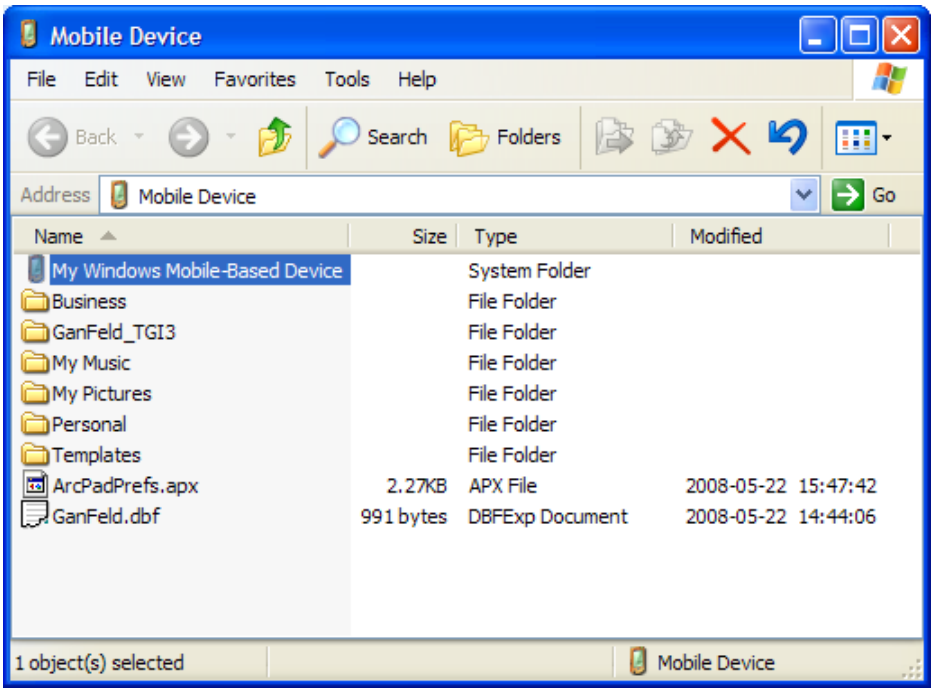
The easiest way to make changes to the values in your drop-down list (also called a combo box or pick-list) is to use the free software, **DBF Explorer** by **Pablo Software Solutions**. It allows you to edit and delete fields and records in the dbf lookup tables that GanFeld uses to populate the drop-down list. Make sure that when you edit a dbf lookup that you backup the original lookup table before doing the edits.

Step 1: Download DBF Explorer from this link http://www.pablosoftwaresolutions.com/html/dbf_explorer.html

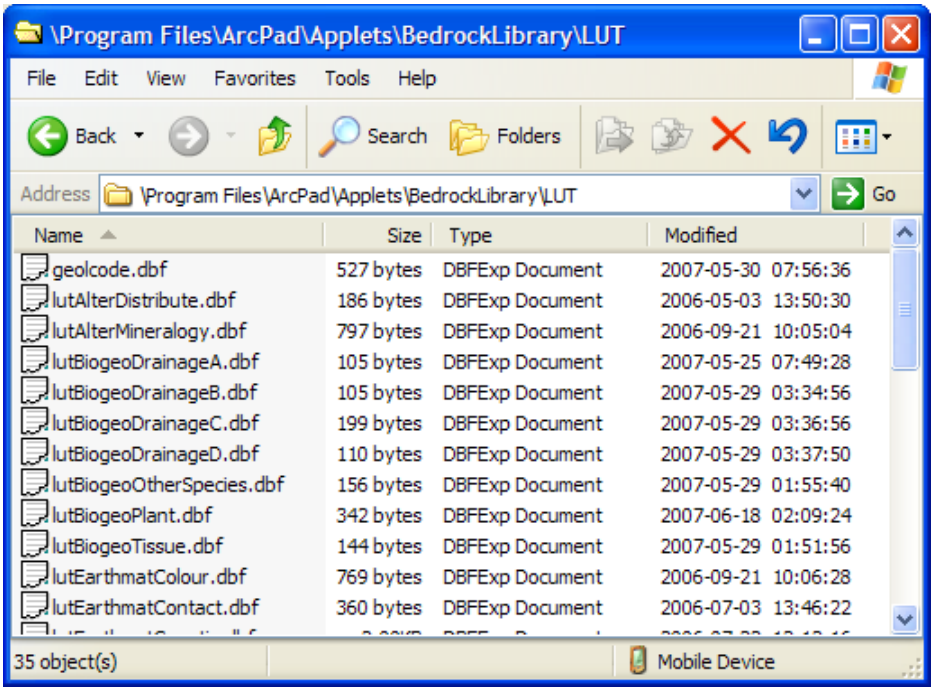
Step 2: Connect you Windows Mobile device to your computer to startup Microsoft ActiveSync. Make sure that ArcPad is not running on the Windows Mobile device. Click on the "**Explore**" button.



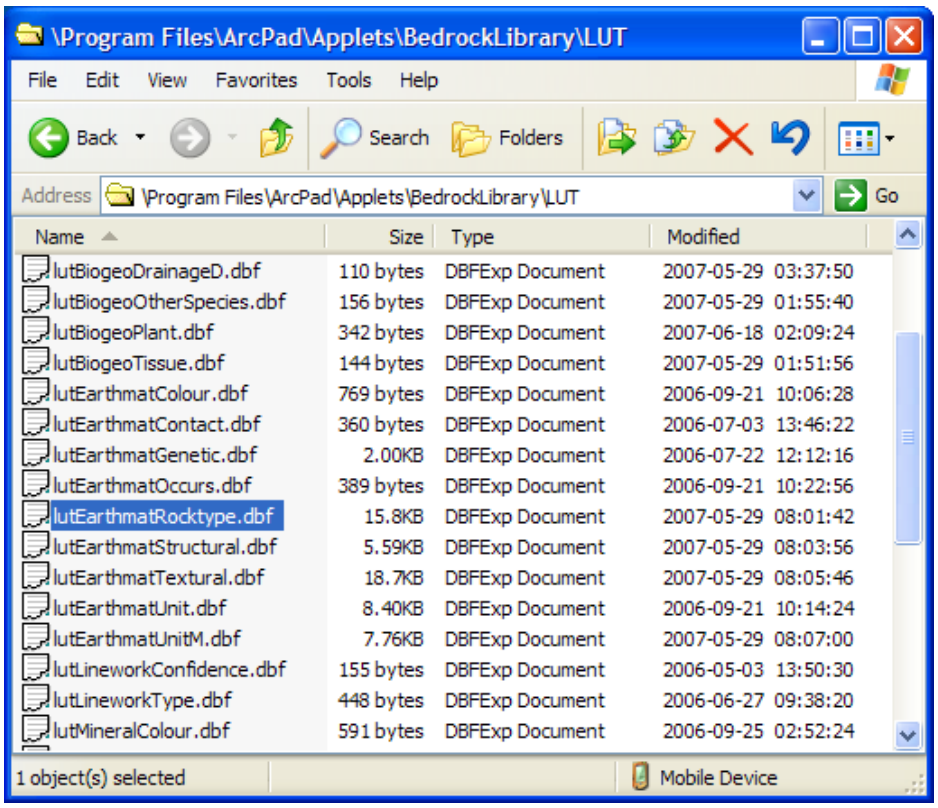
Step 3: File Explorer showing the contents of your Windows Mobile device will appear.



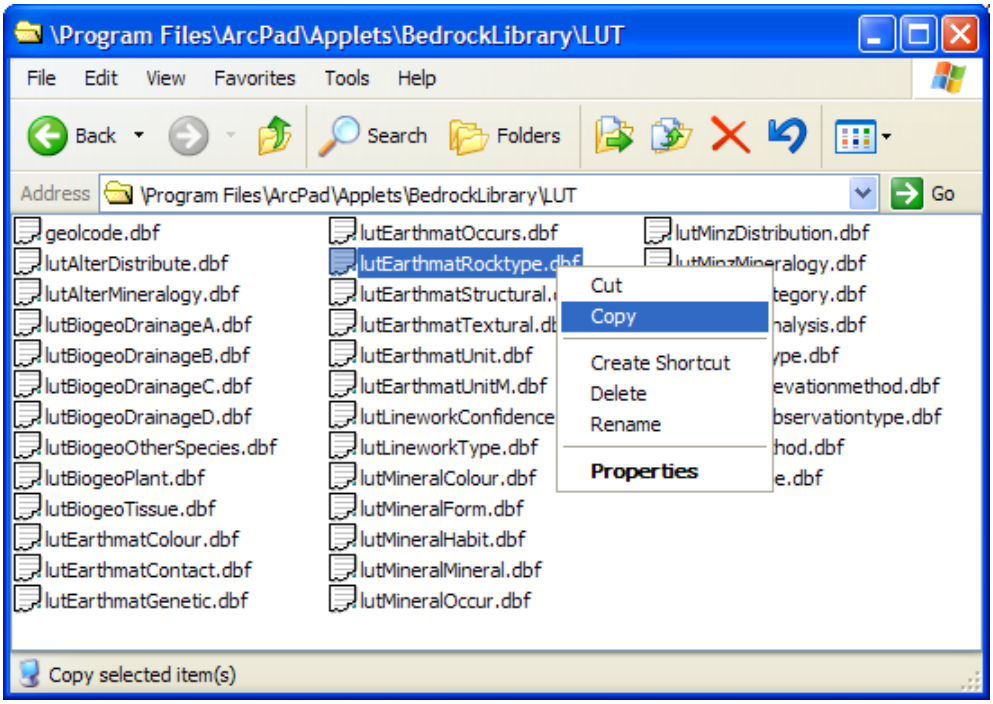
Step 4: Navigate to the location of the lookup tables, i.e., "**\Program Files\ArcPad\Applets\BedrockLibrary\LUT**" folder on your device.



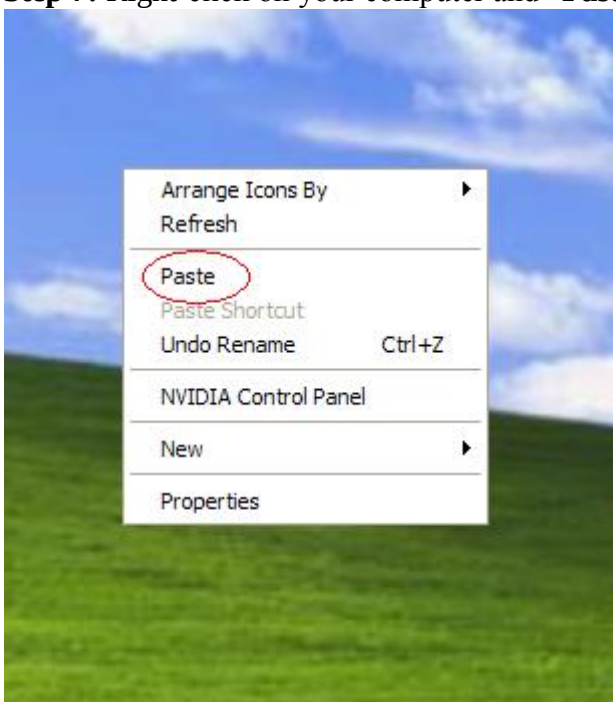
Step 5: The name of each file begins with a prefix of "lut" (short for "**l**ook **u**p **t**able", e.g. **lut**EarthmatRocktype.dbf). After "lut" is the name of the shapefile layer the lookup table belongs to such as "Earthmat" in the lut**Earthmat**Rocktype.dbf file. After the shapefile layer name is a description of what field or fields the dbf file is used to populate. Again let's use the "lutEarthMat**Rocktype**.dbf" example. This lookup table is a special case in that it is used to populate three related fields in Earthmat shapefile.



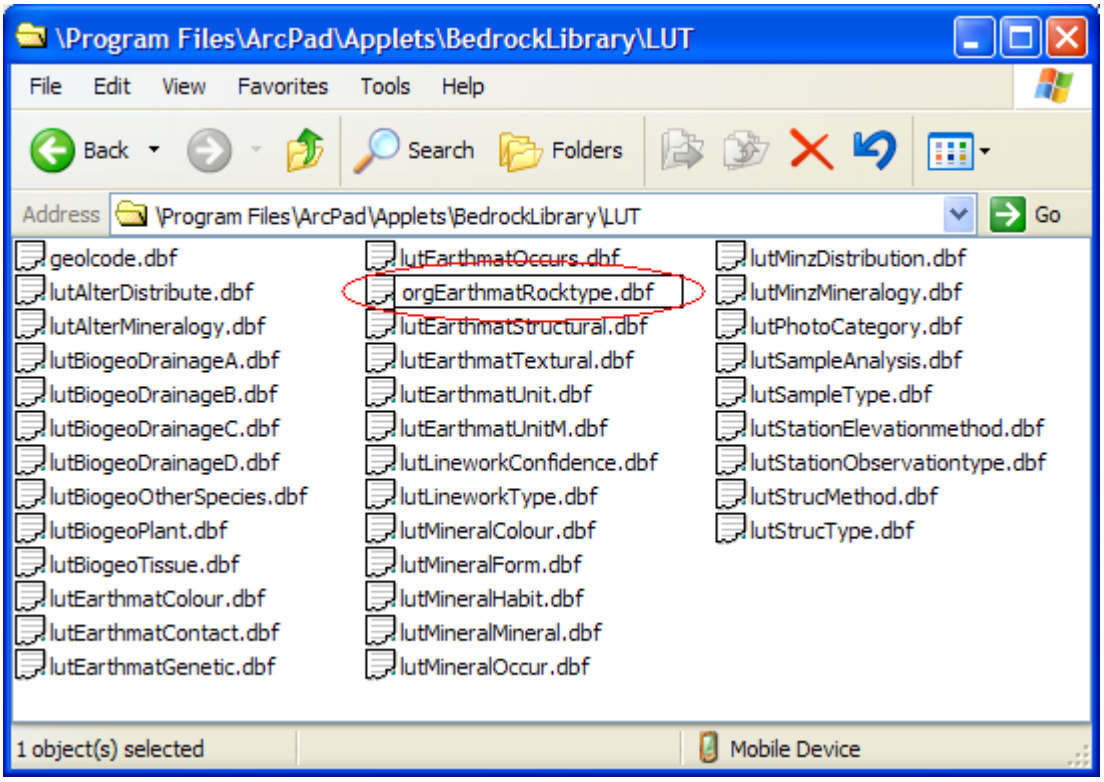
Step 6: Select and the lookup table you would like to edit and **copy** it to your computer.



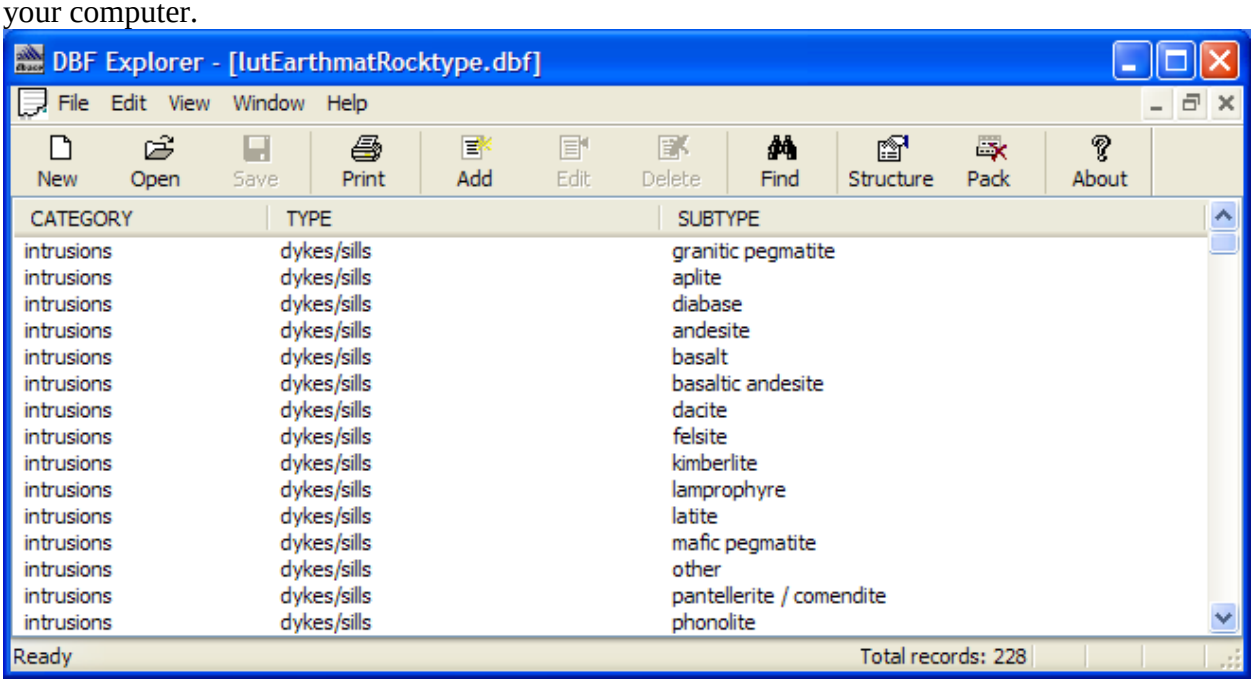
Step 7: Right-click on your computer and "**Paste**" the lookup table onto your desktop.



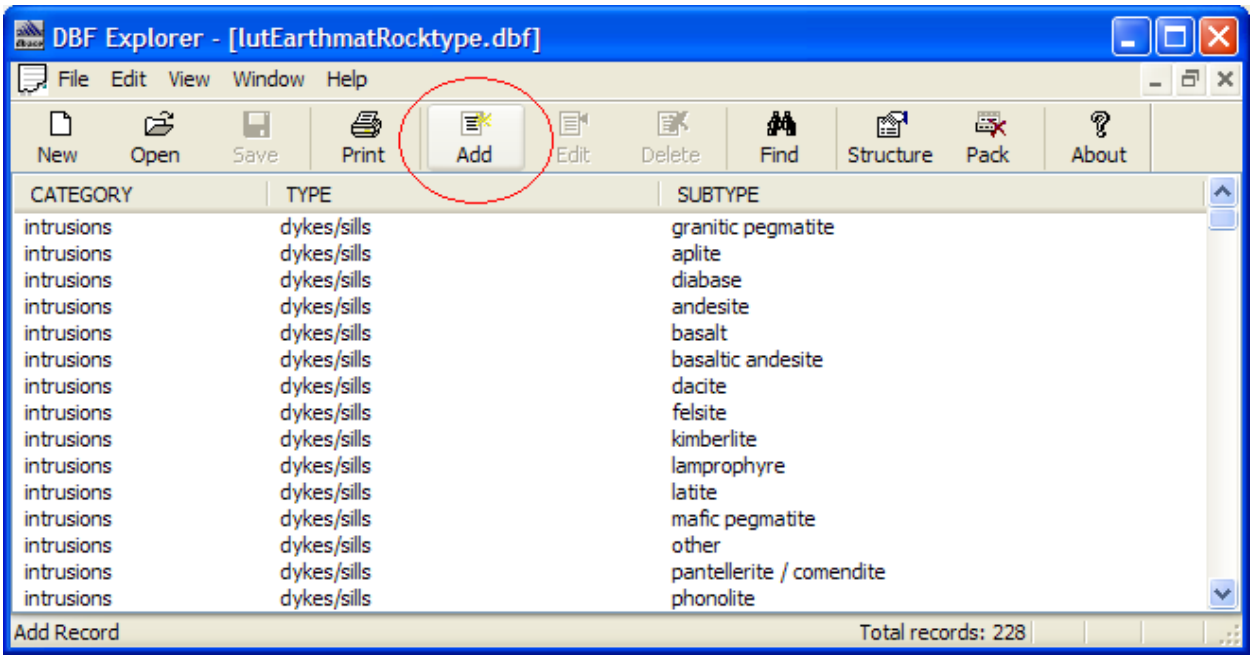
Step 6: After pasting the lookup table from your Windows Mobile device to the desktop on your computer, rename the original lookup table on your Windows Mobile device to something different like “orgEarthmatRocktype.dbf”. That is change the prefix of “lut” to “org” for “original”.

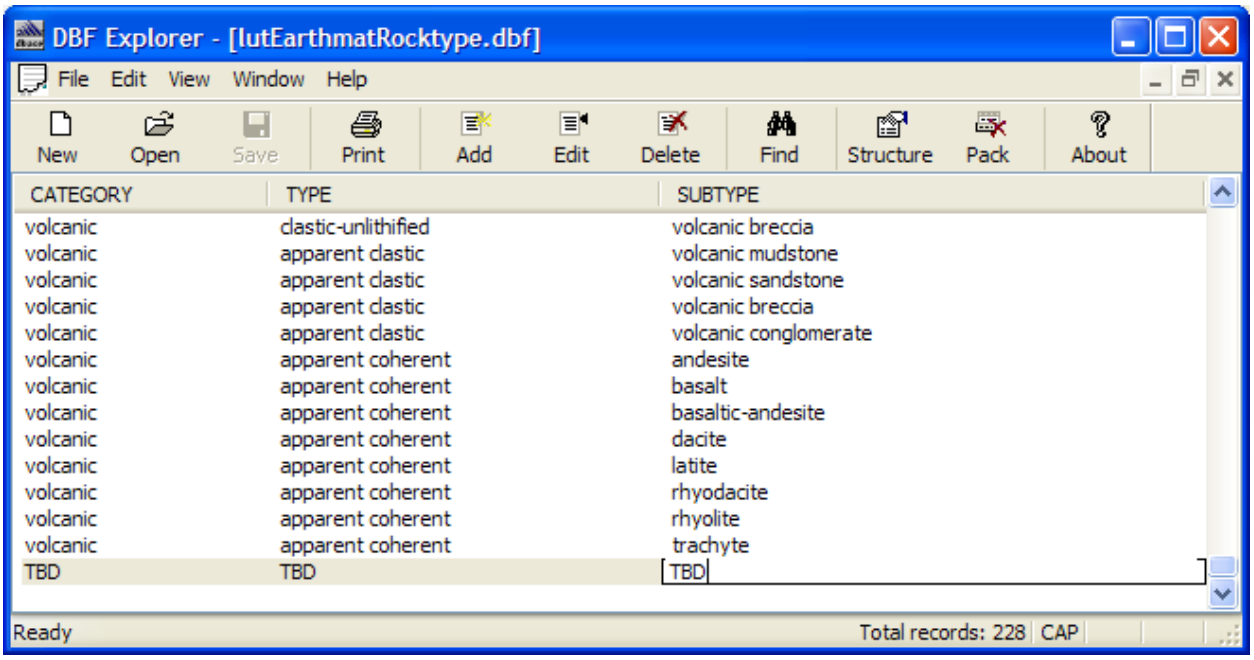


Step 7: Now startup DBF Explorer and open “lutEarthmatRocktype.dbf” where you copied it to your computer.

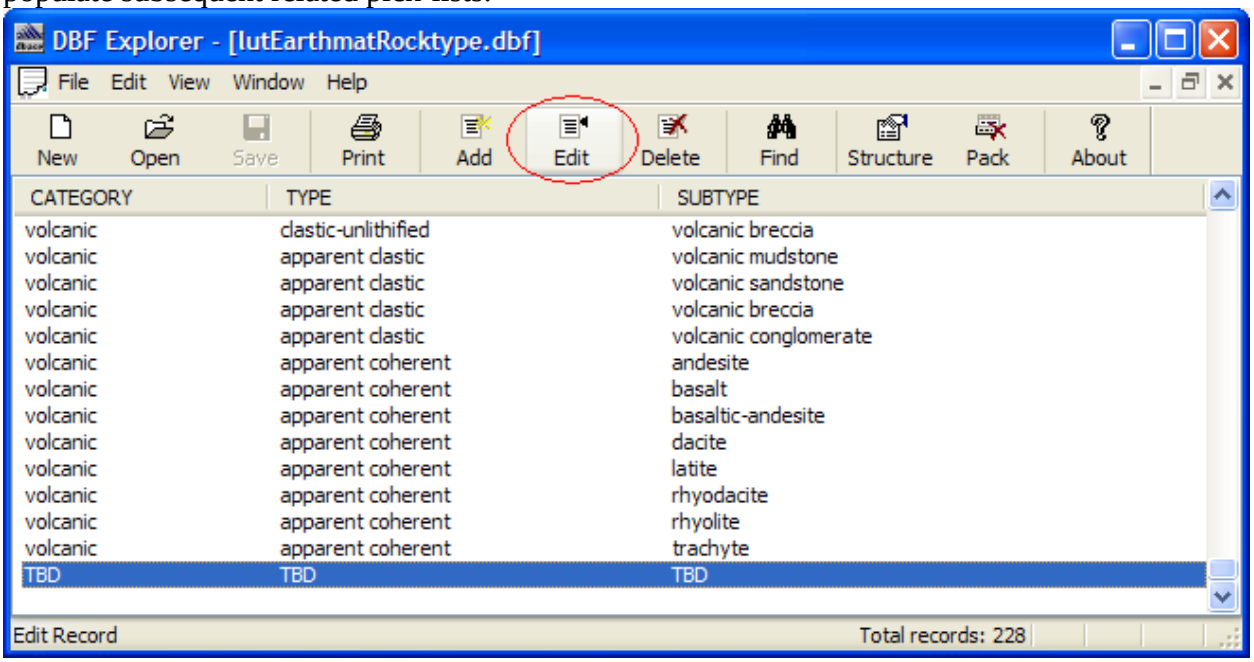


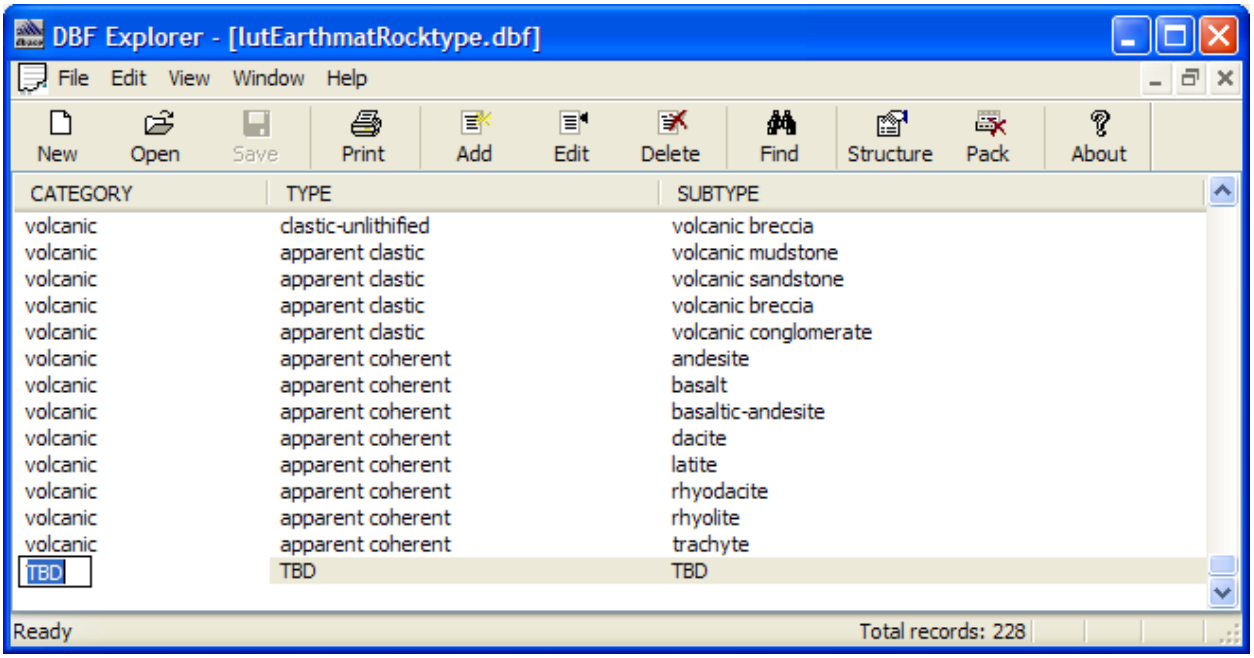
Step 8: To add records using DBF Explorer, click on the "**Add**" button and type in the new values.



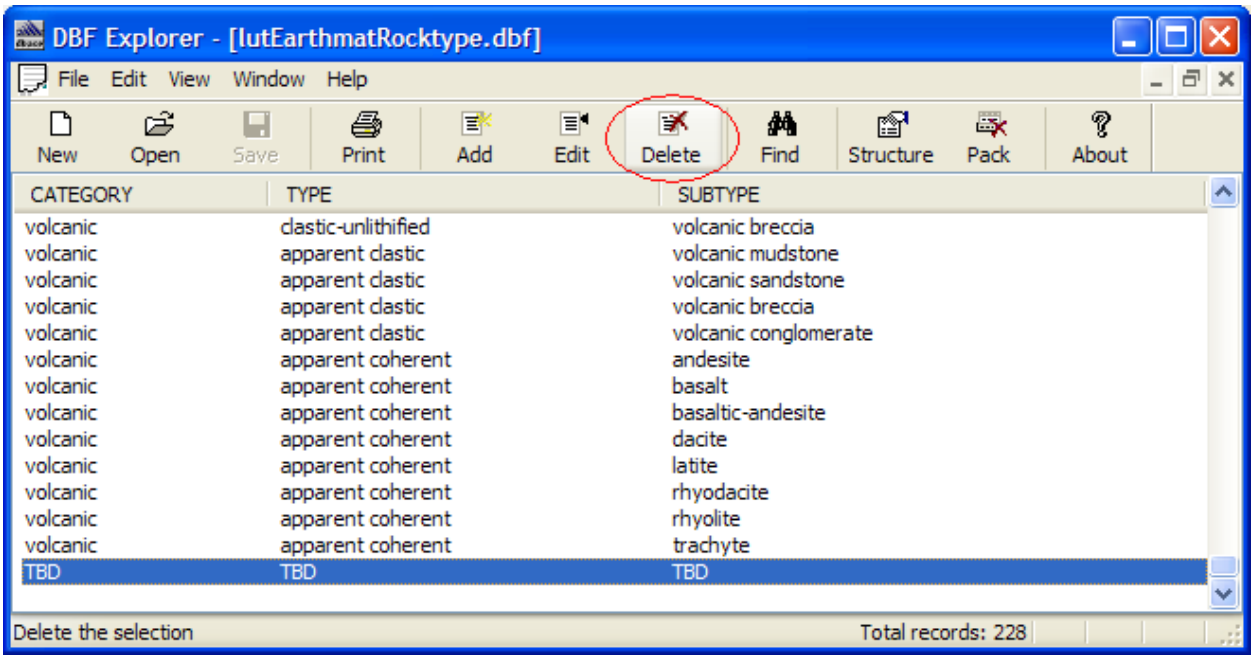


Step 9: To edit a record you just have to double-click on the value or select the "**Edit**" button to make the changes. However, be careful when editing a lookup table with multiple columns such as this one because this is a hierarchical pick-list and the values from the "SUBTYPE" is dependant on the values in "TYPE", and in turn the values in "TYPE" is dependant on "CATEGORY". In other words, GanFeld uses this hierarchical design to filter the values that populate subsequent related pick-lists.

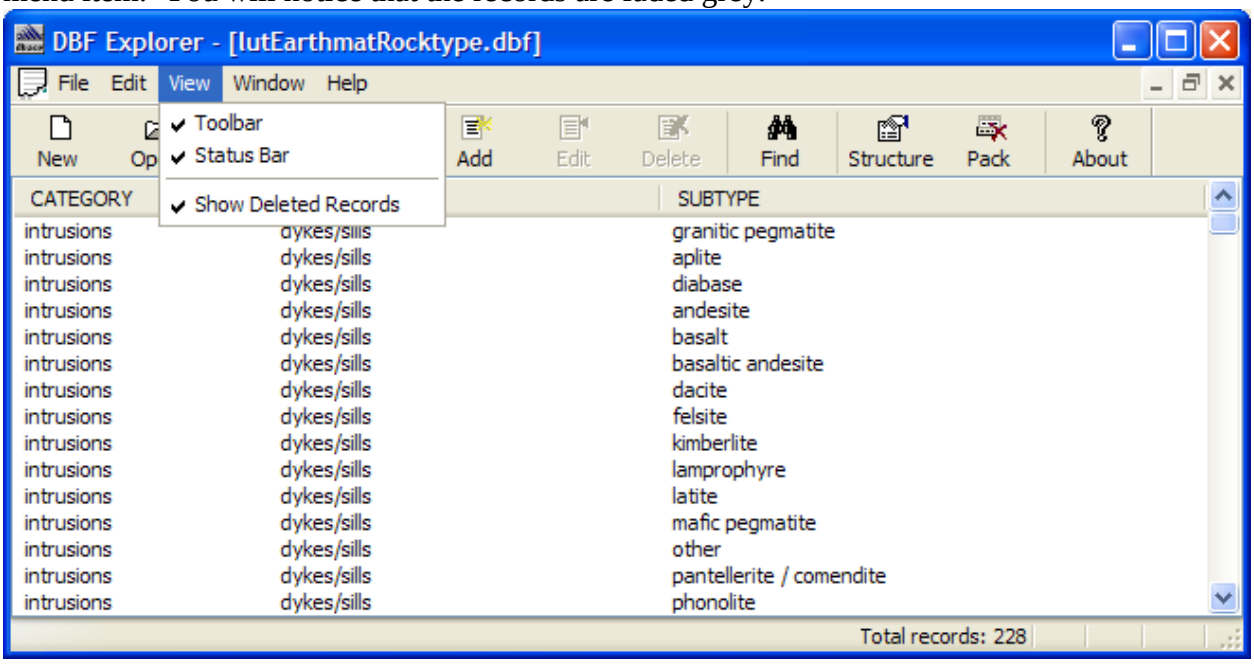




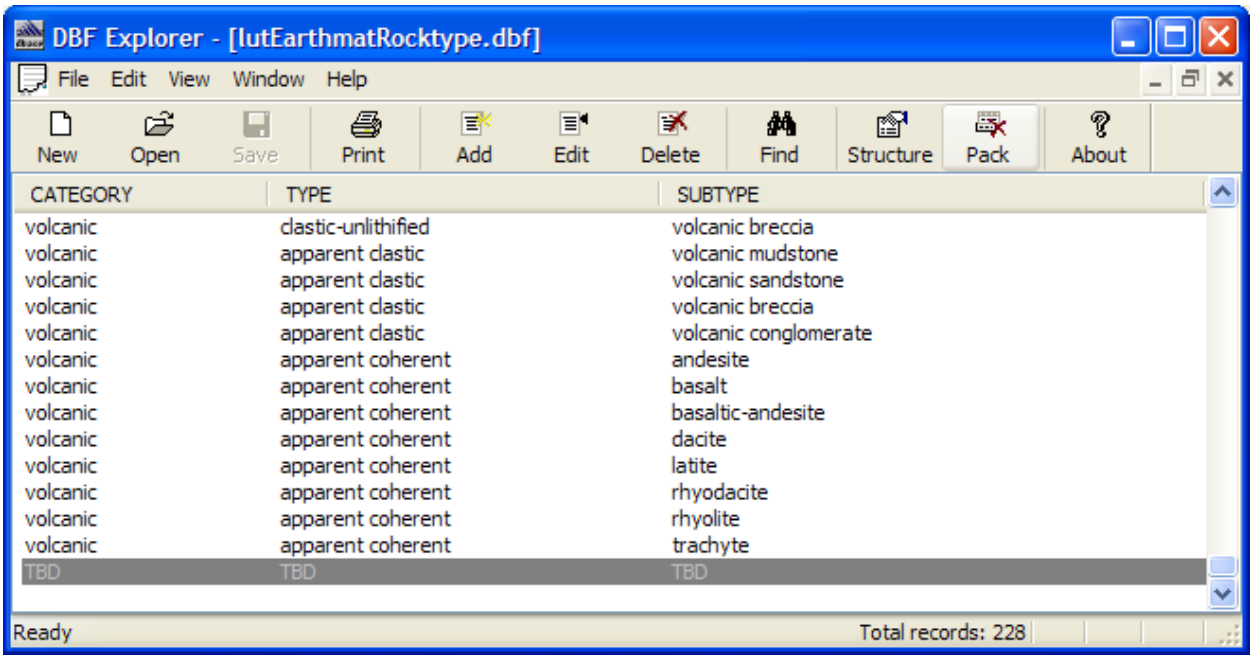
Step 10: Deleting records in DBF Explorer is a two step process. First select the record(s) and click on the "**Delete**" button.



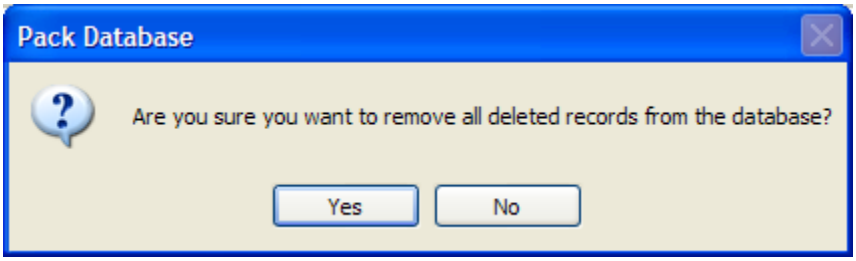
Step 11: However, this does not permanently delete the record, it merely flags it for deletion. To view records flagged for deletion select the "**Show Deleted Records**" option under the "**View**" menu item. You will notice that the records are faded grey.



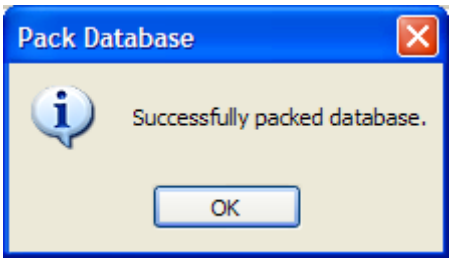
Step 12: You may still recover the records flagged for deletion by highlighting the faded record and then going to the menu "**Edit**" and select "**Undelete Record(s)**". If we were to use this lookup table in GanFeld then the deleted values will still display in the pick-list. To complete the deletion process, permanently removing the flagged records, you must click on the "**Pack**" button.



Click on the "**Yes**" button to confirm you want to delete all flagged records for permanent deletion.

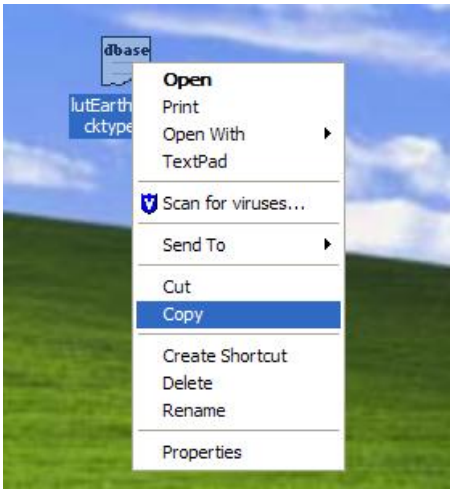


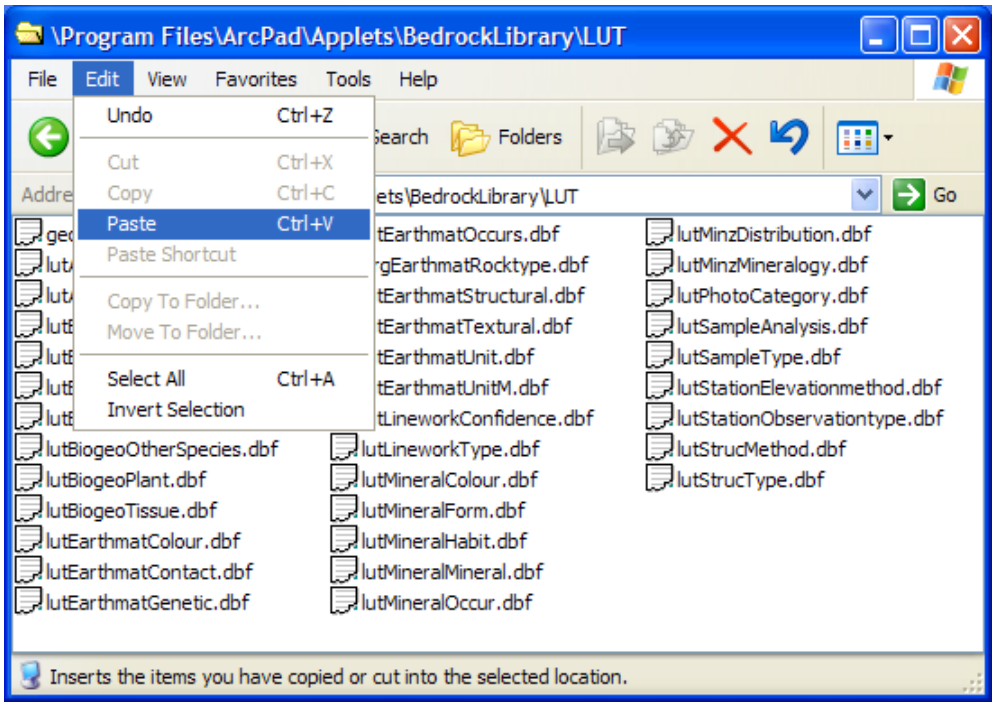
Click on the "**OK**" button.



Step 13: Now exit DBF Explorer.

Step 14: Copy the edited lookup table from your computer and **paste** it to the folder "**\Program Files\ArcPad\Applets\BedrockLibrary\LUT**" on your Windows Mobile device.





Step 15: Finally, verify that the new lookup table with your changes is working by starting up GanFeld again on our Windows Mobile device and testing the pick-lists.

WEB LINKS

The lists below are not intended to be exhaustive but rather a starting point to useful resources on the web and are current as of August 2008.

GIS

- Arcpad: http://www.esri.com/software/arcgis/arcpad/index.html
- ESRI Canada: http://www.esricanada.com/

WINDOWS MOBILE DEVICE AND ACCESSORIES

- Microsoft Windows Mobile: http://www.microsoft.com/windowsmobile/default.mspx
- PDAdb.net: http://pdadb.net/
- Rugged PC Review: http://www.ruggedpcreview.com/index.html
- MobileTechReview: http://www.mobiletechreview.com/
- Engadget: http://www.engadget.com/
- Ecosol Powerstick: http://www.powerstick.com/new/home.php

GPS

- U.S. Government site on GPS : http://www.gps.gov/
- GPS Passion: http://www.gpspassion.com/
- Pocket GPS World: http://www.pocketgpsworld.com/

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