

Lessons learned from one of New Zealand's most challenging civil engineering projects: rebuilding the earthquake damaged pipes, roads, bridges and retaining walls in the city of Christchurch 2011 - 2016.

GPS Photo Manual

Story: Click Click Zoom – Focus on GPS Cameras

Theme: Finance and Business Systems

A photo manual and guide provided to design and delivery teams at SCIRT.

This document has been provided as an example of a tool that might be useful for other organisations undertaking complex disaster recovery or infrastructure rebuild programmes.

For more information about this document, visit www.scirtlearninglegacy.org.nz



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SCIRT GPS Photo Manual

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1. Introduction

This process is only for photos that have been taken using GPS cameras or any smart phones that have photo geo tag capability enabled.

The purpose of this document is to outline the process that SCIRT has in place to manage the taking, storing and viewing of photographs associated with projects. The main reasons being to:

1. Supply CCC with a database of GPS referenced photos at the end of the project.
 2. Provide one central location for accessing and viewing photographs – SCIRT GIS – please note that this currently only applies to photos that have GPS coordinates.
 3. Photographs are not to be stored permanently on G or J drives within SCIRT.
 4. Photographs are not to be sent via project centre.
- GPS referenced photos are photos that have ‘actual’ GPS coordinates which were recorded when the photo was taken – it does not include photos that have had coordinates added manually.
 - There currently is not a process set up for adding photos that do not have GPS coordinates or photos that have had GPS coordinates added after the photo has been taken.

2. Photo process overview

1. Photos must be taken with GPS cameras or any smart phones that have photo geo tag capability enabled.
2. If you have not used a GPS camera before talk to other people in your team or other teams who have used them to make sure you know how to use it correctly. Photos that do not have GPS coordinates will not be added to the viewer. The locational or directional information cannot be edited after the photo has been taken.
3. All photos will get renamed with the project number, the gate (0-9)/phase the photo relates to, the date the photo was taken, the time the photo was taken. So there is no need to rename the photos. Descriptions can be added to the photo using the spreadsheet creator see section 4.1.2 – 4.1.3 for more details on adding a description.
4. Site photos must have a project number and relevant gate/phase of when the photo was taken associated with them. The only exception to this will be when photos are taken that relate to a specific event and cannot be confined to a particular project e.g.

photos taken during weather events. As a default all of these photos will be given project number 100000 and gate 0.

5. GPS referenced Photos will be processed and uploaded to the SCIRT GIS daily. The GIS team must be notified when there are photos to download from dropbox.
6. Photos are available on the active layer list/photos from the SCIRT GIS viewer and can be copied and pasted from here into reports, powerpoint presentations. Photos are resized to an image size with pixel dimensions 1440 x 1080, this is an optimum size to balance the size of the file and quality of the image.

2.1. Who does what?

2.1.1. Cameras, taking and downloading photos

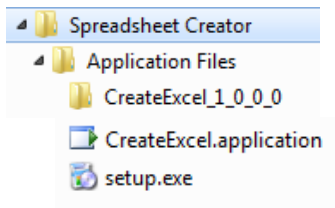
- It is the responsibility of the person that takes the photos to make sure that the photos are taken correctly, that the GPS locks on, that the photos are stored in the correct folder structure, and to notify SCIRT GIS team of where the photos are.
- If you have not used a GPS camera and are going out on site to take photos please talk to other people in your team or in any other teams about how to use the cameras.
- Photos that do not have GPS references at the time the photo was taken will currently not be added to the viewer.

2.1.2. Processing photos

- The SCIRT GIS team will process photos taken with GPS cameras and make them available on the SCIRT GIS viewer.

2.1.3. Software installation

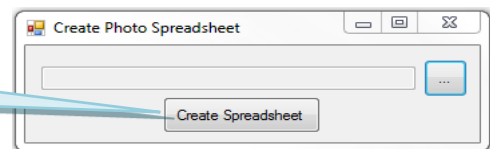
- If you can't install any of the applications described in this document you will need to get your own IT section to do it for you.
- The spreadsheet creator application was developed by SKM - it was developed in response to the design teams request to be able to rename photos and add descriptions.
- This application creates a spreadsheet which lists all of the images within a particular folder, 2 fields are created in the spreadsheet one called FILE this is the image name and the other DESCRIPTION. The description field is blank and people then if they do so wish can add any kind of a description to the photo. This spreadsheet is then read as part of the GPS photo processing which attaches the description to the photo which in turn us searchable on the SCIRT viewer.



To install the application double click the on the 'CreateExcel.application' will install.

- Once installed go to Start/All Programs/Sinclair Knight Merz/CreateExcel to open the Create Photo Spreadsheet application.
- An excel spreadsheet called photos.xls will be created in the folder where you have downloaded the photos to with a list of all the photos and a blank description column – as part of the GIS processing this spreadsheet is imported into the database and attached to provides the link between the image and the geodatabase.

Click here and navigate to the location you have downloaded photos to and then click Create Spreadsheet



3. Taking GPS Photos in the field

The following are some points to note when carrying out the field GPS photography – please make yourself familiar with the camera manual before you use the camera.

- Please make sure you know how to use the camera before you go out in the field – talk to other people who have used the cameras – photos that do not have a GPS reference will not be added onto the SCIRT GIS.
- Make sure GPS is turned on.
- Ensure the camera has locked onto a GPS position before taking the photo.
- Make sure you are clear of obstacles that could cause satellite interference (e.g. tree cover, roofing).
- The quality of GPS location and direction is linked to how good a signal you have so if you ensured the camera has locked position then it should be fine – good photos in = good photos out, bad photos in = bad photos out. The location or direction cannot be changed after the photo was taken.
- To ensure you also obtain a direction take your time when shooting the photo this will also help with the compass lock.
- Do not take photos from inside vehicles.
- Set Camera to a medium resolution this will help subsequent displays and storage.

- Capture information on Project Number and project phase associated with photos taken.
- If you are taking photos under bridges, inside buildings etc you can lock a position where you have coverage and use this. Make sure you unlock it after.
- Make sure you don't cover the GPS antenna on the camera with your hand when you are taking photos as this will slow down the time it takes to get a GPS signal – please see the camera manual for where this is.
- Activate the GPS assist to potentially speed up the time it takes to get a signal.
- Install the PMB software (this software is on a CD and should be with the camera) onto your pc and use this to check GPS information when you get back into the office.

4. Photo Downloads

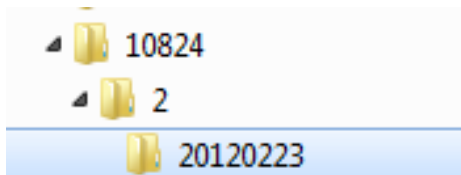
All photos must be downloaded to the structure as outlined below.

4.1. Site Photos download

The following applies to photos taken of sites at different phases (project definition through to completion). All site photos must have a project number and gate/phase number – the photo will get renamed automatically by the GIS team with the project number, gate number, date and time photo was taken.

4.1.1. Download photos

- Site photos to be saved to the following folder structure



Project number

Gate number – see box for numbers

Download folder – it doesn't matter what you call this folder

Gate no.	Phase
0	Project Definition
1	Design Allocation
2	Concept design
3	Detailed design
4	TOC
5	Construction allocation
6	Construction
7	Handover
8	Practical completion
9	Project completion

- It is really important that project photos are saved to this structure (project number\gate number) as highlighted in red as the project number and gate number form part of the photo name.
- After you have downloaded your images, rotate your image correctly – use the picture manager under Microsoft office 2010 tools, with this program you can modify the photo while keeping the gps coordinates.
- Please delete any photos that are duplicates, out of focus, not relevant.

4.1.2. Create a spreadsheet to add the descriptions

- Use the spreadsheet creator to automatically generate a list of all the downloaded photos in the folder and then add a description.
- If you have not already installed the Spreadsheet Creator you will need to do the following
- You may need to get you IT section to approve the installation of the 'Spreadsheet creator' – see attached not on how to install this programme.
- Once installed go to Start/All Programs/Sinclair Knight Merz/CreateExcel to open the Create Photo Spreadsheet application

- An excel spreadsheet called photos.xls will be created in the folder where you have downloaded the photos to with a list of all the photos and a blank description column – as part of the GIS processing this spreadsheet is imported into the database and attached to the image.



4.1.3. Adding descriptions

- Open the photos.xls and add descriptions to the photos file list.
- The description should be meaningful, searchable and not hidden amongst a whole bunch of other information try and use specific words that are relevant to the picture e.g. stormwater, manhole, general, wastewater, watersupply, mains, submains, trunk, pressure mains, pump station etc.
- To make searching for your photos easier add your name to the description field as well e.g. taken by and add your name.
- Use the description field to describe the type of event when general photos are taken that don't relate to any particular project e.g. flooding, rain, earthquake, taken by
- You can put whatever you like into the description field.

5. Viewing photos

Photos will be processed weekly and made available on the SCIRT GIS viewer.

5.1. Site and general photos layers

All photos will be available for viewing, searching and copying on

<https://www.webmaps.co.nz/StrongerChristchurch/default.aspx>

- All photos are on the active layer list and shown by the gate the photo relates to.
- Photo symbols are shown with a direction arrow – please note the direction is tied to the compass, so give some time for the compass to set.
- Photos taken using some smart phones or cameras do not record the direction so the direction symbol will always show the direction as being north.

5.2. Viewing and searching for photos

There are a number of ways to view and search for photos using photo pop ups, the identify tool or the photos search.

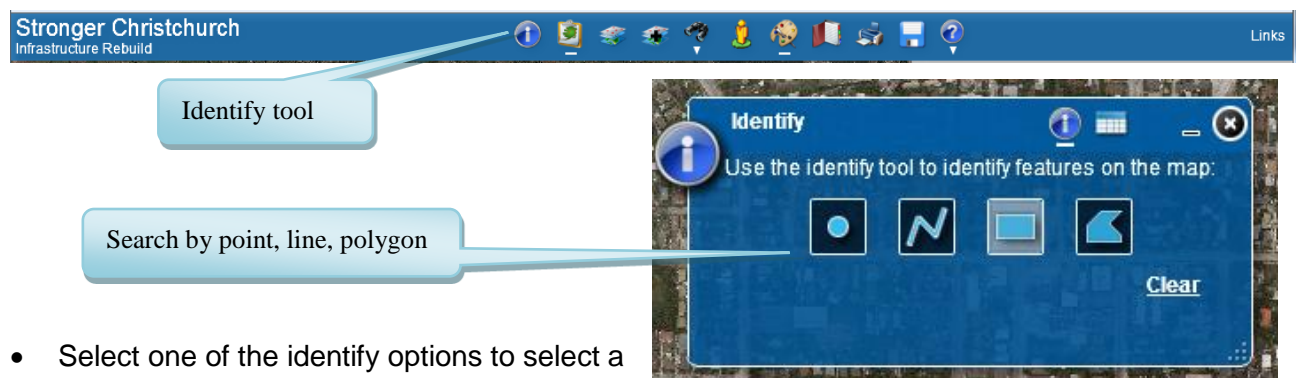
5.2.1. Photo Pop-ups

A pop up function has been added to the photo layers. "Pop ups" allow you just to click on a photo point at any time (you don't need use the identify) and the photo and information about that photo will just pop up.

- Turn on a photo layer (zoom into somewhere with photos) and just click on a photo point.
- To view a larger image of the photo just click on the thumbnail image.

5.2.2. Viewing photos using the identify tool

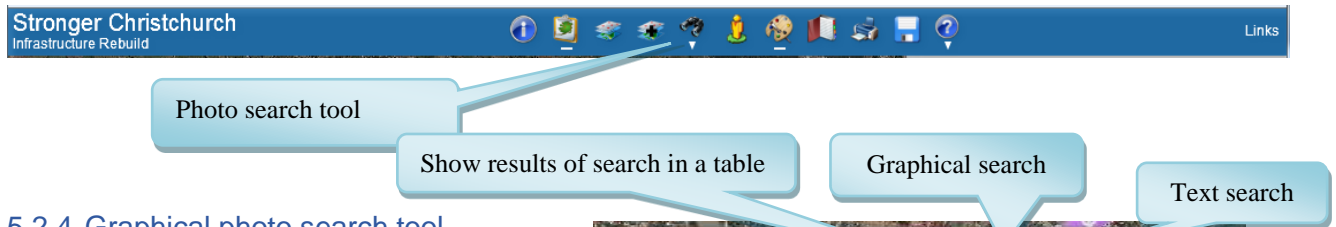
- Use the identify tool to identify a single photo or a selection of photos.
-



- Select one of the identify options to select a photo or photos
- Scroll through the results to view the thumbnail and details about the photo.

5.2.3. Searching using the photo search tool

Search for photos using the photo search tool. The gate number the photo relates to is a prerequisite for all of the photos searches.



5.2.4. Graphical photo search tool

Search photos using the graphical search.

- Select the gate you want to search for photos by.
- Use one of the graphical search tools to select the photos.
- View the details in the show results tab.



5.2.5. Text photo search tool

Search photos using the text search.

- Select the gate you want to search for photos by and then
- Select the layer you want to search by either Project, Description or Date to search by,



e.g. gate 0 (i.e. project definition), project 10581 = search for all photos that are for project 10581 and in gate 0.

e.g. gate 2, description 'flood' = search for all photos that are in gate 2 (i.e. concept design) and have the word flood in the description.

e.g. gate 3, date 2012:02:13 = search for all photos that are in gate 3 (i.e. detailed design) and were taken on 13th february 2012.

5.2.6. Previewing photos

- Click on any photo symbol when the layer is switch on to view details and a thumbnail of the photo.
- Photo symbols by default are set to show when zoomed in beyond 1:16,000
- Photos can be previewed in a number of ways after a photo search



Click on the red play button after the photo search to preview the image

Use the scroll bars to flick photos

Click on any of the results to show the thumbnail image at the location of the photo and the photo will be highlighted

Click on any of the selected photos and view thumbnail image



View the results of the search in table format
 Click on any of the results and view thumbnail image



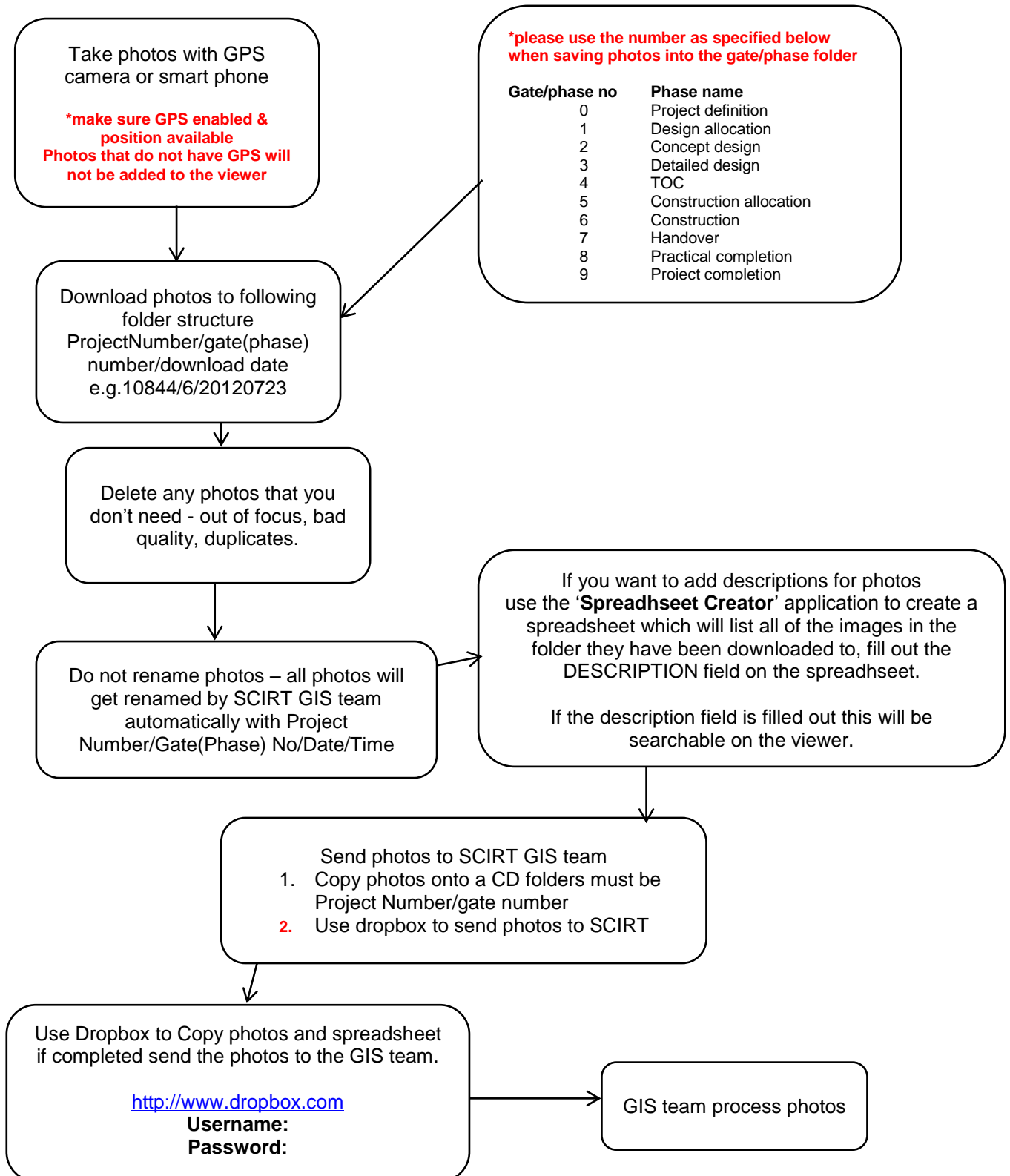
Click on photo thumbnail to view larger image,
 Right click on image to view the full size,
 Right click on the image copy and then paste into word or powerpoint.



example of photo copied and pasted into word

6. Summary

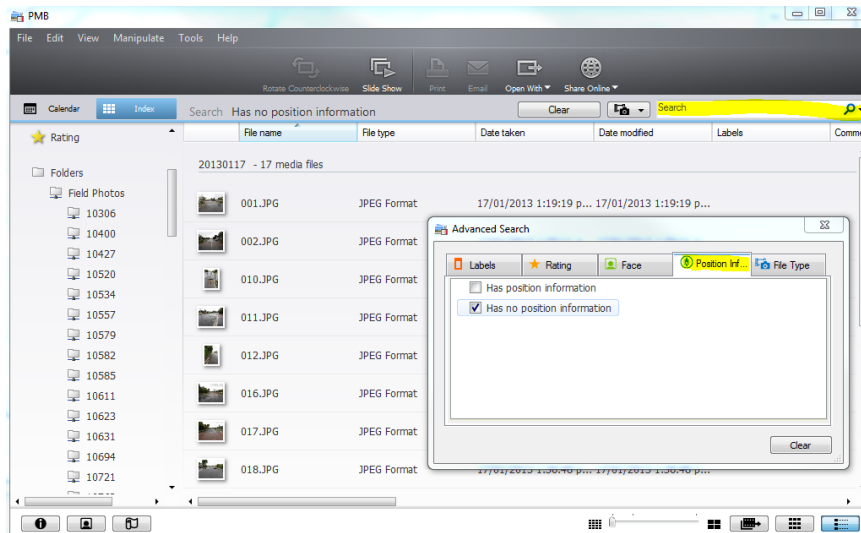
6.1. Overview process chart



6.2. Overview summary

I've been out on site taking photos what do I do?

Follow process for taking gps photos



How can I check if photos don't have coordinates?

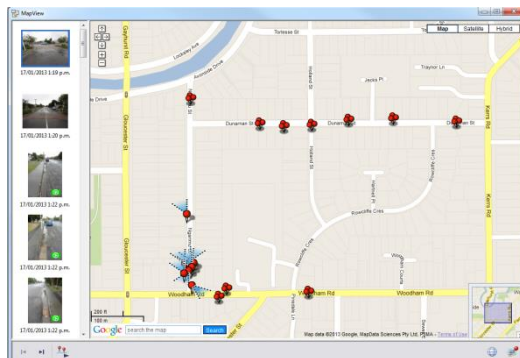
Use the camera software to view check what photos don't have coordinates

Go to the advanced search/position information/has no position information

OR



Select all the photos and from the menu choose to open with map view



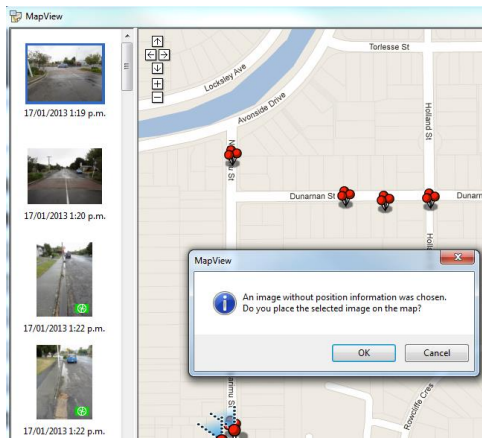
Any photo with a green symbol will have its location plotted.

Photos without a green symbol do not have any coordinates.

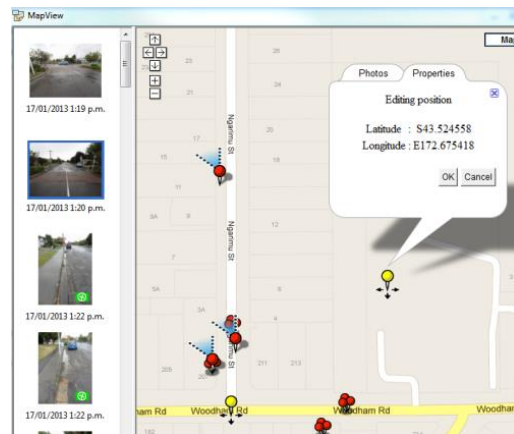
I've checked now I want to add coordinates to my photos – how do I do that?

To embed coordinates onto the photo with no position information.

1. Click on the photo with no green symbol – you will be prompted to add a location
2. Move the location to where you want it by clicking over the black arrows



1 Select photo with no coordinate



2: drag to location of photo

I've added coordinates to my photos now what do I do?

Follow the process for getting photos uploaded to GIS.

I don't want to add coordinates to the photos what do I do?

Follow the process for getting photos uploaded to GIS.

7. GIS Photo processing

The purpose of this section is to outline the process that the GIS team follow when processing photos that have GPS coordinates.

7.1. Data location

All photos are stored in G:\General\Field Photos and processes are in G:\GIS\Processing\fme

7.1.1. Imports

Site photos - G:\General\Field Photos\Project Number\Gate Number\download folder

Site photos - G:\General\Field Photos\Project Number\Gate Number\download folder\Photos.xls

General photos - G:\General\Field Photos\1000000\0\download folder

General photos - G:\General\Field Photos\1000000\0\download folder\Photos.xls

7.1.2. Process

FME Process - G:\GIS\Processing\fme\Photos\PhotoProcessing

Documentation - G:\GIS\Admin\Documentation\RegisteredDocuments\GpsPhotoProcessing.docx

7.1.3. Outputs

Site photos - G:\General\Field Photos\Project Number\Gate Number\download folder\updated

General photos - G:\General\Field Photos\1000000\0\download folder\updated

Geodatabase - G:\GIS\Amazon\Web_Data\Geodatabase\Photos.gdb

7.1.4. Web upload

Web data MXD - G:\GIS\Amazon\Web_Data\MXD\Initial_Service\Photos.mxd

Web data MSD - G:\GIS\Amazon\Web_Data\MXD\Service_MSD\Photos.msd

Geodatabase - G:\GIS\Amazon\Web_Data\Geodatabase\Photos.gdb

7.2. Processing

- Original copies of photos specific to projects are downloaded and saved to the following location G:\General\Field Photos\ProjectNumber\Gate.
- Original copies of photos not specific to projects are downloaded and saved to the following location. G:\General\Field Photos\1000000\0
- Add a folder called updated to G:\General\Field Photos\ProjectNumber\Gate – this is where the renamed and resized photos will be stored, photos from this folder are what needs to be copied to the amazon ftp site for upload to the web viewer.
- Open G:\GIS\Processing\fme\Photos\PhotoProcessing.fmw

- Add photos spreadsheet – under the source Microsoft excel file parameters tab in FME navigator window add the location of the file from G:\General\Field Photos\ProjectNumber\Gate\folder name\Photos.xlsx.
- Add all the photos to process – under the source JPEG Directory parameters in FME navigator window add all the photos to process from G:\General\Field Photos\ProjectNumber\Gate\folder name.
- Make sure the Destination ESRI Geodatabase (“Photos [GEODATABASE_FILE]”) is set to G:\GIS\Amazon\Web_Data\Geodatabase\Photos.gdb – this should always be the same.
- Add the updated folder - under the destination JPEG Directory parameters in FME navigator window add the location of the processed photos G:\General\Field Photos\ProjectNumber\Gate\folder name\updated.
- Add the unprocessed.txt file - under the destination Text File File parameters in FME navigator window add the location of the unprocessed.txt file to G:\General\Field Photos\ProjectNumber\Gate\folder name.
- Make sure the photos.gdb is not open in ArcCatalog or ArcMap
- Run the fme photo process.
- Open GIS\WebData\MXD\Initial Service\ Photos.mxd.
- Check data is correct and appears in the correct layer.
- Check that the data is within the project or in general correct location of project areas.
- If needed run the G:\GIS\Processing\fme\Photos\ RemoveDuplicates_in_Photos.fmw – this will remove any duplicate file names in the gdb.

7.2.1. Upload to Amazon

- Prepare data for upload to amazon – run through the Amazon (FTP site) – Scirt Upload checklist.
- Confirm data is logical
- Confirm data is in Mt Pleasant 2000
- Check links within mxd
- Check/Create appropriate indexes
- Check/Create definition queries
- Check that no transparencies and maplex labelling are not set
- Export to msd
- Write out specific details regarding metadata/changes to config files where necessary (identify, search, selection etc.)

- Upload data – photos from the updated folder, gdb, mxd, msd & associated documentation to scirt FTP.
- Notify Todd/Keith

7.2.2. Notification

- Notify the person who downloaded the photos that they have been processed and available on the viewer. If there are any photos that haven't been processed advise the photographer of same.
- Once the photos are available on the viewer delete them from the download location in General/Field Photos except for photos that have not been processed due to not having GPS coordinates.
- Resize any unprocessed photos that are in the download folders.
- Fill in folder location of and number of unprocessed photos to UnprocessedPhotos.xlsx in G:\General\Field Photos.