

Sourcing and loading base data into AutoCAD

February 2023

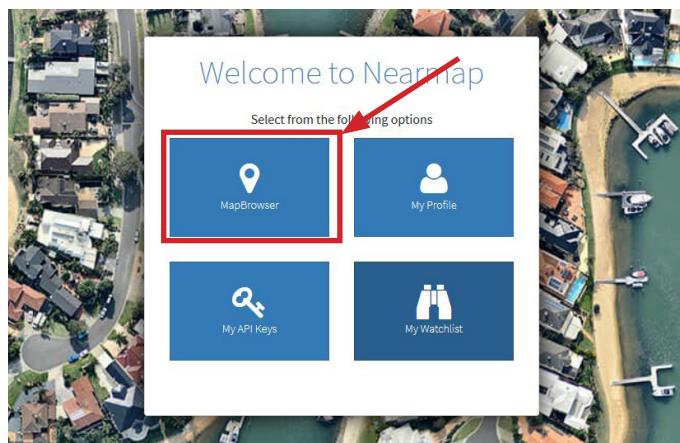
Maia Williams

Part 1: Nearmap aerial photographs

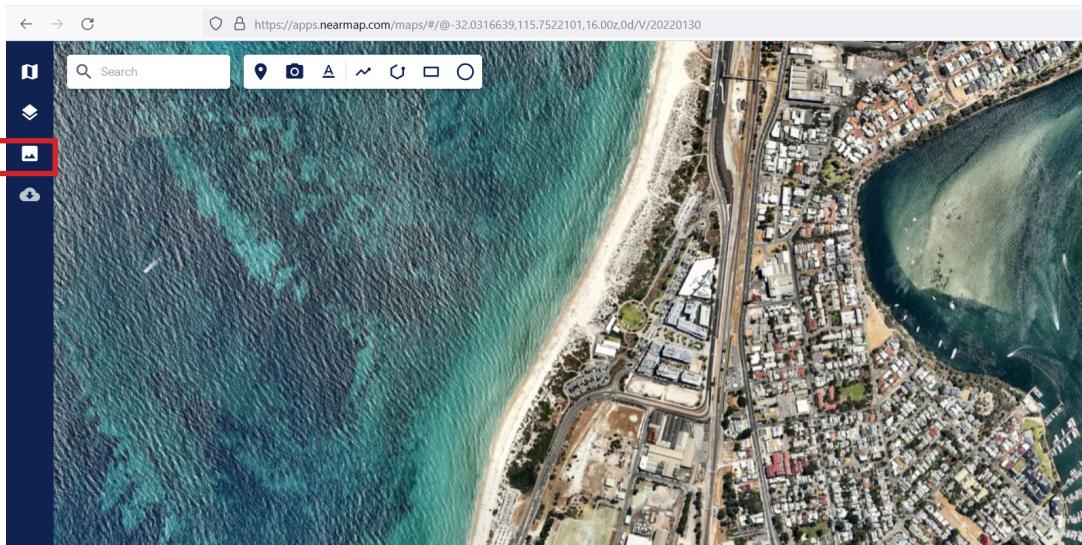
To access Nearmap aerial photographs and download images you need to login to Nearmap using your UWA email address.
No account setup required.

1. Login here: <https://admin.nearmap.com/api/identityserver/v1/login?signin=99a8976ff26f6df79c43879475ee4a7b>

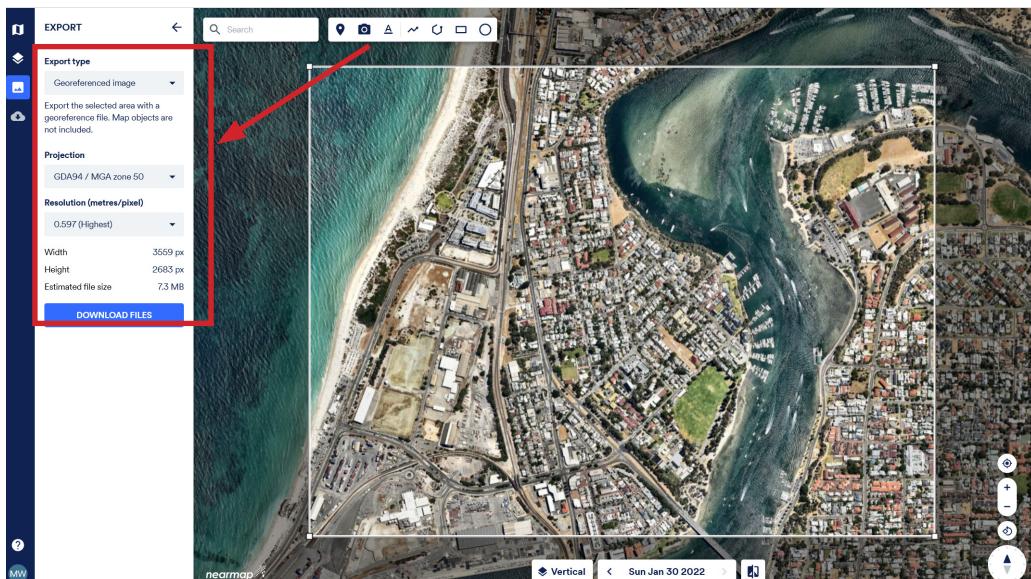
2. On the first page click to go to the Map Browser.



3. Pan around the map to find your desired location. To download an image click on the Exports button.



4. Tick define area, set Export Type to Georeferenced Image, and choose a projection from the list (see below). Then adjust the box to cover your area of interest. Note the output image resolution will drop as the box gets larger. Then click Download Files.



Lesson on projections

It is important to understand which projection to use at your location. In Perth, currently the most common projections are:

- **GDA2020 MGA50 (recommended)**
- GDA2020 PCG2020 (less common but used in industry)

These are replacing the older GDA94 versions. They are very gradually being phased out:

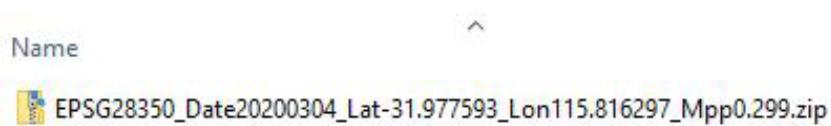
- GDA94 MGA50
- GDA94 PCG94

It is important that ALL data loaded into AutoCAD comes from sources with the same coordinate system (to ensure correct overlays). Whichever coordinate system you choose for Nearmap must also be used for the vector data layers.

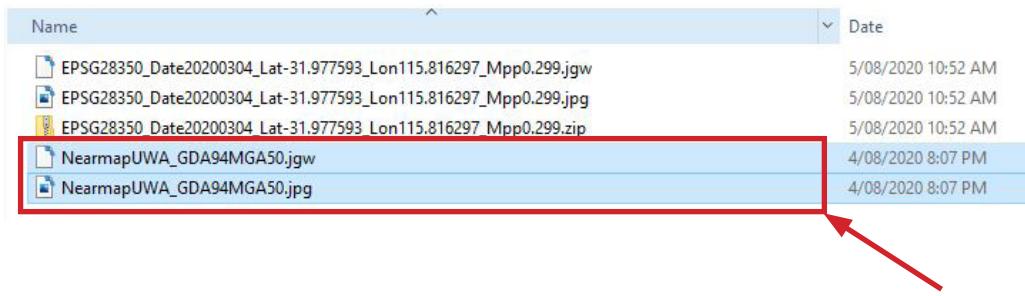
Keep an eye out for the change from GDA94 to GDA2020 in the next years.



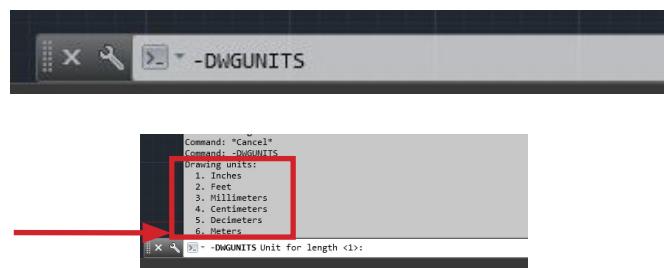
5. A zip folder containing the image will be downloaded. It looks like this:



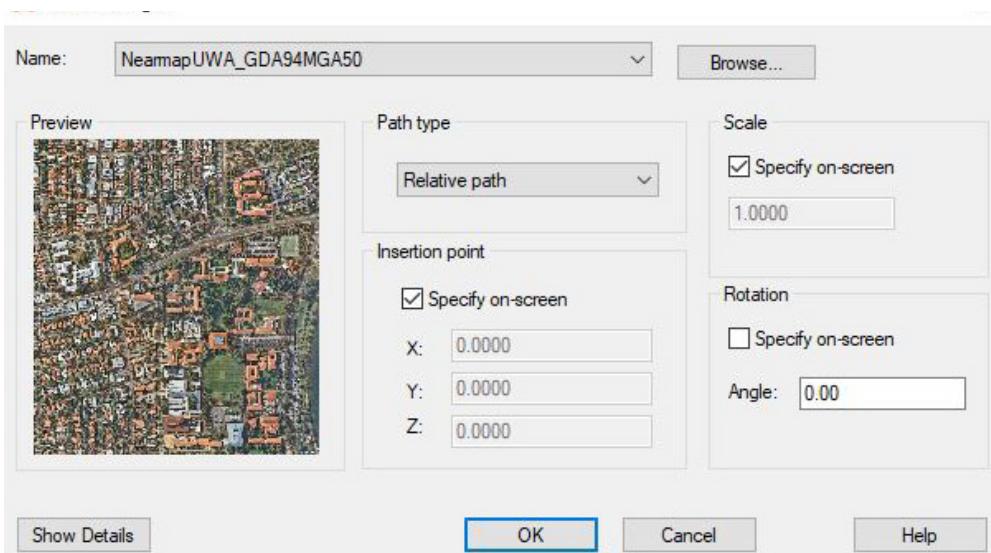
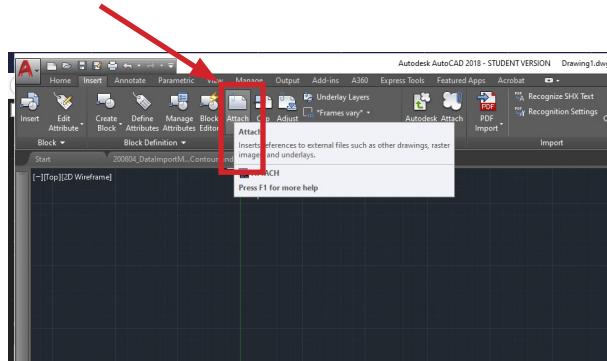
6. Unzip the folder. Then make sure the two files stay together and both have the same filename. The .jgw file contains the projection information (called a world file) and the image will not automatically overlay with other data in AutoCAD if this file is lost. You can rename both files, for example:



7. Open a new AutoCAD drawing. Use the -DWGUNITS command to set the drawing units. Change the units to metres (enter '6'), then accept all the other defaults.



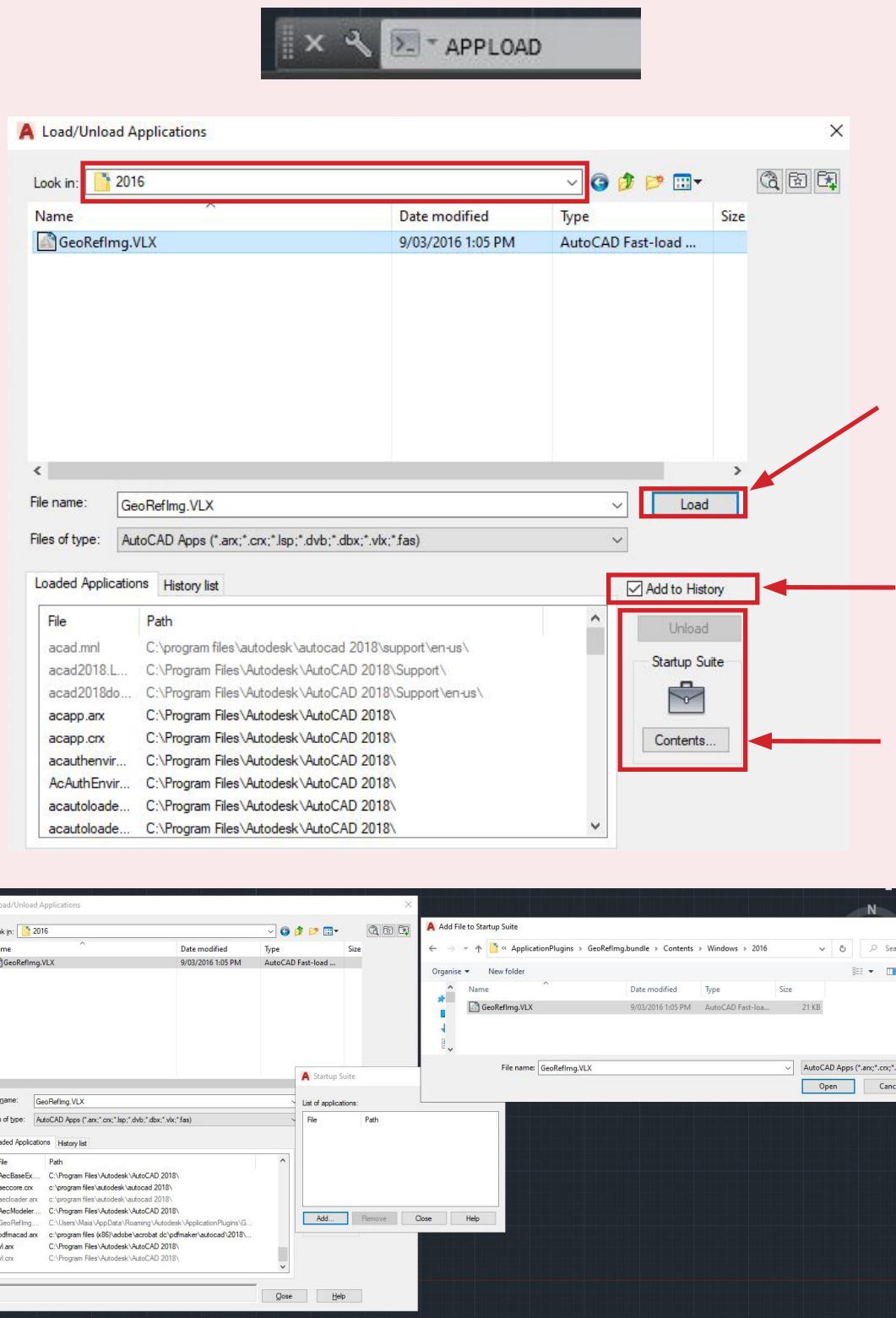
8. To import the Nearmap image go to Insert>Reference>Attach. Navigate to your Nearmap image and accept the import default. Then click anywhere in the drawing and drag to draw a box to insert the image.



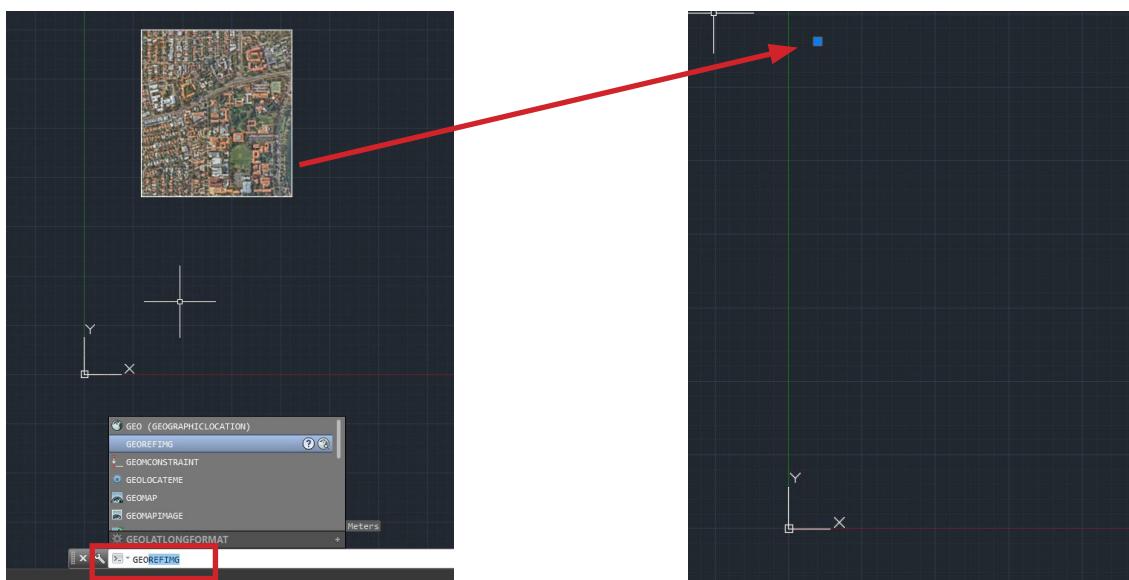
How to install GEOREFIMG plugin

Follow the instructions here: <https://www.cadstudio.cz/georefimg>

- Download the zip folder from that site. Unzip and copy the GeoRefImg.bundle folder (PC) or GeoRefImgMac.fas file (Mac) to:
C:\Users\<Username>\AppData\Roaming\Autodesk\ApplicationPlugins
- In AutoCAD run the APPLOAD command.
- On PC navigate to the GeoRefImg.vlx file here: C:\Users\<Username>\AppData\Roaming\Autodesk\ApplicationPlugins\GeoRefImg.bundle\Contents\Windows\2016. On Mac navigate to GeoRefImgMac.fas in the same folder.
- Tick the Add to History button and the Contents button, then Add and navigate the the same GeoRefImg.vlx file (this ensures the plugin loads on startup).
- Then close Startup Suite windows and click Load.



9. In AutoCAD select the Nearmap image. Then type in the GEOREFIMG command. The image will automatically move to its correct location (according to the specified projection). You will need to zoom out to find the image further up in the drawing.



Now all georeferenced data that is loaded to this drawing will overlay correctly with the Nearmap image. No manual scaling or moving data will be needed.

Terms

Georeferenced means data that knows where it is in the world. That is, data that has an assigned coordinate system (or projection). For example that Nearmap image is a 'georeferenced image' when the jgw (world file) is saved with the jpg. By default AutoCAD drawings/dxf datasets are not georeferenced. AutoCAD will place data according the coordinates it comes with (whether those coordinates are meaningful or not).

Raster data is image data made up of cells/pixels. The Nearmap image is a raster dataset (as are all jpg files). A **Digital Elevation Model** is another type of georeferenced raster dataset (usually tiff) where every pixel has an elevation value.

Vector data is made up of points, lines and polygons. Svg files (and others) are vector files. **Shapefiles** and **Geopackages** are georeferenced vector files. Shapefiles can be used in many Geographic Information System (GIS) and some CAD programs. Normal AutoCAD cannot open shapefiles.

Shared Location Information Platform (SLIP) is the Western Australian government data repository. The data is available from data.wa.gov.au. UWA has a subscription to access almost all available datasets from this platform.

QGIS is a free and open source GIS program for PC and Mac. The latest long term release version is recommended.

ArcGIS is an expensive GIS program by ESRI that UWA students have (educational level) access to.

Part 2: Shapefiles/Geopackages from data.wa.gov.au (SLIP)

1. You need to register to get access to all the datasets available via UWA's SLIP subscription. Instructions are given here: <https://guides.library.uwa.edu.au/c.php?g=569441&p=6625990> The same steps are outlined below.

2. Go to <https://data.wa.gov.au/slip> and click on Register for SLIP. In the next page click on registering for an account. On the next page click on Register an account.

OR... go straight to <https://img.slip.wa.gov.au/external/registration.jsf#/register>

Fill in the form using your UWA email address and click Register

The screenshot shows the SLIP homepage with sections for Location data services, Looking for help? Have feedback?, Status updates, and Sign on and register. The 'Sign on and register' section contains two buttons: 'Manage SLIP Profile' and 'Register for SLIP', with the latter being highlighted by a red box and arrow.

How do I create an account?

Registering to access subscription services in SLIP is as simple as [registering for an account](#), or signing in with your existing [Google account](#).

A three-step guide for account creation:

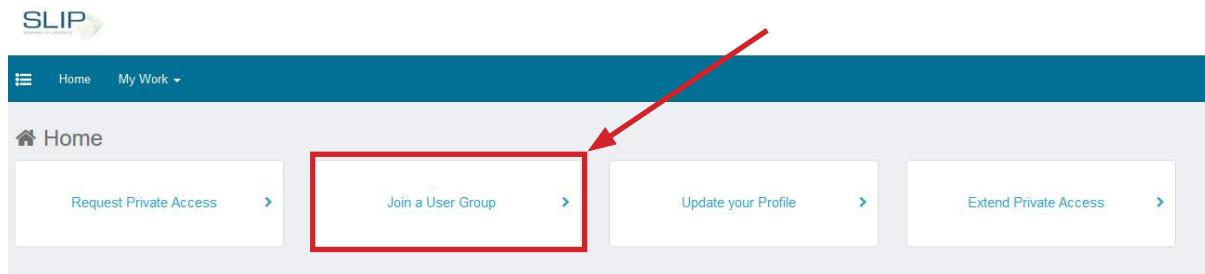
1. Create your SLIP Identity: Shows a sign-on screen with fields for Username and Password, and options for 'Sign On' or 'Sign in with Google'.
2. Manage your Account: Shows a dashboard with sections for My Work, My Tasks, Manage Access, and SLIP.
3. Request Access: Shows a screen for requesting private access or joining a user group.

The 'Sign On' page has fields for Username and Password, a 'Sign On' button, and a 'Sign In with Google' button. At the bottom, there are links for 'Forgot password?' and 'Register an account', with 'Register an account' being highlighted by a red box and arrow.

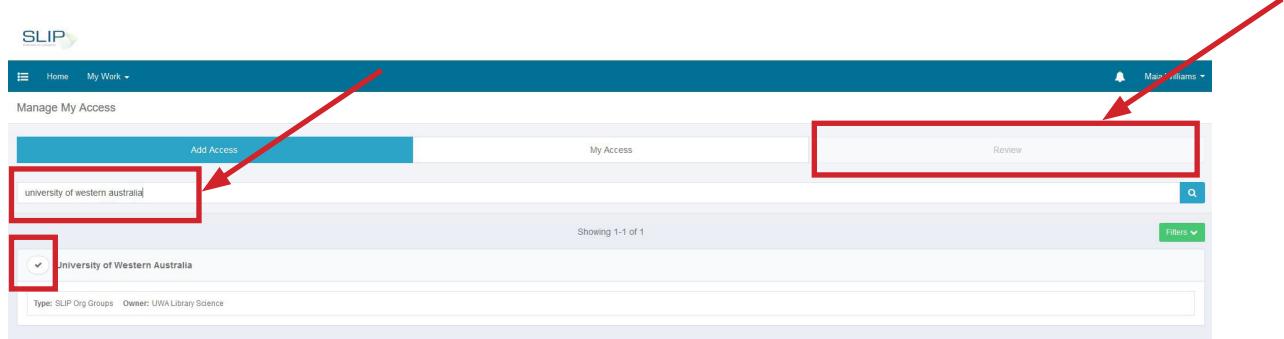
The 'Register for a SLIP Account' page contains the following fields:
First Name *
Last Name *
Primary Email *
Organisation Name *
ABN/ACN
Mobile Phone Number
State *
Purpose *
Street *
Post Code *
Password *
Confirm Password *
A note at the bottom states: 'Your password must be at least 8 characters long. Must contain at least one lower case letter, one upper case letter, 1 digit and 1 special character'. There are 'Cancel' and 'Register' buttons at the bottom.

3. You will get an email from SLIP. Click on the Activate my SLIP account link in this email. At the the web page click Activate. Then login using your UWA email address and password chosen in Step 2.

4. You need to connect your account to the UWA subscription "group". Click on Join a User Group.



5. Search for University of Western Australia in the search box (not 'UWA'). Click the tick next to the group. Then go to the Review tab and click Submit.



6. You will receive another email. Click on the Link to item above button in the email. Now your request to join the group is sent. It takes 1 or 2 days to be processed.

7. After you get the final confirmation email saying Organisation Request Completed you can download shapefile/geopackage (vector) data from SLIP, via data.wa.gov.au. Some useful datasets to search for are below.

data.wa.gov.au

- Local Government Authorities
- Cadastre Polygons (LGATE 218)**
- Medium Scale Topo Contour Line (5m)
- Large Scale Topo Contour Line (1m)**
- Large Scale Topo Building Polygon**
- Large Scale Topo Building Polygon (2016)**
- Roads Landgate 012**
- Road Network (just Main Roads managed roads)
- Public Transport Authority Stops
- Public Transport Authority Routes
- Medium Scale Rail Topo Segments**
- Reserves**
- Water Corporation (many drainage/sewer/water asset shapefiles)
- Western Power (many asset shapefiles)
- Geomorphic Wetlands Swan Coastal Plan (and same for other regions)
- Medium Scale Topo Water Polygon**
- Medium Scale Topo General Facility Polygon**
- Native Vegetation Extent
- PreEuropean Vegetation
- Vegetation Complexes Swan Coastal Plain (and other areas)
- Soil Landscape Mapping Best Available
- Soil Landscape Mapping Systems
- Urban Forest Mesh Blocks 2016
- State Heritage Register
- Local Heritage Register
- Local Planning Scheme Heritage List

- Aboriginal heritage places and heritage survey boundaries
- DBCA Legislated Lands and Waters
- Bush Forever Areas
- Contaminated Sites
- Clearing Regulations Environmentally Sensitive Areas
- Bush Fire Prone Areas
- Acid Sulphate Soil Risk Map
- FPM Flood datasets
- Hydrographic catchments
- Linear Hydrography
- Perth Regional Ecological Linkages
- Carnabys Cockatoos roosting and feeding sites

** With UWA subscription only

ABS (<https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/access-and-downloads/digital-boundary-files>)

- Meshblocks (with broad land use)
- Greater capital city boundaries
- Suburbs

DWER (Order for small fee)

- Groundwater contours

8. Search for the dataset on data.wa.gov.au. Click on the dataset you want and a new page will open. On that page click on Downloads then Download next to where it says 'Shapefile' or 'Geopackage'. You will be asked to login, then a zip file will download.

Large Scale Topo Contour (Line) (LGATE-140)

Imaginary line joining points of equal elevation relative to a datum

1m contours over the metro area and other regional towns.

NOTE: Landgate no longer maintains large scale topographic features. The large scale topographic data capture programme ceased in 2016. Please consider carefully the suitability of the data within this service for your purpose. © Western Australian Land Information Authority (Landgate). Use of Landgate data is subject to [Personal Use License](#) terms and conditions unless otherwise authorised under [approved License terms and conditions](#).

Access & Use Information

FEES APPLY
This dataset is available for use subject to payment

LICENSE
Custom (Other)
Additional licence options available

DATA ACCESS STATEMENT
The publisher of this dataset has not supplied a specific data access statement.

Fees Apply datasets are generally available for use by everyone but require payment of a subscription or once-off fee. Typically, this is due to a legislative requirement in the enabling acts for Statutory Authorities requiring them to provide a return to the state, or a commercial decision by Government Trading Enterprises.

Payment is managed by the organisation publishing the data. Please contact the data publisher via the Request Access button to enquire about access and fees.

Be sure to carefully read the licence information provided to understand any restrictions on use and what your responsibilities are as a user of the data.

[Request access](#)

Data Downloads

Service Map Package
Download

Shapefile
Download

GeoPackage
Download

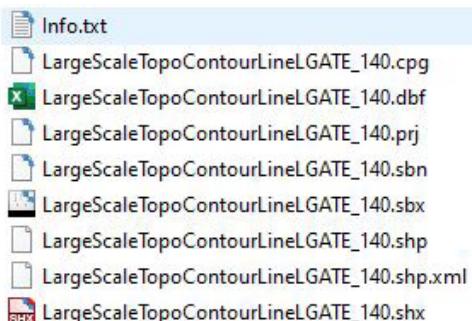
Data and Resources

Expand all / Collapse all

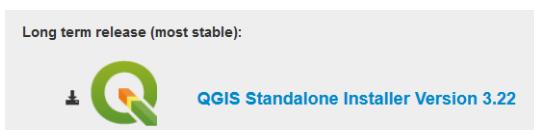
Web Services & APIs

Data Downloads

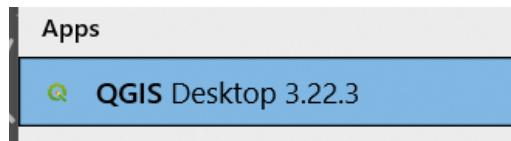
9. Unzip the downloaded folder. The folder will contain multiple files which all together make up a shapefile. All the parts must stay together and must have the same filename or the data will become corrupted. Geopackages have a single .gpkg file.



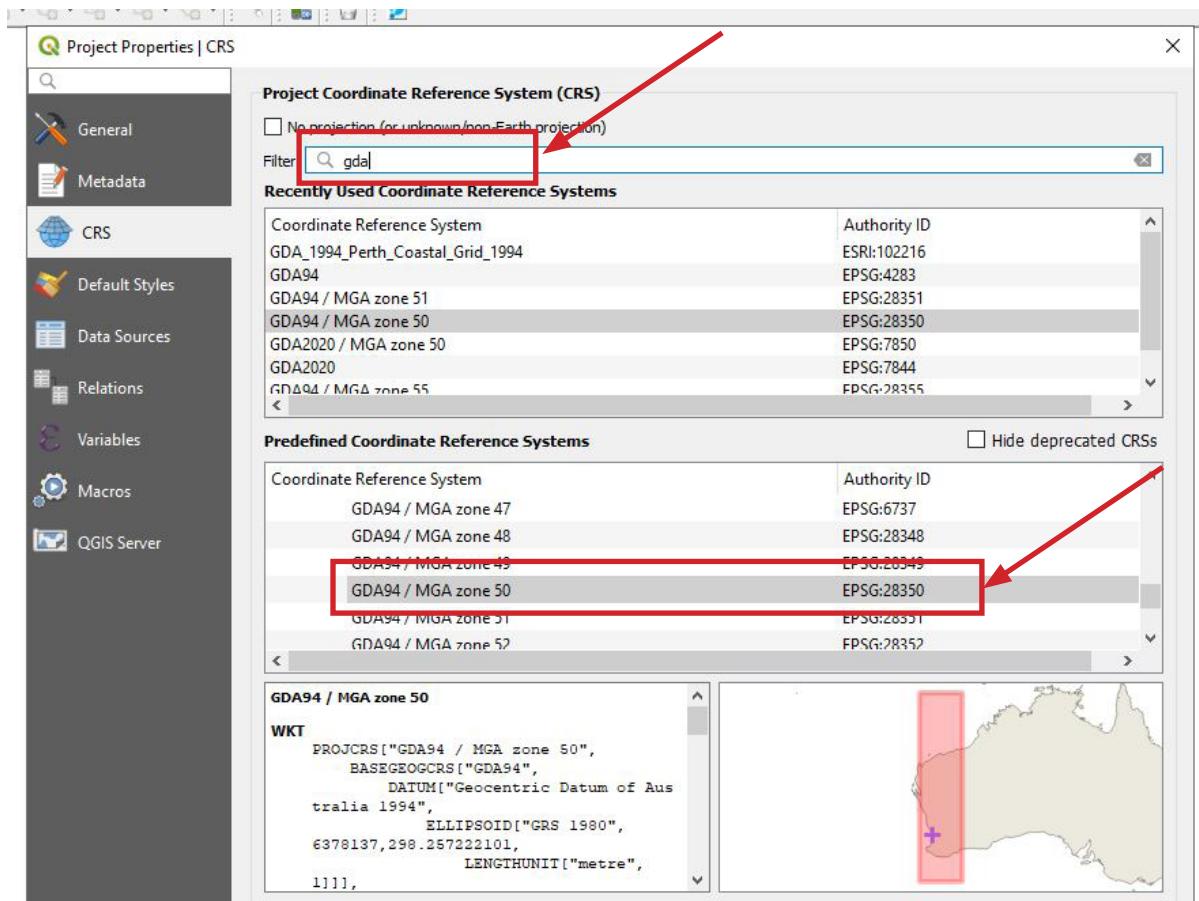
10. Shapefiles/Geopackages cannot be opened directly into standard AutoCAD. One of the simplest (free) methods to convert shapefiles to dxf (which opens in AutoCAD) is using QGIS. Download and install the latest long term release version of QGIS from here: <https://www.qgis.org/en/site/forusers/download>. Accept all the installation defaults.



11. Open QGIS via Start (on PC).



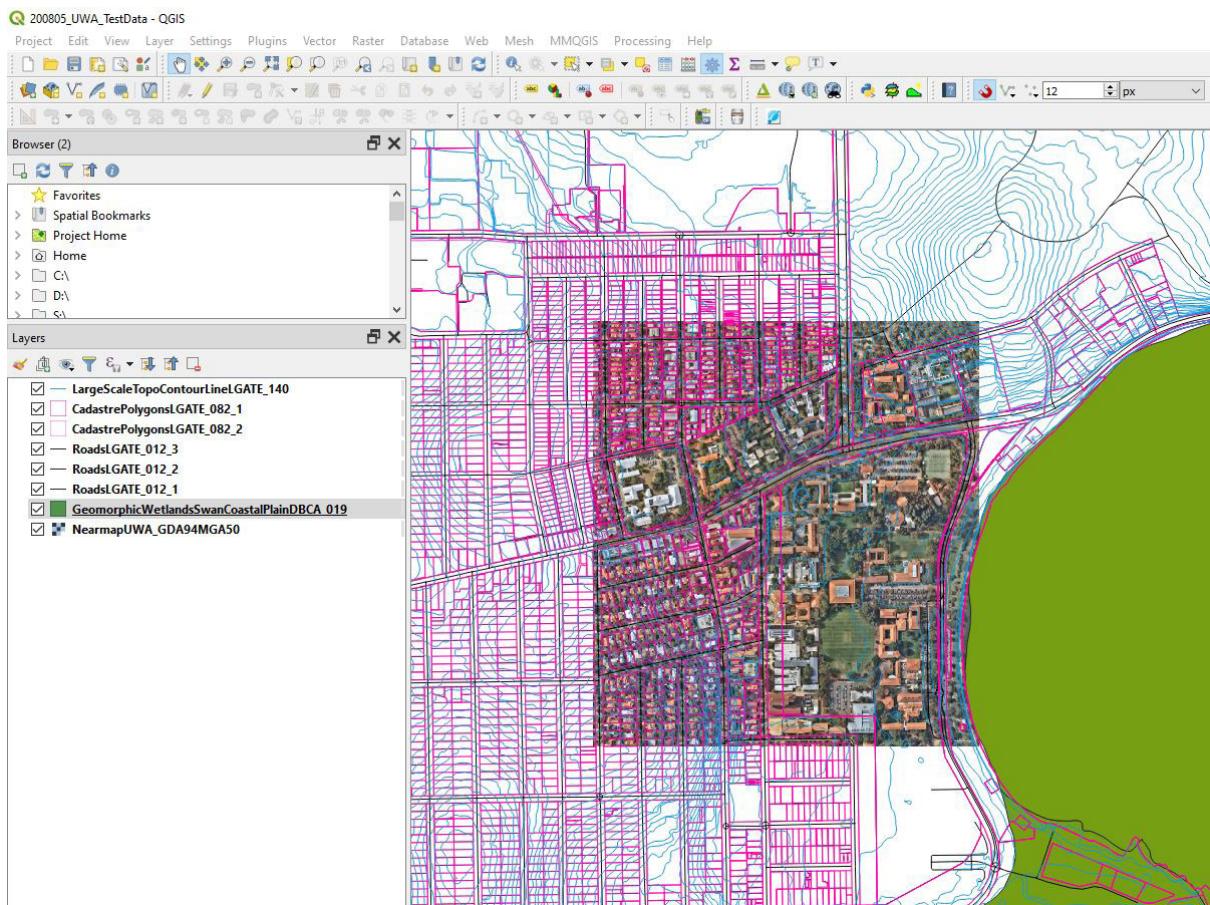
12. Go to Project>Properties>CRS to set the project coordinate reference system (or projection). Search for the same coordinate system as you specified for the downloaded Nearmap image (eg. GDA94 MGA50). Select and click OK.



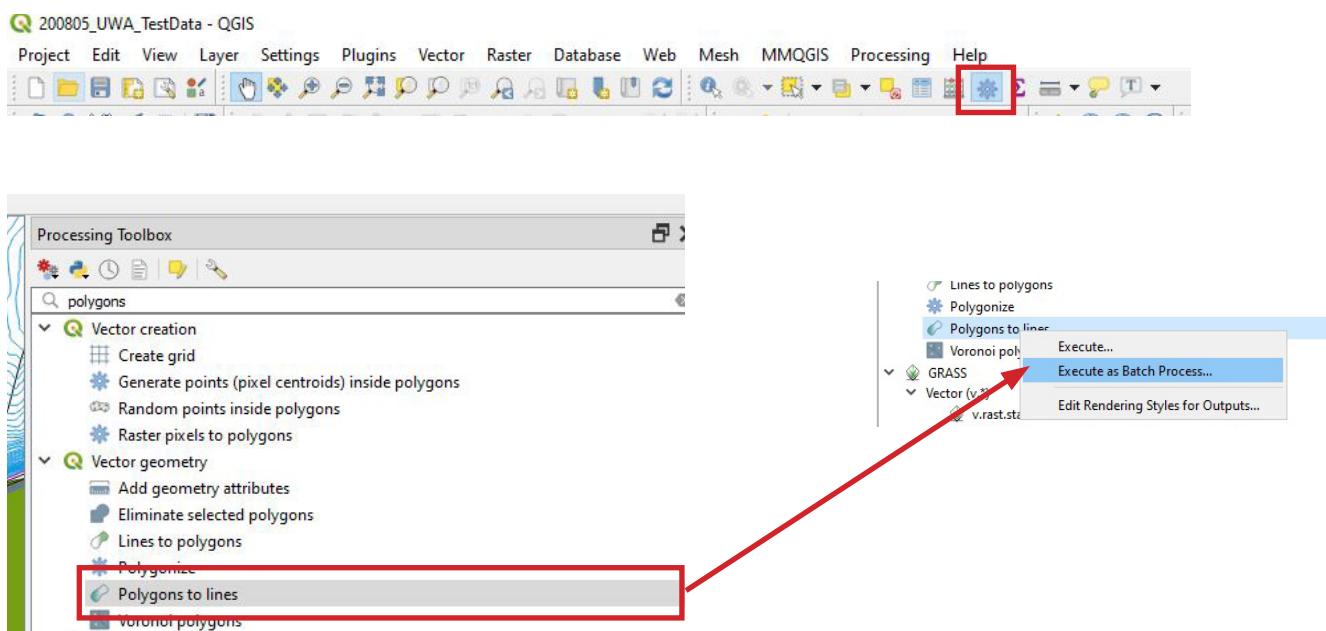
13. Then drag and drop in the Nearmap.jpg file you downloaded before (as long as neither the jpg or jgw have been modified since download). Specify the jpg coordinate reference system if prompted. Then load the shapefiles and geopackages: drag and drop the .shp/.gpkg files into the Layers window. You can drag and drop in multiple files.

Note that some of the bigger datasets (like roads and cadastre) are split into multiple shapefiles. You need to load all shapefiles to make sure you can see the full dataset.

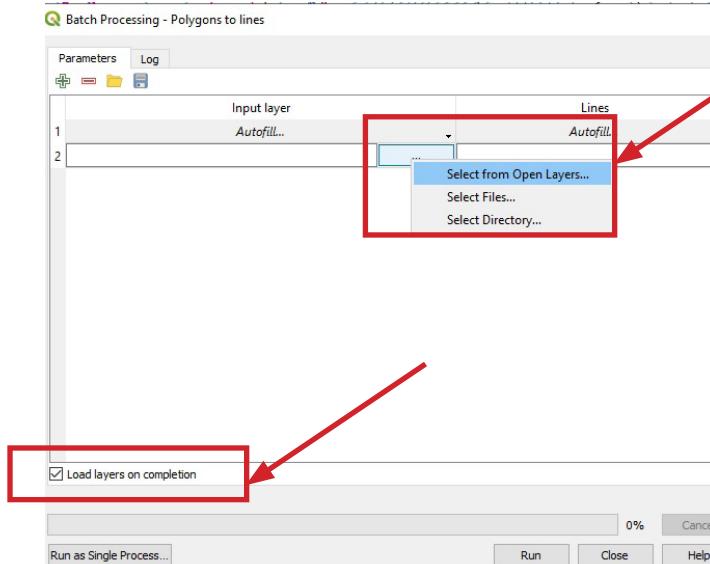
14. Check that the map looks something like this.



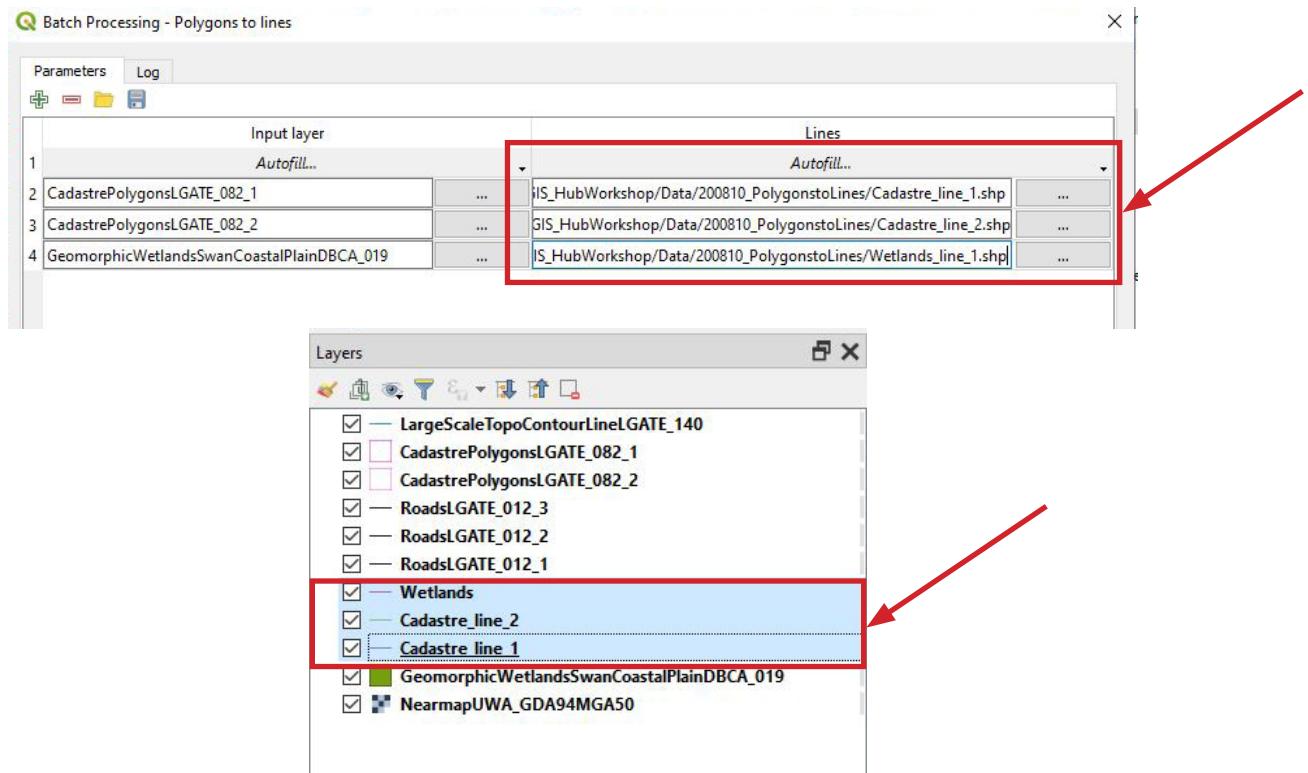
15. When converted to dxf, polygon shapefiles open as hatched areas. It is more useful to have closed polylines than when opening the data in AutoCAD. To achieve this, first click on the Toolbox "cog" to open the Processing Toolbox window. Then search for Polygons to Lines. Right click on that tool and select Execute as Batch Process. This allows you to convert multiple shapefiles to lines at once.



16. In the window that opens right click on the ... on the first row and choose Select from Open Layers. Tick on all the polygon layers you want to convert to lines. Tick on the Load layers on completion.



17. Under the Lines column click on ... to navigate to a folder to save the output files. Give them the .shp extension. Then click Run. Big datasets like cadastre will take some time to process. The new layers will then appear in the Layers window.

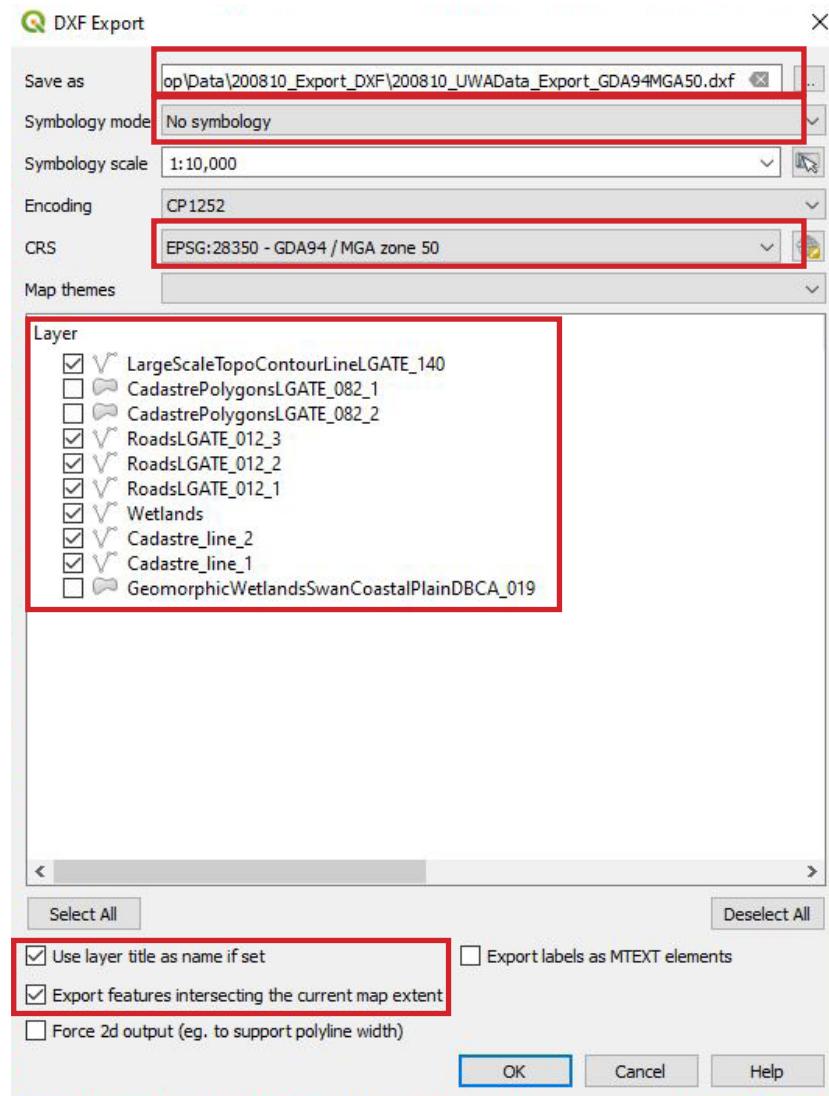


18. Using the same method as in Steps 15 (or 16 and 17) you need to reproject the layers to the desired output coordinate system (eg. GDA94 MGA50. They will originally be in many different coordinate systems. Use this tool:

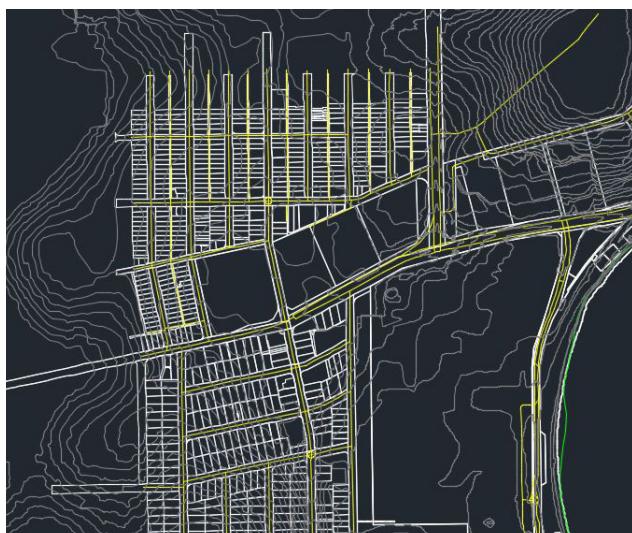
Reproject layer

19. Before exporting to dxf zoom to the area you want to export. Save the QGIS project.

20. Go to Project>Import/Export>Export Project to DXF. In the window that opens tick on all the line layers you want to export to AutoCAD. Set to No Symbology. Check the CRS is the same as the Nearmap file (GDA94 MGA50) or other data in CAD. Tick on Use layer title as name if set and Export features intersecting the current map extent. Set the location and name for the output file. Click OK.



21. This output dxf can be opened in AutoCAD. The layers can be copied to the other drawing containing the Nearmap image using COPYBASE. If you use COPYBASE (not any other copy) and specify the base point as (0,0,0) then PASTECLIP to (0,0,0) in the other drawing, the data will overlay correctly with the Nearmap image. Do not manually move any data.

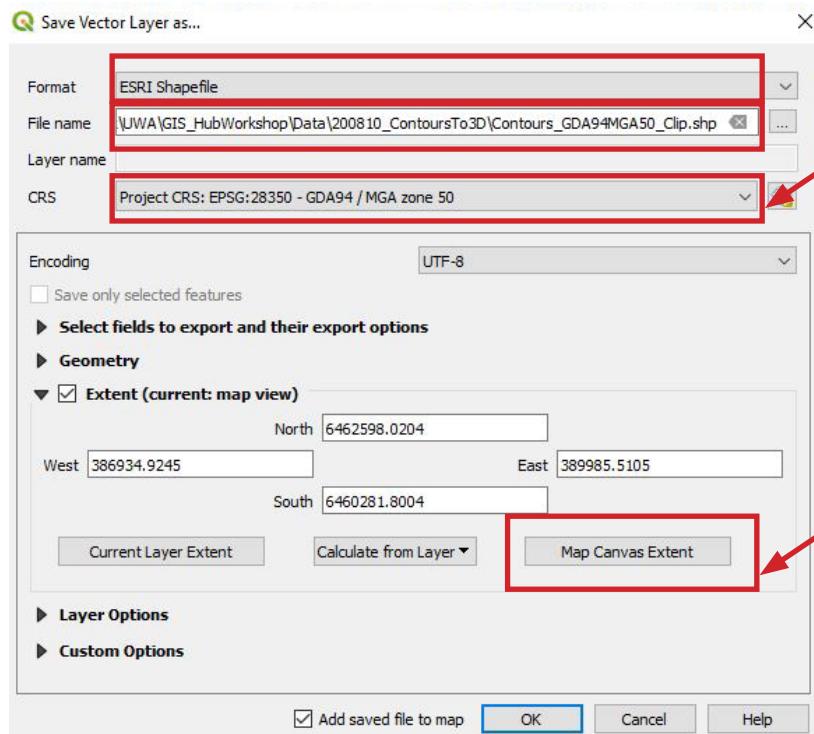


Elevation contour data

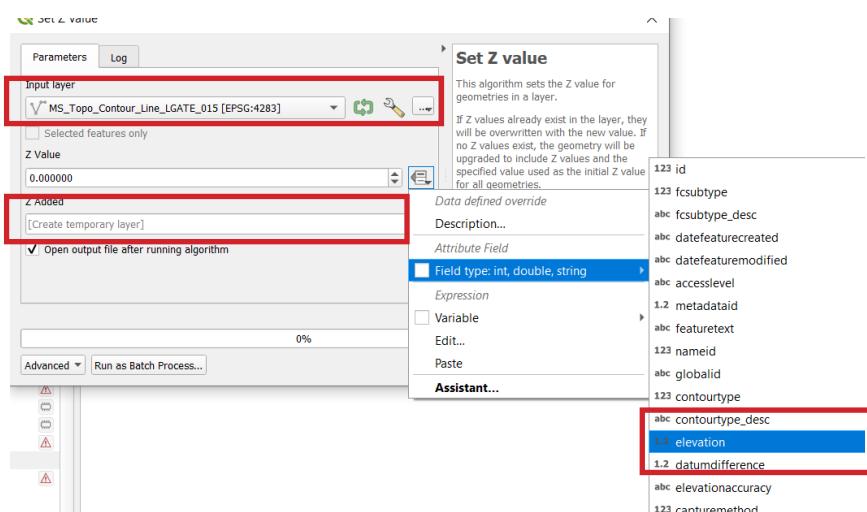
If you click on the elevation contour data exported to AutoCAD using Steps 13-20, you will notice that it does not have an elevation value in the polyline properties (right click on the line then click on Properties). The elevation value just shows as '0'.

To export contour data with elevation values more pre-processing in QGIS is required before export. Follow Step 21 onwards to do this method.

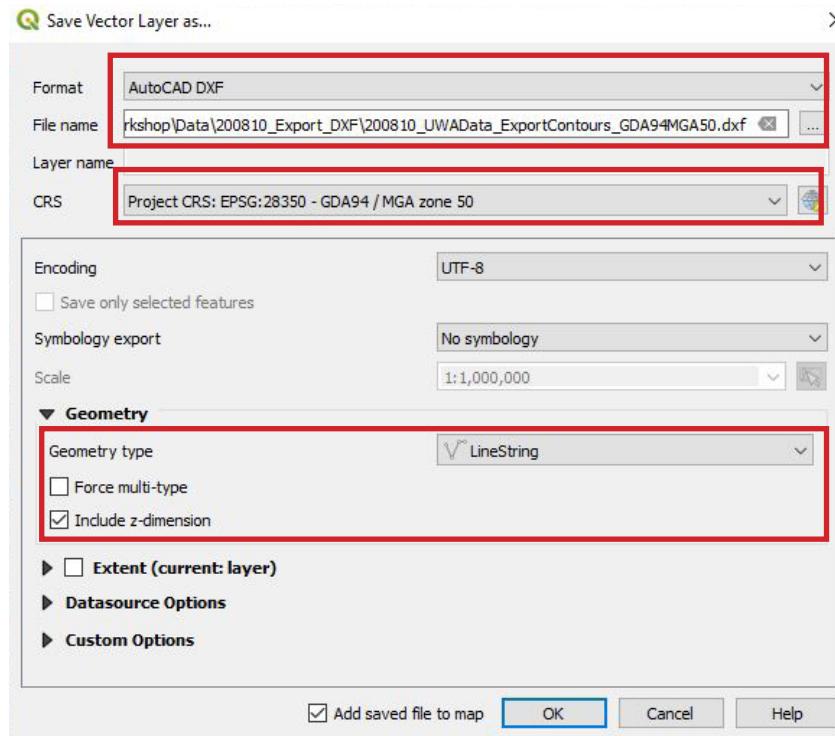
22. Zoom to the area of interest. Then right click on the contours layer and go to Export>Save Features As. Specify the location and name of the output file with the shp extension. Set the CRS to the same as the other export/Nearmap (GDA94 MGA50). Tick extent and click on Map Canvas Extent. Tick Add saved file to map and click okay.



23. Now you need to convert the shapefile to a 3D shapefile (so the lines have a z value). Go to the Processing Toolbox window and type Z. Double click to open the tool called Set Z value. Specify the input contour shapefile. Under Z Value click on the 'Data defined override box' and choose the attribute containing the contour elevation value. Specify the location and name of the output file.

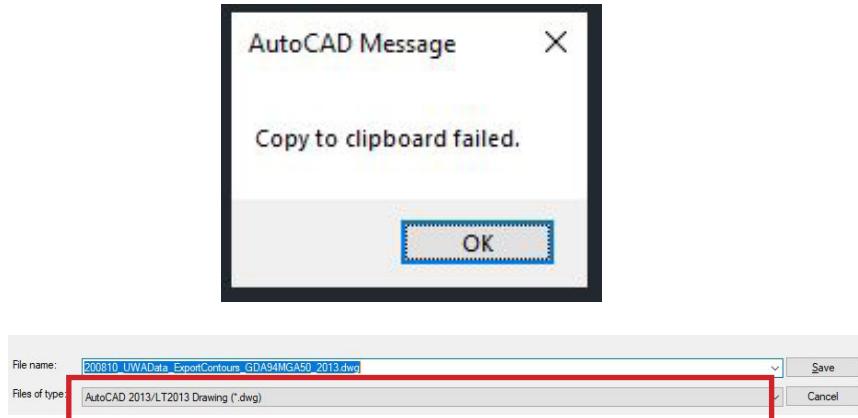


24. To export the 3d contour layer to dxf right click on the previous output layer and go to Export>Save Features As. Specify the location to save to and the output file as AutoCAD DXF. Set the CRS to GDA94 MGA50. Specify the Geometry as LineString and tick Include z-dimension.

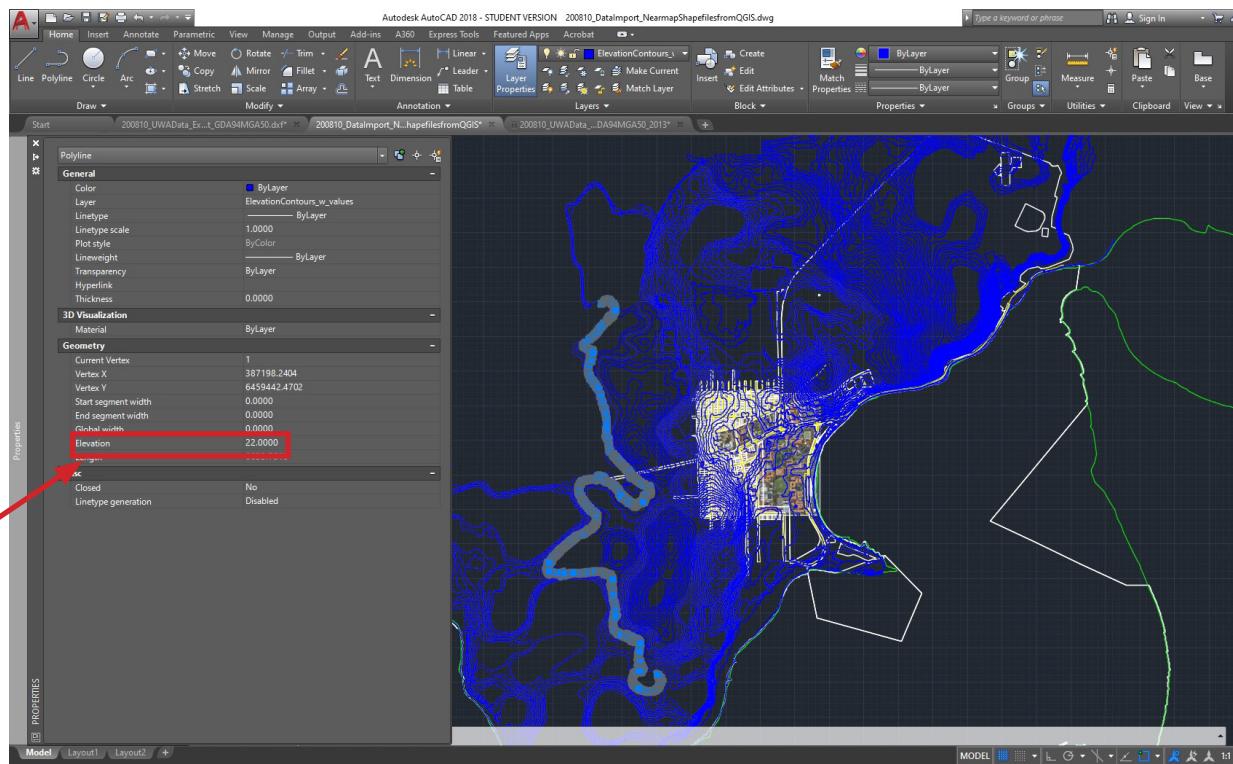


25. Open the new dxf contour dataset in AutoCAD. You will need to zoom to the layer. Use COPYBASE to copy the layer to the other AutoCAD project with the previously added data.

Sometimes there is an error with the COPYBASE command. To overcome this problem Save As the dxf to a 2013 dwg file. Reopen this file then you can COPYBASE (with 0,0,0) and PASTECLIP (to 0,0,0).



26. Now when you look the properties of a contour line (right click>Properties) you will see a value listed against Elevation.



Part 3: Downloading Digital Elevation Model (DEM) data

1. The best free Digital Elevation Model data is the 5m LiDAR-derived data available from here: <https://elevation.fsdf.org.au/>

You must use an email address that doesn't start with a number (don't use your student email address) when ordering data otherwise it won't be sent.

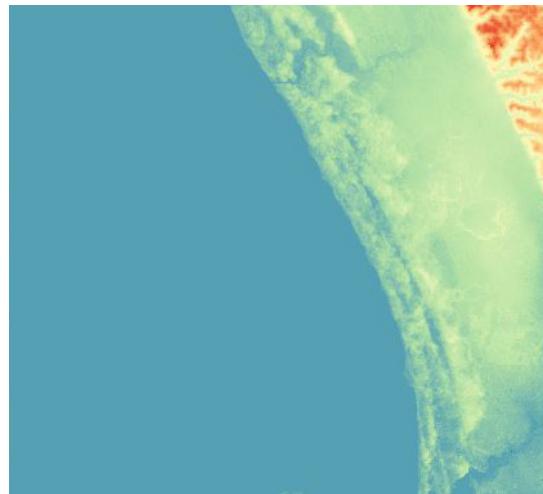
2. On the first page zoom to your area of interest

The screenshot shows the main interface of the ELVIS website. At the top, there's a header with the logo of the Australian Committee on Surveying & Mapping (ACSM), the title 'ELVIS - Elevation and Depth - Foundation Spatial Data', and a 'Version: 0.6' link. Below the header is a search bar with the placeholder 'Enter a location'. To the right of the search bar are several icons: Layers, Download, Help, Glossary, and Reset. The main content area is a map of the northern coast of Australia and parts of Indonesia and Papua New Guinea. The map features a grid overlay and various colored areas representing different datasets. A specific location, Darwin, is marked on the map. On the right side of the map, there's a sidebar with the heading 'Select area by:' followed by three icons: a pencil inside a square, a pencil inside a circle, and a keyboard. Below this is a yellow box containing the text 'Select an area to find datasets within.'

3. Then use the Select by Area tool to outline your area of interest. It will bring up the available DEM data. Click on Show List to reveal the datasets available. Tick on the 5m LiDAR dataset (or others). Then click the Download button at the bottom. Enter a non-UWA email address that doesn't start with a number. Your data will be emailed to you.

This screenshot shows a zoomed-in view of a coastal area in Sydney, Australia, on the ELVIS platform. The map shows a mix of urban and natural landscapes. A black rectangular box highlights a specific area of interest on the map. To the right, the interface changes to show a list of datasets. Under the heading 'Geoscience Australia (Showing 3 of 3)', there is a list of datasets. The first item, '5 Metre Digital Elevation Model (DEM) of Australia derived from LiDAR', has a checkbox next to it that is checked. A red arrow points to this checked box. Another red arrow points to the 'Download 1 selected datasets... (Approx: 500.0 MB)' button at the bottom of the list. The interface also includes a 'DEM' section for 'Digital Earth Australia' which lists a single dataset: '25 Metre Intertidal'.

4. You can't load GeoTiff files directly to the correct location in AutoCAD - the GeoReflmg plugin needs to read a separate (not embedded) world file. First open the .tif file in QGIS and set the layer symbology (colours). Right click>Properties>Symbology>Single Band Pseudocolour.



5. Zoom to the extent you want to export. Then use Export>Save As to export a rendered version of the image. Set the Create Options TFW = YES to create a world file.

Load the output .tif image to AutoCAD using the steps outlined for Nearmap images and use GeoReflmg.

