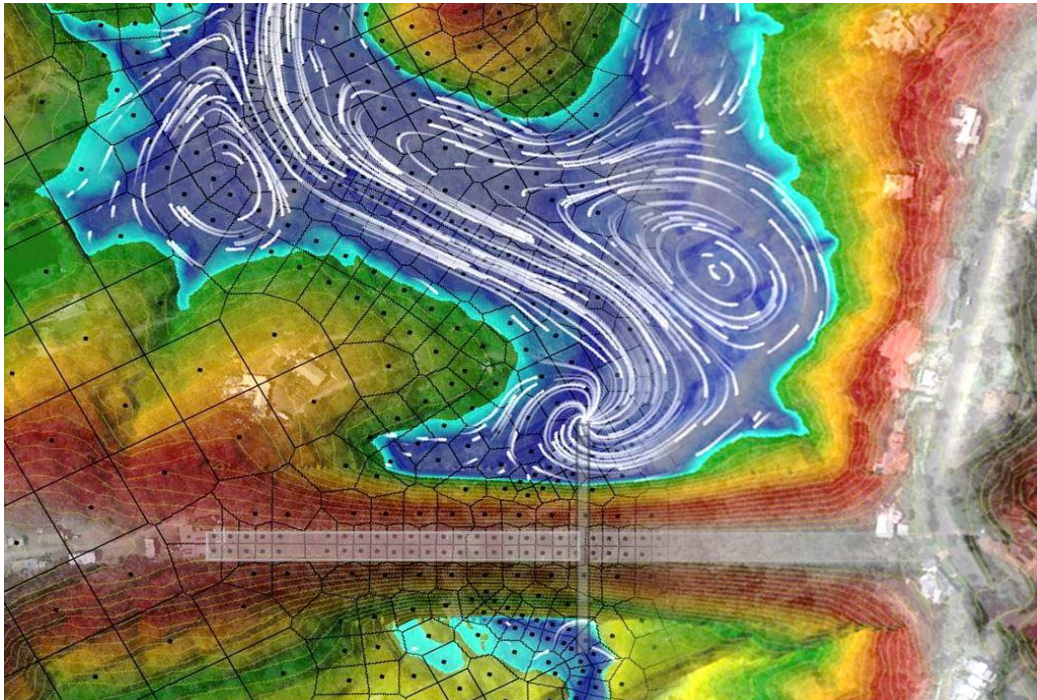




HEC-RAS 5.0 Training

New Zealand Workshop Guide



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**In conjunction with the lecture notes,
these workshops are designed to prepare you
to build, run, and animate 1D and 2D flood models
using the new features available in HEC-RAS 5.0.5**

Additional resources: www.surfacewater.biz/workshops/

Key:



Left-click



Right-click



Double-click



Select Link



Draw



Introduction: Getting started

This guidance document describes a basic model setup process for:

- HEC-RAS one-dimensional (1D) flood model
- HEC-RAS two-dimensional (2D) flood model

This guide includes new features available in HEC-RAS Version 5.0.5 and assumes that users have downloaded and installed the latest version.

The schematic image below shows an example of the file setup for the files that will be developed for these exercises along with the relevant icons for creating, running, and viewing basic HEC-RAS models.

Reading from left to right, the HEC-RAS icons that will be covered in these exercises correspond to the following files:

- HEC-RAS project file (*.prj)
- Geometry file (*.g01)
- Unsteady flow file (*.u01)
- Plan file (*.p01)
- RAS Mapper file (*.rasmapper)

The first four icons shown in the inset image below require user input with a defined title that is associated with each file name. The RAS Mapper file (*.rasmapper) is automatically created and does not require the selection of a title.

Before beginning, an appropriate folder structure should be set up under a HEC-RAS directory created within the overall project folder. Here is an example of the folders to be created:

- Aerial photos
- Hydrology
- Land use
- Projection
- Results
- Terrain
- Shape files

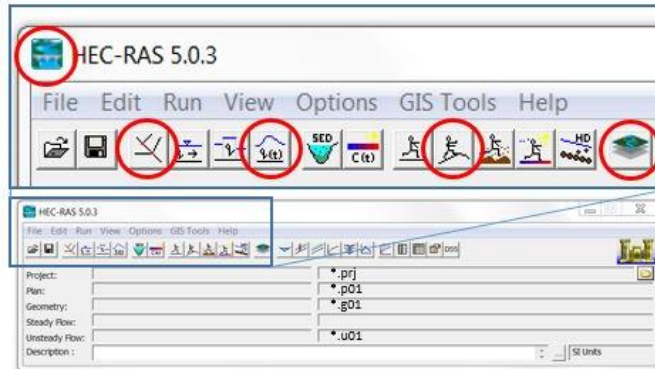
This folder structure may be adjusted to suit organisational IT requirements and geospatial data standards. Available shape files, terrain files, hydrographs, and other relevant files should be placed in the appropriate folders before proceeding. It would be beneficial to create new layers outside of HEC-RAS for some features first, such as:

- Catchment delineations
- Flow paths
- Cross section and long section profile alignments
- Roadway or levee centreline alignments
- Building footprints

These features should be defined as shape files using CAD or GIS software (Arc, QGIS, AutoCAD, etc.). The shape file should include a name field, and individual features should be assigned names that will allow clarity and consistency in the HEC-RAS model once the shape file is imported.



HEC-RAS File Management:



HEC-RAS Project File (*.prj)

- Model settings
- File linkage
- Project description



RAS Mapper File (*.rasmapper)

- Assign projection (*.prj)
- Associate terrain/land use
- View:
 - Geometry input
 - Plan results
 - Geospatial data

Plan File (*.p01)



- Geometry and flow linkage
- Simulation window
- Options & tolerances

Geometry File (*.g01)

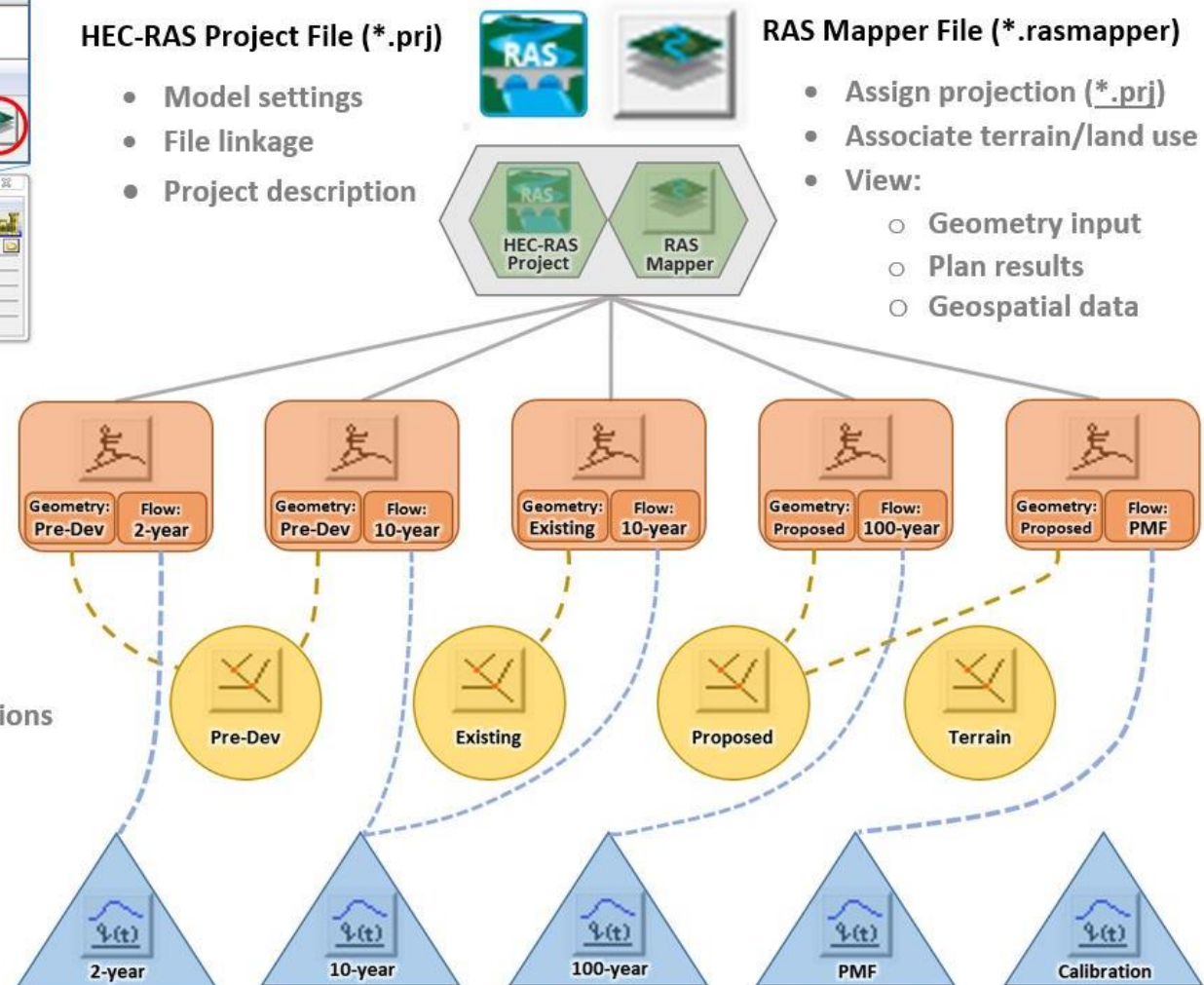


- Mesh definition
- Breaklines & boundary locations
- Roughness

Unsteady Flow File (*.u01)



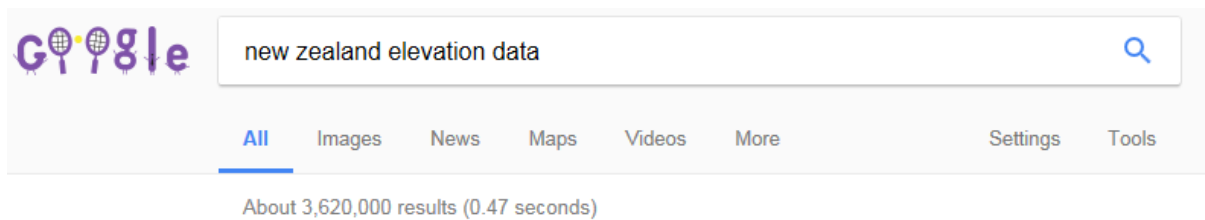
- Hydrographs
- Precipitation rates
- Boundary conditions





Download elevation data (Skip this step if terrain and projection are already available)

- Google “New Zealand elevation data” and select Land Information New Zealand (LINZ) website

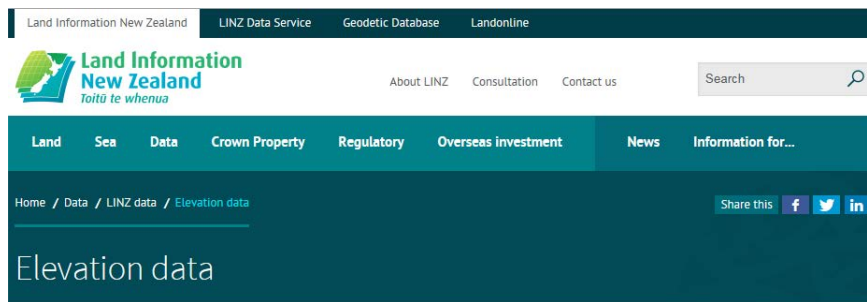


Elevation data | Land Information New Zealand (LINZ)

www.linz.govt.nz > Data > LINZ data ▾

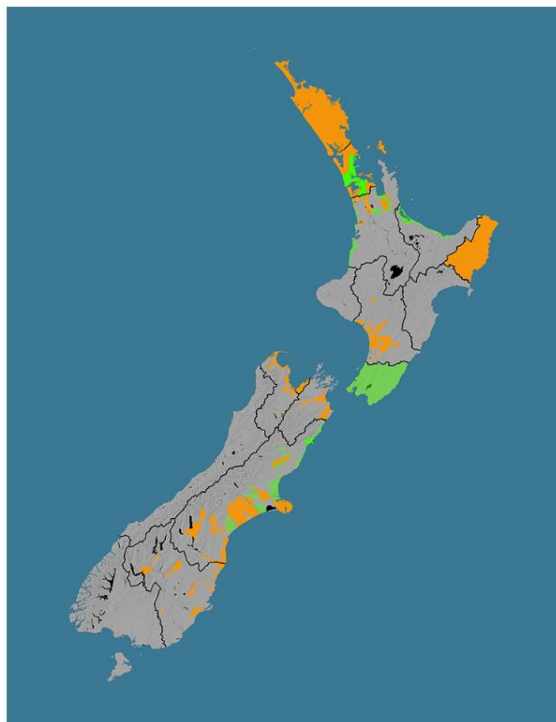
Dec 20, 2016 - Access elevation data through the LINZ Data Service.

- Select LINZ (Land Information New Zealand) and browse to “NZ Data Service”



Access nationally consistent high accuracy elevation data through the LINZ Data Service.

Elevation data captured as part of LINZ's role in the coordination of national LIDAR is being made freely available through the [LINZ Data Service](#) as 1m Digital Elevation Models and the source point cloud data for the areas in green. Capture and supply of data from the orange areas is in progress and will be made available on the LINZ Data Service in the future.



[Visit the LINZ Data Service →](#)

News

- Calling all spatial innovators... | 31 May 2018
- New Zealand Industries trial advanced GPS technologies | 22 November 2017
- LINZ Data Service Update October 2017 | 17 October 2017
- LINZ nominated for a spatial excellence award | 29 September 2017
- Map My Waahii, My Place – virtual field trip | 14 August 2017
- LINZ Data Service Update June 2017 | 15 June 2017

[View all News](#)

You might be interested in

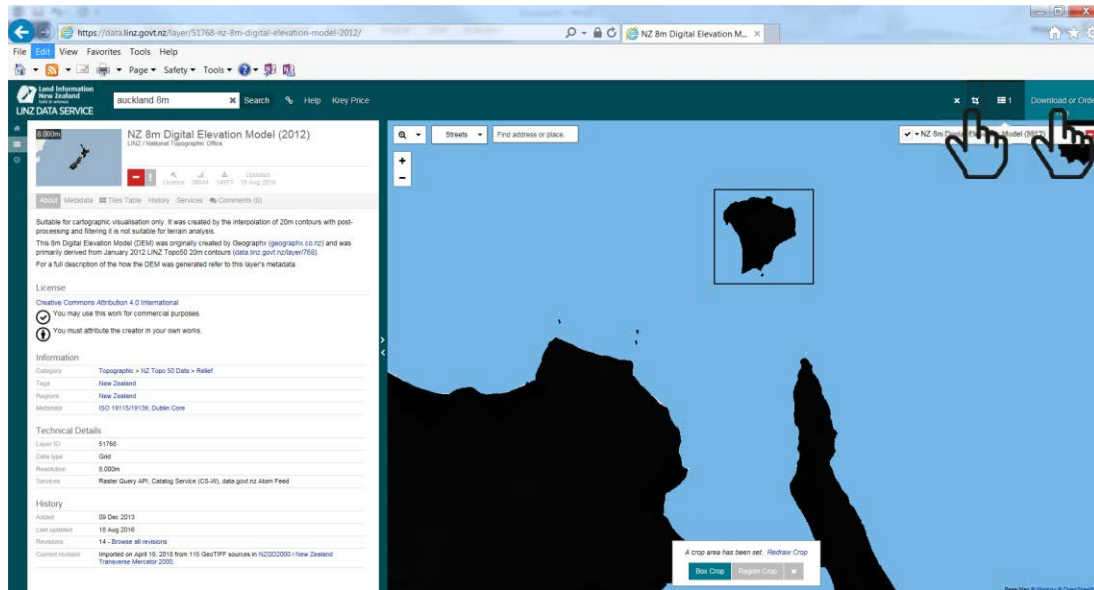
- LINZ basemaps
- Geodetic Database
- NZ Gazetteer: Search for place names
- Geodata.govt.nz
- Our location strategy
- Licensing and using data

What we don't do

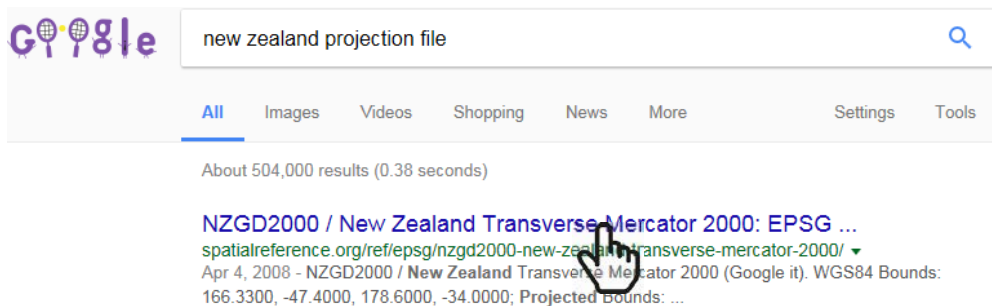
- **Territorial Authority or Regional Council boundary data**
Statistics New Zealand maintains administrative boundaries. Visit them online to download data: [Statistics New Zealand](#)
- **Property valuation and sales data**
Private companies hold property valuation and sales data. Look under 'Valuers' in the Yellow



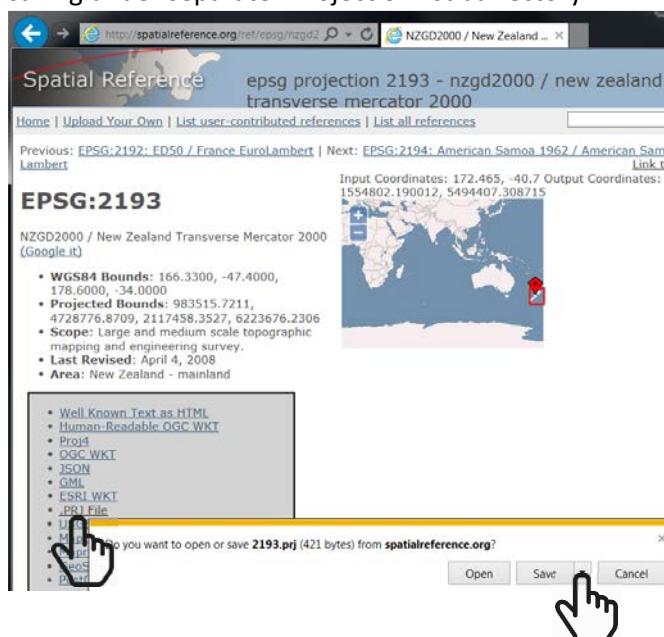
- Select area of interest, select geotif format and NZGD2000 projection, download DEM file
- Hint: Search for 1m or 8m data to view coverage extents
- Hint: Older versions of Internet Explorer may not work; Chrome or Firefox may be preferred.



- Google "New Zealand projection files", find relevant zone (NZGD2000 for example)



- Select relevant prj file and download to project directory
- Suggest renaming file to descriptive name ("NZGD 2000 NZTM Projection File.prj") and saving under separate "Projection" subdirectory



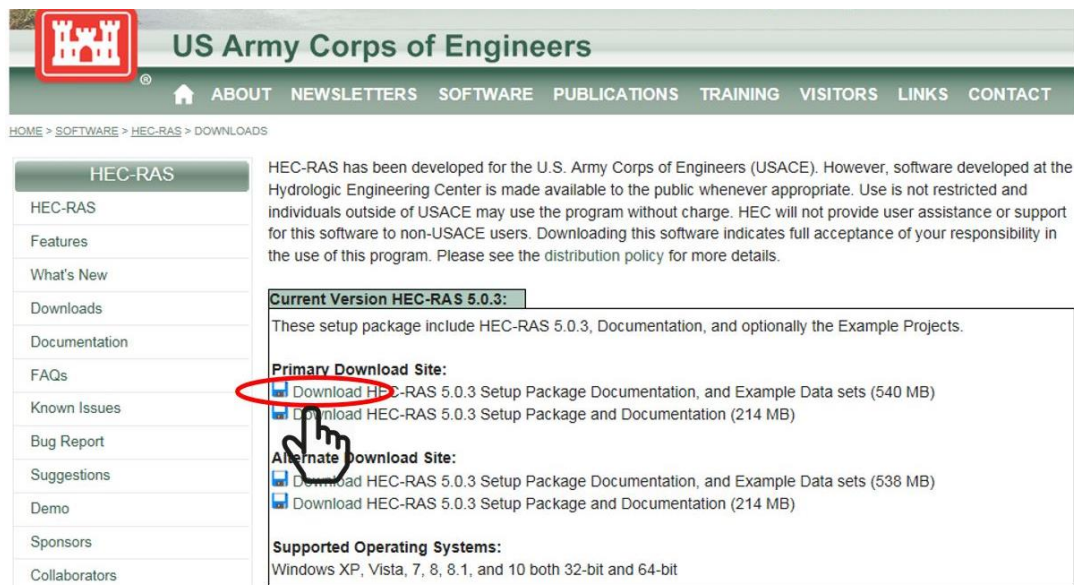
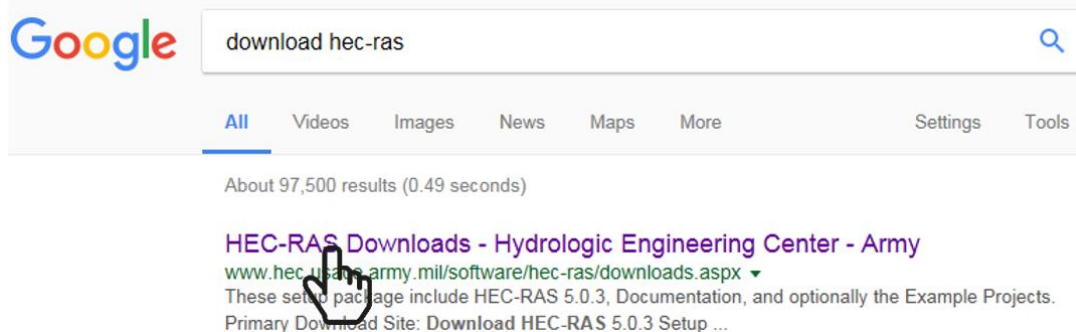


Workshop 1: Set Up Project File and RAS Mapper

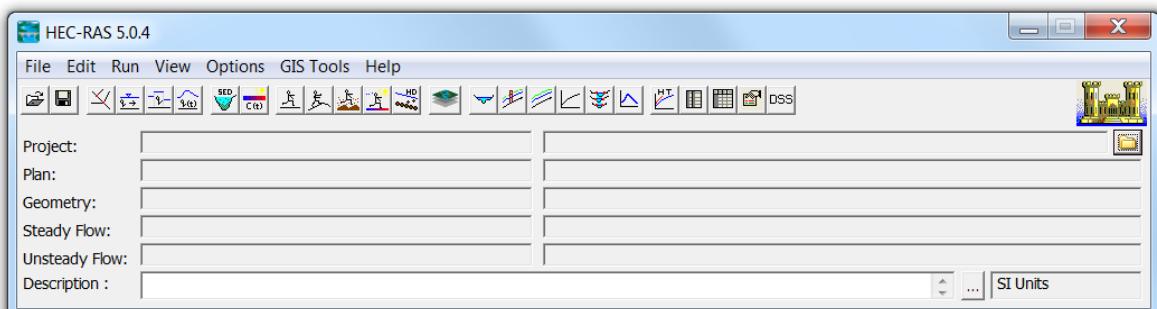


- Download the latest version of HEC-RAS (Version 5.0.4)

- Google "Download HEC-RAS"
- Download link: <http://www.hec.usace.army.mil/software/hecras/downloads.aspx>
- Recommend installing with Example Projects

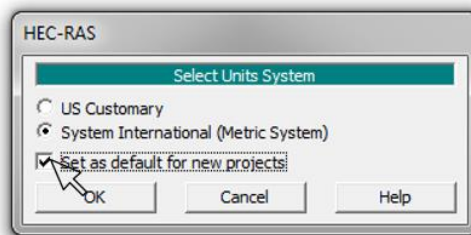
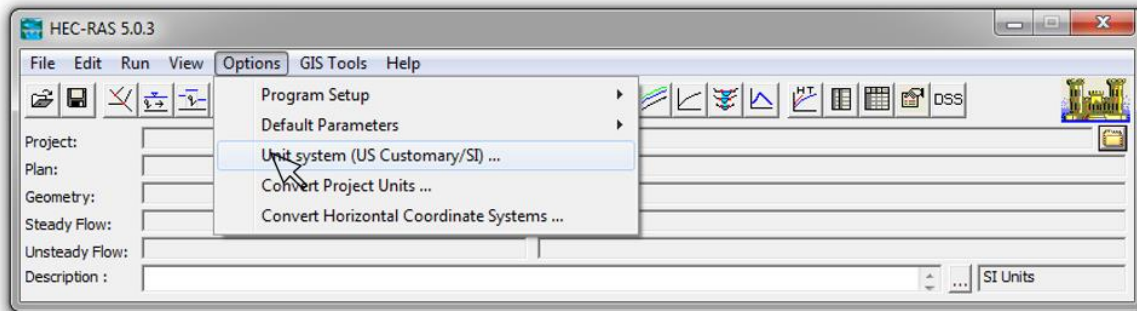


- Open HEC-RAS (Select HEC-RAS 5.0.4 from Start Menu)

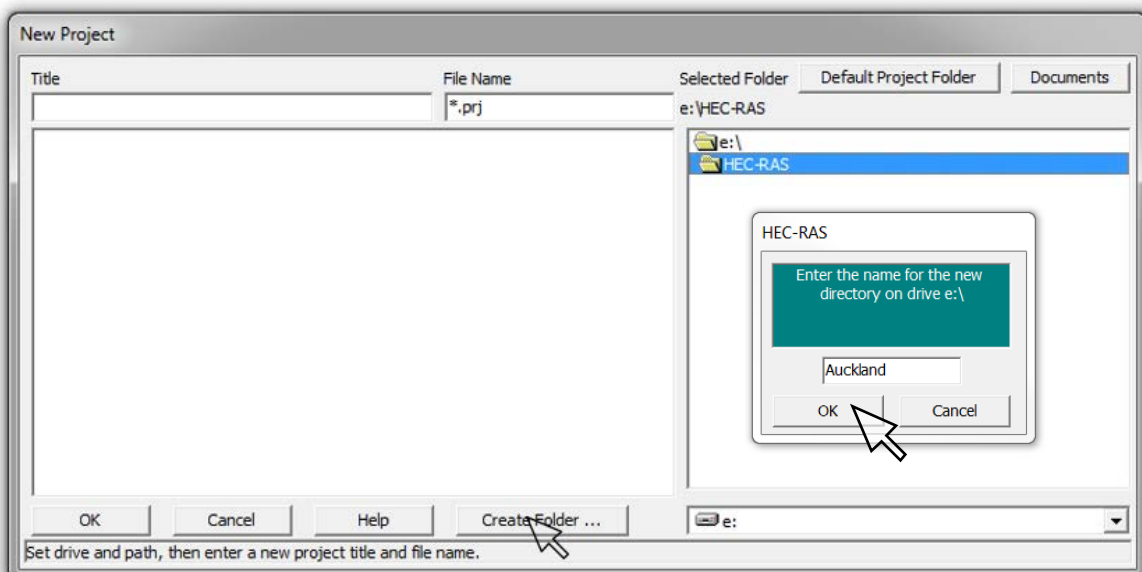




- Set unit systems to default to SI units (Options | Unit System)



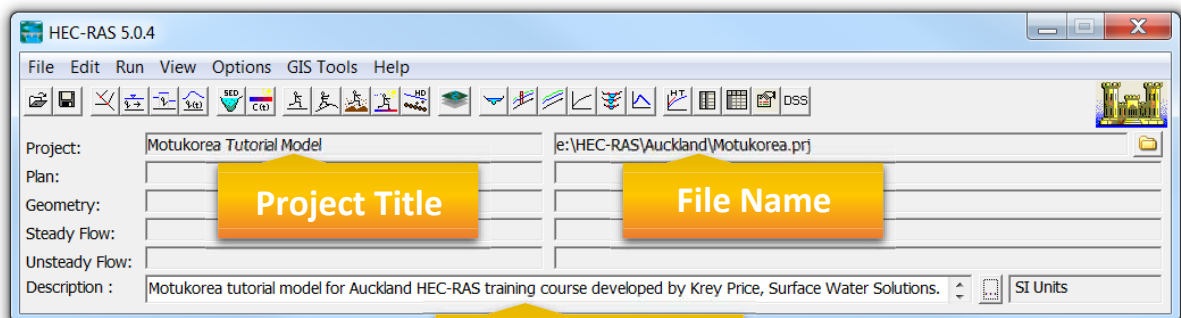
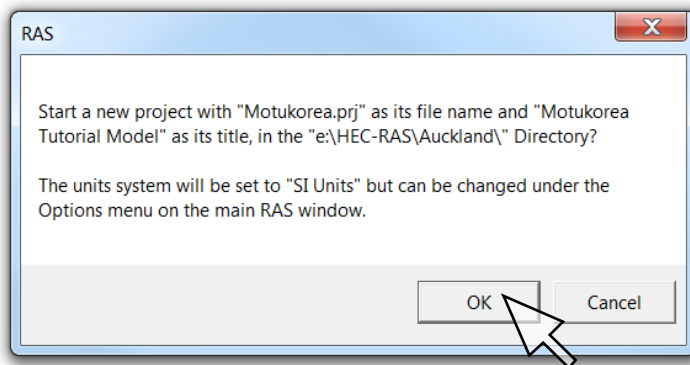
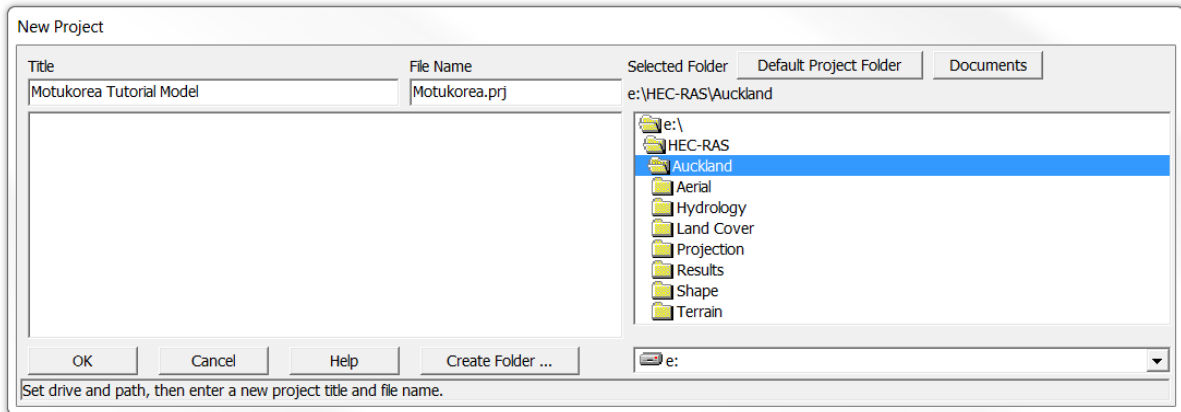
- Start a new project in SI units (File | New Project)
- If folder structure has not yet been set up, return to introduction for instructions or create a new folder (recommend setting up folder in root directory, not in windows shortcuts)





- Assign descriptive project title and relevant file name

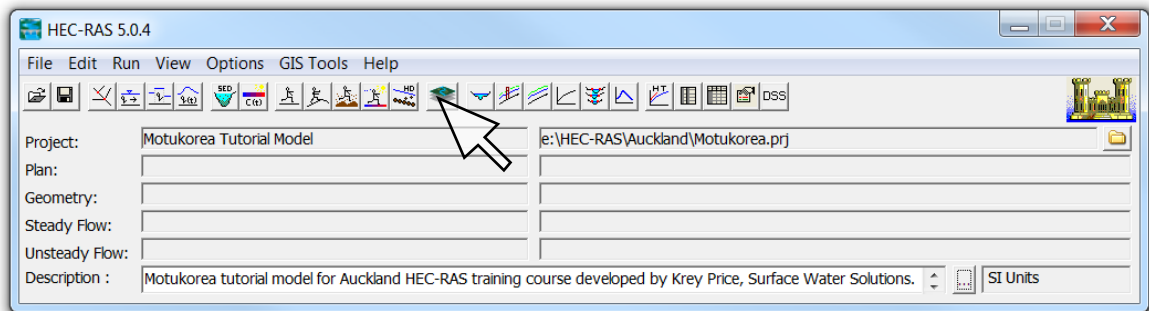
[Note: the file name will be replicated in many other files with varying file extensions – sometimes to hundreds or even thousands of files. The files are not easily renamed, so choose the file name carefully!]



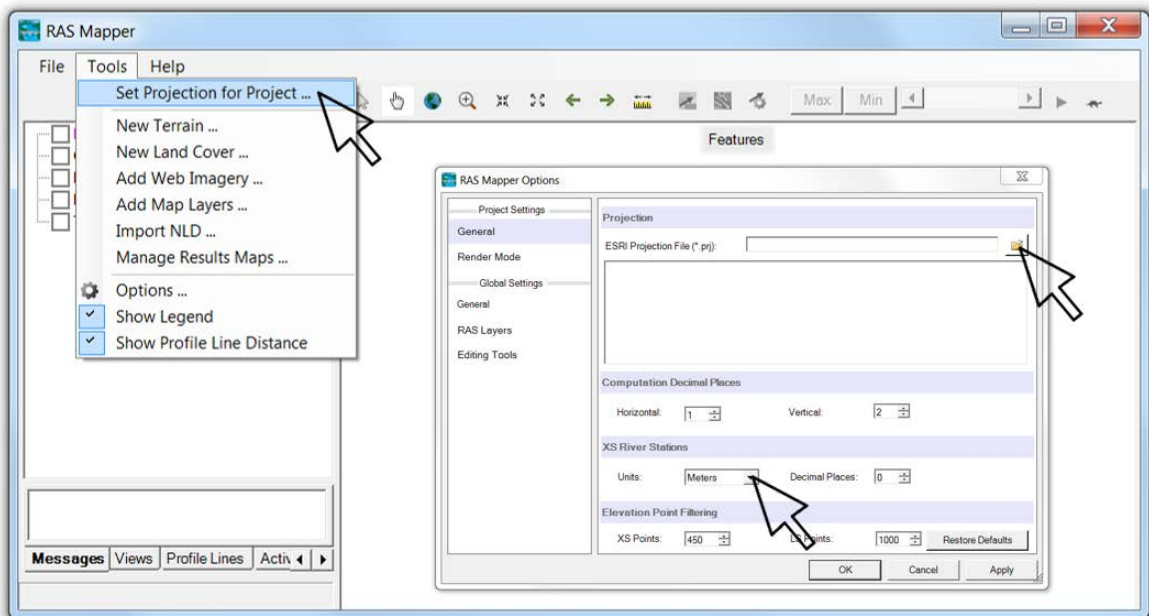
- Enter description, including:
 - Purpose of model
 - End client
 - Data sources for hydrology
 - Data sources for terrain data
 - Name and contact details for modeller
- Save files using File | Save



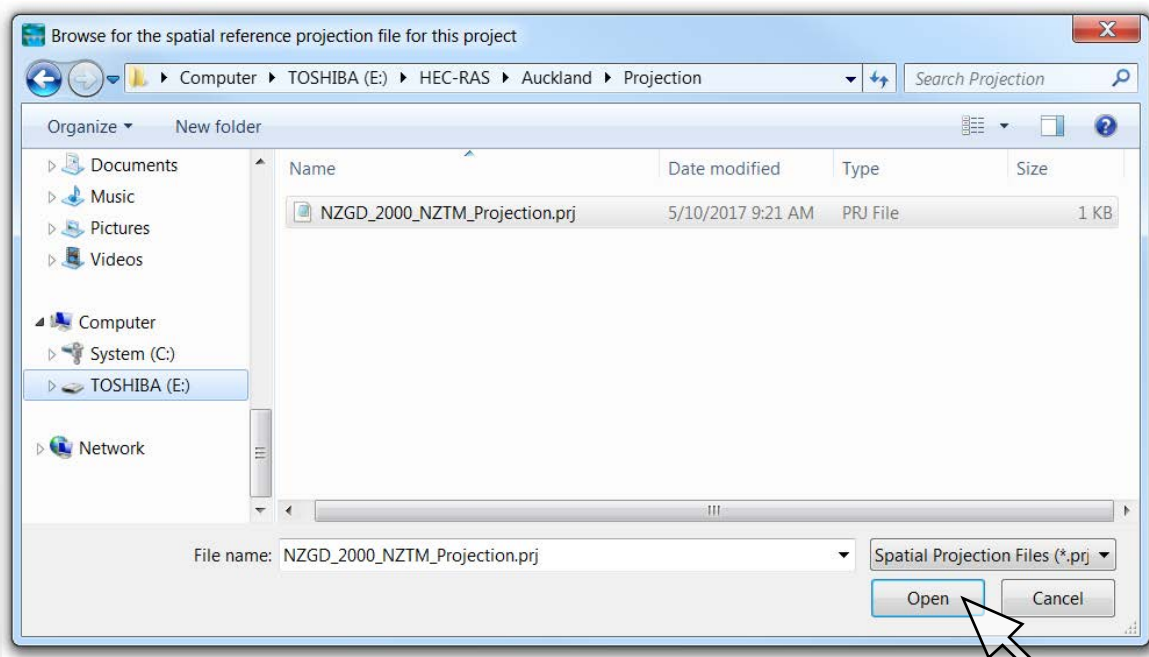
- Open RAS Mapper (click on RAS Mapper icon or Menu: GIS Tools | RAS Mapper)



- Set projection (Menu: Tools | Set Projection for Project)

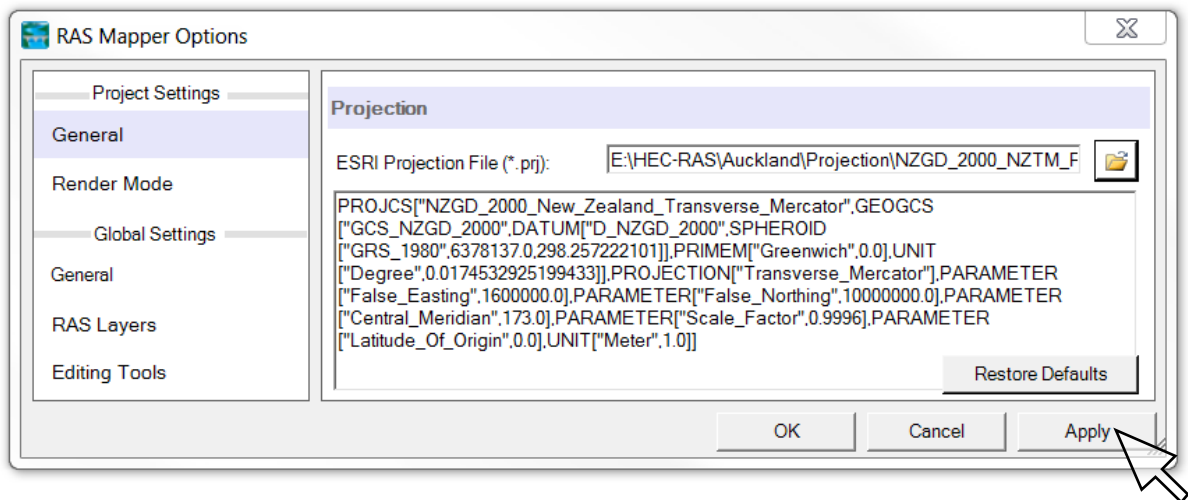


- Change Default XS River Stations to Metres and browse to downloaded projection file

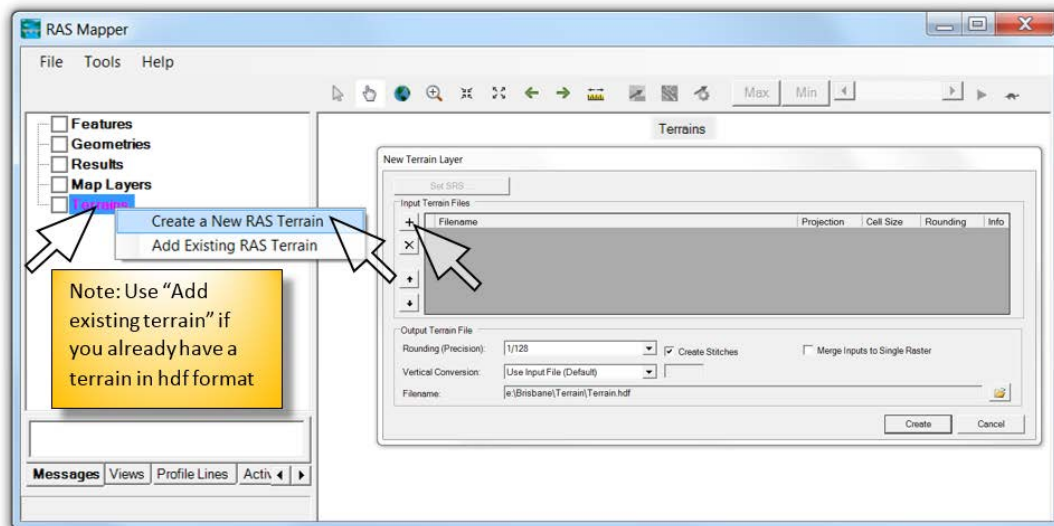




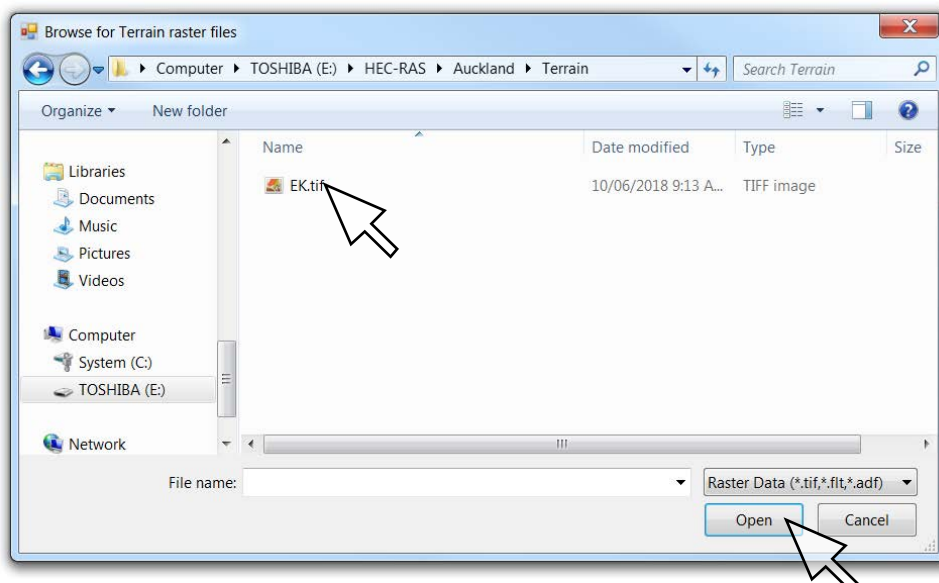
- Confirm details and click “Apply” and “OK”



- Create a new terrain (right-click on Terrain | Create a new terrain) and select “plus” button

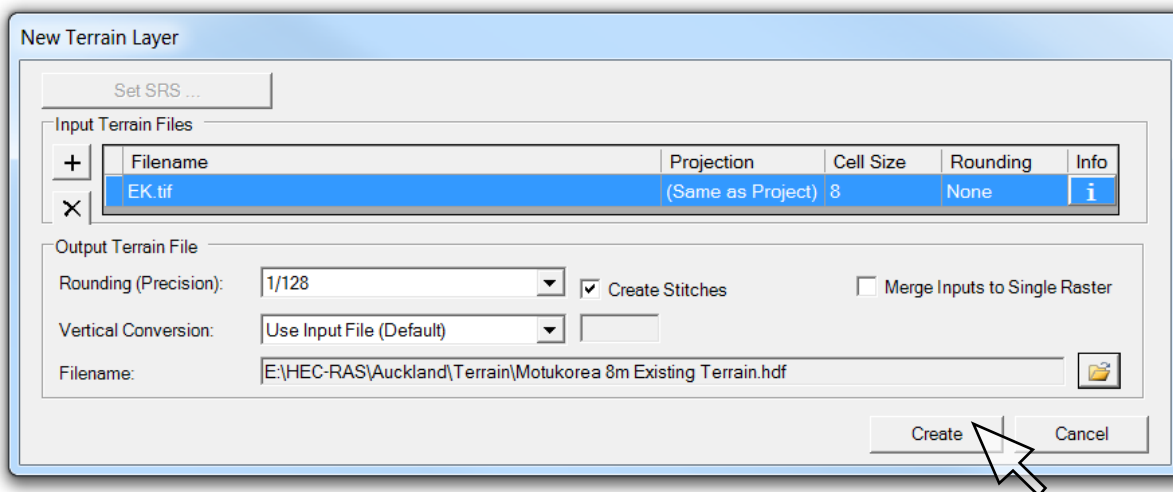
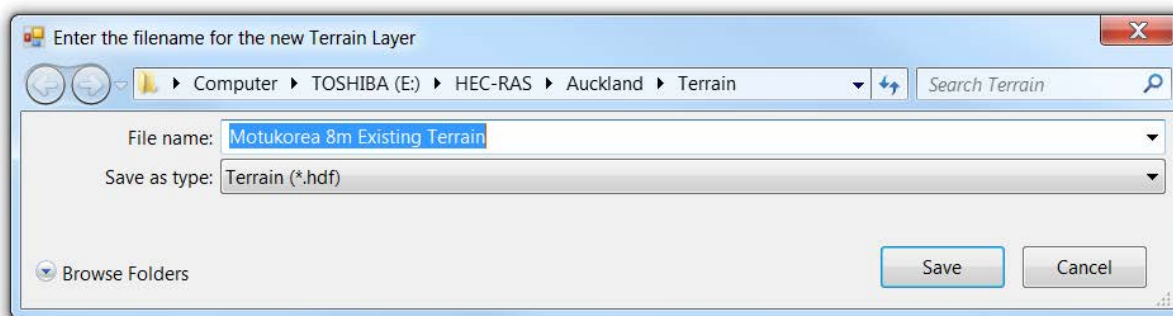
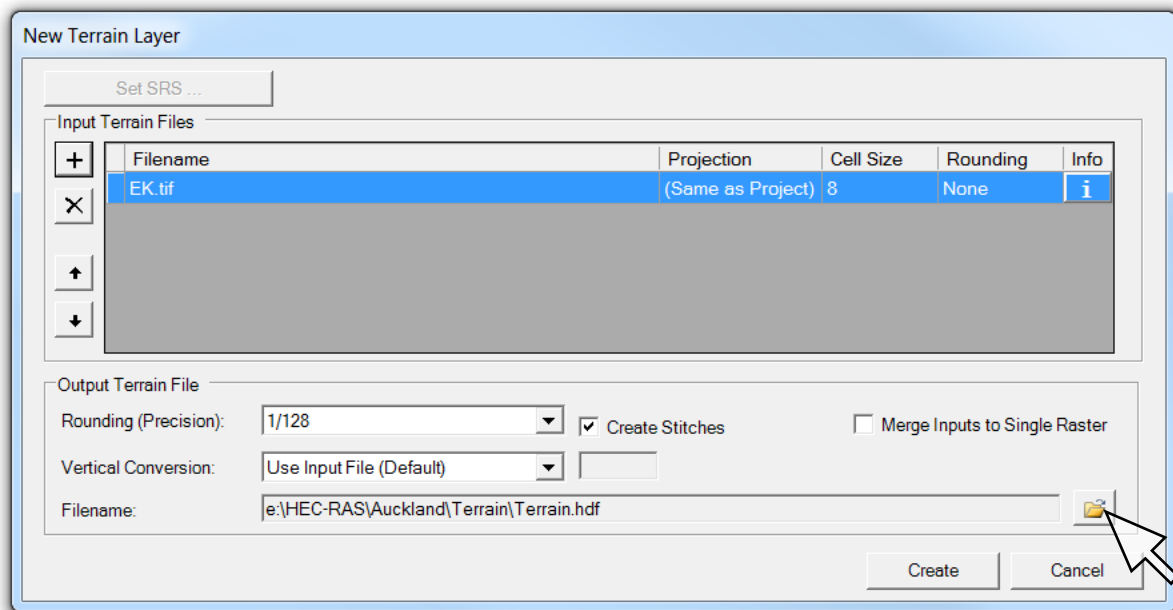


- Browse to downloaded or provided terrain file (Drag down to additional file types if needed)

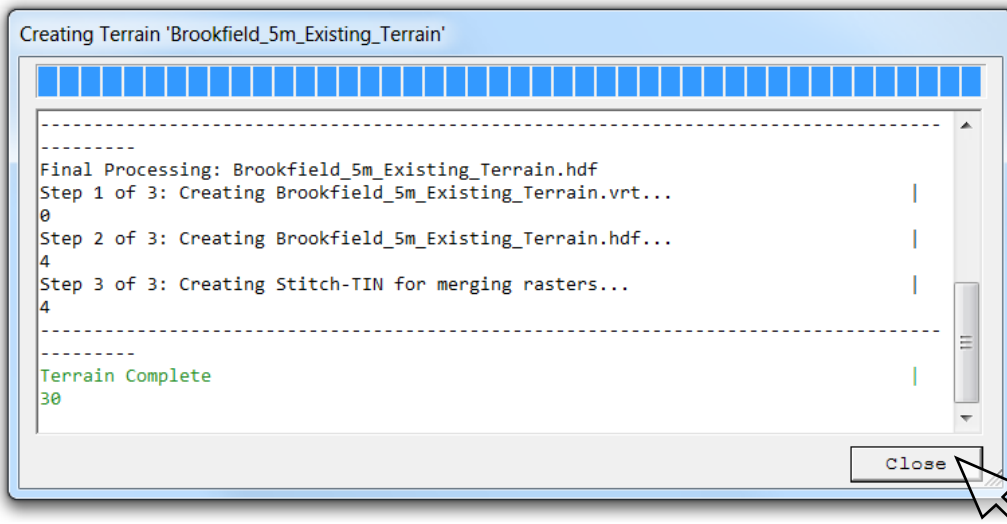
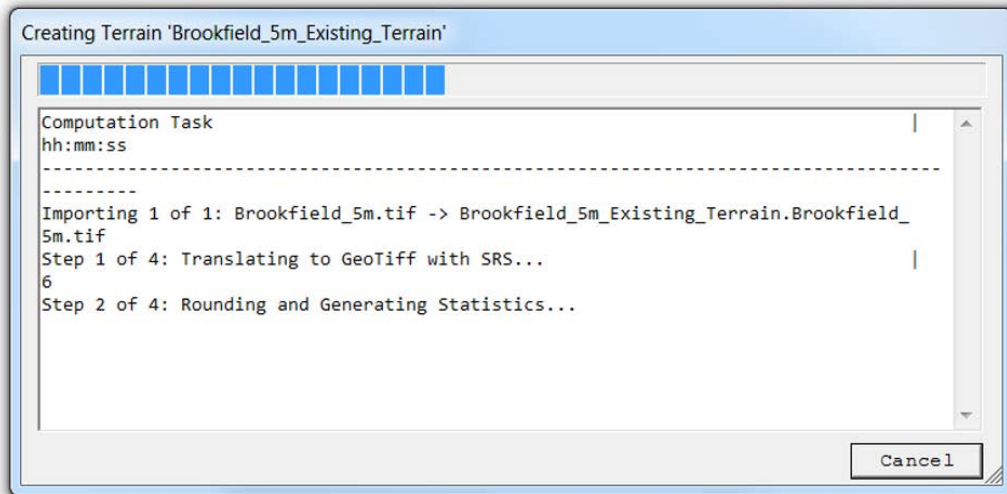




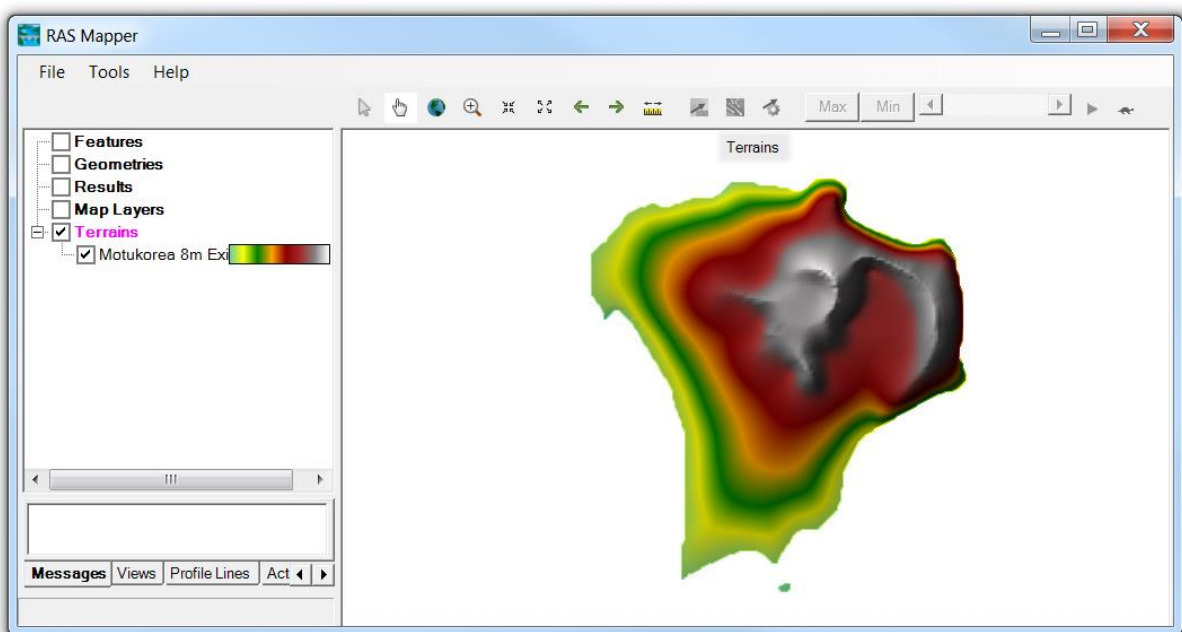
- Change file name to relevant description of terrain and click “Create”



- Click “Close” when complete

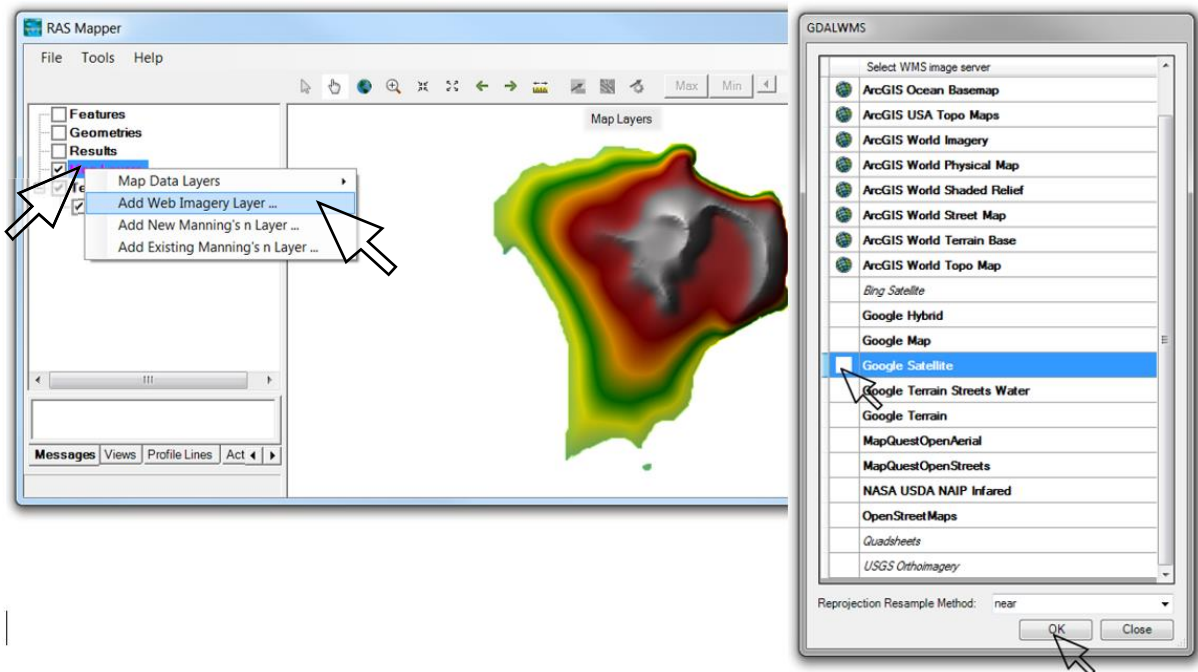


- Toggle on Terrains Layer Group, right-click on Terrain and click "Zoom to Layer"

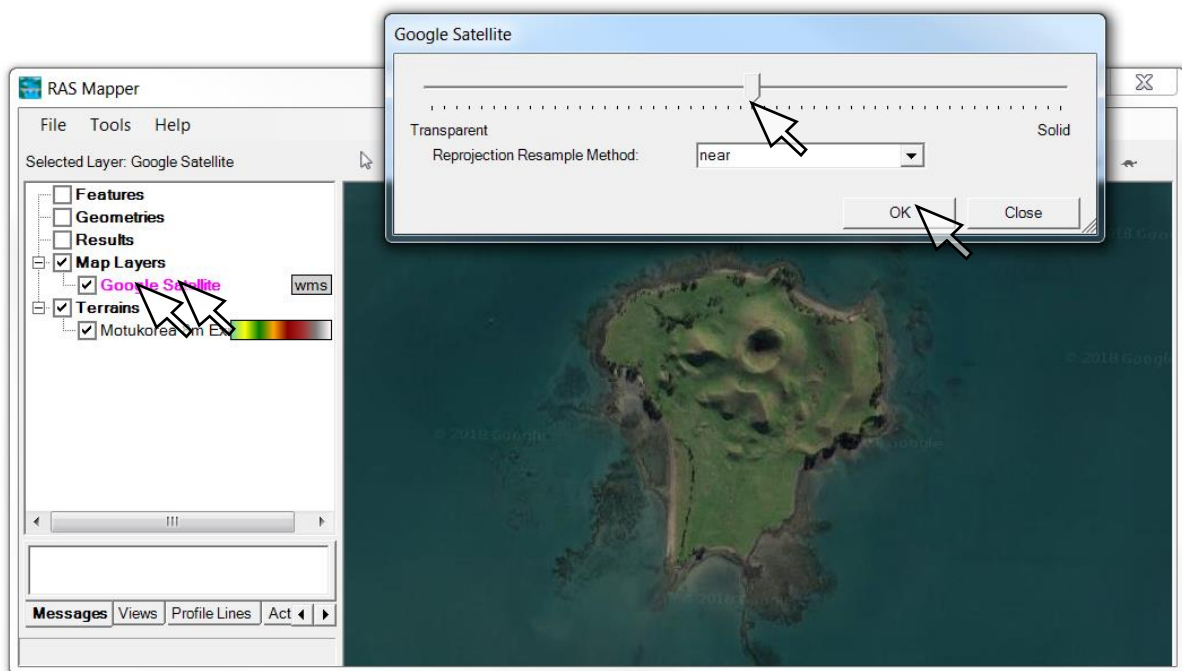




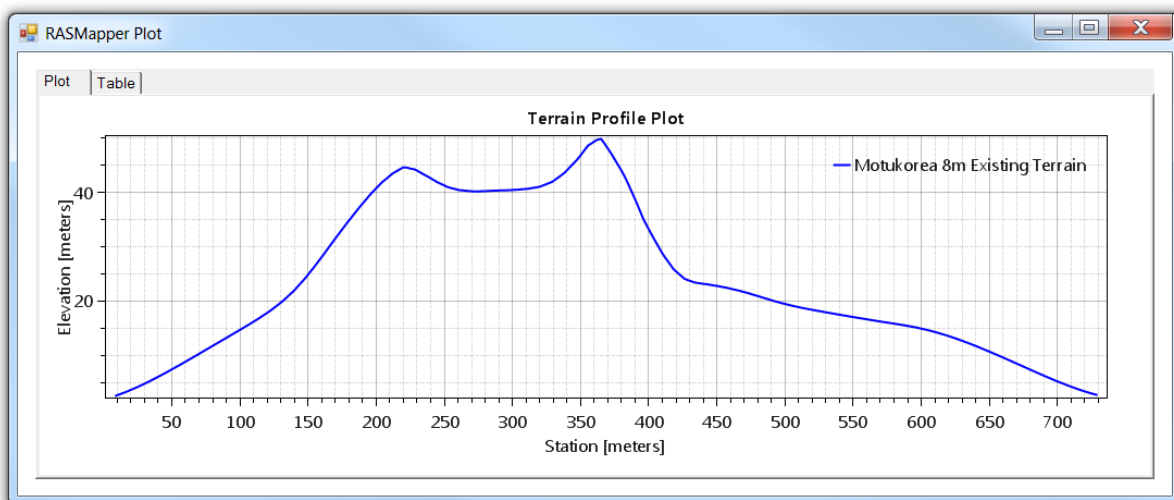
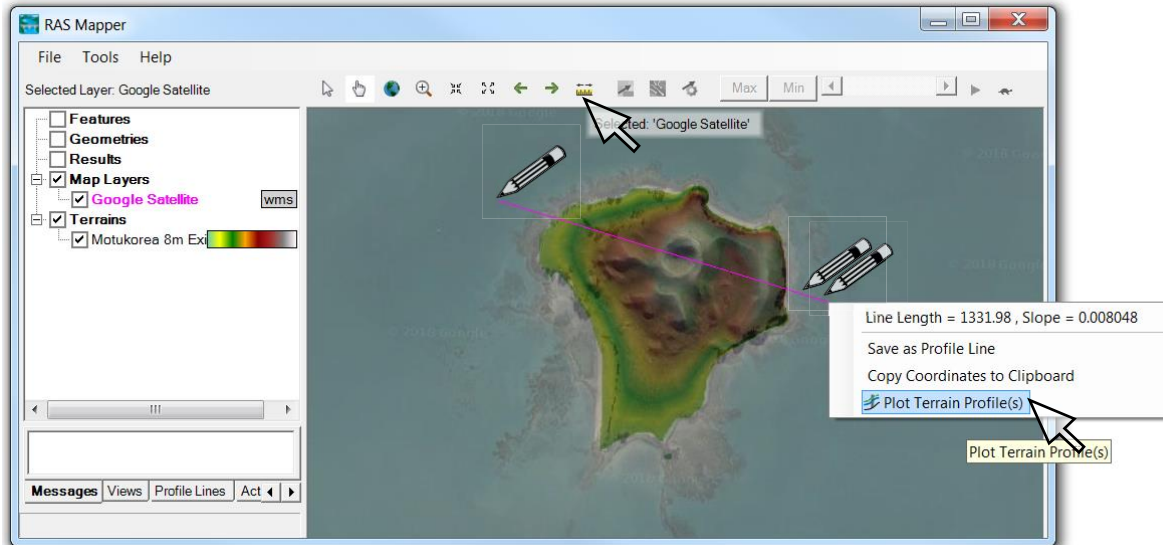
- Right-click on “Map Layers”, select “Add Web Imagery Layer”, and click on “Google Satellite”



- Double-click on “Google Satellite” and adjust transparency



- Select the measure tool and delineate a profile location
- Double-click when complete and select “Plot Terrain Profiles(s)”

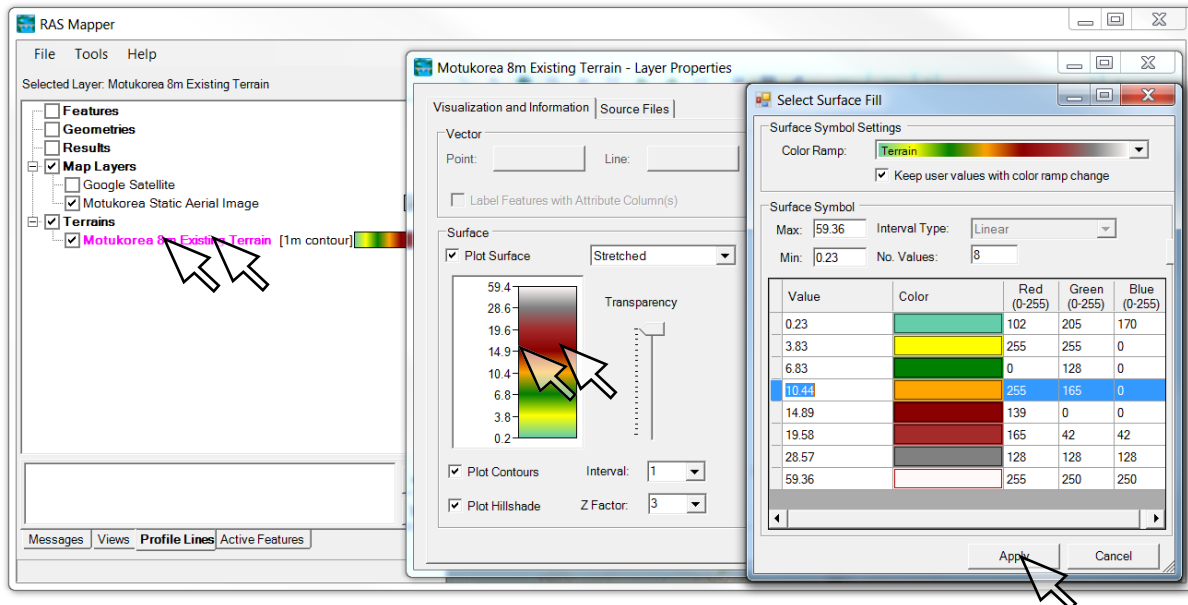


- Click on the "Table" tab to view the profile plot ordinates. Select the blank cell in the upper left to highlight all text. These values can be copied and pasted into Excel or similar program.

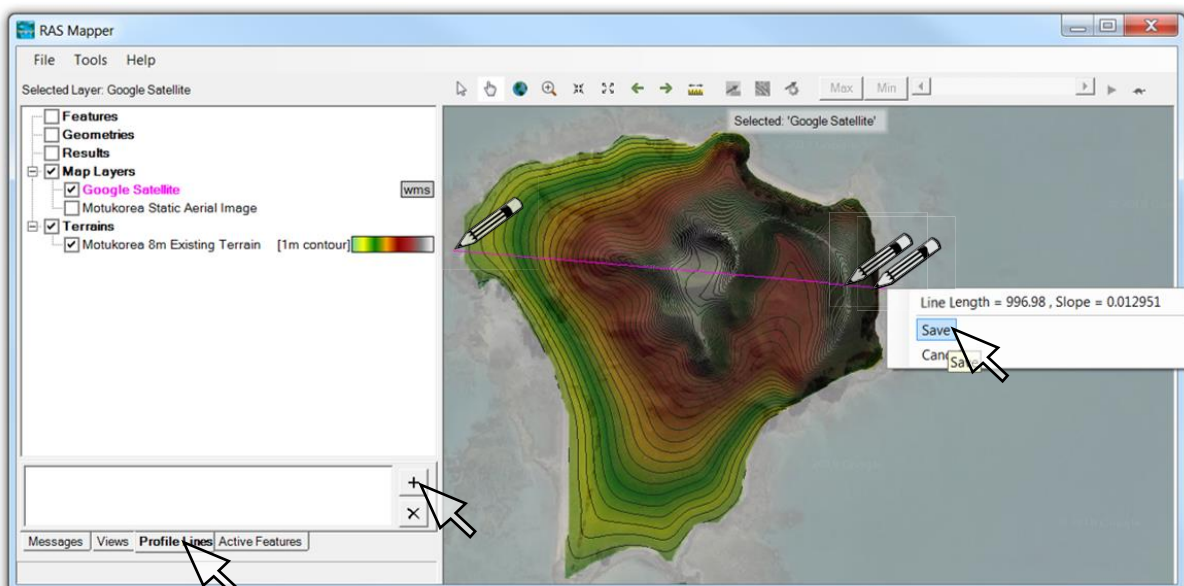
| | Station (meters) | Motukorea 8m Existing Terrain (meters) |
|----|------------------|--|
| 1 | 8.286 | 2.546 |
| 2 | 10.318 | 2.736 |
| 3 | 16.424 | 3.313 |
| 4 | 17.177 | 3.393 |
| 5 | 21.212 | 3.823 |
| 6 | 24.036 | 4.125 |
| 7 | 24.562 | 4.183 |
| 8 | 25.330 | 4.276 |
| 9 | 30.895 | 4.940 |
| 10 | 32.700 | 5.150 |

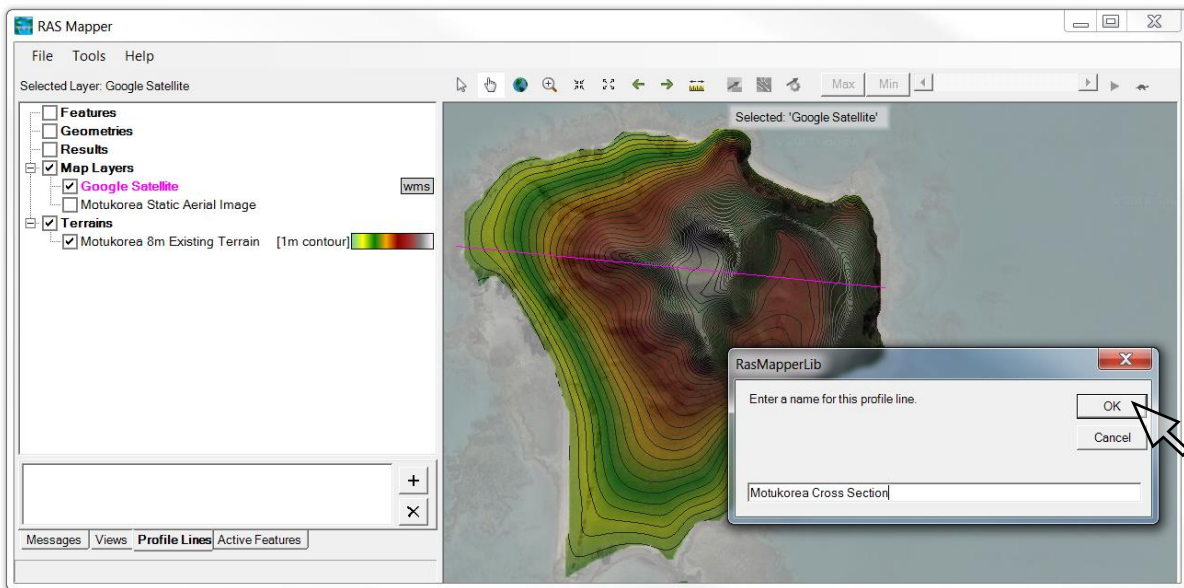


- Repeat the process by selecting the measuring tool, but this time click on “Save as Profile Line” and enter a name for the profile line.
- Right-click on the name of the terrain file, then select “Layer Properties” (or double click on the terrain name).
- Double click on the colour band (or press the Edit button) and adjust all desired parameters, including colour ramp, min/max values, number of displayed values, and transparency.
- Click on “Create” and “Apply” when finished

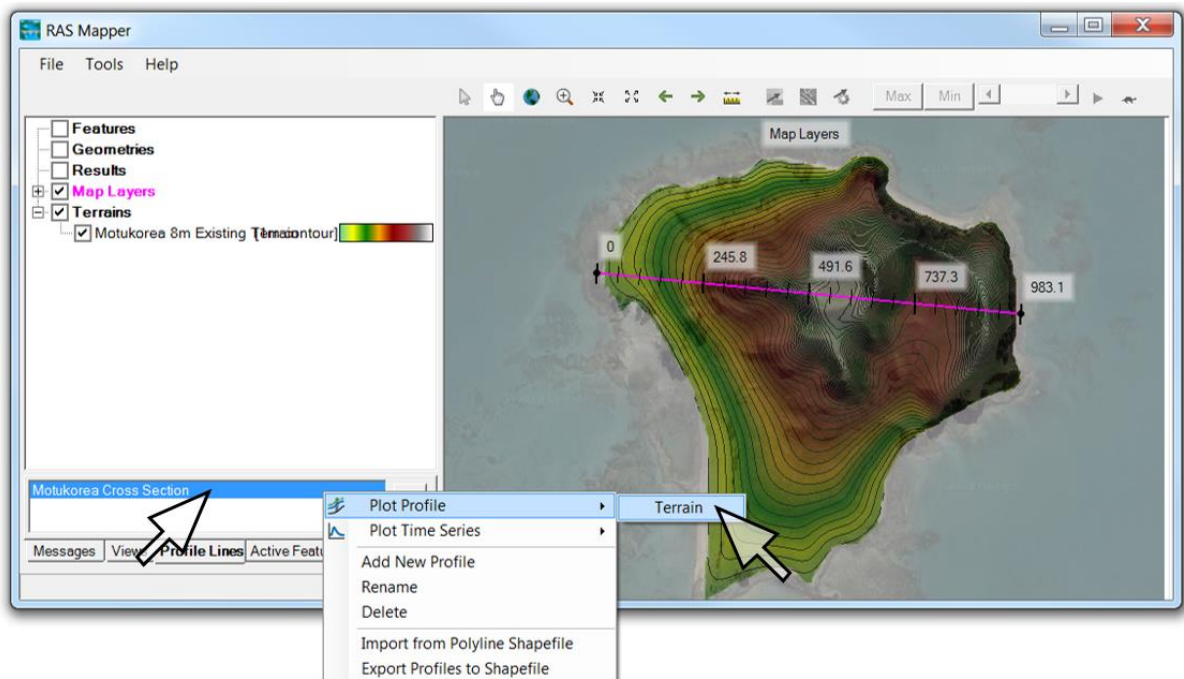


- Select “Plot Contours” and adjust contour line colours and interval
- Select “Plot Hillshade” and adjust Z factor to observe effect on map appearance
- Hint: Use middle mouse button to adjust contour and hillshade values
- Left-click on Profile Lines tab at the lower left of the window, then use the plus button to add a new profile line, and assign a profile name when prompted.

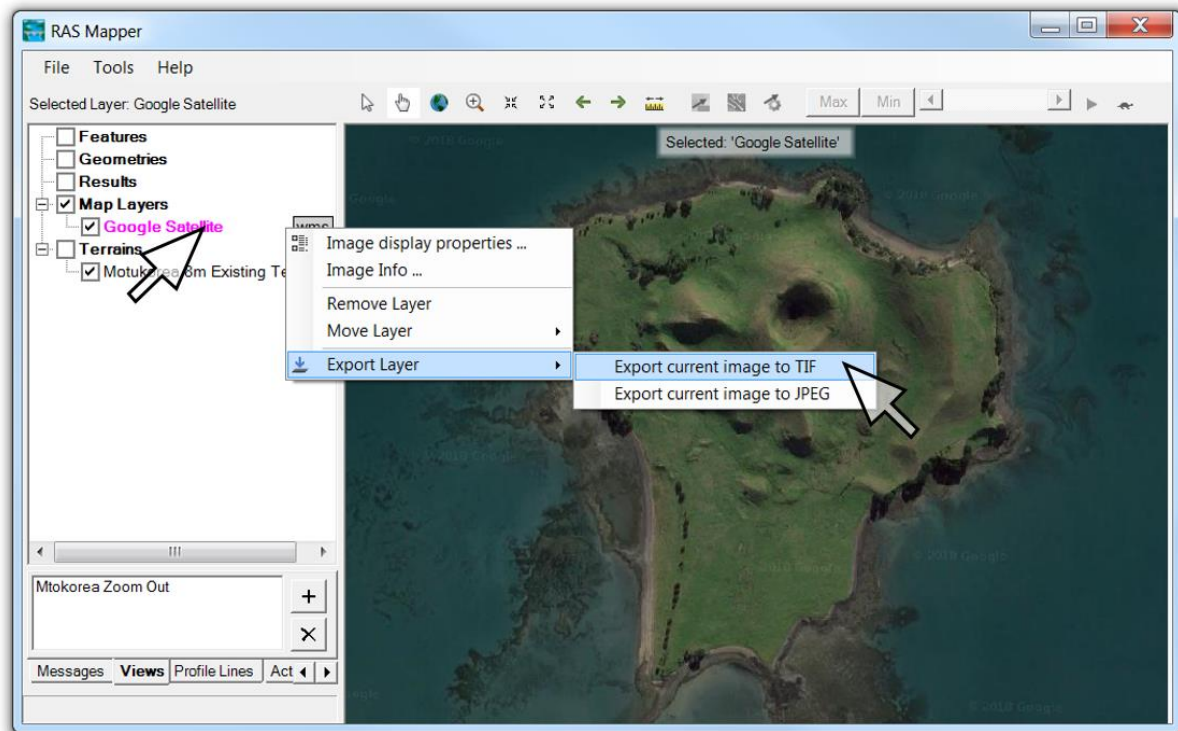
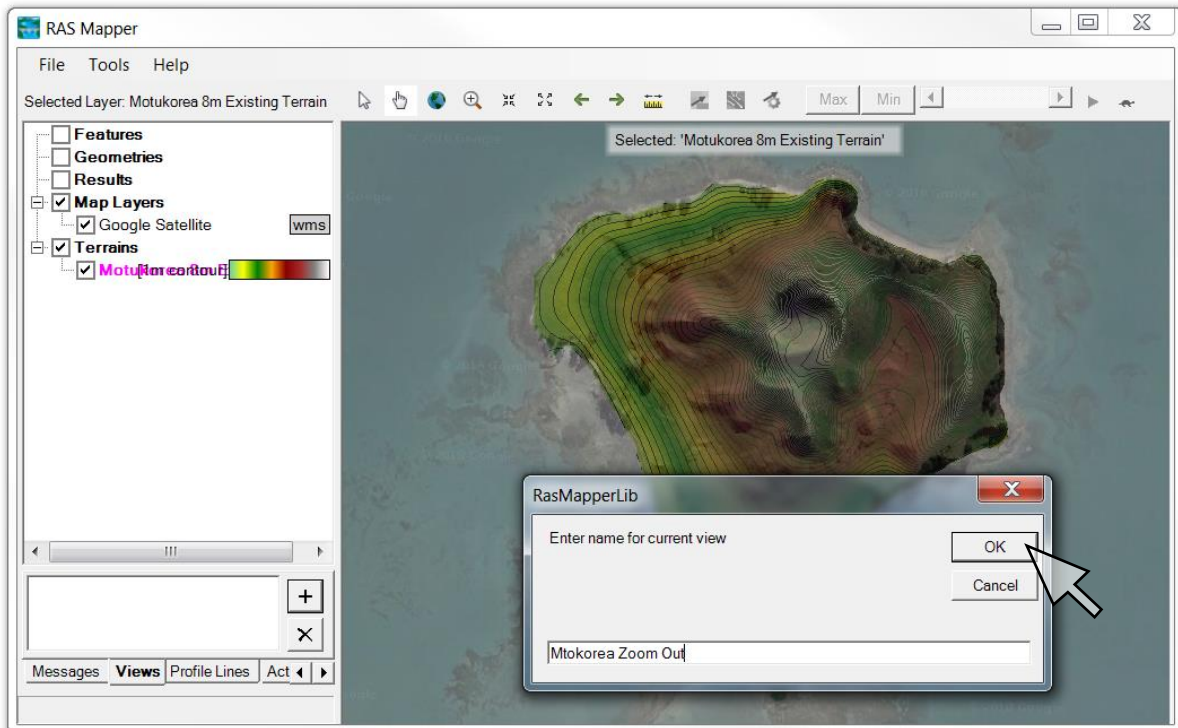


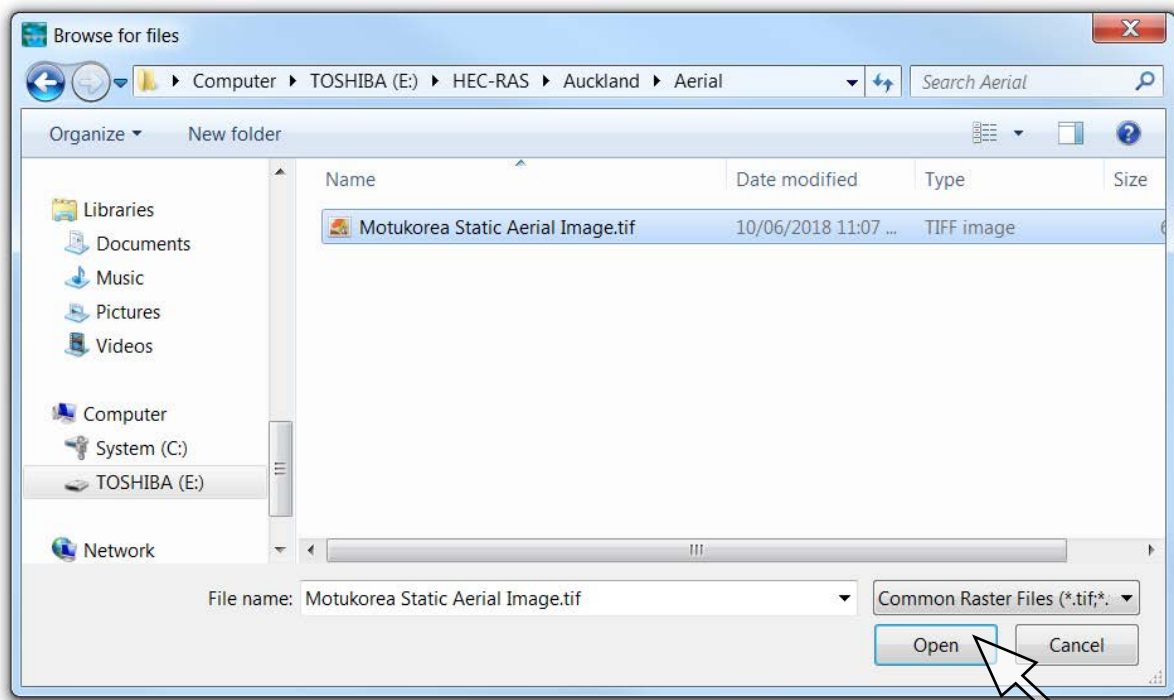
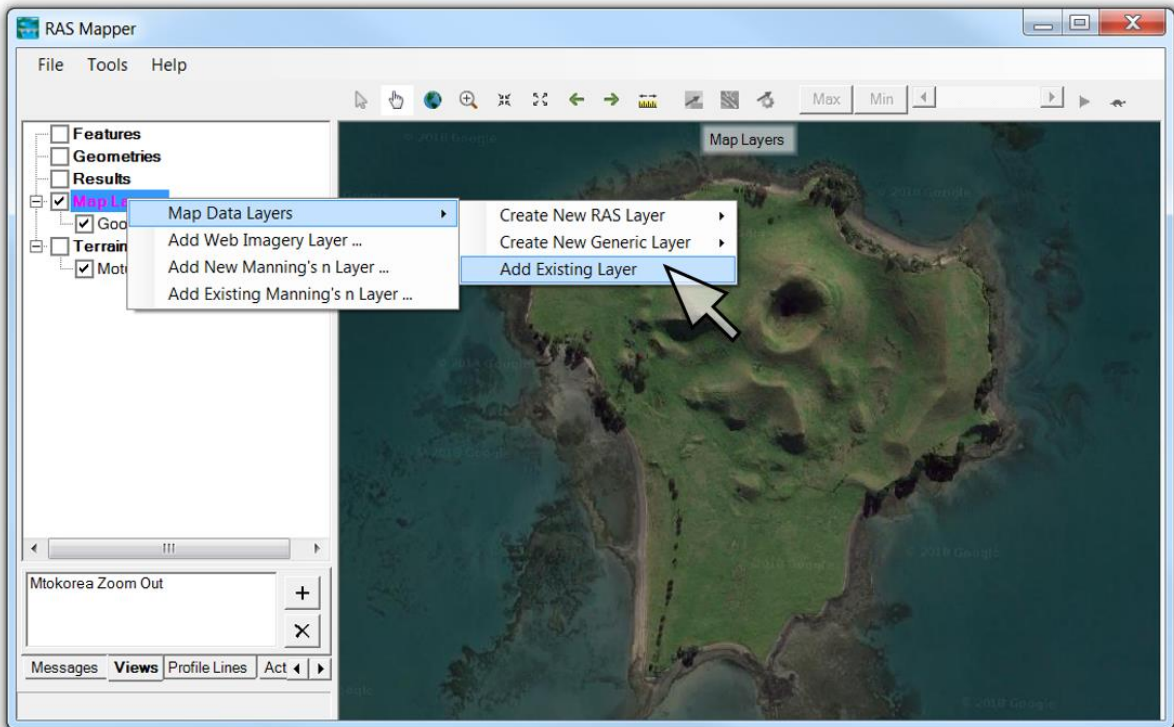
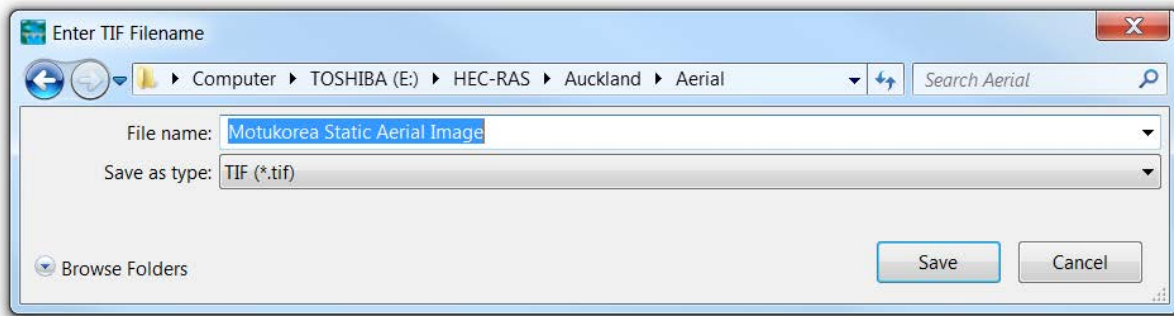


- Right-click on the profile name, select “Plot Profile | Terrain” to view the long section



- Zoom to selected zoom levels and save views using view tab
- Note: more instructions for saved views available at www.surfacewater.biz/views/
- Right-click on web imagery and save the view extents as a static image (with a world file)
- Add static aerial images as existing map layers







Bonus GIS and RAS Mapper tasks:

- Create your own shape file three ways:
 - Creating a profile line, then right-click on the assigned name and select “Export Profile to Shapefile”.
 - Right-click on Map Layers and select Map Data Layers | Create New Generic Layer and try making point, polyline, and polygon shape files. Right-click on layer name and export as shape file when complete.
 - Right-click on Features and select “Create New Layer”. Add features using create features tool. Right-click on layer name and export as shape file when complete.
- Add the newly created shape files to the Map Layers in RAS Mapper
- Adjust symbols, colour palettes, ranges, intervals, and transparency for all layers to optimise the view for later use in the Geometry Editor