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HANDS ON GUIDE TO THE NATIONWIDE AUSTRALIAN CARTOGRAPHIC DATASET IN ICS DESIGNER

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Data Source:

The DTM is created form the 2011 Geoscience Australia 1 arc second SRTM Derived from Hydrological Digital Elevation model (DEM-H). The DEM-H data set captures flow paths based on SRTM elevations and mapped stream lines, and supports delineation of catchments and related hydrological attributes. DEM-H was derived from 1 second smoothed Digital Elevation Model.

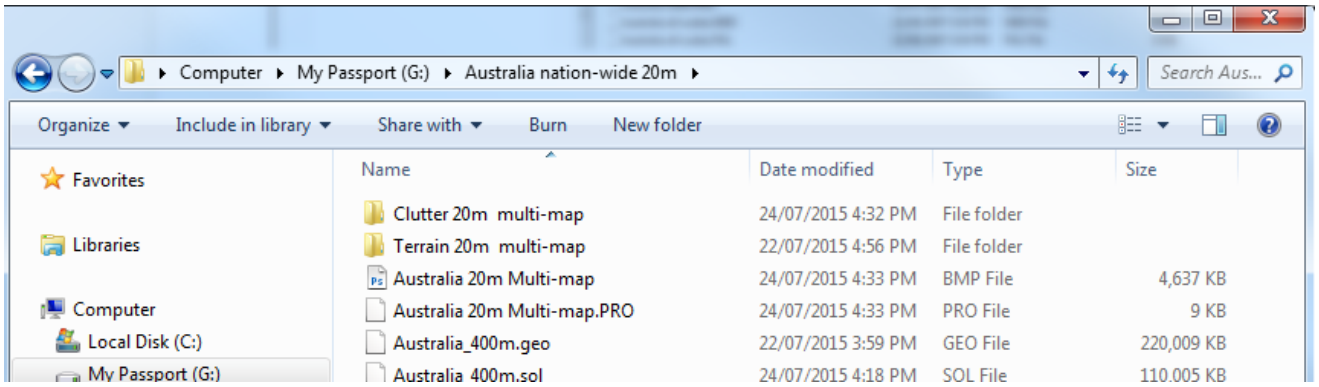
The clutter data was extracted from various sources:

- Australian Land Use and Management Classification, Forest of Australia (2013) released in May 2010.
- Queensland Land use mapping data produced by Queensland Government under Queensland Land Use Mapping Program (QLUMP), latest update Nov. 2014.
- Open Street Map for roads and streets Information (March 2015)

1 Loading the 400m nationwide dataset

1.1 Copy the files on the your hard-drive

First of all, copy the content of all CDs/DVD/External Hard Drive in one directory on your hard drive.

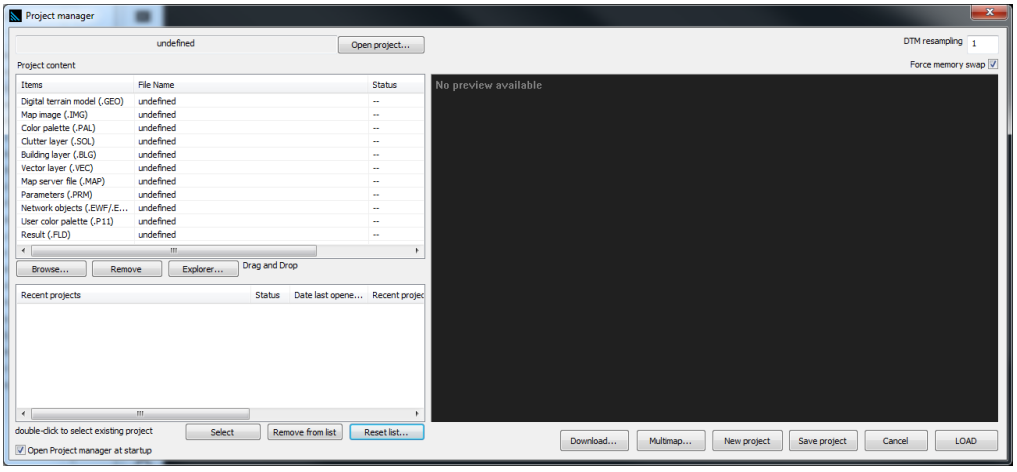


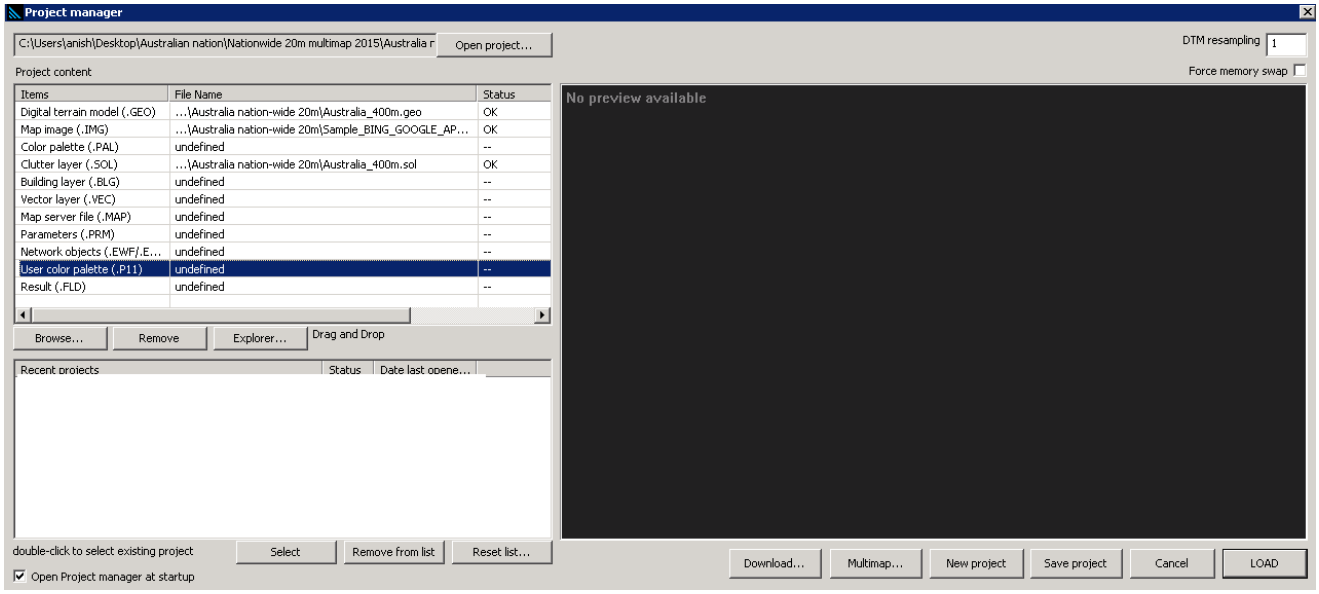
1.2 ICS Designer start up: the project manager

Your cartographic dataset covering Australia is comprised of these **layers**:

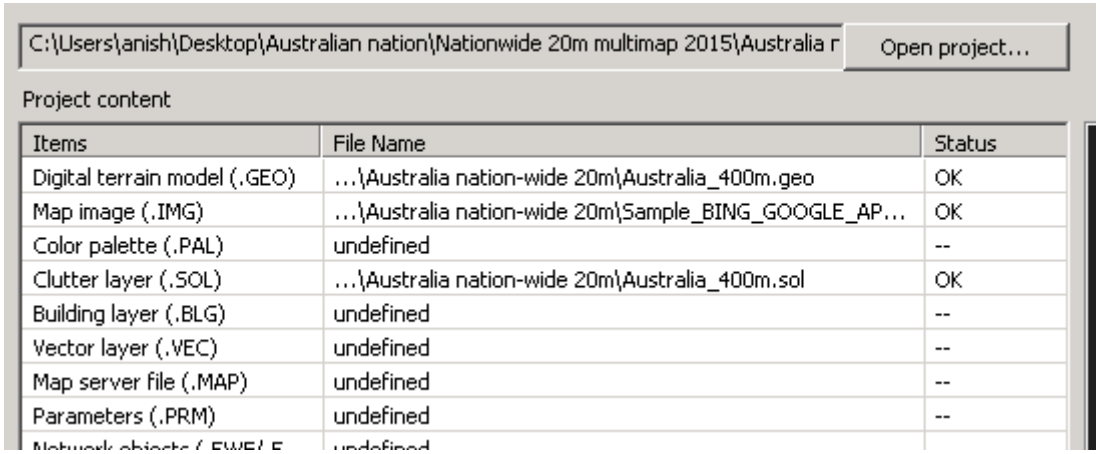
- A digital terrain model (known as DTM with extension .GEO)
- Imagery using .BIM Key
- A ground usage layer or clutter (ext .SOL)

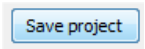
On launching ICS Designer, you will be greeted with the Project Manager window:





1: Double click on the first 4 lines of the content and fill as above.

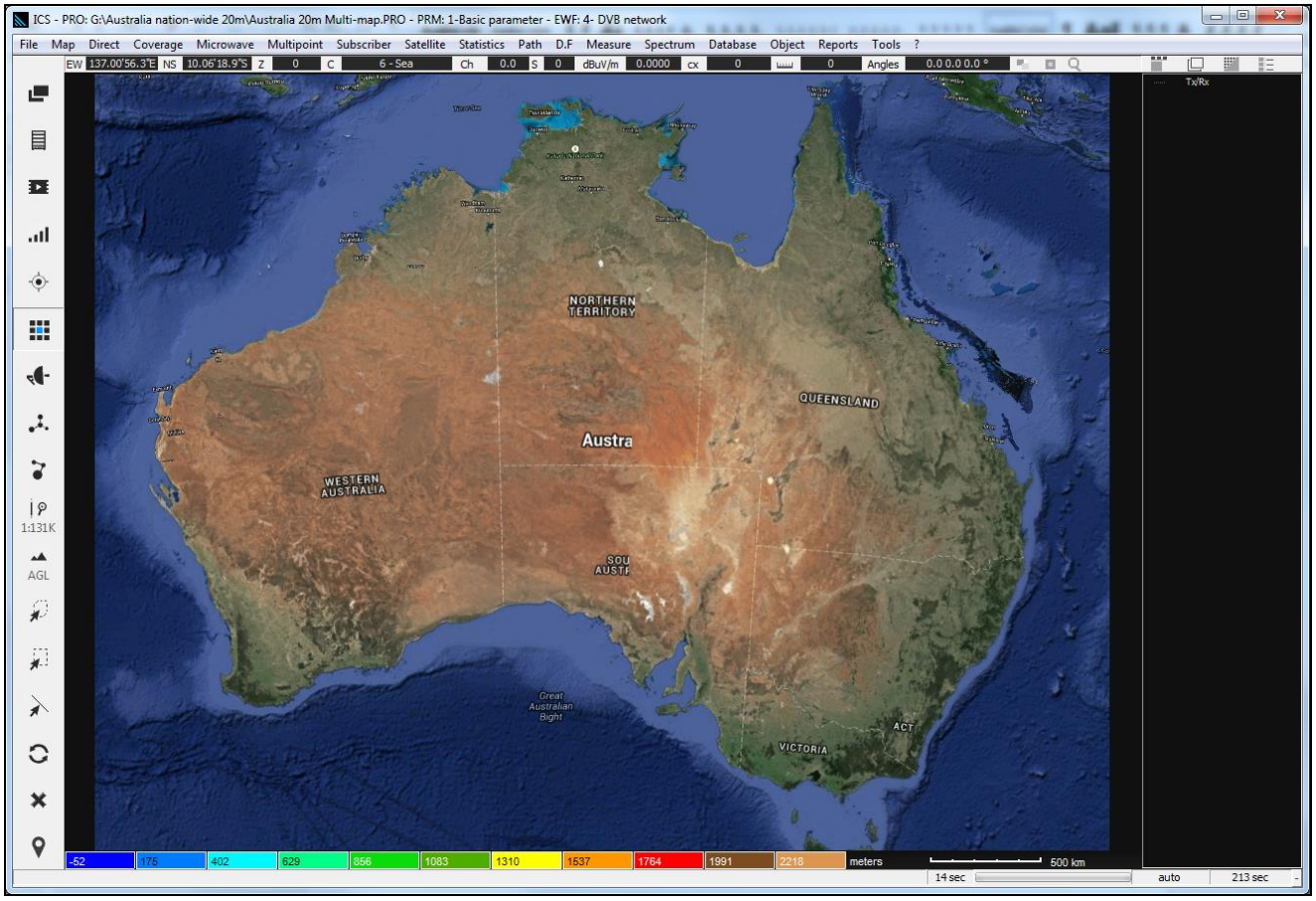


2: Click on the 

button to save your 400m project as a .pro file.

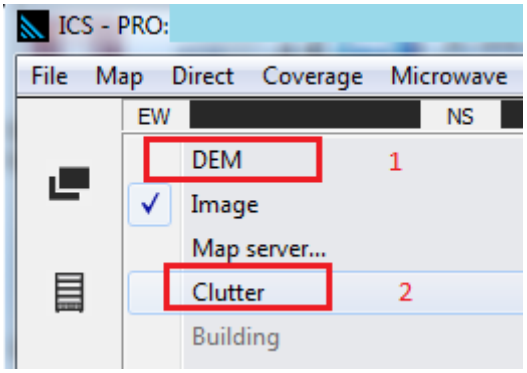
3: Click on the 

button to load the project you just setup.


ICS - PRO: G:\Australia nation-wide 20m\Australia 20m Multi-map.PRO - PRM: 1-Basic parameter - EWF: 4- DVB network
File Map Direct Coverage Microwave Multipoint Subscriber Satellite Statistics Path D.F Measure Spectrum Database Object Reports Tools ?
NORTHERN TERRITORY
QUEENSLAND
Austra
WESTERN AUSTRALIA
SOU AUSTR
Great Australian Bight
VICTORIA
ACT
meters
500 km

1.3 The Layers – 400m dataset

Once the project is loaded, you can select which layer to display by selecting in the list from the *Layer* button:

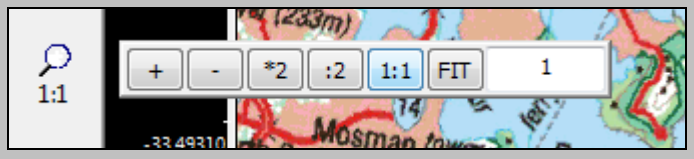


You have a choice of displaying either the *DEM* or the *Image* alone (select 1). Or Clutter over DEM/Image, select (1) than (2).

All layers are using the metric projection (compliant with radio-planning standards) **Australian Albers**.

TIP

To zoom in or out of the map, you can use:

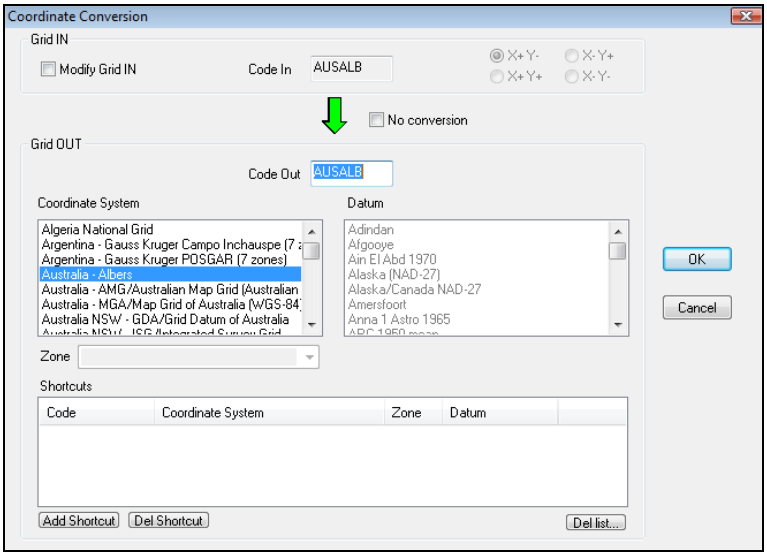
- *The mouse wheel*
- *The Zoom button.* 

Select the magnification factor and click on the map to centre on this point
- *Select a zone to zoom in. Shift-Left click to place a corner and Left click again to place opposite corner*

To navigate the map, you can use:

- *The slider bars*
- *Press Shift key **and** mouse movement*

You can change the coordinates that are displayed by ICS Designer in the upper left corner by going to Tools \ cartographic conversions.

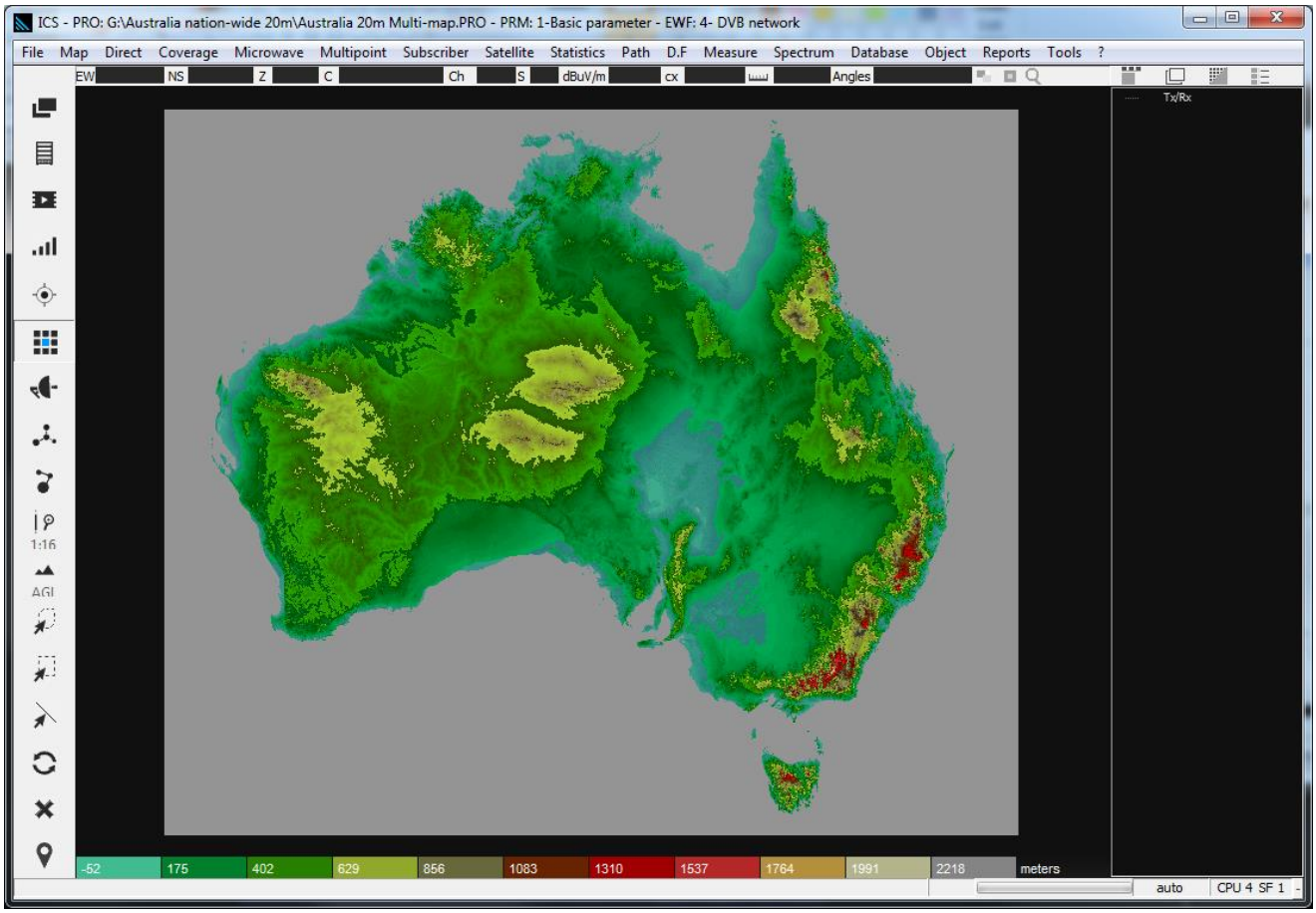


ICS Designer manages plenty of datums, projections, and coordinates units among which are:

ATDI Grid Code	Datum	Projection	Unit
AUSALB	GDA94	Albers Conic equal-area	Meters
161DMS	AGD66	Geographic	Degrees, Minutes and seconds
161DEC	AGD66	Geographic	Decimal degrees
161DMD	AGD66	Geographic	Degrees, decimal minutes
161UTSxx	AGD66	UTM - metric	Meters (xx = UTM zone number)
18DMS	AGD84	Geographic	Degrees, Minutes and seconds
18DEC	AGD84	Geographic	Decimal degrees
18DMD	AGD84	Geographic	Degrees, decimal minutes
18UTSxx	AGD84	UTM - metric	Meters (xx = UTM zone number)
4DMS	GDA94 / WGS84	Geographic	Degrees, Minutes and seconds
4DEC	GDA94 / WGS84	Geographic	Decimal degrees
4DMD	GDA94 / WGS84	Geographic	Degrees, decimal minutes
4UTSxx	GDA94 / WGS84	UTM - metric	Meters (xx = UTM zone number)

1.3.1 Digital terrain model

The Digital terrain model has a 400m step, projected in Australian Albers.



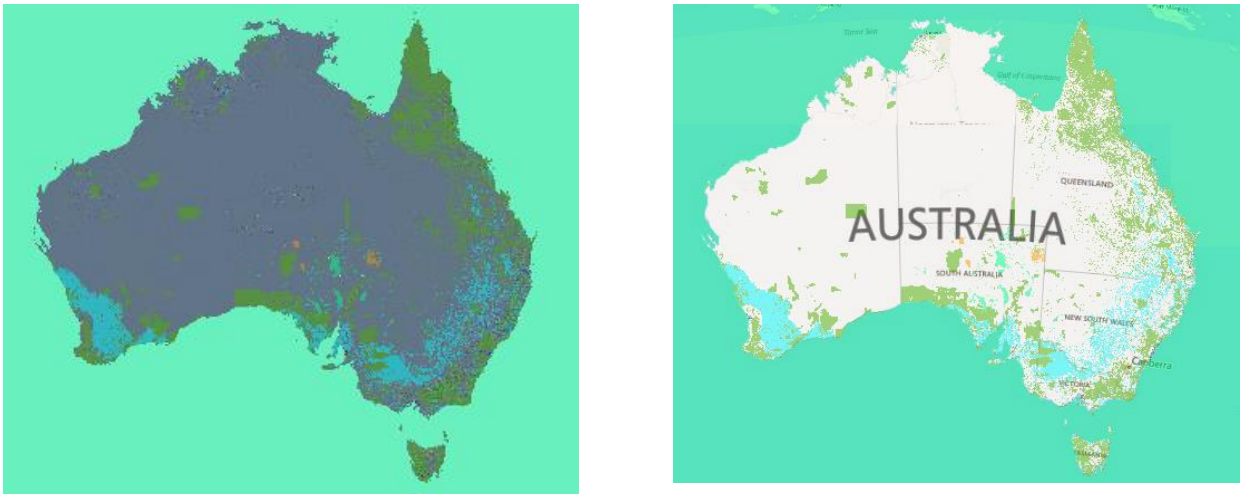
TIP

Press F4 to display the DTM in color or in greyscale.

1.3.2 Clutter file – Ground occupancy

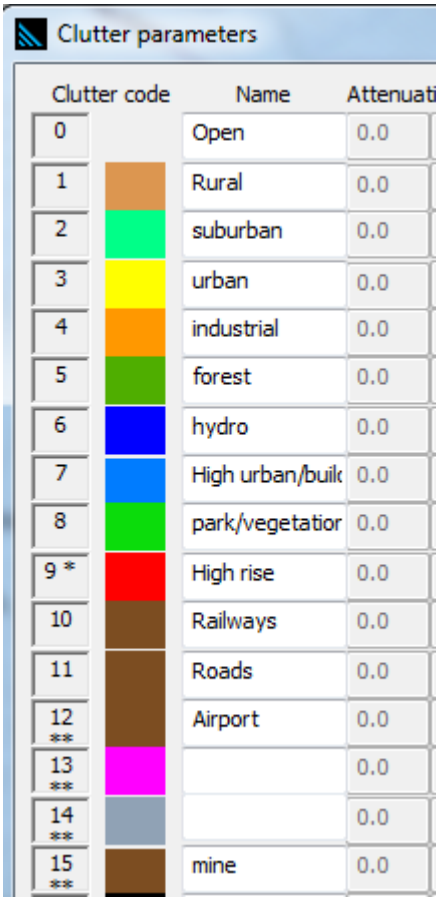
The clutter file has a 400m step, projected in Australian Albers. The clutter codes are the following:

Clutter code	Description
0	Open
1	Rural
2	Sub-urban
3	Urban
4	Industrial
5	Forest
6	Hydro
7	High Urban/building
8	Vegetation/park/Cropping
9	High rise/ Sky Scraper
10	Railway
11	Roads
12	Airport
15	Mines



400m Clutter file display on the DTM (left) and on the map (right)

The corresponding clutter properties for radio-planning can be defined in the Tools \ clutter options:

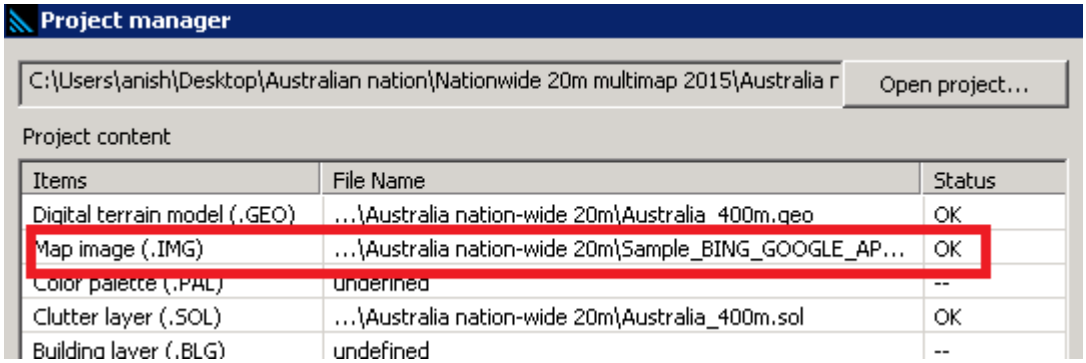


The configuration of the clutter file can be saved in a .PRM file, and associated to the project.

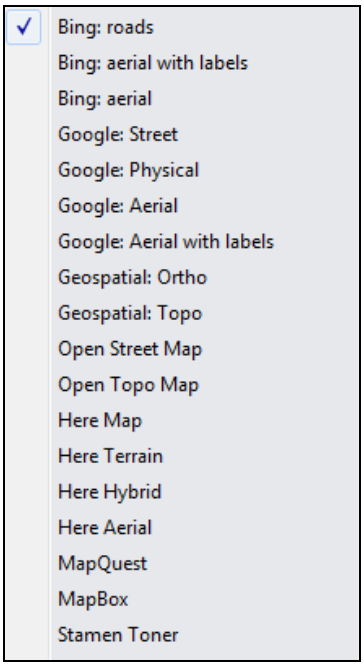
1.3.3 Imagery: BIM key

The imagery is available using .BIM key which extracts images from third party such as Google, Bing and many more.

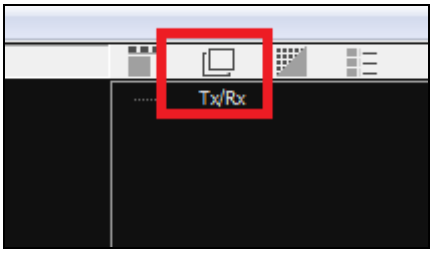
To load the BIM file simply load the .BIM file in the Map image item in the project manager window.



Available third party image using BIM is listed below:



To load different available third party images click on map display area in the top right hand corner.



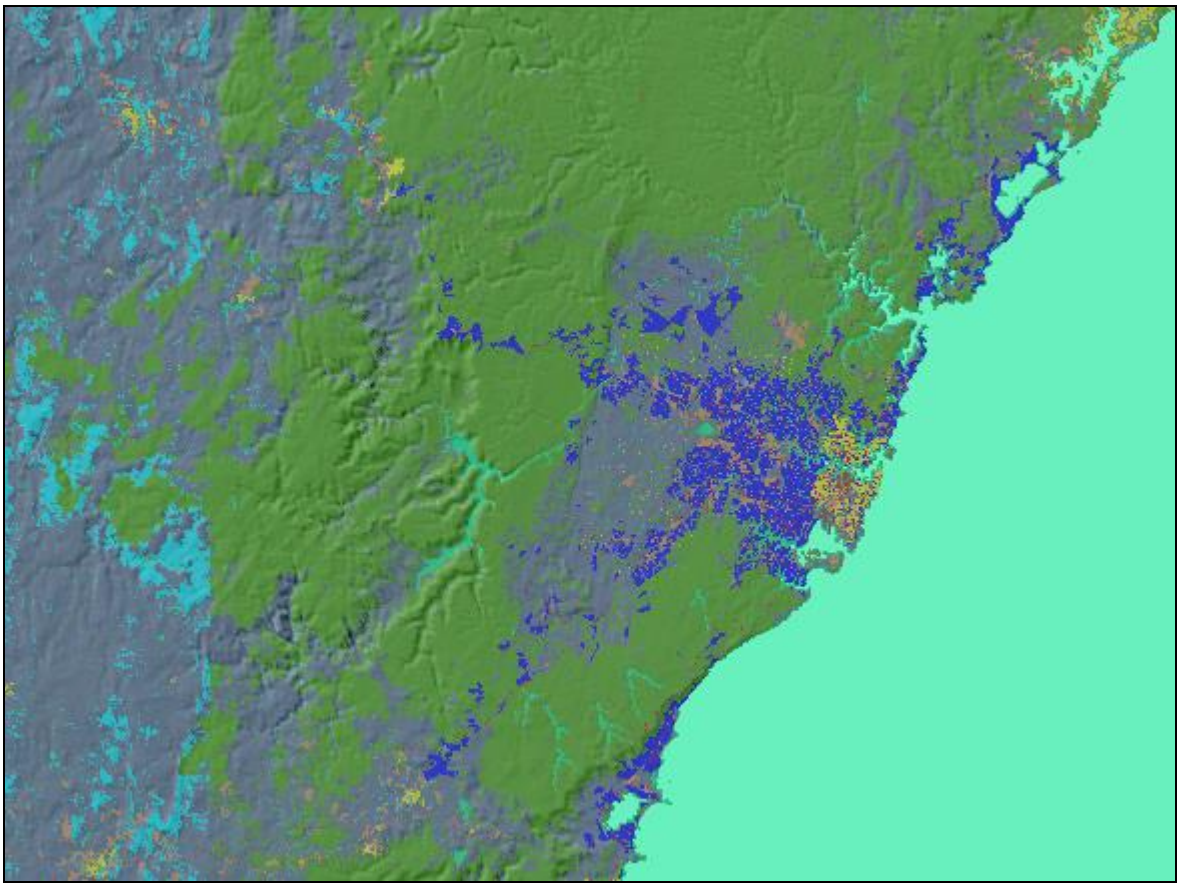
Images below shows sample of different image option.

Nationwide Bing: Roads

Nationwide Google Aerial images

2 Accessing the 20m resolution data using the external map function

So far, the nationwide dataset has a very coarse resolution of 400m for both the DTM and the clutter files.

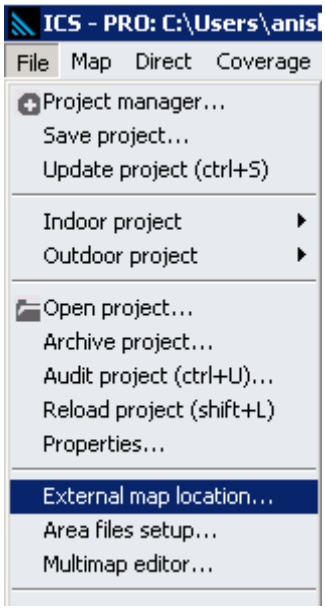


The "External map" function allows you to extract a given Area of Interest with a greater resolution: 20m.

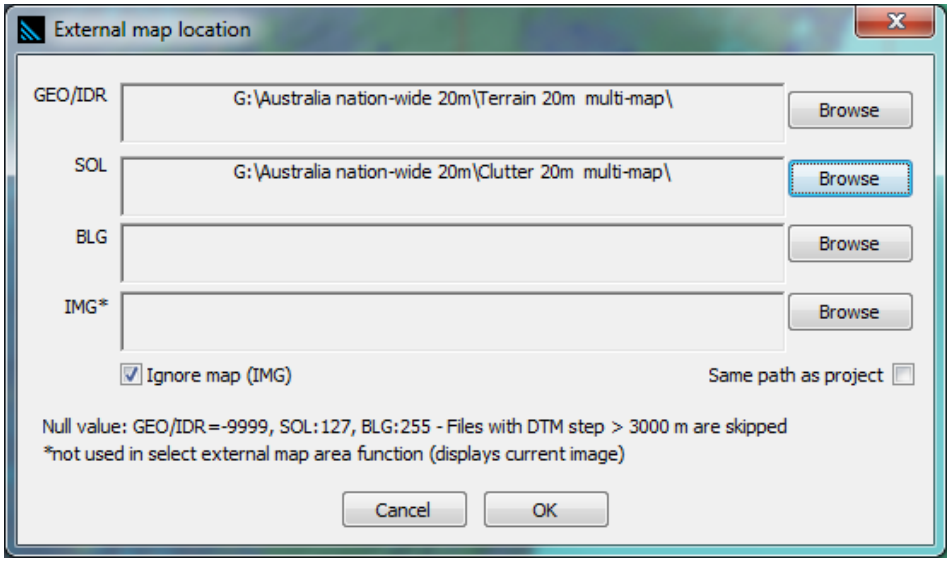
2.1 Configuring the external map

First of all, we need to indicate where our external maps at 20m for DTM and clutter files are.

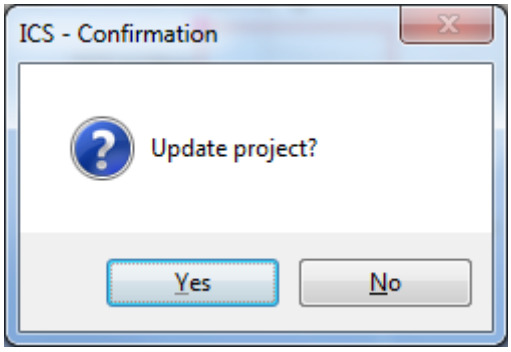
Go to File-> External map location.



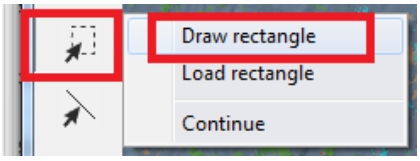
The location of the 20m DTM and clutter files can then be specified. It correspond to the location where you copied the files in § 1.1. The 20m DTMs are located in the "Terrain 20m multi-map" folder, the 20m clutter files are located in the "Clutter 20m multi-map" folder.



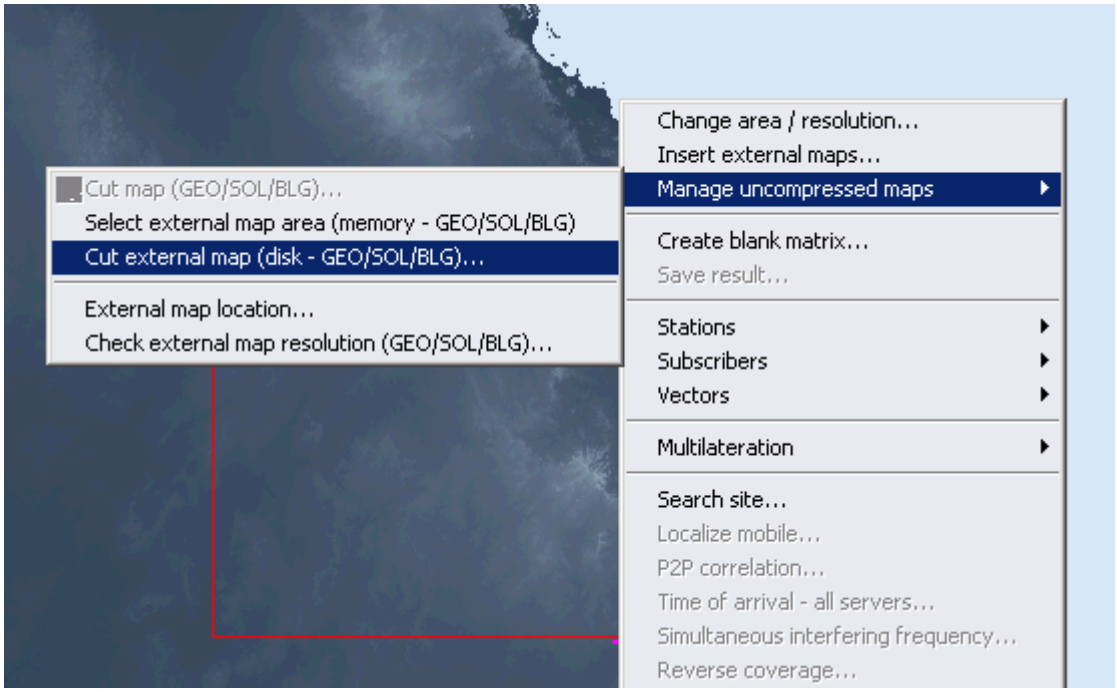
Click on "OK" to validate.
Click on Yes to update the project.



2.2 Extracting 20m resolution dataset from the 400m master map

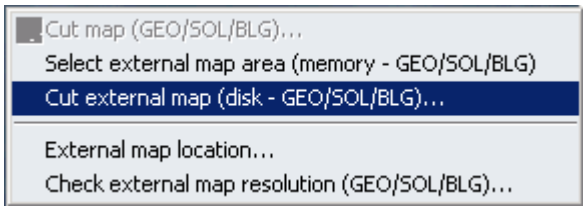
Use the 

Rectangle tool again to draw a rectangle on the map where you would like to use the 20m terrain and clutter. Two options are available:

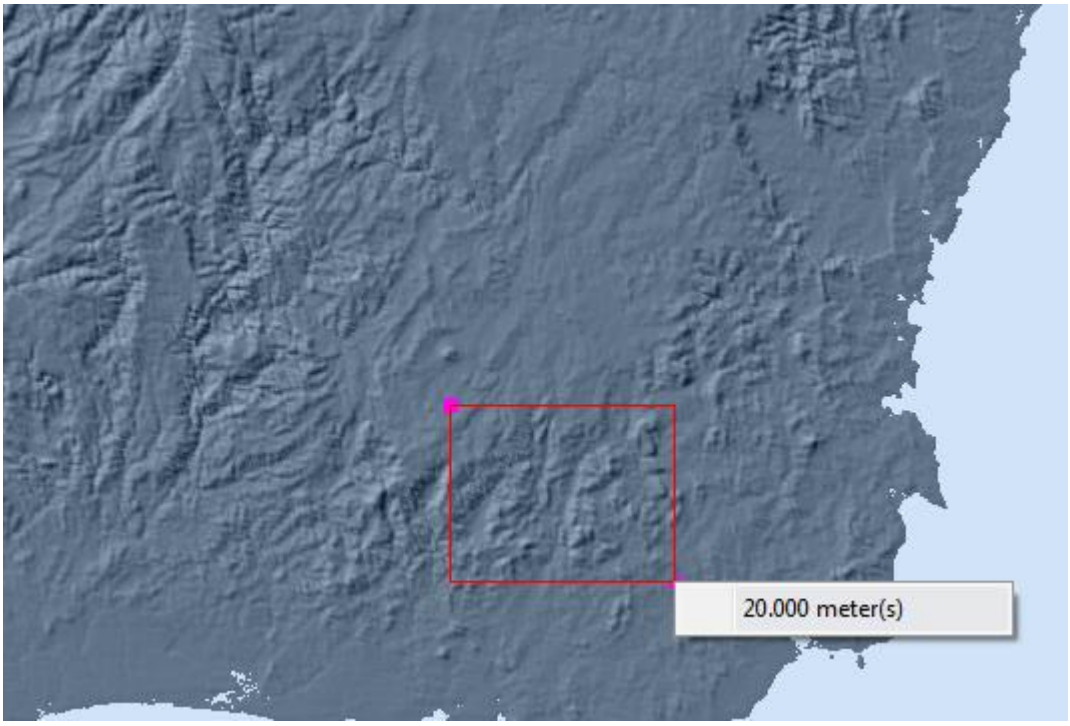


2.2.1 Cut External map (disk)

This option will generate on your hard-drive new .geo and .sol files at 20m accuracy on your Area Of Interest. As the files are physically generated, it is easier to come back to them during future sessions of ICS Designer, the corresponding project just needs to be opened.



A pop-up will then appear with the corresponding resolutions available. By default, there is only one sub-resolution (20m) available with the nationwide package.



ICS Designer will then ask you to validate the choice of the Area of Interest according to the size of the dataset about to be loaded in memory. Selecting a very large area might generate a resampling factor, depending on the RAM available on your computer.

Specify the location and the name of the project you are about to create, and then click on "OK". It is advice to create a folder in which the project files will be generated.

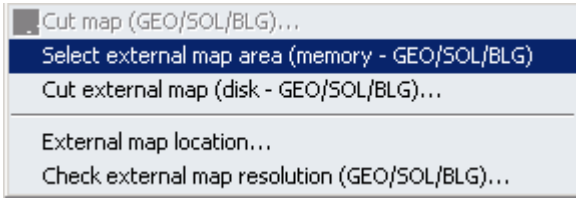
The loaded cartographic dataset now at 20m resolution, with extended clutter codes (See § 2.3.2)

TIP

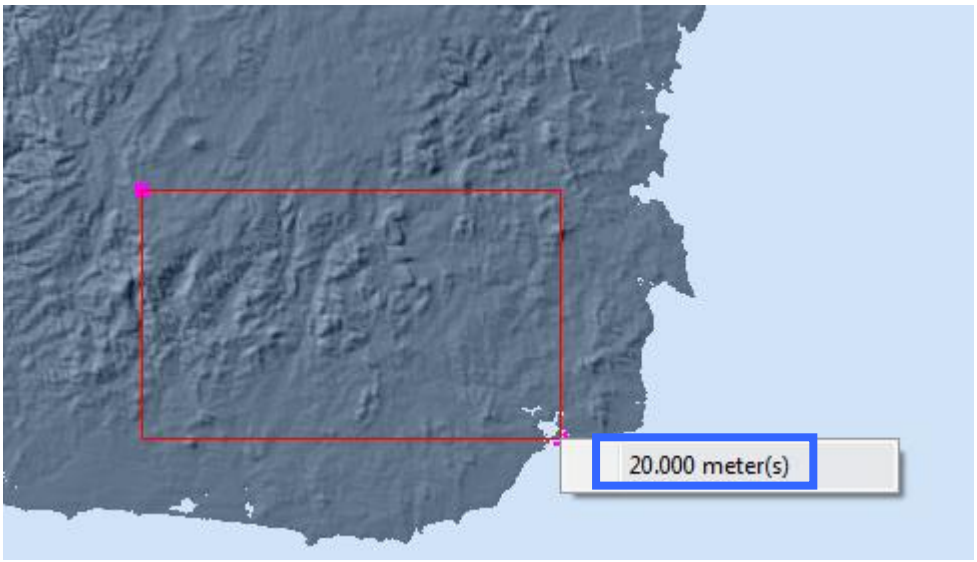
During future sessions of ICS Designer, to reload the same 20m project, go to Files→Project Manager, click on "Open Project", select it, and click on Load.

2.2.2 Select external map (Memory)

This option will load in memory new .geo and .sol files at 20m accuracy on your Area Of Interest. No files are generated on the hard drive, making this option less space consuming.



A pop-up will then appear with the corresponding resolutions available. By default, there is only one sub-resolution (100m) available with the nationwide package.



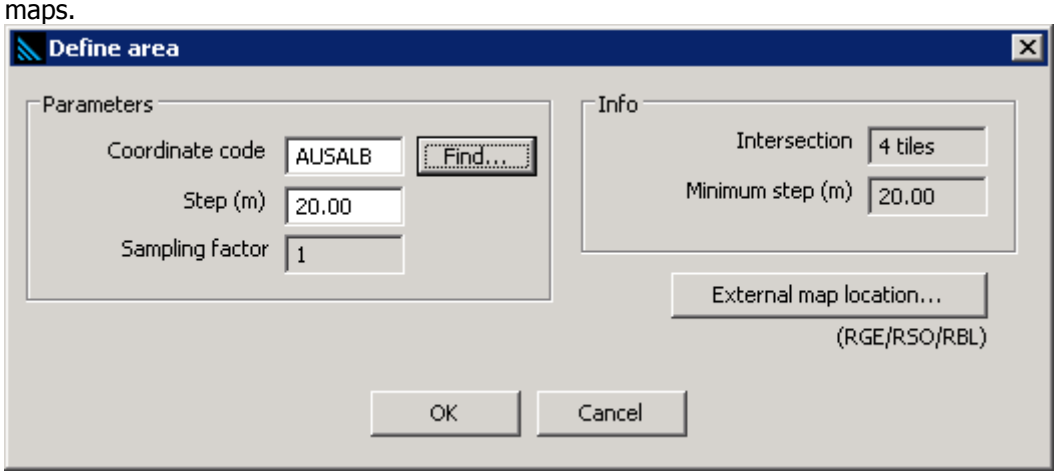
ICS Designer will then ask you to validate the choice of the Area of Interest according to the size of the dataset about to be loaded in memory. Selecting a very large area might generate a resampling factor, depending on the RAM available on your computer.

2.2.1 Select external map (RGE/RSO)

RGE and RSO are compressed version of GEO and SOL file. The configuration of external maps for RGE and RSO are exactly same as external map configuration for GEO and SOL files (Section 2.1).

External map for RGE and RSO can be loaded with insert external maps function.

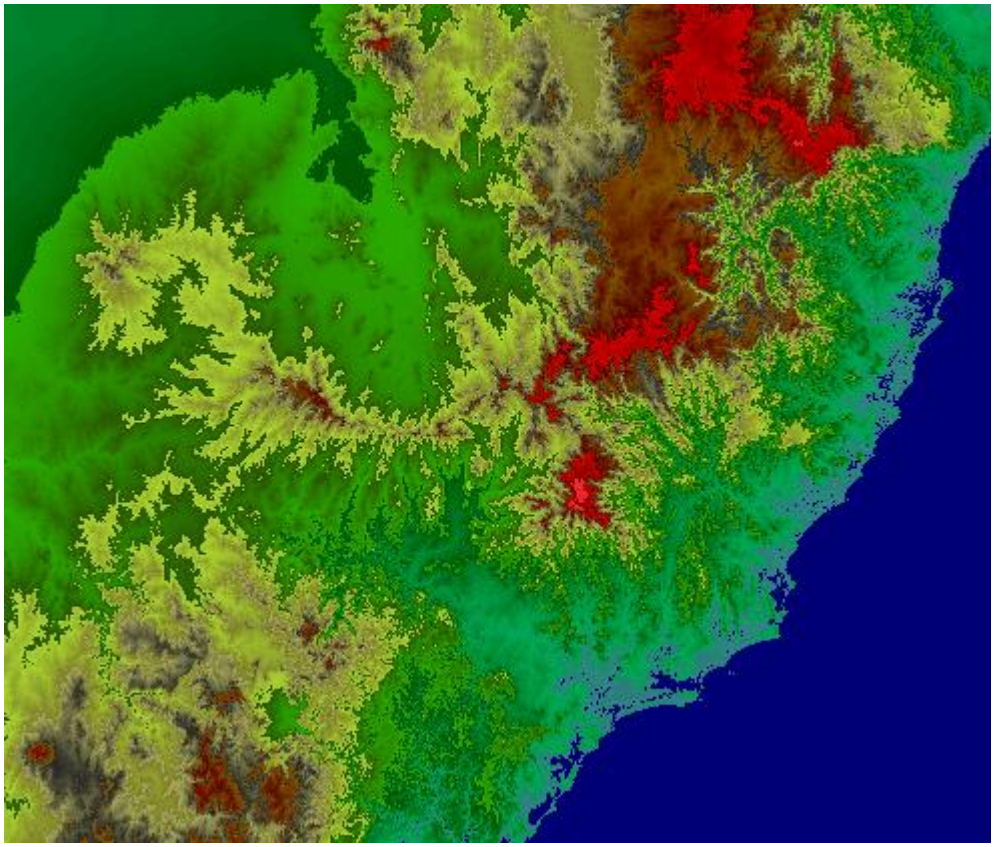
Number of tiles that are inserted and the resoulution of external map is displayed. Click ok to insert external maps.



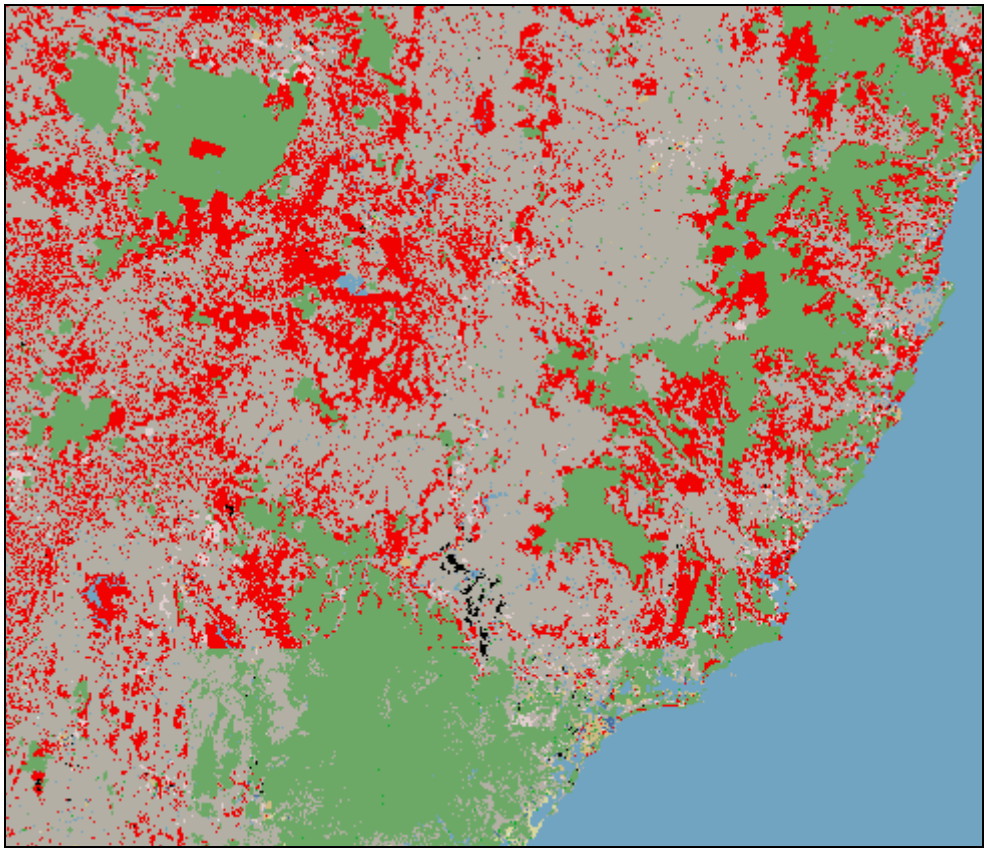
2.3 The layers – 20m resolution dataset

2.3.1 Digital terrain model

The Digital terrain model has a 20m step, projected in Australian Albers.



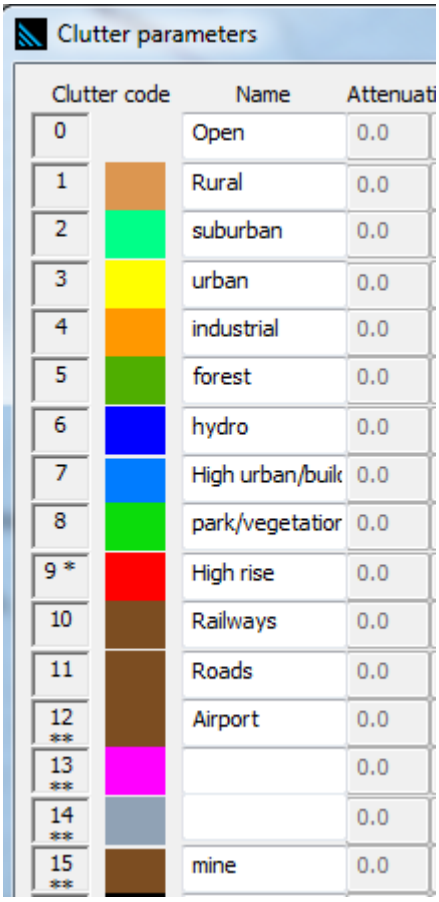
2.3.2 Clutter file – Ground occupancy



The clutter file has a 20m step, projected in Australian Albers. The clutter codes are the following:

Clutter code	Description
0	Open
1	Rural
2	Sub-urban
3	Urban
4	Industrial
5	Forest
6	Hydro
7	High Urban/building
8	Vegetation/park/Cropping
9	High rise/ Sky Scraper
10	Railway
11	Roads
12	Airport
15	Mines

The corresponding clutter properties for radio-planning can be defined in the Tools \ clutter options:



The configuration of the clutter file can be saved in a .PRM file, and associated to the project.

2.3.3 Imagery: BIM key

The imagery for 20m data is available as described in section 1.3.3

3 Loading directly the 20m data

Each 20m tile (DTM and clutter) can be loaded independently using the same process as § 1.2.

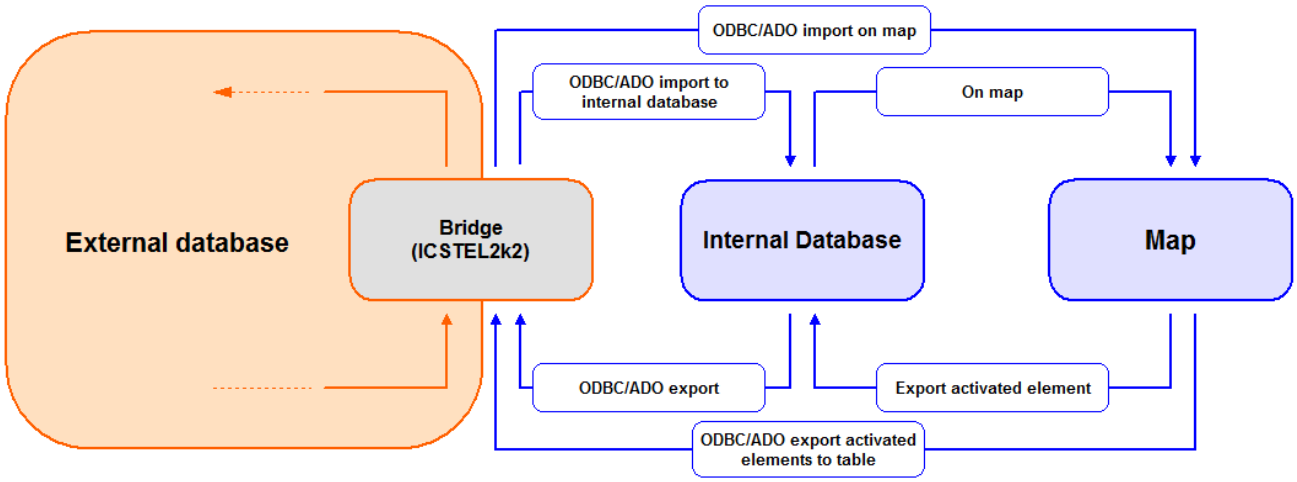
Be however aware of a potential loading of the files with a resampling factor given the sizes of each tile with regards of the RAM available on today's computer's with a Windows© 64-bit operating system.

4 Launching a coverage directly on the 20m data in multimap mode

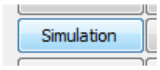
Even though the 20 data is provided in tiles, ICS Designer can be used in order to calculate a coverage using the tiled 20m terrain and clutter data.

4.1 Place the sites in the internal database

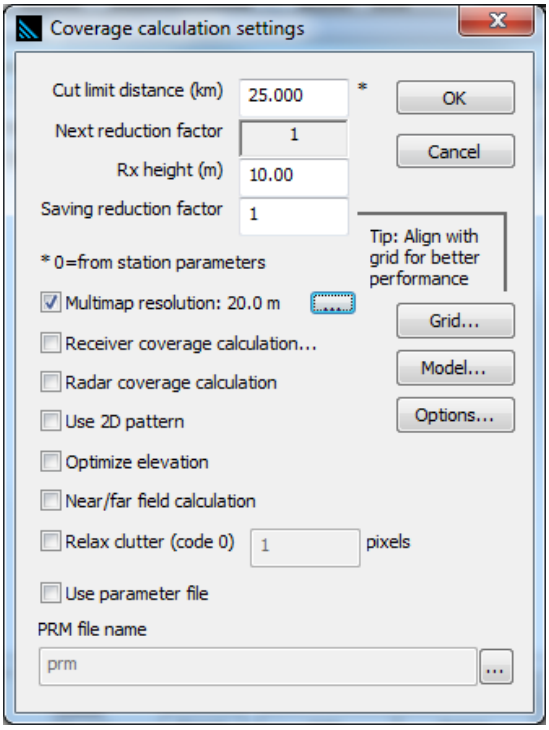
The sites you want to calculate the coverage should be placed in an internal database. The internal database can be populated from the ICS Designer map mode or using the ODBC/ADO connection (refer to the corresponding training documentation in order to do so).



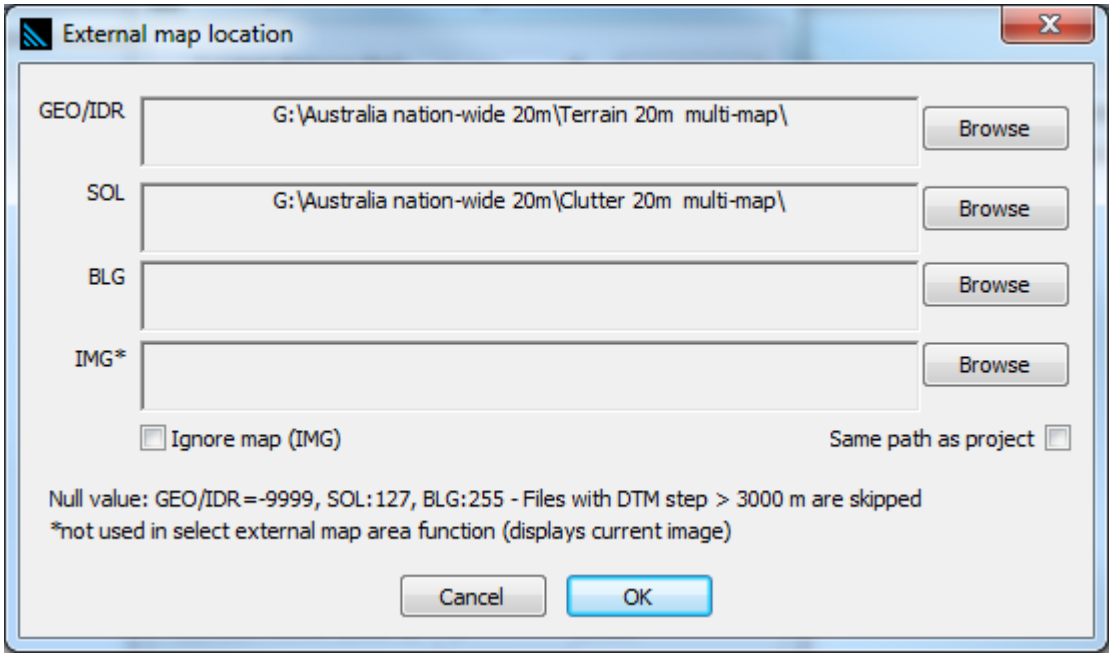
4.2 Launching the coverage in internal database mode

Once the stations are located in the internal database, select the ones you are interested in, and click on the 

button. Select the maximum distance of calculation around the site, and tick the "multimap resolution button". If the external map location has already been defined as per section 2.1, ICS Designer will automatically display that 20m data is available.



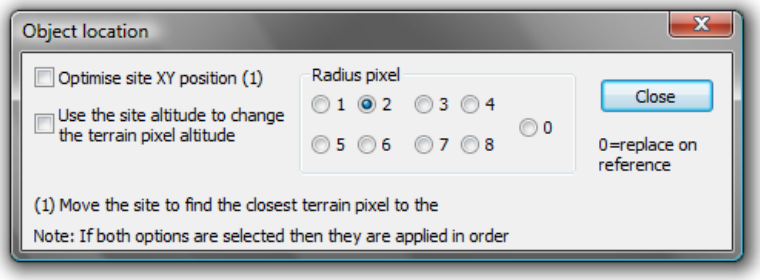
If not, click on  in order to define the location of the maps (see section 2.1), and click on OK.



Back to the database simulation settings, configure the calculation as usual and click on "Start". Per site, ICS Designer will prepare a temporary DTM and clutter file at 20m resolution up to a "Cut limit distance" radius around the site (beware of a potential resampling factor), and launch the coverage. Once all the coverage of all the selected sites have been calculated, ICS Designer will reload the 400 dataset.

4.3 Working with the coverage calculated in multimap mode

Access the 20m data you are interested in as per section 2. Go to the internal database, select the sites you are interested in, and select the "On Map" button



Do not tick any options, click on "Close": the station will be imported on the 20m dataset, with their coverage calculated at 20m resolution.