

# Data conversion for MCAS-S

## Overview

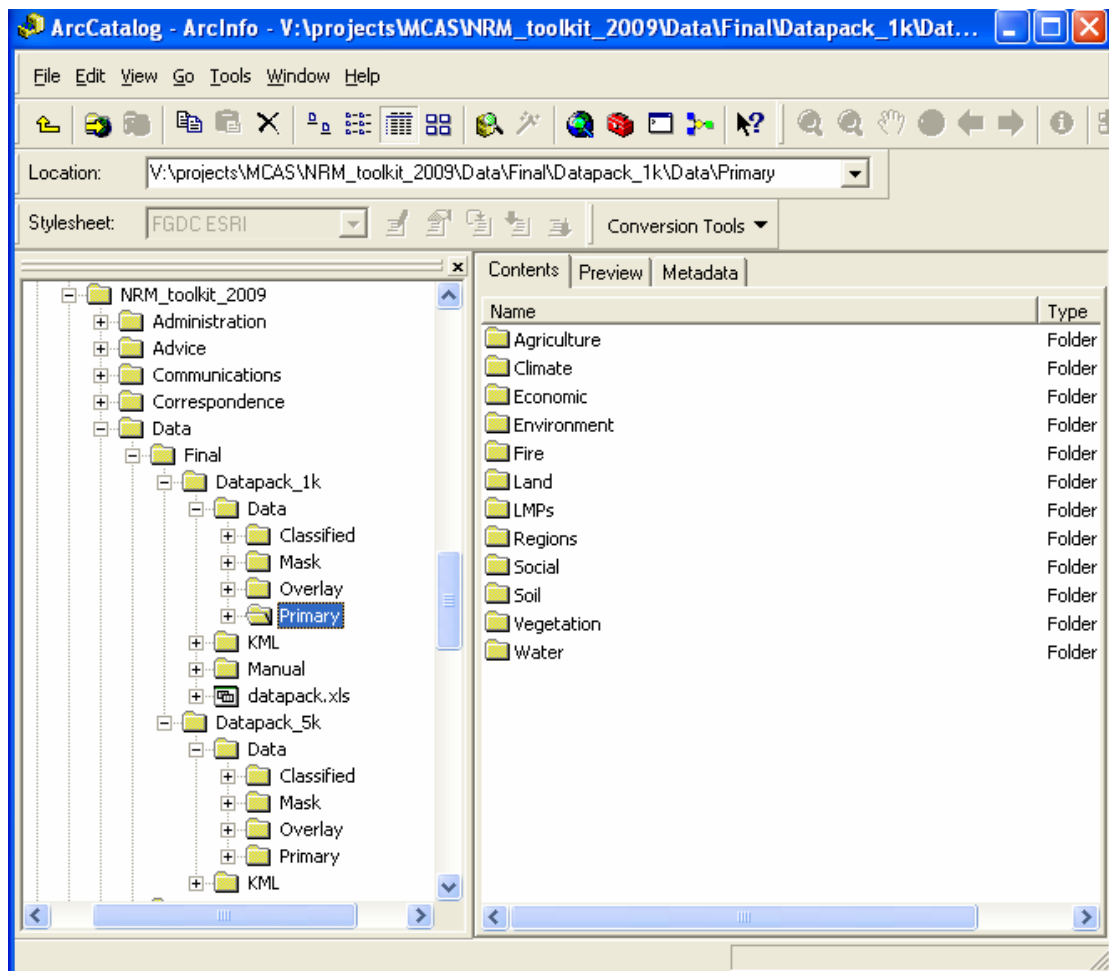
This document describes how to convert data for input into MCAS-S. Users should refer to the MCAS-S User guide for more details on MCAS-S functionality and use. The data conversion techniques are demonstrated in ArcGIS 9.3.1.

MCAS-S is a spatial software shell which can display spatial data but does not have full GIS functionality. So data held within MCAS-S must conform in:

- spatial extent
- resolution, and
- projection.

The Toolkit data is currently in Albers projection with a datum of GDA94. There are two sets of data at 1 km and 5 km resolution. The number of cells in the 1 km raster data is 4009 columns and 3837 rows and in the 5 km raster data there are 802 columns by 767 rows.

The data are in a folder called **Datapack\_1k** and **Datapack\_5k**. Within these folders is a **Data** folder which has the following sub-directories: **Classified**, **Mask**, **Overlay** and **Primary** (see below).



For simplicity, the data conversion process will be described for the 5 km dataset

## ***Software and hardware requirements***

### **System requirements**

The minimum requirements for running MCAS-S is Windows NT, 2000, XP or Vista, 1GB RAM, 1Ghz CPU and 1GB of disk space for the program.

### **Software requirements**

The recommended software for converting data for MCAS-S is ArcGIS - the current version is 9.3.1 and requires the spatial analyst extension. Other software may be used to convert data but are not described in this document.

### **Data formats**

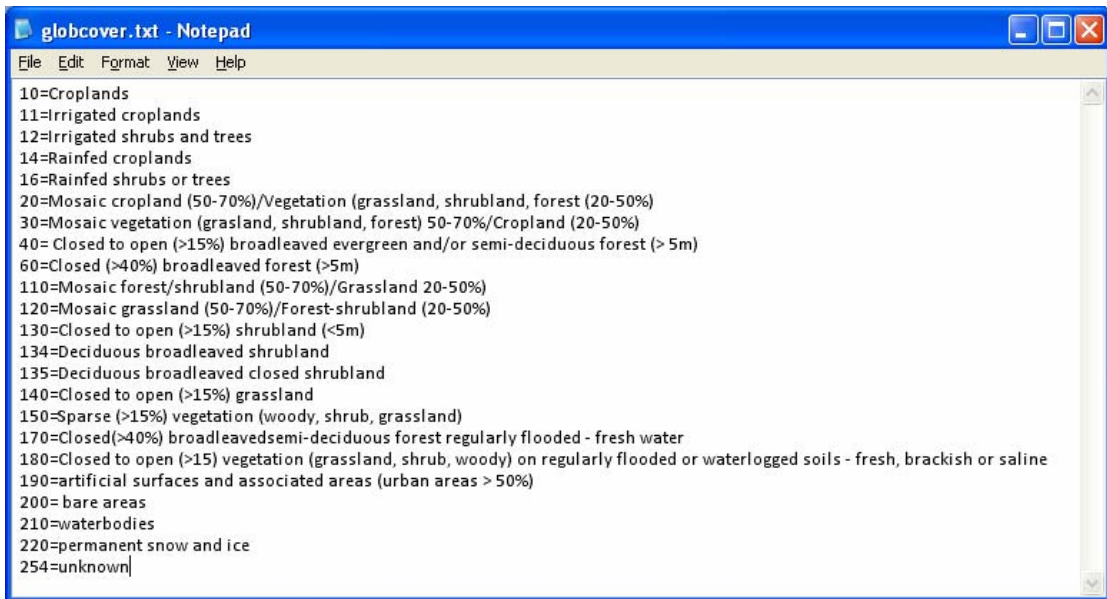
MCAS-S software is currently at version 2.1 and supports the following formats:

1. Raster for **Primary** and **Mask** data
  - a. ArcInfo Grids and Float
  - b. BIL
  - c. GeoTIFF
  - d. IDRISI
2. Polygon for **Overlays**
  - a. ESRI shapefiles

### ***Data conversion***

This section describes the data conversion process for **Primary** datasets, these are used for analysis and must be in a raster format. The underlying principles of data conversion are:

- datasets must be consistently captured and complete for the region of interest
  - If data are missing for certain areas, the value of -9999 can be used as 'no data'
  - If data are inconsistently captured then it is better to create separate layers and merge them in MCAS-S
- consider whether the data should be input as **Primary** data, **Overlays** or **Masks**; the same raster data can be used for both primary and mask layers
- while GIS data formats can generally support multiple attributes, MCAS-S can only use one. The value field will be used by MCAS-S and so should contain numbers that either directly represent the dataset (continuous) or are a class code (categorical)
- data should be as "raw" as possible, if you wish to classify the data; then use MCAS-S to do this. For example, slope data should be input as percent or degrees rather than slope classes such as 'flat' or 'steep'
- categorical data such as land use or vegetation types need to have a unique numeric identifier and an accompanying text file given exactly the same name as the dataset eg Primary/Land/globcover.txt and the format:



- minimise the number of processing steps as this will lead to resampling errors.

## Pre-processing

This section outlines how to convert data to the same format as the data provided in Datapack\_5k.

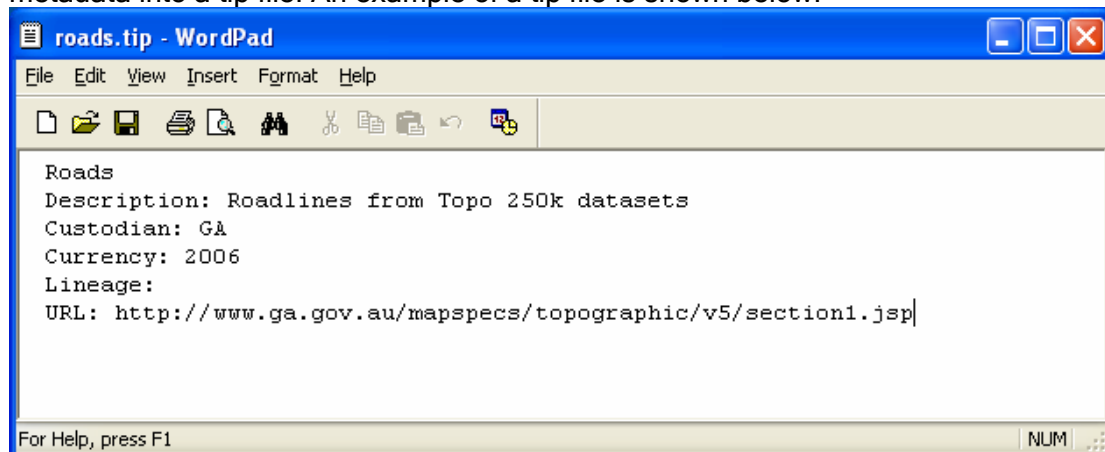
As examples, we have four datasets which require conversion:

Data	Format	Projection
placenames	point	GCS_WGS_1984
roads	line	GCS_GDA_1994
local government areas	polygon	Albers GDA 1994
globcover	Raster (tif)	Plate Caree WGS84

Set up a data processing folder structure, such as

- raw
- working
- final

Copy the input dataset into **raw**. Ensure the projection is defined and capture the metadata into a tip file. An example of a tip file is shown below.



The tip file captures essential information about the dataset such as the name, currency, units, custodian and links to the metadata. A lineage field describes how

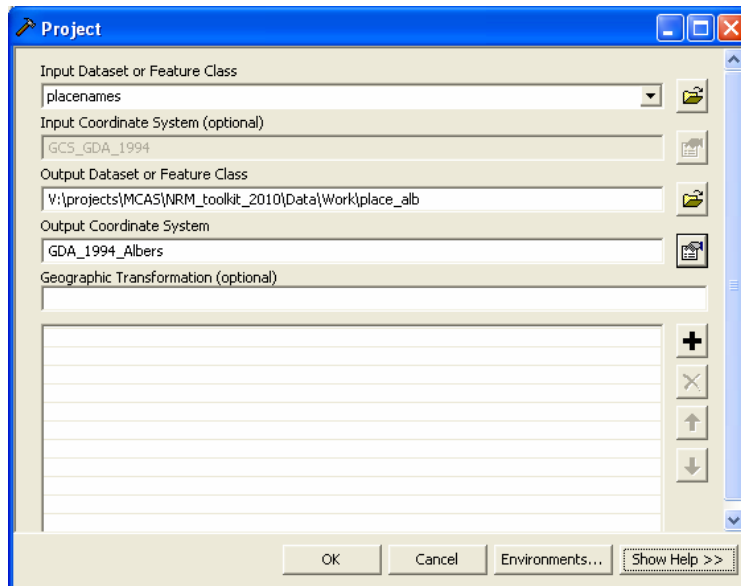
the original data were processed. The tip file is created in Notepad or Word and saved as a txt file with exactly the same name of the dataset and an extension *.tip*. The first line of a tip file appears in MCAS-S when you hover the mouse over the dataset; hence ensuring that the first line holds a useful description of the data.

## 1) Re-project the data

This section focuses on **Primary** data and outlines how to convert different datasets to the correct raster format. The first step in data conversion is to project the data into a common projection, in this case Albers Equal Area; datum GDA94. The ArcMAP commands for re-projecting raster and vector data are as follows:

### 1A) Vector

In ArcCatalog select *ArcToolbox>Data Management Tools>Projections and Transformations>Feature>Project*

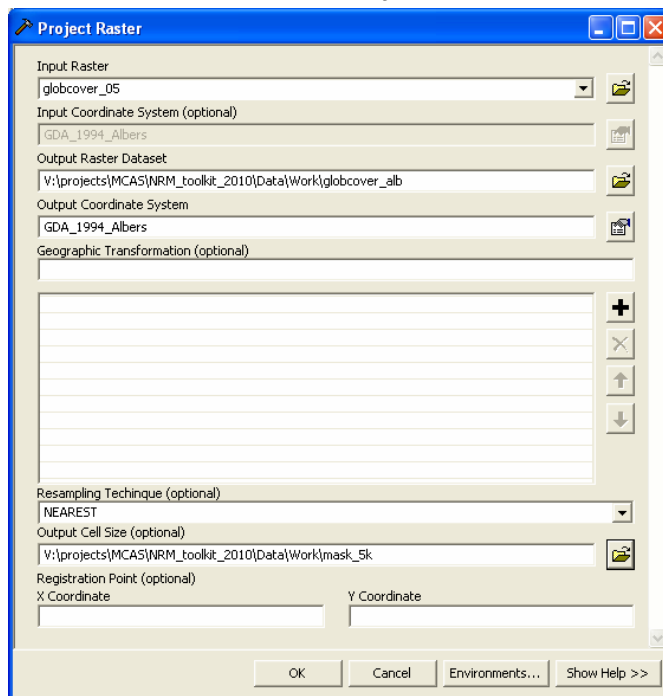


Save to **working** directory

Import projection from Datapack\_5k/Data/**Primary/Agriculture/beef\_dse**

### 1B) Raster

In ArcCatalog select *ArcToolbox>Data Management Tools>Projections and Transformations>Raster>Project Raster* function

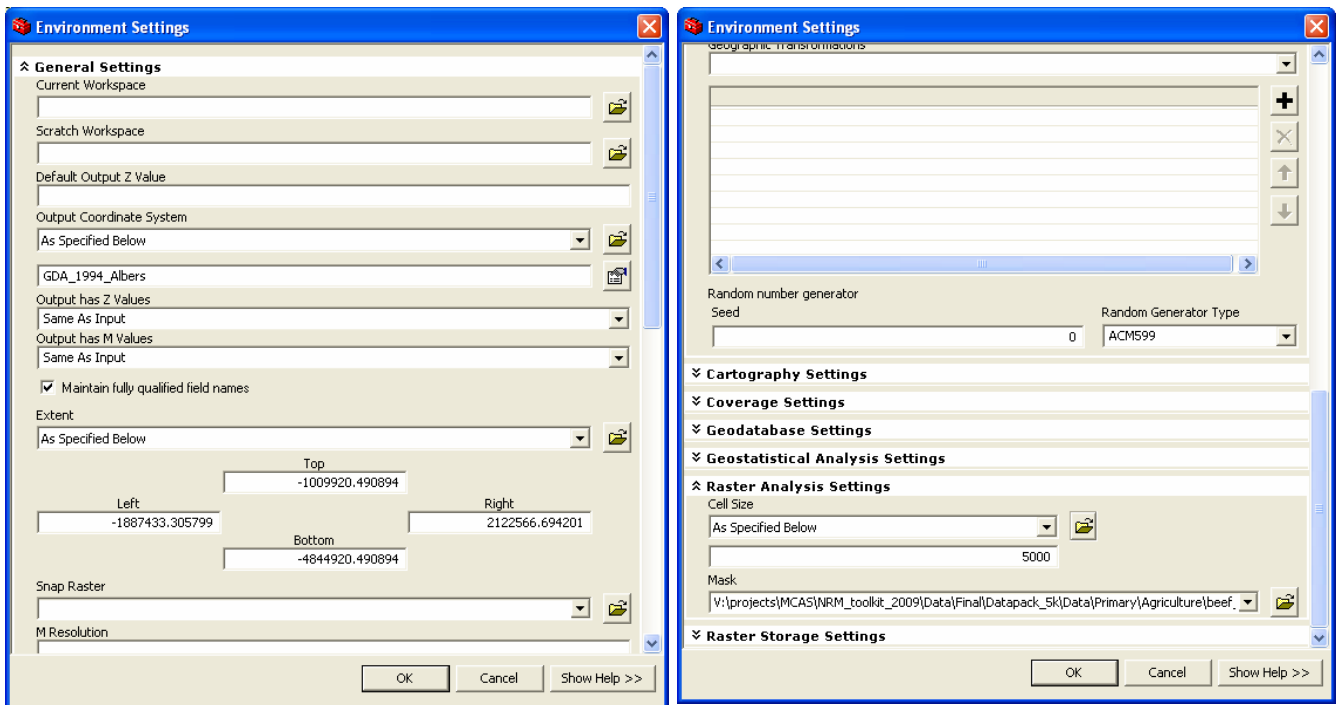


Select **Environments...**  
Set **General Settings** to **beef\_dse**:

- Output Coordinate System
- Extent

Set **Raster Analysis Settings** to **beef\_dse**:

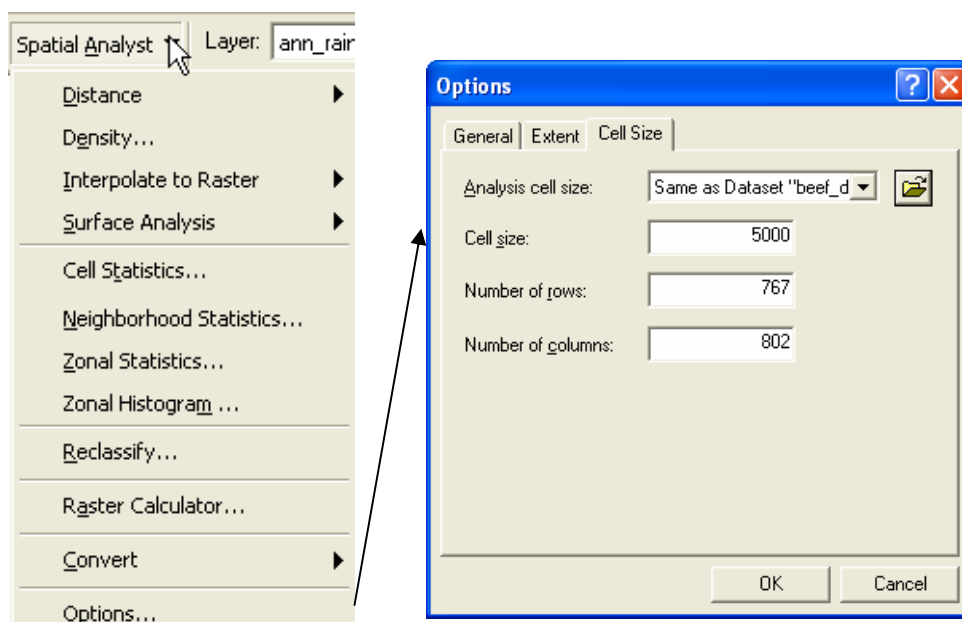
- Cellsize
- Mask



## 2) Convert the data to rasters

The next step is to convert the data into a raster; most of the tools for converting your data are found in the Spatial Analyst toolbar which is found in ArcMap.

Open ArcMap and load the projected data. Select the Spatial Analyst extension and *Options...* item and choose a template dataset for setting the extent, resolution and mask (use *beef\_dse* to set these).



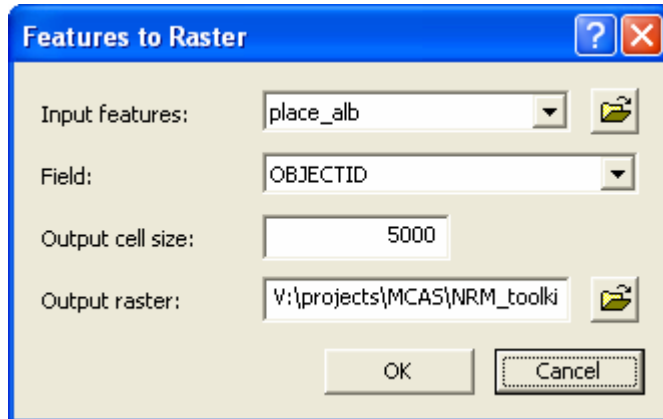
## 2A) Converting points

MCAS-S does not currently support point data and in order to create a raster layer, some processing is required in ArcGIS. You need to consider how the data would be used in MCAS-S, for example, you have a dataset of cities; do you want portray these by location or proximity? If the location is more important, then you should convert the points to rasters. If proximity is more important, then a distance function might be preferable.

### Points to rasters

Tool

Spatial Analyst>Convert>Features to Raster



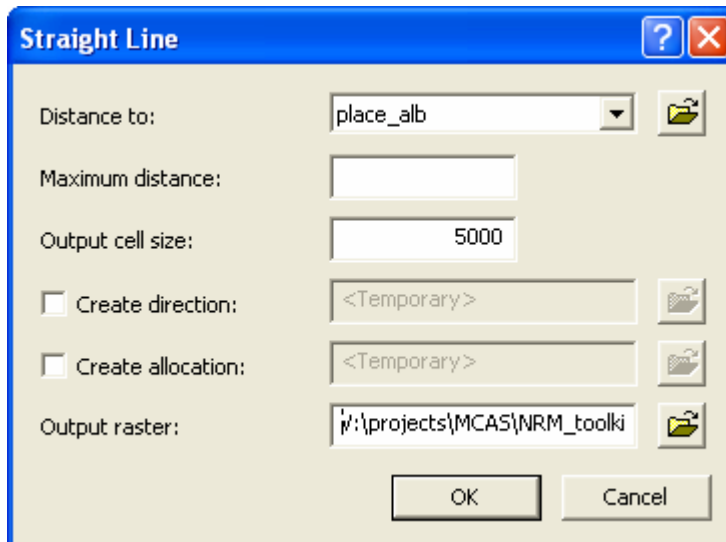
Save as **work/place\_loc**

### Distance

A straight-line distance function can be used to convert sparse points such as water points or grain silos to a raster.

Tool:

Spatial Analyst>Distance>Straight Line



Save as **work/dist\_place**

## Interpolation

This is useful when you had a network of points such groundwater sampling sites. This tool uses the Inverse-Distance weighted function and the output is a surface raster.

Tool:

Spatial Analyst>Interpolate to Raster>Inverse Distance Weighted

**Inverse Distance Weighted**

Input points: place\_alb

Z value field: OBJECTID

Power: 2

Search radius type: Variable

Search Radius Settings

Number of points: 12

Maximum distance:

Use barrier polylines: roads\_alb

Output cell size: 5000

Output raster: V:\projects\MCAS\NRM\_toolki

OK Cancel

Use default settings

Save as work/idw\_place

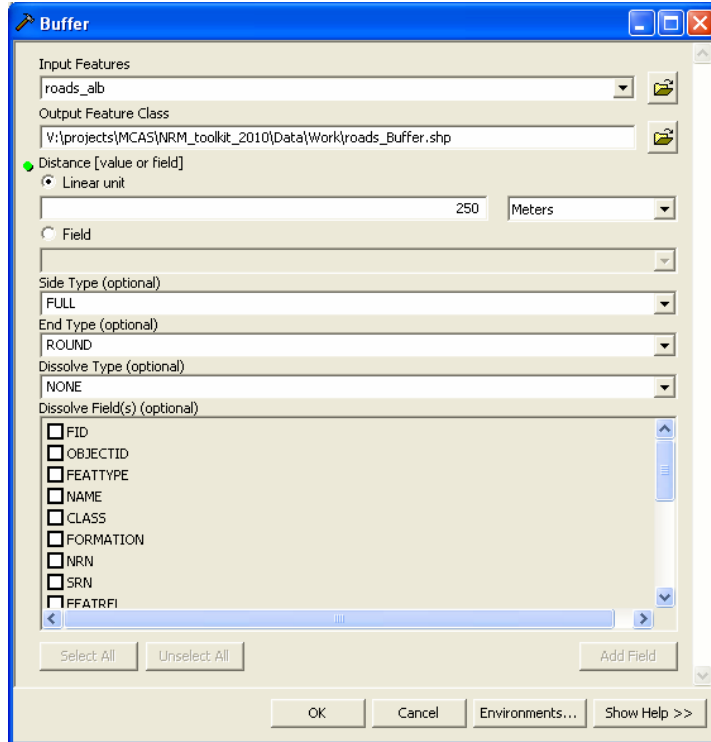
## 2B) Converting lines

MCAS-S will accept line data as **Overlays** but not as **Primary** data.

### Buffer

Create a polygon around the line features at a specified distance; this could be set this to 250m.

ArcToolbox>Analysis Tools>Proximity>Buffer



Save as work/road\_buffer

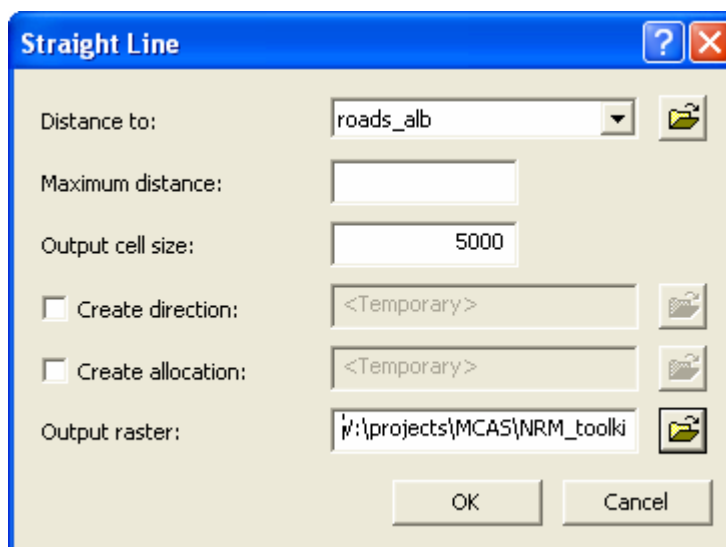
### Distance

A straight-line distance

function can be used to convert lines such as rivers or roads to a distance raster.

Tool:

Spatial Analyst>Distance>Straight Line



Save as work/dist\_road

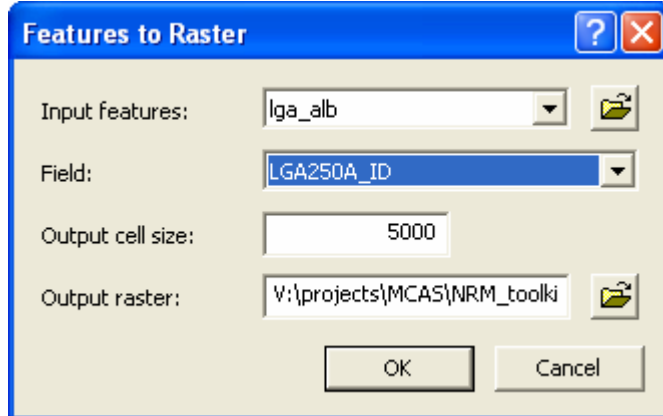
It may be required to split roads into major (dual carriageway, principal) and minor (secondary, minor and tracks) roads by selecting in Properties> Definition Query.

## 2C) Converting polygons

It should be remembered that Arc rasters uses a numeric attribute. If you do not have one, this should first be created in ArcMap by opening the attribute table and adding a field (from Options>Add field). Then select the field and populate it using the field calculator (from right mouse button).

Tool:

Conversion Tools>To Raster>Feature to raster

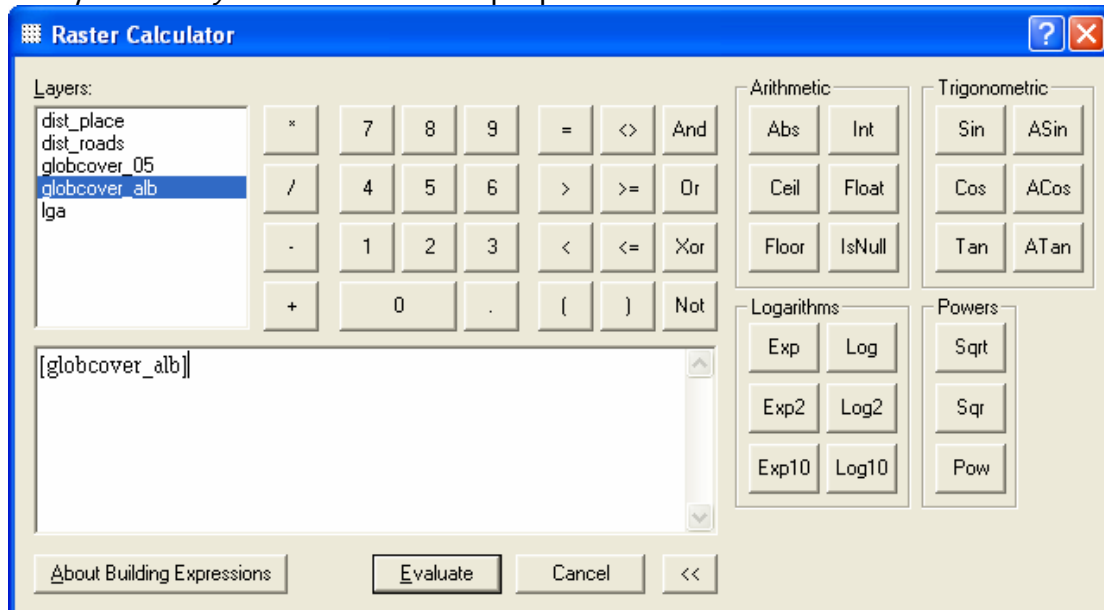


This field should be numeric

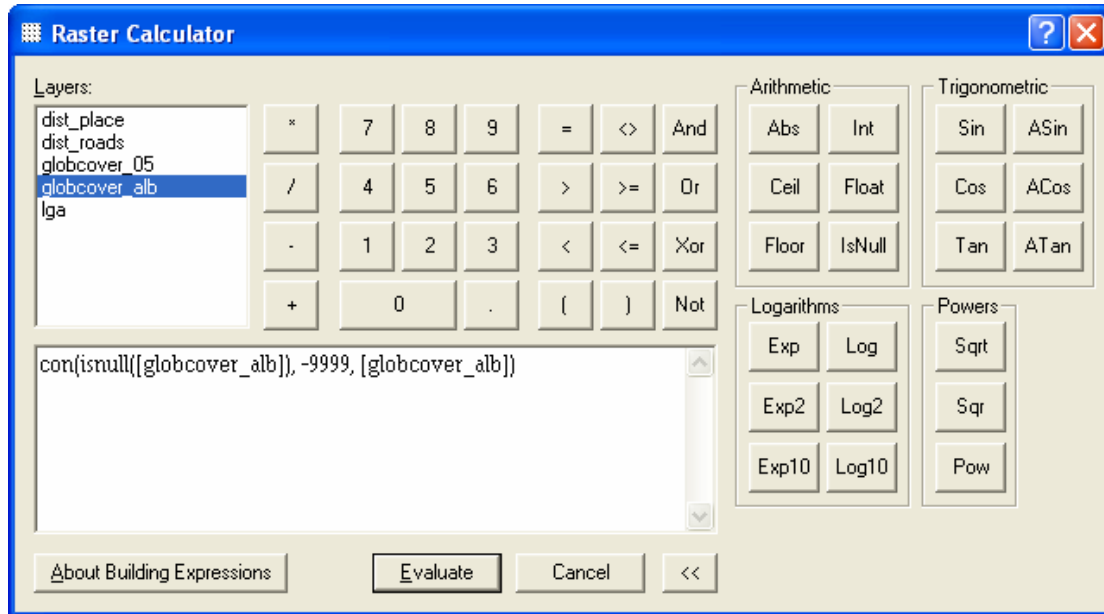
However, you may wish to have more control over the final output by using Conversion Tools>To Raster>Polygon to Raster tool and select Cell assignment type as Maximum Combined Area.

## 2D) Converting grids

The simplest way to resample data is to use the raster calculator. The *Options* item in the *Spatial Analyst* menu sets the output parameters.



Furthermore, you can use the Raster Calculator to set 'No data' values to -9999 using the *con(isnull)* function:



The output of the Raster Calculator is a temporary raster that you will need to save permanently by selecting the raster, right-click and select Data>Make Permanent. Save to **working**.

The raster calculator uses nearest neighbour technique for resampling. This technique is appropriate if the data is categorical. If the data is continuous, bilinear interpolation or cubic convolution is preferred.

If you require more flexibility in resampling, you should also use the *Resample* tool (in Data Management>Raster>Raster Processing>Resample). Here you can select majority as well as bilinear or cubic.

### **3) Save the data**

Finally copy the final data into the appropriate MCAS-S **Primary** data directories. For example the **dist\_places** dataset might go in the following folder: *Datapack\_5k/Data/Primary/social*. Alternatively, a new sub directory can be created and the dataset saved there.

Local government area (LGA) data can be used as a mask so it should be copied to *Datapack\_5k/Data/Mask*.

Make sure to add processing information to the .tip file and save alongside the dataset. The .txt file for categorical data should also be saved alongside the associated dataset.

### ***Help***

The most common problems in converting the data are that the extent, resolution or projection of the data in MCAS-S does not conform. If the dataset doesn't show up in the Primary, Overlay or Mask drop down menus, or is the wrong place on the mapping window then the data have different extents, cell sizes or projections and you will need to re-create the data.

You should also check that each dataset contains the same number of pixels using the Layer Properties - 1246 columns and 916 rows in the examples used here. The origin should also be exactly the same for all datasets.

If when you open a saved project, you get a big red X instead of a data layer - this usually means that you have moved a dataset, renamed it or the data has been corrupted. If the dataset has changed names or moved you can navigate to it by right-clicking and selecting *Change Source...* If the dataset has been deleted or corrupted, you will need to re-create the data.

If MCAS-S slows down or freezes then you may have too much data. Try removing some of the datasets from the window. Another reason may be that your data are in floating point format, which makes the dataset very large; the solution is to convert the data to integers. For example if you have elevation data, you may wish to create integers to the nearest 1m. In Raster Calculator enter *int(elevation)*.

Any technical questions can be addressed to [Lucy.Randall@brs.gov.au](mailto:Lucy.Randall@brs.gov.au)