**OEH Grid Garage ArcGIS Toolbox User Guide**

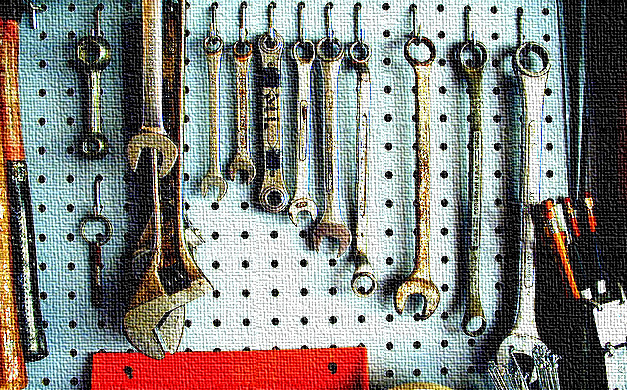
**The Grid Garage V3**

**(ArcGIS Toolbox) User Guide**

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**Versioning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Date** | **Author** | **Updates** |
| GG01.01 | 01/09/2015 | Tom Barrett | First version |
| GG01.02 | 18/09/2015 | Tom Barrett | Incorporated edits from Louise Goggin and Dymphna Javier |
| GG01.03 | 25/09/2015 | Tom Barrett | Completed help for all tools and added the Basic Tutorial |
| GG02.01 | 21/10/2015 | Tom Barrett | Incorporated feedback from Dymphna Javier, Arjan Wilkie and Andrew Steed. |
| GG02.011 | 17/10/1016 | Tom Barrett | Incorporated feedback from Jon Thorne (DPI). |
| GG03.01 | 24/11/2016 | Tom Barrett | Started updating to reflect changes introduced in GG V3. |

# Acknowledgements

We thank the following Grid Garage beta testers who provided valuable feedback on the tools and the user guide, including: Louise Goggin, Dymphna Javier, Arjan Wilkie, Andrew Steed and Jon Thorne. The software development component was funded by Minor Capital Works from OEH as part of the ‘LM15 Realizing the Potential of Spatial Data in NSW’ project undertaken under the Landscape Management Knowledge Strategy 2014-15 Implementation Plan.

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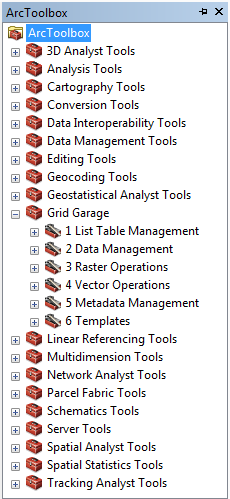
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# Why use the Grid Garage Toobox?

The OEH ArcGIS Grid Garage Toolbox (Grid Garage) will help you undertake the Geographic Information System (GIS) tasks required to process GIS data (geodata) into a standard, spatially aligned format. This format is required by most grid or raster spatial modelling tools such as the [Multi-criteria Analysis Shell for Spatial Decision Support (MCAS-S)](http://www.agriculture.gov.au/abares/data/mcass). Grid Garage contains over thirty tools designed to save you time by batch processing repetitive GIS tasks as well as capturing a record of each processing step as well as errors.

Grid Garage provides tools that function using a list based approach to batch processing where both inputs and outputs are specified in tables to enable selective batch processing and detailed result reporting. In many cases the tools simply extend the functionality of standard ArcGIS tools, providing some or all of the inputs required by these tools via the input table to enable batch processing on a 'per item' basis. This approach differs slightly from normal batch processing in ArcGIS, instead of manually selecting single items or a folder on which to apply a tool or model you provide a table listing target datasets. In summary the Grid Garage allows you to:



* List, describe and manage very large volumes of geodata.
* Batch process repetitive GIS tasks such as managing (renaming, describing etc.) or processing (clipping, resampling, reprojecting etc.) many geodata inputs such as time-series geodata derived from satellite imagery or climate models.
* Record any errors when batch processing and diagnose errors by interrogating the input geodata that failed.
* Develop your own models in ModelBuilder that allow you to automate any GIS workflow utilising one or more of the Grid Garage tools that can process an unlimited number of inputs.

The Grid Garage in intended for use by anyone with an understanding of GIS principles and an intermediate to advanced level of GIS skills. Using the Grid Garage tools in ArcGIS ModelBuilder requires skills in the use of the ArcGIS ModelBuilder tool. In this manual we refer to all digital spatially referenced data as ‘geodata’, see Chapter 8 Glossary of terms, on page 64 for a full list of commonly used terms and their definitions.

# Using the Grid Garage Tools

Grid Garage is written in Python programming language and tested in ArcGIS 10.1 for Desktop (Licence type: Advanced). The tools may not work in older versions (pre-10.1). We have undertaken limited testing of the tools in versions 10.2 and the tools have all worked fine, but have not done any testing in 10.3 yet.

## Adding Grid Garage to the ArcMap ArcToolbox

To add the Grid Garage toolbox to the ArcMap Toolbox right-click the folder ‘ArcToolbox’ and select ‘Add Toolbox’ from the menu. You will then need to navigate to the folder where the Grid Garage toolbox is located on your hard drive and then add the tbx file.

## How does Grid Garage work?

All Grid Garage tools use the same method to batch process multiple geodata inputs. The geodata processing is undertaken by standard ESRI ArcGIS tools described in the ESRI online help. See Chapter 6 Technical documentation for Grid Garage tools for usage tips and a short description of the tool, including a link to the ESRI online help. The following features are common to all tools:

### ‘iItem’ field and Results table

The Results table contains a list of file paths of all input geodata that you may want to be processed by a tool, in a field called ‘item’, as shown in Figure 3. You can generate a Results table using the ‘*1.1 Search for Geodata’*tool, described on page 25. Most tools also generate a Results table when they execute. This table reports any errors encountered when processing any of the input geodata. Figure 1 shows where you specify the input table (‘Rasters List’) containing the items, or geodata, to be processed (clipped in this case) and the location for the processed geospatial outputs and Results table (‘Result Location’). The Results table, shown in Figure 3, will always contain the following fields:

**Source:** The path and file name of the input geodata.

**Item:** The path and file name for the output geodata (note that any table with this field can be used as input to other Grid Garage tools).

**Error:** Reports on any errors encountered when the geodata was processed by the tool.

If you want to restrict the processing to only selected rows (geodata inputs) then you need to ensure the table is in ‘file geodatabase’, or GDB. To do this in the ‘Result Location (optional)’ input box select either ‘ArcGIS Current Workspace’, after setting this to be a file geodatabase in the Environment Settings, or ‘ArcGIS Scratch GDB’ or select ‘As specified below’ and use the folder button to find a file geodatabase (*name*.gdb). If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for Grid Garage tools.

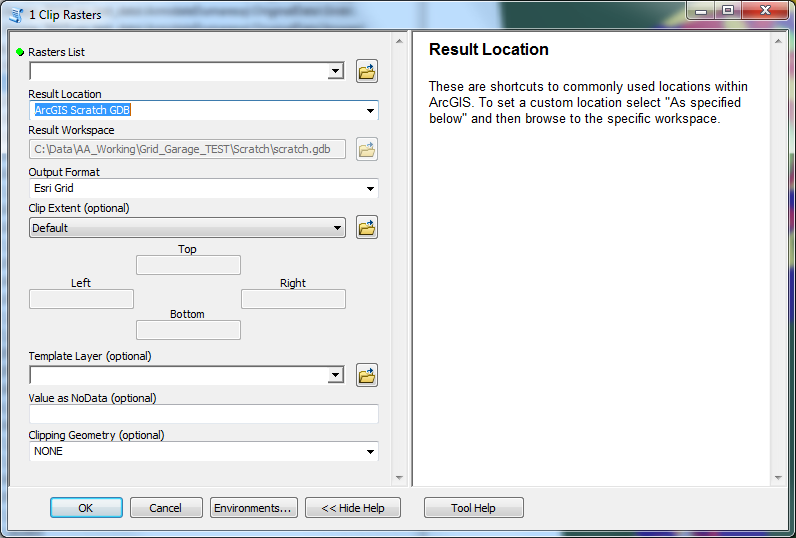
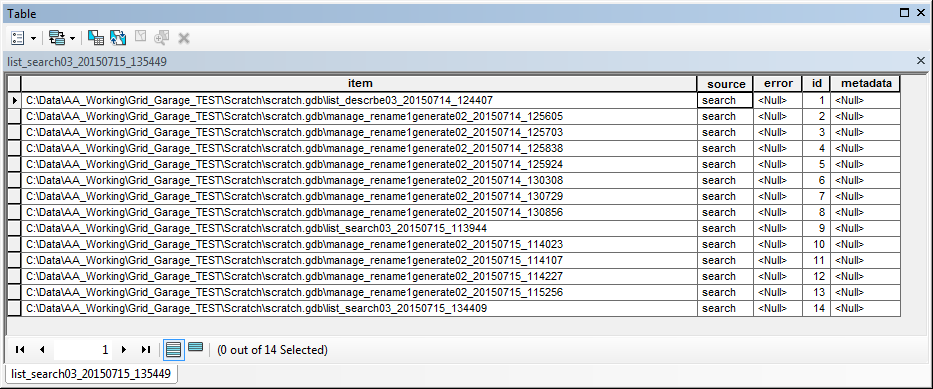


Figure Specifying the input table (Items table and ‘Result Location’) and ‘Results [table] location’ which will show you if there were any errors.

|  |
| --- |
| **TIP #1:** *We would suggest that for each processing step you create a new file geodatabase and specify this in the ‘Geoprocessing > Environments…’ settings as shown on the right. All Grid Garage tools will then default to using this file geodatabase for all geodata and result table outputs.*  ***TIP #2:***  *If you are getting errors (or ArcMap crashes) when the tool tries to write the output grid to a file geodatabase then try selecting a folder for the Result Workspace and choose ‘tif’ as the output format.*  Figure ArcMap ‘Environment Settings’. |

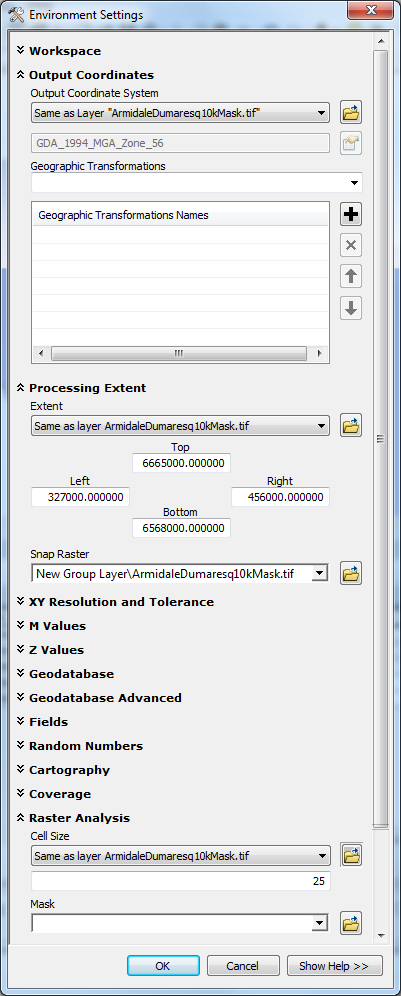
Table Example of an Items table (in ArcMap), this one was generated using the ‘1 List Table Management > 1.1 Search for Geodata’ tool



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **status** | **source** | **Item** | **error** | **id** |
| deleted | C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198705\_dima2m4\_bare.tif | C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198705\_dima2m4\_bare.tif |  | 1 |
| deleted | C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198708\_dima2m4\_bare.tif | C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198708\_dima2m4\_bare.tif |  | 2 |
| deleted | C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198711\_dima2m4\_bare.tif | C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198711\_dima2m4\_bare.tif |  | 3 |
|  | C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198802\_dima2m4\_bare.tif |  | Failed to execute. Parameters are not valid. ERROR 000732: Input Data Element: geodata C:\Data\AA\_Working\Grid\_Garage\_TEST\gg\_test\_data\Seasonal\_GC\_1900\lztmre\_wlwha\_m198802\_dima2m4\_bare.tif does not exist or is not supported Failed to execute (Delete). | 4 |

Figure Example of a Results table from the ‘2 Data Management > 2.4 Delete Data Items’ tool. The fourth row documents the error experienced when attempting to delete this item (To illustrate error reporting, I removed the file so it could not be found.)

### Geodata outputs



All spatial geodata outputs will be written to the ‘Result Workspace’. The first time the tool is run the output geodata will be written to the Result Workspace using the same name as the input geodata. If the tool is run again the output geodata will be given the same name plus a number, starting at zero (0) and incrementing each time the tool is run, as shown in Figure 4.

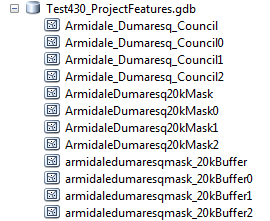


Figure Example of a 'Result Workspace’ (file geodatabase) where the ‘Project Features’ tool has been run four times on three input files

### Setting up the Geoprocessing Environment

If your output raster features are being combined, which is often the case when they are used in raster modelling projects, you will need all the pixels in the raster feature classes to be spatially aligned. To achieve this we recommend you use a template grid to specify the output coordinates, processing extent, especially ‘Snap Raster’, and cell size using the ArcMap ‘Geoprocessing > Environments..’ tool, illustrated in Figure 5, before running any of the Grid Garage tools.

### Dealing with errors and crashes

In the Results table generated by most tools there will be an ‘error’ field. This field can tell you if the tool failed for the input (item) in that row. We have also found that sometimes when a tool crashes or causes fatal errors one solution is to create a new ArcMap project (mxd) and try the operation again. Or just close ArcGIS down and re-open the project before trying again. If you are still having problems running the tools please report the issue to Tom Barrett ([tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au)).

Figure Example of ArcMap Environment Settings where a ‘template’ raster feature is used to define coordinates, extent and cell size

# Using Grid Garage tools in ArcGIS ModelBuilder

## Overview

You can drag-and-drop any of the Grid Garage (GG) tools into an ArcGIS model when it is in ‘Edit’ mode. You need to know how to build models using ArcGIS ModelBuilder before attempting this. See [ArcGIS Online Help](http://doc.arcgis.com/en/arcgis-online/) for instructions and tutorials on this topic.

### Linking multiple Grid Garage tools

Each Grid Garage tool requires an input table containing an ‘item’ field that lists all the input geodata to be processed. Each tool also generates a ‘Results table’ that also contains an ‘item’ field listing the paths of all the output data. This allows the tools to be ‘daisy chained’ together where the output of the previous tool can become the input for the next, as shown in Figure 6.

Other standard ArcGIS tools can also be used in combination with the Grid Garage tools. The ‘Table Select’ ArcGIS tool is used in this example model to select a subset of the geodata items, based on their data type and projection, before being fed into the ‘3.2.1 Clip Rasters’ Grid Garage tool.

We recommend that if you’re generating multiple (intermediate) geodata outputs in your model, e.g. a ‘3.2.1 Clip Rasters’ output followed by a ‘3.3.2 Resample Raster’ output, then you should specify a different ‘Result Workspace’ for each one. This also makes it easier to validate the outputs from each tool and de-bug if things go wrong. See ‘Model 04’, in the ‘6 Templates’ toolset, for an example.

Figure An example of a custom model built in ArcGIS ModelBuilder (Model 01 in ‘6 Templates’ toolset) that utilises four of the Grid Garage tools. The first tool ‘1.1 Search for Geodata’ creates the Results or Items table listing all the geodata found in the ‘Workspace to Search’ path. This table then feeds straight into the ‘1.2 Describe Geodata’ tool which generates a Results table reporting on many of the geodata attributes including projection type. The ArcGIS ‘Table Select’ tool (a standard ArcGIS tool) then selects only those geodata items that are ‘raster’ data and are in ‘MGA Z56’ projection. These selected data items are then fed into the ‘3.2.1 Clip Rasters’ Grid Garage tool which clips out a subset of the data based on the ‘Clipping Geometry’ which is a polygon feature class defining the project study area. The final Grid Garage tool ‘1.3. Display Items’ loads the outputs into your ArcMap project.

# Tutorials

At present there is only one tutorial that introduces you to the basic operation of Grid Garage tools. We intend adding more tutorials in the near future. All tutorials will use the sample geodata provided with Grid Garage. Table 1 below lists the different geodata provided. In order to test the different tools the geodata are in different projections and the raster geodata provide examples of different pixel types and cell sizes.

## Sample geodata

Table List of sample geodata provided with the Grid Garage Toolbox. Note that the raster geodata sets have different cell sizes, spatial reference and pixel type.

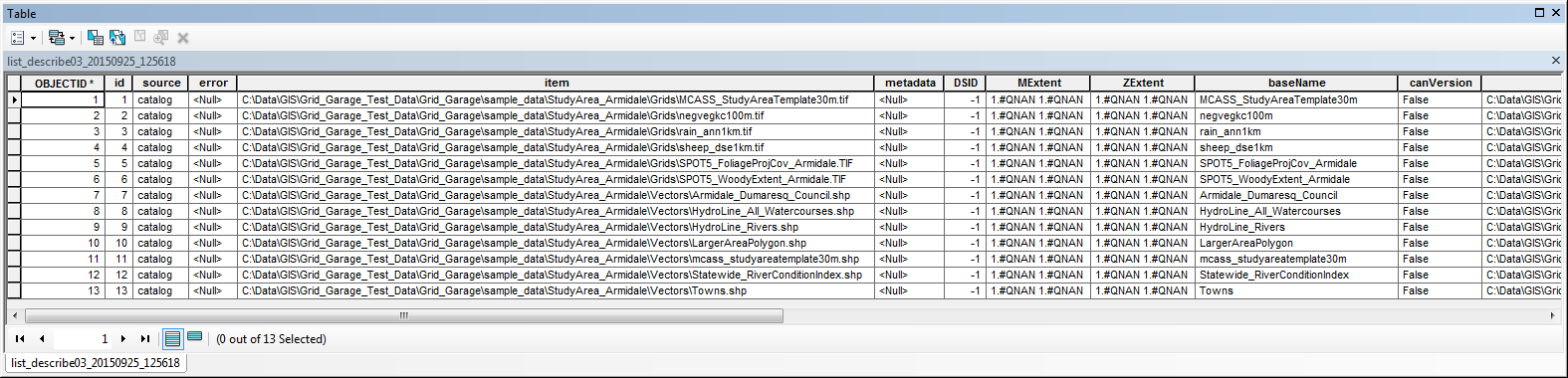
|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Geodata File** | **Folder** | **Dataset Type** | **Spatial Reference** | **Pixel Type** | **Max Value** | **Min Value** | **Cell Size** | **No Data Value** | **Is Integer** |
| MCASS\_StudyAreaTemplate30m.tif | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Grids | RasterDataset | GDA\_1994\_MGA\_Zone\_56 | U8 | 1 | 1 | 30 | 255 | True |
| netvegkc100m.tif | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Grids | RasterDataset | GDA\_1994\_Lambert\_Conformal\_Conic | S16 | 7000 | 0 | 100 | -32768 | True |
| rain\_ann1km.tif | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Grids | RasterDataset | GDA\_1994\_Albers | F32 | 2101 | 714 | 1000 | -1 | False |
| sheep\_dse1km.tif | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Grids | RasterDataset | GDA\_1994\_Albers | F64 | 602.18 | 0.05 | 1000 | -1.79769e+308 | False |
| SPOT5\_WoodyExtent\_Armidale.TIF | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Grids | RasterDataset | GDA\_1994\_MGA\_Zone\_56 | U8 | 1 | 1 | 5 | 255 | True |
| Armidale\_Dumaresq\_Council.shp | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Vectors | FeatureClass | GCS\_GDA\_1994 | NA | NA | NA | NA | NA | NA |
| HydroLine\_All\_Watercourses.shp | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Vectors | FeatureClass | GCS\_GDA\_1994 | NA | NA | NA | NA | NA | NA |
| HydroLine\_Rivers.shp | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Vectors | FeatureClass | GCS\_GDA\_1994 | NA | NA | NA | NA | NA | NA |
| LargerAreaPolygon.shp | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Vectors | FeatureClass | GDA\_1994\_MGA\_Zone\_56 | NA | NA | NA | NA | NA | NA |
| mcass\_studyareatemplate30m.shp | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Vectors | FeatureClass | GDA\_1994\_MGA\_Zone\_56 | NA | NA | NA | NA | NA | NA |
| Statewide\_RiverConditionIndex.shp | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Vectors | FeatureClass | NSW\_Lambert\_Conformal\_Conic | NA | NA | NA | NA | NA | NA |
| Towns.shp | ...Grid\_Garage\sample\_data\StudyArea\_Armidale\Vectors | FeatureClass | GDA\_1994\_MGA\_Zone\_56 | NA | NA | NA | NA | NA | NA |

## Tutorial 1: Basic use of Grid Garage tools

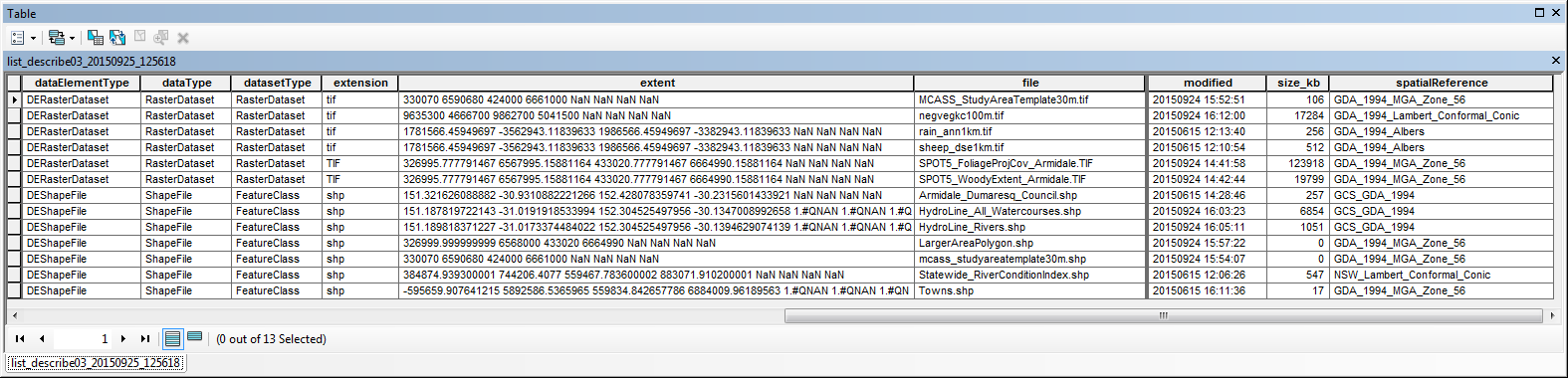
This tutorial will teach you how to find and describe geodata. This produces a single (very handy) table as an output which makes selecting data for subsequent processing by other Grid Garage tools (and tutorials) much easier.

|  |  |
| --- | --- |
| **Step 1:** Open ArcMap and save the project as ‘Grid Garage Tutorial 01.mxd’ in the ‘…Grid\_Garage\sample\_data\Tutorial\_01’ folder. |  |
| **Step 2:** Open the ArcToolbox window in ArcMap, then right- click on the ‘ArcToolbox’ entry and select ‘Add Toolbox…’ You will need to navigate to the location of your ‘Grid\_Garage’ folder and select the Grid Garage toolbox (highlight and click [Open]). |  |
| **Step 3:** In ArcMap open an ArcCatalog window (see red circle) then right-click on the ‘Home – Sample Data/Tutorial\_01’ folder, select ‘New’ and then ‘File Geodatabase’. Rename the new file geodatabase to ‘Tutorial 1’. |  |
| **Step 4:** Select ‘Geoprocessing > Environments..’ from the ArcMap menu. |  |
| **Step 5:** Select the ‘Tutorial 1.gdb’ file geodatabase for both the ‘Current Workspace’ and ‘Scratch Workspace’.  Now is a good time to save your ArcMap project. |  |
| **Step 6:** Open the ArcToolbox window and double-click on the ‘1.1 Search for Geodata’ Grid Garage tool. |  |
| **Step 7:** In the ‘Workspaces to Search’ input navigate to the ‘sample\_data’ folder.  The ‘Result Location’ will default to your ‘AcrGIS Current Workspace’ which you set to be ‘Tutorial 1.gdb’ file geodatabase in Step 5.  Unless you click ‘<<Hide Help’ the help panel to the right will provide instructions for each of the tool parameters.  Click OK.  *If you get an error here such as 000735 “value is required” try running again but in the “Result Location” input box select “As specified below” instead of the default ArcGIS Current Workspace.* |  |
| **Step 7 cont..** You can view the tool processing progress by selecting ‘Geoprocessing > Results’ from the ArcMap menu, then expanding ‘Current Session’ and ‘Messages’. |  |
| **Step 7 cont..** When the tool has finished processing you will get a (temporary) message in the bottom right hand corner. If the message contains a green tick then it completed successfully without any errors.  In your ‘Table of Contents’ window you will see a new Table in the “List By Source” ArcMap display tab where the Results table will be automatically loaded. Right-click on this table and click “Open” to view it.  The Results table will contain an ‘item’ field listing all the geodata found in the search folder and its sub-folders. |  |
| **Step 8:** Run the ‘1.2 Describe Geodata’ tool by double-clicking on it. |  |
| **Step 8 cont..** In the ‘Items table’ click the drop-down menu and select the Results table generated in the previous step.  For ‘Describe Type’ select the ‘Long description’. |  |

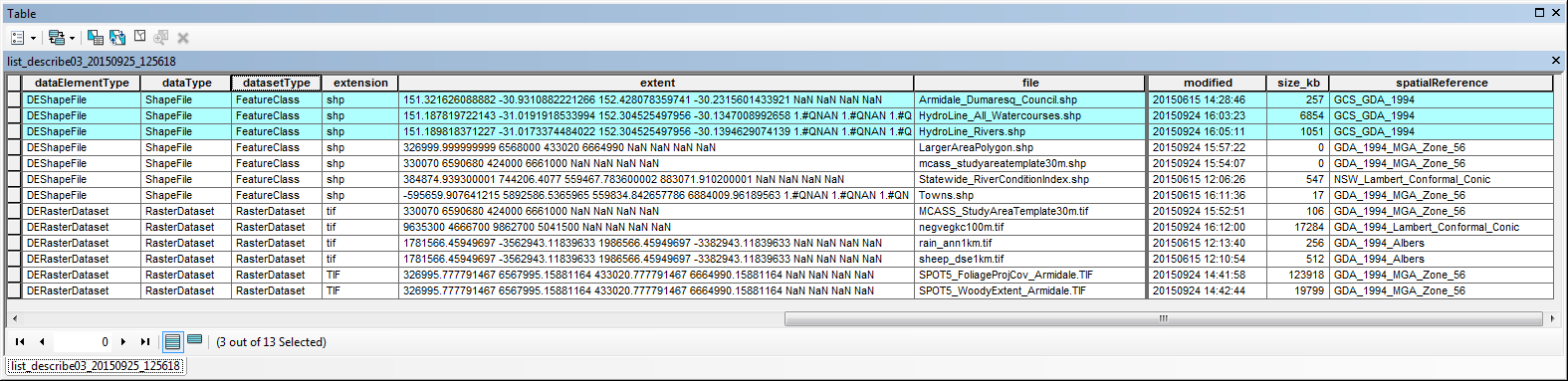
Open the Results table to see if there were any errors. The errors will be reported in the ‘error’ field. In this case there are none, they are all ‘<Null>’.



**Step 8 cont..** Scroll to the right end of the Results table to look at the ‘spatialReference’ field. This field reports on the spatial reference coordinate system of each geodata file. You can also see details of the geodata by looking at the ‘dataType’, ‘datasetType’ and ‘extension’ fields.



If you select a subset of files then only these selected files will be processed by any of the Grid Garage tools, if this table is selected for the input, or items, table. In the example below only shapefiles that have geographic spatial reference of GCS\_GDA\_1994 have been selected for processing.



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# Summary of Grid Garage Tools

| **Tool (with link to technical documentation)** | **Summary of Tool function** |
| --- | --- |
| **Geodata** |  |
| [Geodata > Search](#_1.1_Search_for) | This tool returns a table listing all the geodata found in the given workspace(s) in a ‘results table’. The results table stores the path to each of the geodata items in the ‘geodata’ field. This table can then be used as an input into any of the other Grid Garage batching tools. If you want to restrict the processing to only selected rows (geodata items) then you need to ensure the ‘Output Workspace’ is a ‘file geodatabase’, or GDB. If you choose a folder for the Output Workspace then the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for Grid Garage tools. |
| [Geodata > Describe](#_1.2_Describe_Geodata) | This tool inspects all input geodata and reports on the geodata properties such as geodata type, extent, projection, gird cell size, etc.. |
| [1.3 Display Items](#_1.3_Display_Items) | This tool loads geodata, listed in the items table, into your ArcMap display frame. |
| [1.4 Select Manually](#_1.4_Select_Manually) | This tool allows you to build a new Items table by browsing to, and manually selecting, geodata to include in the table. |
| [1.5 Merge Lists](#_1.5_Merge_Lists) | This tool creates a single Items table by merging one or more input tables containing an ‘item’ field. |
| **2 Data Management** |  |
| [2.1 Rename: Generate Names](#_2.1_Rename:_Generate) | This tool provides a first stage in safely renaming datasets according to a set pattern. The tool generates candidate names for geodata listed in the Items table, which can then be applied using the ‘*2.2 Rename: Apply Names*’ tool. |
| [2.2 Rename: Apply Names](#_2.2_Rename:_Apply) | This tool applies the new file names (to the original geodata) generated by the ‘2.1 Rename: Generate Names’ tool. For more detailed help see [ESRI Help for the ‘Rename (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/EN/HELP/MAIN/10.1/index.html#//001700000056000000). |
| [2.3 Copy Data Items](#_2.3_Copy_Data) | This tool copies geodata into a single workspace defined by the ‘Result Location’. The tool uses the standard ArcGIS ‘Copy (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Copy (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000035000000). |
| [2.4 Delete Data Items](#_2.4_Delete_Data) | This tool permanently deletes listed geodata from the disk. The tool uses the standard ArcGIS ‘Delete (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Delete (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000052000000) |
| **3 Raster Operations > 1 Information** |  |
| [3.1.1 Build RAT](#_3.1.1_Build_RAT) | This tool builds the raster attribute table (RAT) for raster feature classes that do not have one. The tool uses the standard ArcGIS ‘Build Raster Attribute Table (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Build Raster Attribute Table (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//0017000000m2000000). |
| [3.1.2 Calculate Statistics](#_3.1.2_Calculate_Statistics) | This tool calculates statistics for raster geodata which allows ArcMap to properly stretch and symbolize raster geodata for display. The tool uses the standard ArcGIS ‘Calculate Statistics (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Calculate Statistics (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//0017000000m3000000). |
| [3.1.3 Describe Rasters](#_3.1.3_Describe_Rasters) | This tool inspects all rasters and reports raster properties. For more detailed help see [ESRI Help for the ‘Get Raster Properties (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//0017000000m7000000). |
| [3.1.4 Zonal Counts](#_3.1.4_Zonal_Counts) | For each file in the Rasters List, this tool allows you to report on the number of pixels within zones described by a vector polygon feature class and write these values to a table. This tool functions like the ArcGIS 10.1 ‘Tabulate Area’ (Spatial Analyst) tool. For more detailed help see [ESRI Help for the ‘Tabulate Area’ (Spatial Analyst)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000w2000000). |
| **3 Raster Operations > 2 General Operation** |  |
| [3.2.1 Clip Rasters](#_3.2.1_Clip_Rasters) | This tool clips out a subset of a larger raster geodata based on either a bounding extent or a polygon feature. The tool uses the standard ArcGIS ‘Clip (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Clip (Data Management)’ tool (10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000009n000000) |
| [3.2.2 Copy Rasters](#_3.2.2_Copy_Rasters) | This tool copies raster geodata to a new location. It also allows you to change some of the format/attributes of the raster geodata when copying. For more detailed help see [ESRI Help for the ‘Copy Raster (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000094000000). |
| **3 Raster Operations > 3 Transformation** |  |
| [3.3.1 Aggregate](#_3.3.1_Aggregate) | This tool is used to generate reduced-resolution versions of rasters, that is, from small to larger pixels. Each output cell contains the Sum, Minimum, Maximum, Mean, or Median of the input cells that are encompassed by the extent of that cell. The tool uses the standard ArcGIS ‘Aggregate (Spatial Analysis)’ tool. For more detailed help see [ESRI Help for the ‘Aggregate (Spatial Analyst)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z00000034000000). |
| [3.3.2 Resample Raster](#_3.3.2_Resample_Raster) | This tool alters the raster geodata by changing the cell size and resampling method. The tool uses the standard ArcGIS Resample (Data Management) tool. For more detailed help see [ESRI Help for the ‘Resample (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000009t000000). |
| [3.3.3 Project Rasters](#_3.3.3_Project_Rasters) | This tool transforms the raster geodata from one projection to another. The tool uses the standard ArcGIS ‘Project Rasters (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Project Rasters (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000007q000000). |
| [3.3.4 Reclass Raster by Table](#_3.3.4_Reclass_Raster) | This tool copies geodata into a single workspace defined by the ‘Result Location’. The tool uses the standard ArcGIS ‘Reclass by Table (Spatial Analyst)’ tool. For more detailed help see [ESRI Help for the ‘Reclass by Table (Spatial Analyst)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000sq000000). |
| [3.3.5 Set Raster NoData Value](#_3.3.5_Set_Raster) | This tool replaces all ‘NoData’ pixels with a user-defined value. The tool uses the standard ArcGIS ‘Copy (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Copy Raster (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000094000000). |
| [3.3.6 Transform Raster](#_3.3.6_Transform_Raster) | This tool applies simple transformations to the raster geodata values. Options include: Standardise, Stretch, Normalise, Log, Square root and Inverse. |
| [3.3.7 Set Raster Value to Null](#_3.3.7_Set_Raster) | This tool replaces a user defined value to Null or ‘NoData’. The tool uses the standard ArcGIS ‘Copy Raster (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Set Null (Spatial Analyst)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z00000007000000). |
| [3.3.8 Tweak Raster Values](#_3.3.8_Tweak_Raster) | This tool is used to tweak, or change, raster values. Values can have floor and ceiling applied, be scaled, translated and also converted to integer data type. The changes to the pixel values are undertaken in the order they’re presented in the tool, i.e. 1) Rescaling between a floor and ceiling, 2) Scale Factor, 3) Constant Shift and 4) Integerise. |
| [3.3.9 Block Statistics](#_3.3.9_Block_Statistics) | This tool partitions the input into non-overlapping blocks and calculates the statistics of the values within each block. The value is assigned to all of the cells in each block in the output. This is illustrated in Figure 8 below. If the data type of the input raster is floating point then only a subset of the statistics will be available (MEAN, MAXIMUM, MINIMUM, RANGE, STD and SUM). For more detailed help see [ESRI Help for the ‘Block Statistics (Spatial Analyst)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000qp000000). |
| **4 Vector Operations** |  |
| [4.1 Describe Classes](#_4.1_Describe_Classes) | This tool inspects all vector classes and reports on vector geodata properties. |
| [4.2 Clip Features](#_4.2_Clip_Features) | This tool cuts out a piece of one feature class using one or more of the features in another feature class as a cookie cutter. This is particularly useful for creating a new feature class, also referred to as study area or area of interest (AOI), which contains a geographic subset of another, larger feature class. For more detailed help see [ESRI Help for the ‘Clip (Analysis)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//000800000004000000). |
| [4.3 Project Features](#_4.3_Project_Features) | This tool transforms the geodata from one projection to another. For more detailed help see [ESRI Help for the ‘Project (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000007m000000). |
| [4.4 Rasterise by Template](#_4.4_Rasterise_by) | This tool converts vector feature classes into raster feature classes based on a template feature class. The template feature class must contain at least one field that is present in all the other vector feature classes and which is used to generate the new rasters. For more detailed help see [ESRI Help for the ‘Feature to Raster (Conversion)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00120000002v000000). |
| [4.5 Rasterise by Table](#_4.5_Rasterise_by) | This tool converts fields within vector feature classes into raster feature classes based on a list of fields stored in the Items table. In addition to the ‘item’ field the Items table must have a field that contains a list of fields, for each input feature class that you want converted into raster features. The Grid Garage ‘*4.1 Describe Classes*’ tool can be used to generate a list of all the fields present in each input feature attribute table. For more detailed help see [ESRI Help for the ‘Feature to Raster (Conversion)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00120000002v000000). |
| **5 Metadata Management** |  |
| [5.1 Analyse Metadata](#_5.1_Analyse_Metadata) | This tool scans all input items for metadata files and lists them in the Results table.  This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au). |
| [5.2 Parse Tips](#_5.2_Parse_Tips) | This tool takes the Results table from *‘5.1 Analyse Metadata’* tool and extracts field information from metadata files.  This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au) |
| [5.3 Build Tips](#_5.3_Build_Tips) | This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au). |
| [5.4 Export Metadata](#_5.4_Export_Metadata) | This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au). |

# Technical documentation for Grid Garage tools

## Geodata

### Geodata - Search

| **Tool** | **Description** |
| --- | --- |
|  | This tool returns a table listing all the geodata found in the given workspace(s) in a ‘results table’ illustrated in the example below. The results table stores the path to each of the geodata items in the ‘geodata’ field. This table can then be used as an input into any of the other Grid Garage batching tools. If you want to restrict the processing to only selected rows (geodata items) then you need to ensure the ‘Output Workspace’ is a ‘file geodatabase’, or GDB. If you choose a folder for the Output Workspace then the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for Grid Garage tools.  **NOTE:** This tool currently crashes if there are any spaces in the path selected in the 'Workspaces to Search' input. We are currently trying to fix this (ESRI) bug but until we do you will need to either remove or replace all the spaces in your folder names with a character such as an underscore ‘\_’. There can be spaces in any of the sub-folders under the path selected in the 'Workspaces to Search' input path.  **TIP:** *This is the first step for any Grid Garage work flow.*  **Workspaces to Search:** You can navigate to and add one or more workspaces, i.e. folders or geodatabases, to search for data.  **Data Types:** You can restrict the search to just find and list a specific type of data by selecting one or more of the tick boxes in this list. If you want to return a list of all types of geodata select ‘Any’.  **Output Workspace:** This is the location for the Grid Garage results table that contains the list of geodata found in the locations you specified in ‘Workspaces to Search’.  If you have set the ArcGIS ‘Workspace' parameter in the 'Geoprocessing > Environment' Settings then this path will be used as the default. You can use this default path or click the folder button to select a new output location which can be a folder or File Geodatabase. If you specify a folder then the Results Table will be written to a comma-delimited (CSV) text file, if you specify a File Geodatabase it will be written as a Geodatabase Table.  **TIP:** *If you choose a folder then the output table will be written to a CSV text file and will not allow you to select rows for processing when using the table as input for other Grid Garage Tools. Geodatabase Tables do allow you to select rows for processing by other Grid Garage Tools.*  **Result Table Name:** You can choose to use the default table name or specify a different name for the Grid Garage results table. The Grid Garage results table contains the list of geodata found in the workspace(s) you have selected. If the tool encounters any errors when querying any of the geodata then a second results table will be generated, with a "\_FAIL" suffix, listing the input geodata that failed and any ESRI error messages. If you choose a folder for the Output Workspace then the result table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage Tools.  Result Table file name: The default name will always take the form of “**SearchGeodataTool\_date\_time**”, where ‘**date**’ and ‘**time**’ are the date and time that the tool was run.    [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 1.2 Describe Geodata

| **Tool** | **Description** |
| --- | --- |
|  | This tool inspects all input geodata and reports on the geodata properties such as geodata type, extent, projection, gird cell size, etc.. For a full description of these parameters see the Grid Garage User Manual and [ESRI Help for reporting on dataset properties](http://desktop.arcgis.com/en/arcmap/10.3/analyze/arcpy-functions/dataset-properties.htm), and [here for reporting on raster dataset properties](http://desktop.arcgis.com/en/arcmap/10.3/manage-data/raster-and-images/raster-dataset-properties.htm).  **TIP:** *This is often the second step in any Grid Garage work flow.*  **Table for Geodata:** This is the input table, usually the results table generated by the ‘*Geodata > Search*’ tool, but it can be any table with a field containing the full path to the geodata you want to process with this tool. If the Items Table is a DBF, or a table in an ESRI File Geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Field for Geodata:** Select the field from the 'Table for Geodata' that contains the full path to the geodata items you want to have processed by the tool.  **Output Workspace:** This is the location for the Grid Garage results table containing the list of geodata processed by the tool as well as any data outputs. If the tool encounters any errors when processing the input geodata then a second results table will be generated, with a "\_FAIL" suffix, listing the input geodata that failed and any ESRI error messages.  If you have set the ArcGIS ‘Workspace' parameter in the 'Geoprocessing > Environment' Settings then this path will be used as the default. You can use this default path or click the folder button to select a new output location which can be a folder or File Geodatabase. If you specify a folder then the Results Table will be written to a comma-delimited (CSV) text file, if you specify a File Geodatabase it will be written as a Geodatabase Table.  **Result Table Name:** You can choose to use the default table name or specify a different name for the Grid Garage results table. The Grid Garage results table reports on a range of different properties for each of the geodata items in the 'Table for Geodata' input table. See the Grid Garage User Manual for a description of all the properties reported on.  If the tool encounters any errors when processing any of the geodata then a second results table will be generated, with a "\_FAIL" suffix, listing the input geodata that failed and any ESRI error messages. If you choose a folder for the Output Workspace then the result table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage Tools.  Result Table file name: The default name will always take the form of “**DescribeGeodataTool\_date\_time**”, where ‘**date**’ and ‘**time**’ are the date and time that the tool was run.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

Table List of fields reported on using 'Geodata > Describe’

| **Field in results table** | **Property type** | **Property Description** |
| --- | --- | --- |
| OBJECTID | System | System identifier |
| geodata | System | Full path to the Input geodata. |
| dataset\_DSID | Dataset | The ID of the dataset |
| dataset\_MExtent | Dataset | A space-delimited string (MMin, MMax) |
| dataset\_ZExtent | Dataset | A space-delimited string (ZMin, ZMax) |
| dataset\_canVersion | Dataset | Indicates whether the dataset can be versioned. |
| dataset\_datasetType | Dataset | Description of the geodata type i.e. ShapeFile, RasterDataset etc. |
| dataset\_extent | Dataset | Extent of the geodata i.e. Top, Bottom, Left, Right coordinates |
| dataset\_isVersioned | Dataset | Indicates whether the dataset is versioned. |
| dataset\_spatialReference | Dataset | This is either Geographic (Lat/Long) or a projected spatial reference such as Lamberts, Albers, Map Grid of Australia etc. |
| file\_FileModified | File | Date file was last modified. |
| file\_FileSizeKB | File | Size of file. |
| general\_baseName | General | Name of geodata set minus the path and file extension. |
| general\_catalogPath | General | Full path of the geodata. |
| general\_children | General | List of sub elements. For example a raster geodata with more than one band of data. |
| general\_childrenExpanded | General | Indicates whether the children have been expanded. |
| general\_dataElementType | General | Description of the geodata type i.e. ShapeFile, RasterDataset etc. |
| general\_dataType | General | Description of the geodata type i.e. ShapeFile, RasterDataset etc. |
| general\_extension | General | Geodata file extention. |
| general\_file | General | File name with extention. |
| general\_fullPropsRetrieved | General | Indicates whether full properties have been retrieved. |
| general\_metadataRetrieved | General | Indicates whether the metadata has been retrieved. |
| general\_name | General | File name with extention. |
| general\_path | General | Path to geodata file, minus the file name. |
| raster\_bandCount | Raster Band | Number of bands in raster geodata. |
| raster\_band\_height | Raster Band | Number of rows in each raster band |
| raster\_band\_isInteger | Raster Band | Is the band of type 'Integer'? |
| raster\_band\_meanCellHeight | Raster Band | Mean raster grid cell height. |
| raster\_band\_meanCellWidth | Raster Band | Mean raster grid cell width. |
| raster\_band\_noDataValue | Raster Band | No raster grid data value. |
| raster\_band\_pixelType | Raster Band | Data type for raster geodata band. |
| raster\_band\_primaryField | Raster Band | Primary raster grid field. |
| raster\_band\_stats\_ACQUSITIONDATE | Raster Band | Raster statistics. |
| raster\_band\_stats\_ALLNODATA | Raster Band | Raster statistics. |
| raster\_band\_stats\_ANYNODATA | Raster Band | Raster statistics. |
| raster\_band\_stats\_BANDCOUNT | Raster Band | Raster statistics. |
| raster\_band\_stats\_BOTTOM | Raster Band | Raster statistics. |
| raster\_band\_stats\_CELLSIZEX | Raster Band | Raster statistics. |
| raster\_band\_stats\_CELLSIZEY | Raster Band | Raster statistics. |
| raster\_band\_stats\_CLOUDCOVER | Raster Band | Raster statistics. |
| raster\_band\_stats\_COLUMNCOUNT | Raster Band | Raster statistics. |
| raster\_band\_stats\_LEFT | Raster Band | Raster statistics. |
| raster\_band\_stats\_MAXIMUM | Raster Band | Raster statistics. |
| raster\_band\_stats\_MEAN | Raster Band | Raster statistics. |
| raster\_band\_stats\_MINIMUM | Raster Band | Raster statistics. |
| raster\_band\_stats\_OFFNADIR | Raster Band | Raster statistics. |
| raster\_band\_stats\_PRODUCTNAME | Raster Band | Raster statistics. |
| raster\_band\_stats\_RIGHT | Raster Band | Raster statistics. |
| raster\_band\_stats\_ROWCOUNT | Raster Band | Raster statistics. |
| raster\_band\_stats\_SENSORAZIMUTH | Raster Band | Raster statistics. |
| raster\_band\_stats\_SENSORELEVATION | Raster Band | Raster statistics. |
| raster\_band\_stats\_SENSORNAME | Raster Band | Raster statistics. |
| raster\_band\_stats\_SOURCETYPE | Raster Band | Raster statistics. |
| raster\_band\_stats\_STD | Raster Band | Raster statistics. |
| raster\_band\_stats\_SUNAZIMUTH | Raster Band | Raster statistics. |
| raster\_band\_stats\_SUNELEVATION | Raster Band | Raster statistics. |
| raster\_band\_stats\_TOP | Raster Band | Raster statistics. |
| raster\_band\_stats\_UNIQUEVALUECOUNT | Raster Band | Raster statistics. |
| raster\_band\_stats\_VALUETYPE | Raster Band | Raster statistics. |
| raster\_band\_stats\_WAVELENGTH | Raster Band | Raster statistics. |
| raster\_band\_tableType | Raster Band | Data type for raster geodata band. |
| raster\_band\_width | Raster Band | The number of columns in each band. |
| raster\_compressionType | Raster | Compression type. |
| raster\_format | Raster | Raster format. |
| raster\_permanent | Raster | Indicates the permanent state of the raster: False if the raster is temporary and True if the raster is permanent. |
| raster\_sensorType | Raster | The sensor type used to capture the image. |
| table\_OIDFieldName | Table | The name of the OID field if it exists. |
| table\_fields | Table | A Python list of Field objects for this table. This is the same as using the ListFields function. |
| table\_hasOID | Table | Indicates whether the table has an ObjectID field. |
| table\_indexes | Table | A Python list of Index objects for this table. This is the same as using the ListIndexes function. |

### 1.3 Display Items

| **Tool** | **Description** |
| --- | --- |
|  | This tool loads geodata, listed in the Items table, into your ArcMap display frame.  **Items Table:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to display in ArcMap. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 1.4 Select Manually

| **Tool** | **Description** |
| --- | --- |
|  | This tool allows you to build a new Items table by browsing to, and manually selecting, geodata to include in the table.  **Items:** Use the folder icon to browse to the geodata you want to include in the new items table.  **Result Location:** This is the location for the Grid Garage Results table containing the list of geodata selected. If the tool encounters any errors when processing any of the geodata, i.e. adding them to the Results table, this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “list\_pickitems03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run*.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 1.5 Merge Lists

| **Tool** | **Description** |
| --- | --- |
|  | This tool creates a single Items table by merging one or more input tables containing an ‘item’ field.  **Items Table:** Select the items tables from the drop-down list or use the folder icon to browse to the tables that you want to merge into a single items table.  **Result Location:** This is the location for the Grid Garage Results table containing the list of geodata listed in the ‘items’ field from each input table. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table filename:Each time this tool is run the Results table file is given the name “list\_mergeitems03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run*.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

## 2 Data Management

### 2.1 Rename: Generate Names

| **Tool** | **Description** |
| --- | --- |
| **2.1 Rename: Generate Names *cont..*** | This tool provides a first stage in safely renaming datasets according to a set pattern. The tool generates candidate names for geodata listed in the Items table, which can then be applied using the ‘*2.2 Rename: Apply Names*’ tool.  **Items Table:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to rename. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location for the Grid Garage Results table containing the list of geodata renamed and a ‘candidate\_item’ field containing the full geodata path using the new names. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “manage\_rename1generate02\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run*.*  **Replacements (Optional):** Character replacements in the form of FIND,REPLACE. e.g. '001,1' will change 'file\_001' to 'file\_1'. Replacements are applied in order, starting from the first rule and working top-down, and are case-sensitive. Remember that this tool is not applying the names so if unsatisfactory names are generated just re-run with different replacements until you are happy.  **Prefix (Optional):** Prefix to be applied. e.g. a value of 'myprefix\_' will generate 'myprefix\_*filename*' from an input of 'filename'.  **Suffix (Optional):** Suffix to be applied. e.g. a value of '\_mysuffix' will generate ' *filename*\_mysuffix' from an input of 'filename'.  **TIP:** *If you want to create new names yourself, then add a new field called ‘candidate\_item’ to your Results table, then copy the ‘item’ values into this field so you can edit them manually before feeding into the ‘2.2 Rename: Apply Names’ tool.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 2.2 Rename: Apply Names

| **Tool** | **Description** |
| --- | --- |
|  | This tool applies the new file names (to the original geodata) generated by the ‘2.1 Rename: Generate Names’ tool. For more detailed help see [ESRI Help for the ‘Rename (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/EN/HELP/MAIN/10.1/index.html#//001700000056000000).  **Rename Table:** This is the input table, generated by the ‘2.1 Rename: Generate Names’ tool that describes the input geodata (‘source’ and ‘item’ fields) and proposed new geodata name in the ‘candidate\_name’ field. If the Items Table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location for the Grid Garage Results table containing the list of geodata processed by the tool with their new file path listed in the ‘item’ field. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “manage\_rename2apply03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 2.3 Copy Data Items

| **Tool** | **Description** |
| --- | --- |
|  | This tool copies geodata into a single workspace defined by the ‘Result Location’. The tool uses the standard ArcGIS ‘Copy (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Copy (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000035000000).  **Items Table:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to copy. If the Items Table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to copy the geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “manage\_copydata03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  ***TIP:***  *If you are copying raster geodata and you want the option of changing the geodata format then use the ‘3.2.2 Copy Rasters’ tool.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 2.4 Delete Data Items

| **Tool** | **Description** |
| --- | --- |
|  | This tool permanently deletes listed geodata from the disk. The tool uses the standard ArcGIS ‘Delete (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Delete (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000052000000)  **Items Table:** This is the input table, usually generated by the ‘1.1 Search for Geodata’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to copy. If the Items Table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location that the Grid Garage Results table will be written, containing the list of geodata deleted by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “manage\_deletedata03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

## 3 Raster Operations

### 3 Raster Operations > 1 Information

#### 3.1.1 Build RAT

| **Tool** | **Description** |
| --- | --- |
|  | This tool builds the raster attribute table (RAT) for raster feature classes that do not have one. The tool uses the standard ArcGIS ‘Build Raster Attribute Table (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Build Raster Attribute Table (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//0017000000m2000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to files with raster feature classes to process. If the Rasters List table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_buildrat03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Overwrite existing:** Select ‘OVERWRITE’ if you want to overwrite the existing RAT.  ***TIP:*** *If you build the RAT for a raster that is being displayed in ArcMap you will need to remove and then re-add the geodata layer to view the RAT after it has been built using this tool.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.1.2 Calculate Statistics

| **Tool** | **Description** |
| --- | --- |
| **3.1.2 Calculate Statistics *cont..*** | This tool calculates statistics for raster geodata which allows ArcMap to properly stretch and symbolize raster geodata for display. The tool uses the standard ArcGIS ‘Calculate Statistics (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Calculate Statistics (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//0017000000m3000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the raster geodata you want to generate statistics for. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_calculatestatistics02\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **X Skip Factor (optional):** The number of horizontal pixels between samples. The value must be greater than zero and less than or equal to the number of columns in the raster dataset. The default is 1 or the last skip factor used. The skip factors for raster datasets stored in a file geodatabase or an ArcSDE geodatabase are different. First, if the x and y skip factors are different, the smaller skip factor will be used for both the x and y skip factors. Second, the skip factor is related to the pyramid level that most closely fits the skip factor chosen. If the skip factor value is not equal to the number of pixels in a pyramid layer, the number is rounded down to the next pyramid level, and those statistics are used.  **Y Skip Factor (optional):** The number of vertical pixels between samples. The value must be greater than zero and less than or equal to the number of rows in the raster. The default is 1 or the last y skip factor used. The skip factors for raster datasets stored in a file geodatabase or an ArcSDE geodatabase are different. First, if the x and y skip factors are different, the smaller skip factor will be used for both the x and y skip factors. Second, the skip factor is related to the pyramid level that most closely fits the skip factor chosen. If the skip factor value is not equal to the number of pixels in a pyramid layer, the number is rounded down to the next pyramid level, and those statistics are used.  **Ignore Values (optional):** The pixel values that are not to be included in the statistics calculation. The default is no value, or the last ignore values used.  **Skip Existing (optional):** Specify whether to calculate statistics only where they are missing or regenerate them even if they exist. Options include:  OVERWRITE — Statistics will be calculated even if they already exist; therefore, existing statistics will be overwritten. This is the default.  SKIP\_EXISTING — Statistics will only be calculated if they do not already exist.  **Area of Interest (optional):** Specify a feature class that represents area in the geodata from where you want the statistics to be calculated, so they are not generated from the entire dataset.  ***TIP:*** *If you calculate statistics for a raster that is being displayed in ArcMap you will need to remove and then re-add the geodata layer to view the statistics after it has been built using this tool.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.1.3 Describe Rasters

| **Tool** | **Description** |
| --- | --- |
|  | This tool inspects all rasters and reports raster properties. For more detailed help see [ESRI Help for the ‘Get Raster Properties (Data Management)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//0017000000m7000000).  **Rasters List:** This is the input table, usually generated by the ‘1.1 Search for Geodata’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want described. If the Items Table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_describe03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  ***Genera / File / geodata / Table / Raster geodata / Single Band / Multiband* Properties (optional):** See  Table 4 below for a list of the property fields reported on by each of these options.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

Table Properties reported on by each option in the ‘3.1.3 Describe Rasters’ tool, in addition to the standard fields (OBJECTID, id, source, error, item and metadata)

| **Field** | **General Properties** | **File Properties** | **Dataset Properties** | **Table Properties** | **Raster geodata Properties** | **Single Band Properties** | **Multi Band Properties** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| children |  |  |  |  |  |  | **** |
| ds\_DSID |  |  | **** |  |  |  |  |
| ds\_MExtent |  |  | **** |  |  |  |  |
| ds\_ZExtent |  |  | **** |  |  |  |  |
| ds\_canVersion |  |  | **** |  |  |  |  |
| ds\_datasetType |  |  | **** |  |  |  |  |
| ds\_extent |  |  | **** |  |  |  |  |
| ds\_isVersioned |  |  | **** |  |  |  |  |
| ds\_spatialReference |  |  | **** |  |  |  |  |
| fi\_FileModified |  | **** |  |  |  |  |  |
| fi\_FileSizeKB |  | **** |  |  |  |  |  |
| ge\_baseName | **** |  |  |  |  |  |  |
| ge\_catalogPath | **** |  |  |  |  |  |  |
| ge\_children | **** |  |  |  |  |  |  |
| ge\_childrenExpanded | **** |  |  |  |  |  |  |
| ge\_dataElementType | **** |  |  |  |  |  |  |
| ge\_dataType | **** |  |  |  |  |  |  |
| ge\_extension | **** |  |  |  |  |  |  |
| ge\_file | **** |  |  |  |  |  |  |
| ge\_fullPropsRetrieved | **** |  |  |  |  |  |  |
| ge\_metadataRetrieved | **** |  |  |  |  |  |  |
| ge\_name | **** |  |  |  |  |  |  |
| ge\_path | **** |  |  |  |  |  |  |
| ra\_bandCount |  |  |  |  | **** |  |  |
| ra\_compressionType |  |  |  |  | **** |  |  |
| ra\_format |  |  |  |  | **** |  |  |
| ra\_permanent |  |  |  |  | **** |  |  |
| ra\_sensorType |  |  |  |  | **** |  |  |
| sb\_height |  |  |  |  |  | **** |  |
| sb\_isInteger |  |  |  |  |  | **** |  |
| sb\_meanCellHeight |  |  |  |  |  | **** |  |
| sb\_meanCellWidth |  |  |  |  |  | **** |  |
| sb\_noDataValue |  |  |  |  |  | **** |  |
| sb\_pixelType |  |  |  |  |  | **** |  |
| sb\_pixelType\_X |  |  |  |  |  | **** |  |
| sb\_pixelType\_Y |  |  |  |  |  | **** |  |
| sb\_primaryField |  |  |  |  |  | **** |  |
| sb\_tableType |  |  |  |  |  | **** |  |
| sb\_width |  |  |  |  |  | **** |  |
| ta\_OIDFieldName |  |  |  | **** |  |  |  |
| ta\_fields |  |  |  | **** |  |  |  |
| ta\_hasOID |  |  |  | **** |  |  |  |
| ta\_indexes |  |  |  | **** |  |  |  |

#### 3.1.4 Zonal Counts

| **Tool** | **Description** |
| --- | --- |
|  | For each raster in the Rasters List, this tool allows you to report on the number of pixels within zones described by a vector polygon feature class and write these values to a table. This tool functions like the ArcGIS 10.1 ‘Tabulate Area (Spatial Analyst)’ tool. For more detailed help see [ESRI Help for the ‘Tabulate Area’ (Spatial Analyst)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000w2000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the raster geodata you want to report on. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  ***TIP:*** *All input raster geodata must be categorical and have a raster attribute table (RAT).*  **Result Location:** This is the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_zonalcounts02\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Zones:** Select a vector polygon feature class that contains the zones you want to report on for each raster in the Rasters List.  **Zone Field:** Select the field in the polygon feature class that contains the zones you want to report on for each raster in the Rasters List.  **Values to Count:** Add the values (contained in the Zone Field) that you want to report on for each raster in the Rasters List.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 3 Raster Operations > 2 General Operation

#### 3.2.1 Clip Rasters

| **Tool** | **Description** |
| --- | --- |
| **3.2.1 Clip Rasters *cont..*** | This tool clips out a subset of a larger raster geodata based on either a bounding extent or a polygon feature. The tool uses the standard ArcGIS ‘Clip (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Clip (Data Management)’ tool (10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000009n000000).  ***TIP #1:*** *Note that the output raster alignment and cell size will always be the same as the input data and If the ‘Output Extent’ or ‘Clipping Feature’ do not align with the input raster geodata then the clipped raster will have a slightly different extent (usually one cell larger).*  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the raster geodata you want clipped. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the output location for the clipped raster geodata. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_clip03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Output Format:** Raster format for output geodata. You can choose from: Esri Grid, img (ERDAS IMAGINE) or tif (GeoTIFF). If you select a file geodatabase for the Result Workspace then the output format will default to ‘Esri Grid’. When storing your raster geodata to a JPEG file, a JPEG 2000 file, a TIFF file, or a geodatabase, you can specify a compression type and compression quality within the ‘Environment Settings’.  **Output Extent:** You need to define the coordinates that define the area to be clipped out. This can be based on an existing layer, such as a mask/template raster, a feature geodata, or you can manually enter the extent coordinates into the ‘Top, Bottom, Left & Right’ input boxes.  **Clipping Features (optional):** You also have the option of clipping out areas based on a polygon feature geodata. The boundary of the polygons will define the area clipped out.  ***TIP #2:*** *You will need to ensure that the clipping feature is in the same spatial projection as all of the input raster geodata listed in the ‘item’ field of the Raster List table. The best method to check the projection of the raster geodata in the Raster List is to use the ‘*3.1.3 Describe Rasters*’ tool described on page 35.*  ***TIP #3:*** *If you select a clipping feature from the drop-down menu (i.e. it is loaded into your ArcMap project) then you can manually select individual features within that feature class and only they will be used when clipping.*  **Value as NoData (optional):** You can assign a different value to ‘NoData’, instead of the default ‘NoData’.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.2.2 Copy Rasters

| **Tool** | **Description** |
| --- | --- |
| **3.2.2 Copy Rasters *cont..***  **3.2.2 Copy Rasters *cont..*** | This tool copies raster geodata to a new location. It also allows you to change some of the format/attributes of the raster geodata when copying. For more detailed help see [ESRI Help for the ‘Copy Raster (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000094000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want copied. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to copy the raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_copy03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Output Format:** Raster format for output geodata. You can choose from: Esri Grid, img (ERDAS IMAGINE) or tif (GeoTIFF). If you select a file geodatabase for the Result Workspace then the output format will default to ‘Esri Grid’.When storing your raster geodata to a JPEG file, a JPEG 2000 file, a TIFF file, or a geodatabase, you can specify a compression type and compression quality within the ‘Environment Settings’.  **Config Keyword (optional):** Specifies the storage parameters (configuration) for a file geodatabase and an ArcSDE geodatabase. Personal geodatabases do not use configuration keywords. ArcSDE configuration keywords are set up by your database administrator.  **Background Value (optional):** Use this option to remove the unwanted values created around the raster data. The value specified will be distinguished from other valuable data in the raster dataset. For example, a value of zero along the raster dataset's borders will be distinguished from zero values within the raster dataset. The pixel value specified will be set to NoData in the output raster dataset. For file-based rasters and personal geodatabase rasters, the Ignore Background Value must be set to the same value as NoData in order for the background value to be ignored. ArcSDE and file geodatabase rasters will work without this extra step.  **No Data Value (optional):** All the pixels with the specified value will be set to NoData in the output raster dataset.  **One Bit to Eight Bit (optional):** Choose whether the input 1-bit raster geodata will be converted to an 8-bit raster dataset. In this conversion the value 1 in the input raster geodata will be changed to 255 in the output raster dataset. This is useful when importing a 1-bit raster geodata to ArcSDE. One-bit raster datasets have 8-bit pyramid layers when stored in a file system, but in ArcSDE, 1-bit raster datasets can only have 1-bit pyramid layers, which makes the display unpleasant. By converting the data to 8 bit in ArcSDE, the pyramid layers are built as 8 bit instead of 1 bit, resulting in a proper raster geodata in the display. Select from:   * NONE — No conversion will be done. This is the default. * OneBitTo8Bit — The input raster will be converted.   **Colour Map to RGB (optional):** If the input raster geodata has a colour map, the output raster geodata can be converted to a three-band output raster dataset. This is useful when mosaicking rasters with different colour maps. Select from:   * NONE — No conversion will occur. This is the default. * ColormapToRGB — The input geodata will be converted.   **Pixel type (optional):** Determines the bit depth of the output raster dataset. If left unspecified, the output bit depth will be the same as the input. There will be no rescaling of the raster values when a different pixel type is chosen. If the pixel type is demoted (lowered), the raster values outside the valid range for that pixel depth will be truncated and lost. Select from:   |  |  |  | | --- | --- | --- | | **Pixel type** | **Description** | **Value range allowed** | | 1\_BIT | A 1-bit unsigned integer | The values can be 0 or 1 | | 2\_BIT | A 2-bit unsigned integer | The values supported can be from 0 to 3 | | 4\_BIT | A 4-bit unsigned integer | The values supported can be from 0 to 15 | | 8\_BIT\_UNSIGNED | An unsigned 8-bit data type | The values supported can be from 0 to 255 | | 8\_BIT\_SIGNED | A signed 8-bit data type | The values supported can be from -128To 127 | | 16\_BIT\_UNSIGNED | A 16-bit unsigned data type | The values can range from 0 to 65,535 | | 16\_BIT\_SIGNED | A 16-bit signed data type | The values can range from -32,768To 32,767 | | 32\_BIT\_UNSIGNED | A 32-bit unsigned data type | The values can range from 0 to 4,294,967,295 | | 32\_BIT\_SIGNED | A 32-bit signed data type | The values can range from -2,147,483,648 to 2,147,483,647 | | 32\_BIT\_FLOAT | A 32-bit data type supporting decimals | Floating point (decimals) with large range | | 64\_BIT | A 64-bit data type supporting decimals | Floating point (decimals) with very large range |   ***TIP:*** *The size of the output raster data, on your hard drive, will be determined by the pixel type. The pixel types outlined above are listed in order from smallest file size to largest. We recommend you use the smallest pixel type possible to avoid using up more space on your storage device than is necessary.*  **Scale Pixel Value (optional):** When the output is a different pixel type than the input (such as 16-bit to 8-bit) you can choose to have the values scaled to fit into the new range; otherwise, the values that do not fit into the new pixel range will be discarded. If scaling up, such as 8-bit to 16-bit, the minimum and maximum of the 8-bit values will be scaled to the minimum and maximum in the 16-bit range. If scaling down, such as 16-bit to 8-bit, the minimum and maximum of the 16-bit values will be scaled to the minimum and maximum in the 8-bit range. Select from:   * NONE — The pixel values will remain the same and will not be scaled. Any values that do not fit within the value range will be discarded. This is the default. * ScalePixelValue — The pixel values will be scaled to the new pixel type. When you scale your pixel depth, your raster will display the same, but the values will be scaled to the new bit depth that was specified.   **RGB to Colour Map (optional):** You can convert an 8-bit, 3-band (RGB) raster dataset, to a single-band raster geodata with a colour map. This operation will suppress colour noise that is often found in scanned images by examining the statistics for the raster geodata and classifying the values into 255 quantiles. This is ideal for screen captures, scanned maps, or scanned documents. This is not recommended for satellite or aerial imagery or thematic raster data. Select from:   * NONE — The output will remain as a 3-band (RGB) raster dataset. No conversion to a colour map will occur. This is the default.   RGBToColormap — A single-band raster dataset, with a colour map using 255 colours will be created.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 3 Raster Operations > 3 Transformation

#### 3.3.1 Aggregate

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| **Tool** | **Description** |
| **3.3.1 Aggregate *cont..*** | This tool is used to generate reduced-resolution versions of rasters, that is, from small to larger pixels. Each output cell contains the Sum, Minimum, Maximum, Mean, or Median of the input cells that are encompassed by the extent of that cell. The tool uses the standard ArcGIS ‘Aggregate (Spatial Analysis)’ tool. For more detailed help see [ESRI Help for the ‘Aggregate (Spatial Analyst)’ tool (ArcGIS 10.1)](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z00000034000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the raster geodata you want projected. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the aggregated raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_aggregate03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Output Format:** Raster format for output geodata. You can choose from: Esri Grid, img (ERDAS IMAGINE) or tif (GeoTIFF). If you select a file geodatabase for the Result Workspace then the output format will default to ‘Esri Grid’.When storing your raster geodata to a JPEG file, a JPEG 2000 file, a TIFF file, or a geodatabase, you can specify a compression type and compression quality within the ‘Environment Settings’.  **Cell Factor:** The factor by which to multiply the cell size of the input raster to obtain the desired resolution for the output raster. For example, a cell factor value of three would result in an output cell size three times larger than that of the input raster. The value must be an integer greater than 1.  **Aggregation Type (optional):** Establishes how the value for each output cell will be determined. The values of the input cells encompassed by the coarser output cell are aggregated by one of the following statistics:   * SUM — The sum (total) of the input cell values. This is the default. * MAXIMUM — The largest value of the input cells. * MEAN — The average value of the input cells. * MEDIAN — The median value of the input cells. * MINIMUM — The smallest value of the input cells.   **Expand extent if needed (optional):** Defines how to handle the boundaries of the input raster when its rows or columns are not a multiple of the cell factor. Select from:   * EXPAND — Expands the bottom or right boundaries of the input raster so the total number of cells in a row or column is a multiple of the cell factor. Expanded cells are given a value of NoData. With this option, the output raster can cover a larger spatial extent than the input raster. This is the default. This is the default. * TRUNCATE — Reduces the number of rows or columns in the output raster by 1. This will truncate the remaining cells on the bottom or right boundaries of the input raster, making the number of rows or columns in the input raster a multiple of the cell factor. With this option, the output raster can cover a smaller spatial extent than the input raster.   If the number of rows and columns in the input raster is a multiple of the cell\_factor, these keywords are not used.  **Ignore NoData in calculations (optional):** Denotes whether NoData values are ignored by the aggregation calculation. Select from:   * DATA — Specifies that if NoData values exist for any of the cells that fall within the spatial extent of a larger cell on the output raster, the NoData values will be ignored when determining the value for output cell locations. Only input cells within the extent of the output cell that have data values will be used in determining the value of the output cell. This is the default. * NODATA — Specifies that if any cell that falls within the spatial extent of a larger cell on the output raster has a value of NoData, the value for that output cell location will be NoData. When the NODATA keyword is used, it is implied that when cells within an aggregation contain the NoData value, there is insufficient information to perform the specified calculations necessary to determine an output value.   [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.2 Resample Raster

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| **Tool** | **Description** |
|  | This tool alters the raster geodata by changing the cell size and resampling method. The tool uses the standard ArcGIS Resample (Data Management) tool. For more detailed help see [ESRI Help for the ‘Resample (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000009t000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the raster geodata you want resampled. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the resampled raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_resample03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Output Format:** Raster format for output geodata. You can choose from: Esri Grid, img (ERDAS IMAGINE) or tif (GeoTIFF). If you select a file geodatabase for the Result Workspace then the output format will default to ‘Esri Grid’. When storing your raster geodata to a JPEG file, a JPEG 2000 file, a TIFF file, or a geodatabase, you can specify a compression type and compression quality within the ‘Environment Settings’.  **Resampling Method (optional):** The resampling algorithm to be used. The default is NEAREST. Select from:   * NEAREST — Nearest neighbor assignment * BILINEAR — Bilinear interpolation * CUBIC — Cubic convolution * MAJORITY — Majority resampling   **Cell Size (optional):** The cell size for the new raster dataset. You can specify the cell size in two different ways: 1) using two numbers that specify the X and Y cell size, or 2) base the cell size on a selected raster geodata from the drop-down menu.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.3 Project Rasters

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| **Tool** | **Description** |
| **3.3.3 Project Rasters *cont..*** | This tool transforms raster geodata from one projection to another. The tool uses the standard ArcGIS ‘Project Rasters (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Project Rasters (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000007q000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want projected. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the projected raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_project03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Output Format:** Raster format for output geodata. You can choose from: Esri Grid, img (ERDAS IMAGINE) or tif (GeoTIFF). If you select a file geodatabase for the Result Workspace then the output format will default to ‘Esri Grid’. When storing your raster geodata to a JPEG file, a JPEG 2000 file, a TIFF file, or a geodatabase, you can specify a compression type and compression quality within ‘Geoprocessing > Environments’.  **New Spatial Reference:** Select a new projection, or spatial reference, by clicking on the list icon to the right of the input box. Valid values are a Spatial Reference object, a file with a .prj extension, or a string representation of a coordinate system.  **Resampling Technique (optional):** The resampling algorithm to be used. The default is NEAREST. Select from:   * NEAREST—Nearest neighbour assignment * BILINEAR—Bilinear interpolation * CUBIC—Cubic convolution * MAJORITY—Majority resampling   The NEAREST and MAJORITY options are used for categorical data, such as a land-use classification. The NEAREST option is the default since it is the quickest and also because it will not change the cell values. Do not use NEAREST or MAJORITY for continuous data, such as elevation surfaces. The BILINEAR option and the CUBIC option are most appropriate for continuous data. It is not recommended that BILINEAR or CUBIC be used with categorical geodata because the cell values may be altered  **Output Cell Size (optional):** The cell size for the new raster dataset. The default cell size is the cell size of the selected raster dataset.  **Registration Point (optional):** The x and y coordinates (in the output space) used for pixel alignment. The registration point works similar to the concept of snap raster. Instead of snapping the output to an existing raster cell alignment, the registration point allows you to specify the origin point for anchoring the output cells. All output cells will be an interval of the cell size away from this point. This point does not have to be a corner coordinate or fall within the raster dataset. The Snap Raster environment setting will take priority over the Registration Point parameter. Therefore, if you want to set the registration point, make sure that Snap Raster is not set.  **Transformation Override (optional):** If the datum for the input spatial reference is different to datum for the new spatial reference then ArcGIS will need to convert the datum using a ‘transformation’. The first time you run this tool it will select a default transformation (if nothing is entered into this text box). If you want to use a different transformation then you must run the tool again and specify the transformation to over-ride the one chosen by ArcGIS using the following syntax: ‘*old transformation1: replacement transformation1, old transformation2: replacement transformation2’* and illustrated in Figure 7 below.    Figure 7 Example of a transformation override, where the transformation ‘AGD\_1966\_To\_GDA\_1994\_11\_NTv2’ replaces the default transformation chosen by ArcGIS which was ‘AGD\_1966\_To\_GDA\_1994’.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.4 Reclass Raster by Table

| **Tool** | **Description** |
| --- | --- |
| **3.3.4 Reclassify Raster by Table *cont..*** | This tool copies geodata into a single workspace defined by the ‘Result Location’. The tool uses the standard ArcGIS ‘Reclass by Table (Spatial Analyst)’ tool. For more detailed help see [ESRI Help for the ‘Reclass by Table (Spatial Analyst)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000sq000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want reclassified. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the reclassified raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_reclassbytable03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Input remap table:** Table holding fields defining value ranges to be reclassified and the values they will become.  ***TIP #1:*** *You need to create this table. The most common method to do this is to copy the raster attribute table and add extra fields to it, i.e. add the ‘From’, ‘To’ and ‘Out’ fields.*  **‘From’ Field:** Field holding the beginning value for each value range to be reclassified. This is a numeric field of the input remap table  **‘To’ Field:** Field holding the ending value for each value range to be reclassified. This is a numeric field of the input remap table.  **‘Out’ Field:** Field holding the integer values to which each range should be changed. This is an integer field of the input remap table.  ***TIP #2:***  *To reclassify individual values, use a simple remap table of two fields. The first field identifies the value to reclassify, and the other field identifies the value to assign to it. Set the 'To’ field value the same as the 'From’ field value. The value to assign to the output is 'Out’ field value.*  **Missing Values:** Denotes whether missing values in the reclass table retain their value or get mapped to NoData. Select from:   * DATA — Signifies that if any cell location on the input raster contains a value not present or reclassed in a remap table, the value should remain intact and be written for that location to the output raster. This is the default. * NODATA — Signifies that if any cell location on the input raster contains a value not present or reclassed in a remap table, the value will be reclassed to NoData for that location on the output raster.   [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.5 Set Raster NoData Value

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| **Tool** | **Description** |
|  | This tool replaces all ‘NoData’ pixels with a user-defined value. The tool uses the standard ArcGIS ‘Copy (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Copy Raster (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//001700000094000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to process. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the reclassified raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_setnodata03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **NoData Value to Set:** Replace ‘NoData’ with this value.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.6 Transform Raster

| **Tool** | **Description** |
| --- | --- |
|  | This tool applies simple transformations to the raster geodata values. Options include: Standardise, Stretch, Normalise, Log, Square root and Inverse.  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to reclassify. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the transformed raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_transform03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Method:** Select a transform method from:   * STANDARDISE - This is a ‘Standard score’, also called ‘Z-score’ where each pixel value is expressed in terms of standard deviations from the mean of all pixel values. Resultantly, these z-scores have a distribution with a mean of 0 and a standard deviation of 1. * STRETCH - Stretches data between a range specified by the ‘**Max Stretch Value (optional)**’ and ‘**Min Stretch Value (optional)**’ input boxes. * NORMALISE - Normalises to a scale 0-1 while retaining distribution shape. * LOG - Returns natural logarithmic of raster. * SQUAREROOT - Returns square root of raster. * INVERT - Inverts the range of cell values   **Max Stretch Value (optional)**: When the Transform Method = ‘STRETCH’ this value defines the upper limit of the stretched value.  **Min Stretch Value (optional)**: When the Transform Method = ‘STRETCH’ this value defines the lower limit of the stretched value.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.7 Set Raster Value to Null

| **Tool** | **Description** |
| --- | --- |
|  | This tool replaces a user defined value to Null or ‘NoData’. The tool uses the standard ArcGIS ‘Copy Raster (Data Management)’ tool. For more detailed help see [ESRI Help for the ‘Copy Raster (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z00000007000000).  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to reclassify. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the reclassified raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_setnull03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Value to Set Null:** Replace this value with Null or ‘NoData’.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.8 Tweak Raster Values

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| --- | --- |
| **Tool** | **Description** |
|  | This tool is used to tweak, or change, raster values. Values can have floor and ceiling applied, be scaled, translated and also converted to integer data type. The changes to the pixel values are undertaken in the order they’re presented in the tool, ie. 1) Rescaling between a floor and ceiling, 2) Scale Factor, 3) Constant Shift and 4) Integerise.  **Rasters List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to reclassified. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the changed raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_tweakvalues03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Min Value (optional):** This is the lower or ‘floor’ value you want to restrict the data range to. Any value =< this value will be reclassified using the value specified in the ‘**Under Min Value**’ user input box.  **Under Min Value:** This is the value assigned to pixels with values <= the value specified in the ‘**Min Value (optional)**’ input box.  **Max Value (optional):** This is the upper or ‘ceiling’ value you want to restrict the data range to. Any value >= this value will be reclassified using the value specified in the ‘**Over Max Value**’ user input box.  **Over Max Value:** This is the value assigned to pixels with values >= the value specified in the ‘**Max Value (optional)**’ input box.  **Scale Factor (optional):** All pixel values will be multiplied by this number.  **Constant Shift Value (optional):** This value is added to all values.  **Integerise (optional):** Converts the data type to integer by ‘truncation’. .  ***TIP:***  *The ‘****Integerise (optional)****’ function truncates floating point numbers eg. 1.9 becomes 1.0. To convert floating point values to integer by ‘rounding’ you will need to add 0.5, ie.* ***Constant Shift Value (optional)*** *= 0.5.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

#### 3.3.9 Block Statistics

|  |  |
| --- | --- |
| **Tool** | **Description** |
| **3.3.9 Block Statistics *cont..*** | This tool partitions the input into non-overlapping blocks and calculates the statistic of the values within each block. The value is assigned to all of the cells in each block in the output. This is illustrated in Figure 8 below. If the data type of the input raster is floating point then only a subset of the statistics will be available (MEAN, MAXIMUM, MINIMUM, RANGE, STD and SUM). For more detailed help see [ESRI Help for the ‘Block Statistics (Spatial Analyst)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//009z000000qp000000).    Figure 8 Illustration of how Block Statistics works  **Rasters List:** This is the input table, usually generated by the ‘1.1 Search for Geodata’ tool, but it can be any table with an ‘item’ field containing the full path to the geodata you want to processed. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the reclassified raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “raster\_blockstats03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Neighborhood:** The Neighborhood class dictates the shape of the area around each cell used to calculate the statistic.  The different types of neighborhood available are NbrAnnulus, NbrCircle, NbrRectangle, NbrWedge, NbrIrregular, and NbrWeight. The following are the forms of the neighborhoods:   * NbrAnnulus({innerRadius}, {outerRadius}, {CELL | MAP}) * NbrCircle({radius}, {CELL | MAP} * NbrRectangle({width}, {height}, {CELL | MAP}) * NbrWedge({radius}, {start\_angle}, {end\_angle}, {CELL | MAP}) * NbrIrregular(kernel\_file) * NbrWeight(kernel\_file)   The {CELL | MAP} parameter defines the distance units as either being Cell units or Map units. The default neighborhood is a square NbrRectangle with a width and height of 3 cells.  **Statistics type (optional)**  The statistic type to be calculated.   * MEAN — Calculates the mean (average value) of the cells in the neighborhood. * MAJORITY — Calculates the majority (value that occurs most often) of the cells in the neighborhood. * MAXIMUM — Calculates the maximum (largest value) of the cells in the neighborhood. * MEDIAN — Calculates the median of the cells in the neighborhood. * MINIMUM — Calculates the minimum (smallest value) of the cells in the neighborhood. * MINORITY — Calculates the minority (value that occurs least often) of the cells in the neighborhood. * RANGE — Calculates the range (difference between largest and smallest value) of the cells in the neighborhood. * STD — Calculates the standard deviation of the cells in the neighborhood. * SUM — Calculates the sum (total of all values) of the cells in the neighborhood. * VARIETY — Calculates the variety (the number of unique values) of the cells in the neighborhood. * MINIMUM — Calculates the minimum (smallest value) of the cells in the neighborhood. * MINORITY — Calculates the minority (value that occurs least often) of the cells in the neighborhood. * RANGE — Calculates the range (difference between largest and smallest value) of the cells in the neighborhood. * STD — Calculates the standard deviation of the cells in the neighborhood. * SUM — Calculates the sum (total of all values) of the cells in the neighborhood. * VARIETY — Calculates the variety (the number of unique values) of the cells in the neighborhood.   **Ignore NoData (optional):** Denotes whether NoData values are ignored by the statistic calculation. Select from:   * DATA — Specifies that if a NoData value exists within a block neighborhood, the NoData value will be ignored. Only cells within the neighborhood that have data values will be used in determining the output value. This is the default. * NODATA — Specifies that if any cell in a neighborhood has a value of NoData, the output for each cell in the corresponding block will receive NoData. With this option, the presence of a NoData value implies that there is insufficient information to determine the statistic value for the neighborhood.   [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

## 4 Vector Operations

### 4.1 Describe Classes

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This tool inspects all vector classes and reports on vector geodata properties.  **Classes List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the full path to the vector geodata you want to described. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the location that the Grid Garage Results table, containing the feature properties, will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “feature\_describe03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  ***Genera / File / geodata / Table / GDB Table / GDB Table / Class / GDB Class or Editor Tracking* Properties (optional):** See Table 5 below for a list of the property fields reported on by each of these options.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

Table 5 Properties reported on by each option in the ‘4.1 Describe Classes’ tool, in addition to the standard fields (OBJECTID, id, source, error, item and metadata)

| **Report Field** | **General Properties** | **File Properties** | **Dataset Properties** | **Table Properties** | **GDB Table Properties** | **Class Properties** | **GDB Class Properties** | **Editor Tracking Properties** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ds\_DSID |  |  | **** |  |  |  |  |  |
| ds\_MExtent |  |  | **** |  |  |  |  |  |
| ds\_ZExtent |  |  | **** |  |  |  |  |  |
| ds\_canVers |  |  | **** |  |  |  |  |  |
| ds\_dataset |  |  | **** |  |  |  |  |  |
| ds\_extent |  |  | **** |  |  |  |  |  |
| ds\_isVersi |  |  | **** |  |  |  |  |  |
| ds\_spatial |  |  | **** |  |  |  |  |  |
| et\_created |  |  |  |  |  |  |  | **** |
| et\_creator |  |  |  |  |  |  |  | **** |
| et\_editedA |  |  |  |  |  |  |  | **** |
| et\_editorF |  |  |  |  |  |  |  | **** |
| et\_editorT |  |  |  |  |  |  |  | **** |
| et\_isTimeI |  |  |  |  |  |  |  | **** |
| fc\_feature |  |  |  |  |  | **** |  |  |
| fc\_hasM |  |  |  |  |  | **** |  |  |
| fc\_hasSpat |  |  |  |  |  | **** |  |  |
| fc\_hasZ |  |  |  |  |  | **** |  |  |
| fc\_shapeFi |  |  |  |  |  | **** |  |  |
| fc\_shapeTy |  |  |  |  |  | **** |  |  |
| fd\_areaFie |  |  |  |  |  |  | **** |  |
| fd\_lengthF |  |  |  |  |  |  | **** |  |
| fd\_represe |  |  |  |  |  |  | **** |  |
| fi\_FileMod |  | **** |  |  |  |  |  |  |
| fi\_FileSiz |  | **** |  |  |  |  |  |  |
| ge\_baseNam | **** |  |  |  |  |  |  |  |
| ge\_catalog | **** |  |  |  |  |  |  |  |
| ge\_childre | **** |  |  |  |  |  |  |  |
| ge\_child\_1 | **** |  |  |  |  |  |  |  |
| ge\_dataEle | **** |  |  |  |  |  |  |  |
| ge\_dataTyp | **** |  |  |  |  |  |  |  |
| ge\_extensi | **** |  |  |  |  |  |  |  |
| ge\_file | **** |  |  |  |  |  |  |  |
| ge\_fullPro | **** |  |  |  |  |  |  |  |
| ge\_metadat | **** |  |  |  |  |  |  |  |
| ge\_name | **** |  |  |  |  |  |  |  |
| ge\_path | **** |  |  |  |  |  |  |  |
| ta\_OIDFiel |  |  |  | **** |  |  |  |  |
| ta\_fields |  |  |  | **** |  |  |  |  |
| ta\_hasOID |  |  |  | **** |  |  |  |  |
| ta\_indexes |  |  |  | **** |  |  |  |  |
| td\_aliasNa |  |  |  |  | **** |  |  |  |
| td\_default |  |  |  |  | **** |  |  |  |
| td\_extensi |  |  |  |  | **** |  |  |  |
| td\_globalI |  |  |  |  | **** |  |  |  |
| td\_hasGlob |  |  |  |  | **** |  |  |  |
| td\_modelNa |  |  |  |  | **** |  |  |  |
| td\_rasterF |  |  |  |  | **** |  |  |  |
| td\_relatio |  |  |  |  | **** |  |  |  |
| td\_subtype |  |  |  |  | **** |  |  |  |
| td\_version |  |  |  |  | **** |  |  |  |

### 4.2 Clip Features

|  |  |  |
| --- | --- | --- |
| **Tool** | **Description** | |
|  | This tool cuts out a piece of one feature class using one or more of the features in another feature class as a cookie cutter. This is particularly useful for creating a new feature class, also referred to as study area or area of interest (AOI), which contains a geographic subset of another, larger feature class. For more detailed help see [ESRI Help for the ‘Clip (Analysis)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//000800000004000000).  **Feature Class List:** This is the input table, usually generated by the ‘1.1 Search for Geodata’ tool, but it can be any table with an ‘item’ field containing the full path to the vector geodata you want clipped. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the clipped features to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “feature\_clip03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Clip Features:** Polygon feature used to clip the input features. The boundary of the polygon feature will define the area clipped out.  ***TIP #1:***  *The clip feature and the input feature can be in different geographic projections. The clipped output feature will always be in the same projection as the input feature, not the clip feature.*  ***TIP #2:***  *Note that each time this tool is run the output will overwrite any output from a previous run.*  **XY Tolerance:** The minimum distance separating all feature coordinates as well as the distance a coordinate can move in X or Y (or both). Set the value to be higher for data with less coordinate accuracy and lower for data with extremely high accuracy.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 4.3 Project Features

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This tool transforms geodata from one projection to another. For more detailed help see [ESRI Help for the ‘Project (Data Management)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00170000007m000000).  **Items Table:** This is the input table, usually generated by the ‘1.1 Search for Geodata’ tool, but it can be any table with an ‘item’ field containing the full path to the vector geodata you want to project. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the projected features in to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “feature\_project03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **New Spatial Reference System:** Select a new projection, or coordinate system, by clicking on the list icon to the right of the input box. Valid values are a Spatial Reference object, a file with a .prj extension, or a string representation of a coordinate system.  **Transformation Override (optional):** If the datum for the input spatial reference is different to datum for the new spatial reference then ArcGIS will need to convert the datum using a ‘transformation’. The first time you run this tool it will select a default transformation (if nothing is entered into this text box). If you want to use a different transformation then you must run the tool again and specify the transformation to over-ride the one chosen by ArcGIS using the following syntax: ‘*old transformation1: replacement transformation1, old transformation2: replacement transformation2’* and illustrated in Figure 9 below.    Figure 9 Example of a transformation override, where the transformation ‘AGD\_1966\_To\_GDA\_1994\_11\_NTv2’ replaces the default transformation chosen by ArcGIS which was ‘AGD\_1966\_To\_GDA\_1994’.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 4.4 Rasterise by Template

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This tool converts vector feature classes into raster feature classes based on a template feature class. The template feature class must contain at least one field that is present in all the other vector feature classes and which is used to generate the new rasters. For more detailed help see [ESRI Help for the ‘Feature to Raster (Conversion)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00120000002v000000).  **Feature Classes List:** This is the input table, usually generated by the ‘*1.1 Search for Geodata’* tool, but it can be any table with an ‘item’ field containing the full path to the vector geodata you want to convert into raster geodata. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool.  **Result Location:** This is the location you want to save the new raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “feature\_rast\_by\_template03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Output format:** Raster format for output geodata. You can choose from: Esri Grid, img (ERDAS IMAGINE) or tif (GeoTIFF). If you select a file geodatabase for the Result Workspace then the output format will default to ‘Esri Grid’. When storing your raster geodata to a JPEG file, a JPEG 2000 file, a TIFF file, or a geodatabase, you can specify a compression type and compression quality within the ‘Geoprocessing > Environments..’.  **Template Feature Class (optional):** This is the vector feature class that contains the field (or fields) used to generate the raster features for all the feature geodata in the items list.  **Fields (optional):** Once you have selected a template feature class all the fields from the feature class table will be listed below. If you select (tick) one or more of these fields the tool will search for these fields in each of the input feature classes listed in the items table. If the field is present in the input feature table it will use that field to create a new raster feature class from it.  **Add Field:** If you know the names of the fields you can add them manually using this button before selecting them using the tick-box.  ***TIP #1:***  *It’s OK if not all the selected fields are present in the feature classes listed in the Items table. The tool will convert them into a raster if they are present and report an error if not.*  **Cell Size:** You can specify the raster cell size of all the output raster features.  ***TIP #2:***  *Make sure you set the Geoprocessing > Environments defaults before running this tool.. See section 2.2.2 on page 10, for instructions.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 4.5 Rasterise by Table

| **Tool** | **Description** |
| --- | --- |
|  | This tool converts fields within vector feature classes into raster feature classes based on a list of fields stored in the Items table. In addition to the ‘item’ field the items table must have a field that contains a list of fields, for each input feature class that you want converted into raster features. The Grid Garage ‘*4.1 Describe Classes*’ tool can be used to generate a list of all the fields present in each input feature attribute table. For more detailed help see [ESRI Help for the ‘Feature to Raster (Conversion)’ tool](http://resources.arcgis.com/en/help/main/10.1/index.html#//00120000002v000000).  **Items Table:** This is the input table, usually generated by the ‘*1.1 Search for Geodata*’ tool, but it can be any table with an ‘item’ field containing the vector geodata you want to convert into raster geodata. If the Items table is a DBF, or a table in an ESRI file geodatabase, then you can select a subset of rows in ArcMap and only those rows will be processed by the tool. This table must have a field that contains list the fields (separated by commas), that you want converted into raster features for each input feature class (item). The list of fields must have the following syntax: [‘field1’,’field2’,field3’,….,’field*n*’] as illustrated in Figure 10 below.    Figure 10 Example of an Items table containing a field that lists the fields to use when creating raster features from the polygon input features (shapefiles in this case).  **Result Location:** This is the location you want to save the new raster geodata to. It is also the location that the Grid Garage Results table will be written, containing the list of geodata processed by the tool. If the tool encounters any errors when processing any of the geodata this will be displayed in the ‘error’ field. A value of <Null> in the error field indicates there was no error. You can select from a list of pre-defined locations or select ‘As specified below’ and navigate to a different location. If you choose a folder for the Result Location the output table will be written to a comma-delimited (CSV) text file which will not allow you to select rows for processing when using the table as input for other Grid Garage tools.  **Result Workspace:** If you select one of the pre-defined Result Locations then this box will display the path to the location and be greyed out. If you select ‘As specified below’ then you can use the folder button to navigate to a different location.  Results Table file name: Each time this tool is run the Results table file is given the name “feature\_rast\_by\_table03\_*date\_time”,* where ‘*date’* and ‘*time’* are the date and time that the tool was run.  **Output format:** Raster format for output geodata. You can choose from: Esri Grid, img (ERDAS IMAGINE) or tif (GeoTIFF). If you select a file geodatabase for the Result Workspace then the output format will default to ‘Esri Grid’. When storing your raster geodata to a JPEG file, a JPEG 2000 file, a TIFF file, or a geodatabase, you can specify a compression type and compression quality within the ‘Environment Settings’.  **Field:** Select the field in the items table that contains the lists of fields to rasterise.  **Cell Size:** You can specify the raster cell size of all the output raster features.  ***TIP #2:***  *Make sure you set the Geoprocessing > Environments.. defaults before running this tool.. See 2.2.2 on page 10, for instructions.*  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

## 5 Metadata Management

### 5.1 Analyse Metadata

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This tool scans all input items for metadata files and lists them in the Results table.  This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au).  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 5.2 Parse Tips

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This tool takes the Results table from *‘5.1 Analyse Metadata’* tool and extracts field information from metadata files.  This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au).  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 5.3 Build Tips

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au).  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

### 5.4 Export Metadata

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This tool is still under development. For more information please contact Tom Barrett, email: [tom.barrett@environment.nsw.gov.au](mailto:tom.barrett@environment.nsw.gov.au).  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

## 6 Templates

|  |  |
| --- | --- |
| **Tool** | **Description** |
|  | This toolset contains sample scripts and models.  [Link back to Summary of Grid Garage Tools](#_Summary_of_Grid) |

# Other tips – Generating a metadata file from ArcGIS geodata

ArcCatalog in ArcGIS 10 automatically generates an HTML file from metadata when you click on the "Description" tab. Right click the document and go to properties, the URL given is an HTML file. In the Description ‘Properties’ it has a path to the htm file, as shown in Figure 11.

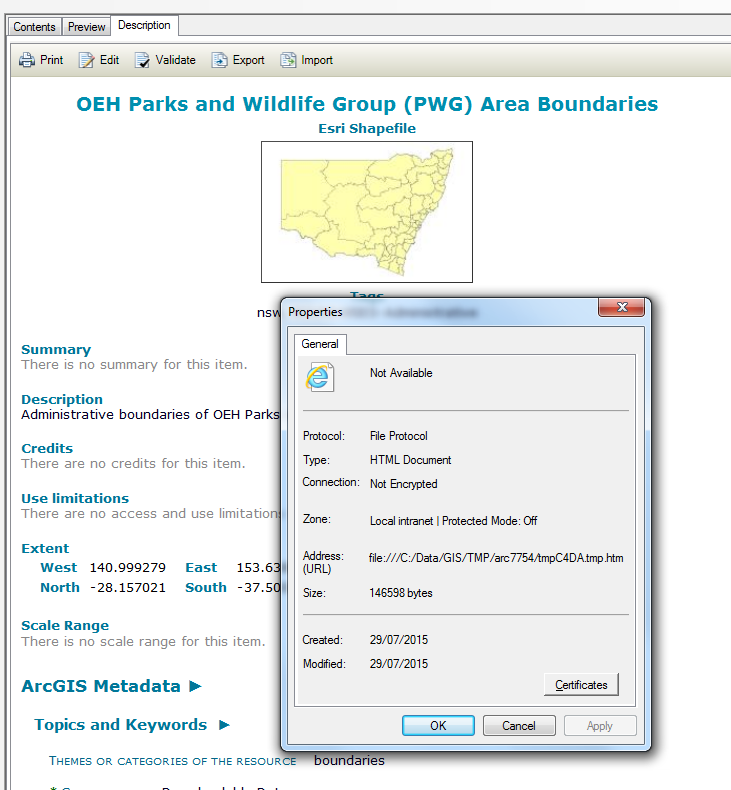


Figure Screengrab from ArcCatalog showing the path to the HTM metadata file.

# Glossary of terms

| **Term** | **Meaning** |
| --- | --- |
| ArcGIS 10.1 | GIS software developed by ESRI. Grid Garage is written and tested in ArcGIS Desktop version 10.1 |
| Geodata | The Collins Dictionary describes ‘geodata’ as “information about geographic location held in a digital format” and we use this term to describe all types of digital, spatially referenced data stored and manipulated by GIS systems. |
| GIS | Geographic Information System |
| File geodatabase (GDB) | ArcGIS file format for storing geodata sometimes abbreviated to ‘GDB’ which is also the file extension (*name.*gdb). |
| Raster or grid | Raster or grid geodata is a format for storing spatial information using pixels or grid cells that cover an area of the earth. The resolution of the raster geodata is determined by the size of the pixels or grid cells. |
| Shapefile | ArcGIS polygon vector geodata. |

# Known issues and bugs

| **Tool** | **Issue** | **Comments** | **Version fixed in** |
| --- | --- | --- | --- |
| Issues affecting all tools | When a table string is longer than 255 characters 'write to File Geodatabase' table fails and the table is only written to a CSV file. | Fixed in V0.2 | V0.2 |
| Issues affecting all tools | In-tool help needs to be updated to reflect recent edits to this manual. | Needs to be updated for GG V0.2. |  |
| **1 List Table Management** |  |  |  |
| 1.1 Search for Geodata | Will not report on geodata if there are any spaces in the file path. | This is an ESRI bug which we have not addressed yet. It may have been fixed in more recent ArcGIS versions (10.2, 10.3). |  |
| 1.2 Describe Geodata | None found |  |  |
| 1.3 Display Items | None found |  |  |
| 1.4 Select Manually | None found |  |  |
| **1.5 Merge Lists** | TBA |  |  |
| **2 Data Management** |  |  |  |
| 2.1 Rename: Generate Names | None found |  |  |
| 2.2 Rename: Apply Names | Crashes when name does not exist, instead of writing an entry in the 'error' field and continuing on to next item. | Not fixed |  |
| 2.3 Copy Data Items | None found |  |  |
| 2.4 Delete Data Items | None found |  |  |
| **3 Raster Operations > 1 Information** |  |  |  |
| 3.1.1 Build RAT | None found |  |  |
| 3.1.2 Calculate Statistics | None found |  |  |
| 3.1.3 Describe Rasters | None found |  |  |
| 3.1.4 Zonal Counts | None found |  |  |
| **3 Raster Operations > 2 General Operation** |  |  |  |
| 3.2.1 Clip Rasters | None found |  |  |
| 3.2.2 Copy Rasters | When copying data.. Output data sets all get a number suffix added eg. '\_1, \_120'. | Fixed, now it only adds suffix if file already exists. | V0.2 |
| **3 Raster Operations > 3 Transformation** |  |  |  |
| 3.3.1 Aggregate | None found |  |  |
| 3.3.2 Resample Raster | None found |  |  |
| 3.3.3 Project Rasters | None found |  |  |
| 3.3.4 Reclass Raster by Table | None found |  |  |
| 3.3.5 Set Raster NoData Value | None found |  |  |
| 3.3.6 Transform Raster | None found |  |  |
| 3.3.7 Set Raster Value to Null | None found |  |  |
| 3.3.8 Tweak Raster Values | None found |  |  |
| 3.3.9 Block Statistics | None found |  |  |
| **4 Vector Operations** |  |  |  |
| 4.1 Describe Classes | None found |  |  |
| 4.2 Clip Features | None found |  |  |
| 4.3 Project Features | None found |  |  |
| 4.4 Rasterise by Template | None found |  |  |
| 4.5 Rasterise by Table | None found |  |  |
| **5 Metadata Management** |  |  |  |
| 5.1 Analyse Metadata | None found |  |  |
| 5.2 Parse Tips | None found |  |  |
| 5.2 Parse Tips | None found |  |  |
| 5.3 Build Tips | None found |  |  |
| 5.4 Export Metadata | None found |  |  |
| **6 Templates** | None found |  |  |