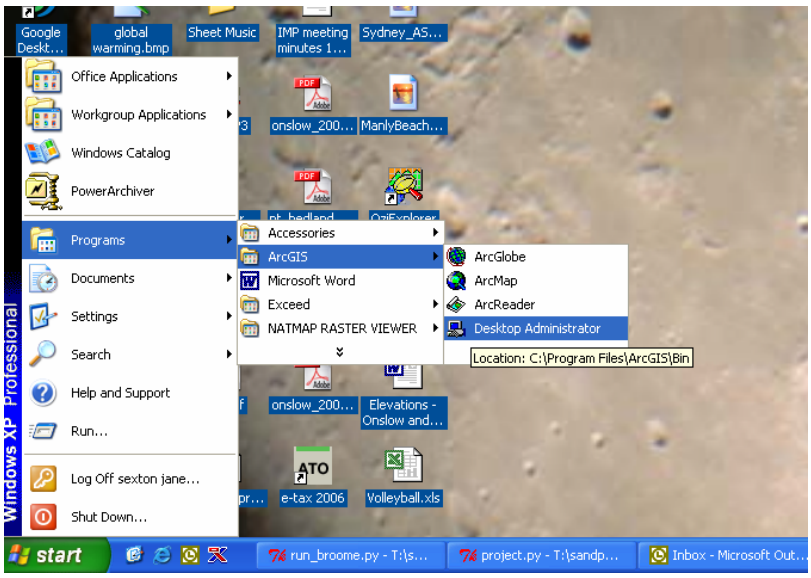
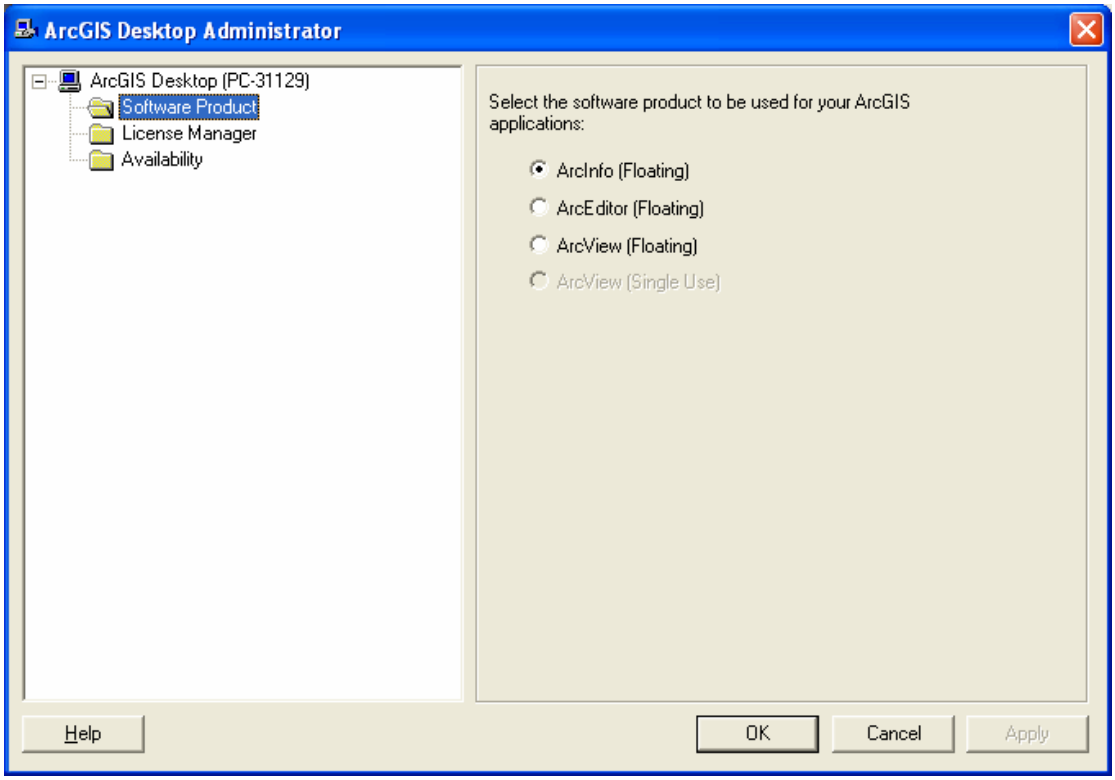
Working with polygons and ASCII grids in ArcGIS

How to develop a polygon for scenario models

- Change ArcGIS Licence to ArcInfo by going to Desktop administrator in the ArcGIS program list (see below)

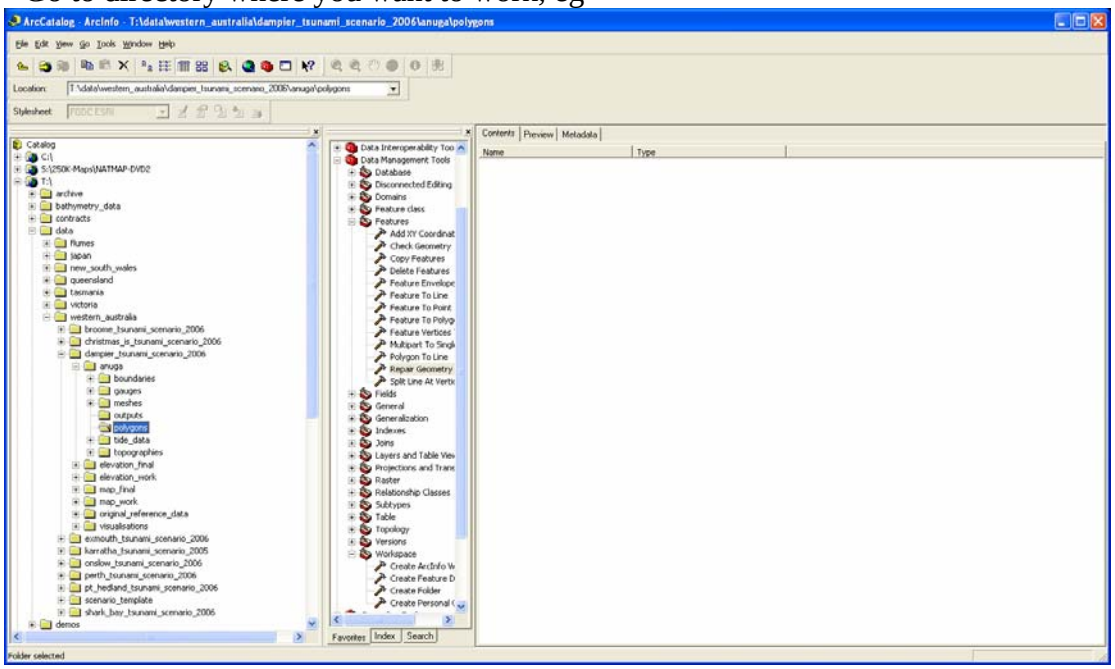


- Select ArcInfo as follows

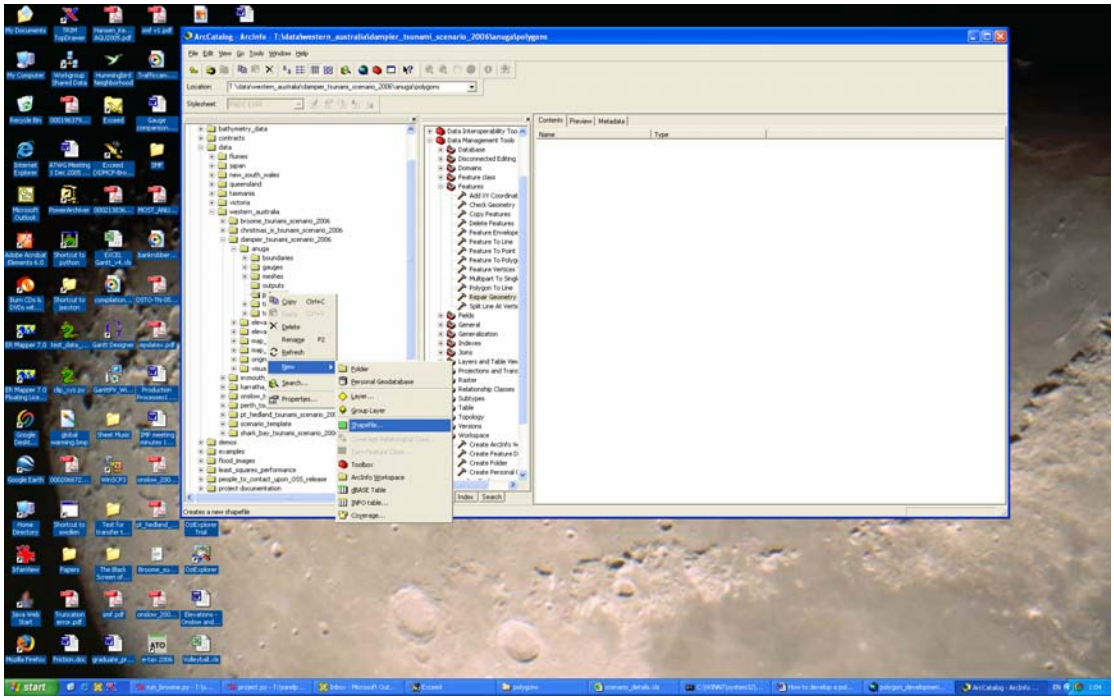


this will allow specific tools to be available.

- Load ArcCatalog
- Go to directory where you want to work, eg



- Right click on directory name and select New Shapefile



- Provide a “Name”

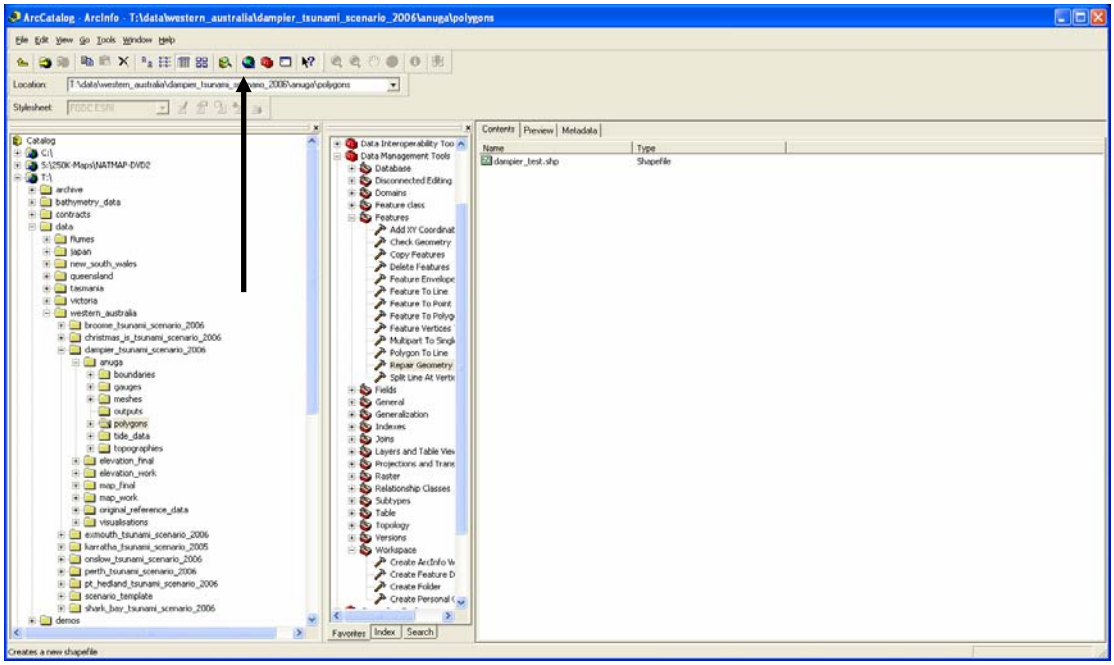
- Select “Feature Type” to be “Polygon”

- DO NOT hit OK here, as we need to define a coordinate system. Select “Edit” and a “Spatial Reference Properties” box will appear.

- Choose “Select” which takes you to a “Browse for Coordinate System” box. Select “Projected Coordinate Systems”, then “National Grids”, then “Australia” and select GDA 1994 MGA Zone 50.prj (for Dampier). Choose appropriate zone location.

- Select Apply then OK. You now have an empty shapefile.

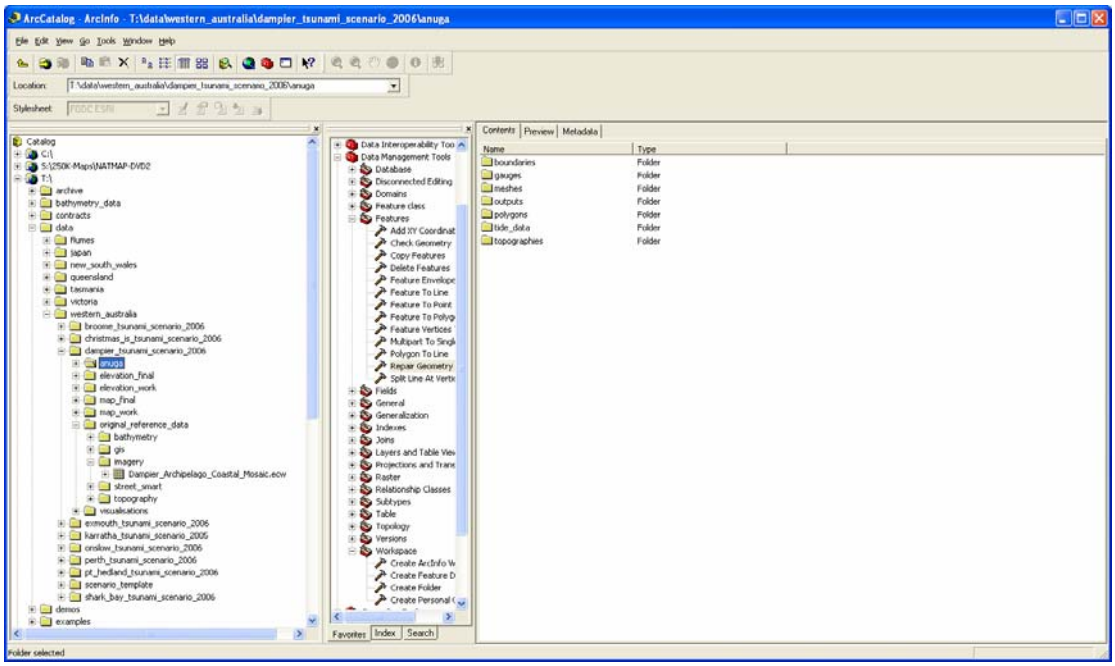
- Next, load ArcMap (see below) and hit OK.



- Right click on the “Layers” and select Properties. On the “Coordinate System” dialogue box, select the “Predefined” box and select the coordinate system in the same way as above.

- Return to ArcCatalogue and drag your newly created shapefile to ArcMap.

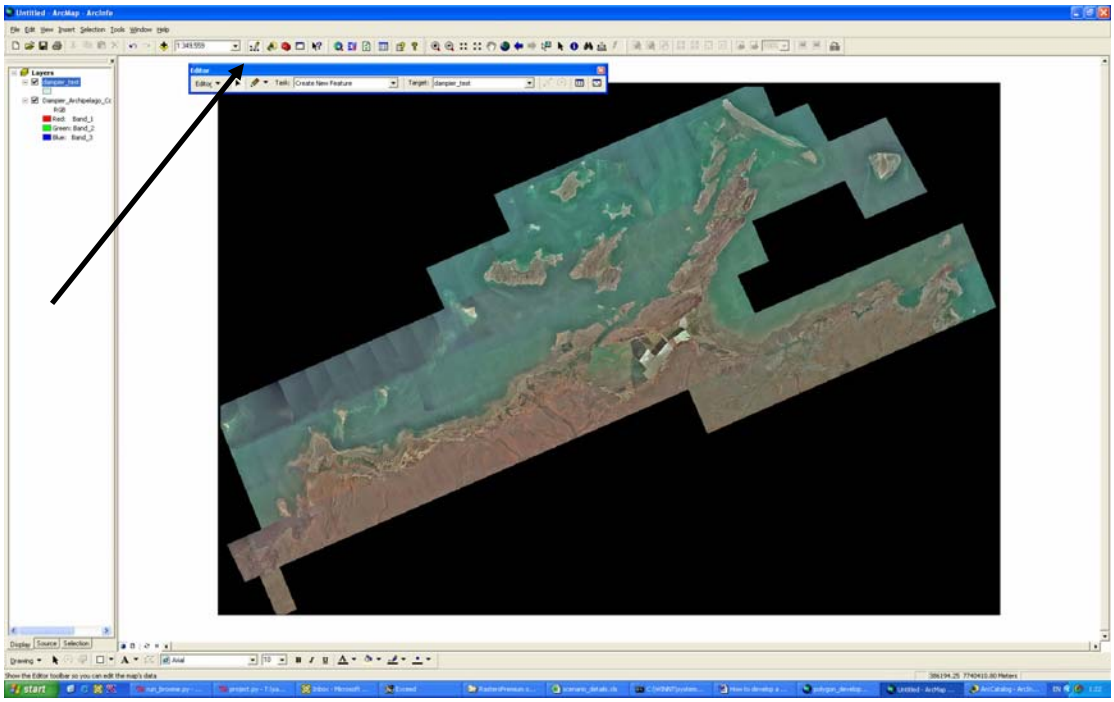
- Return to ArcCatalogue and find relevant imagery. Using structure for tsunami scenarios, then imagery should be found in original_reference_data (see below)



- Drag image into ArcMap session.

- If image isn't available, then you can find a 250K-Map from \\perlite\geo\2\archive\topo_thematic\raster\2005\premium\250K-Maps BUT it will have to re-projected and probably best if get Alex or Hamish to do this!

- Now to create your polygon:
    - Select Editor on the Toolbar



this brings up the Editor

- We want to Create New Feature from the dampier_test (the name given to our shapefile). If there are more shapefiles, they will be available in the Target drop down list.

- You can now start "drawing a polygon" by clicking on the pencil. Throughout drawing, you can zoom in and out, just select the pencil again to keep drawing.

- Double click when you're happy. Go back to the Editor drop down list and select "Save Edits" then "Stop Editing"

- Right click on the dampier_test in the left hand bar and select "Properties" to change the colour and transparency, etc.

- Now you have a polygon shapefile!!!

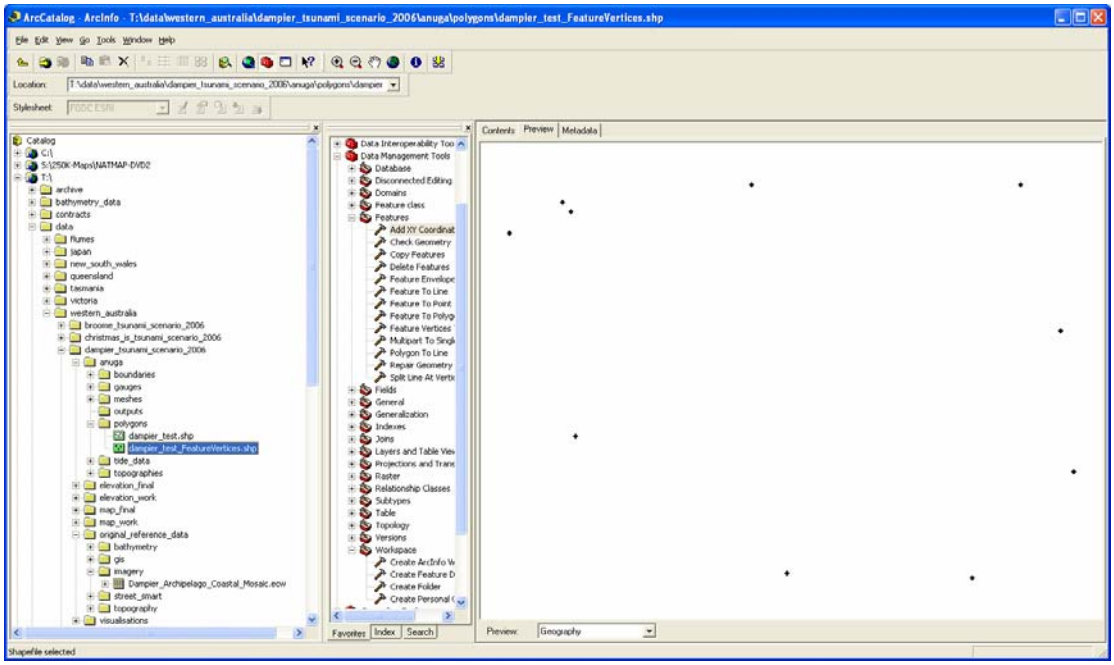
- Next, return to ArcCatalogue to where your shapefile resides.

- Click on the red toolbox in the toolbar. Go to “Data Management Tools”, then “Features” and double click on “Feature Vertices to Points”.

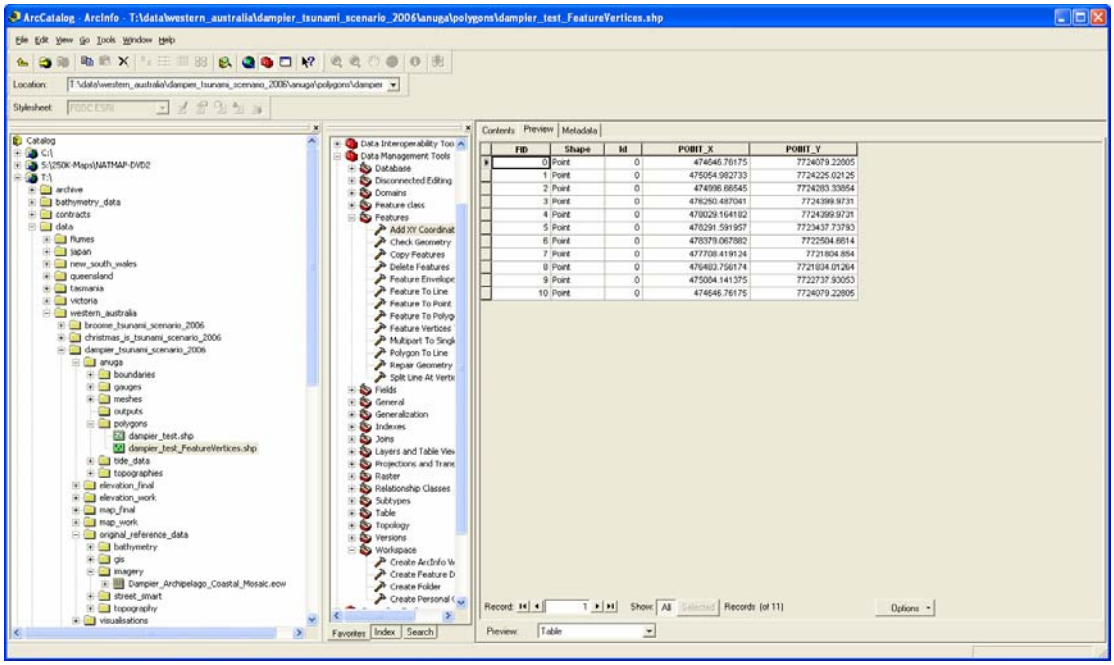
- Drag your shapefile into the “Input Features” and hit OK. You will see the creation of another shapefile in the same directory (it will be called NAME_FeatureVertices.shp)

- Return to the toolbox and double click on “Add XY Coordinates” and drag the second shapefile into the “Input Features”.

- Click on the second shapefile (NAME_FeatureVertices.shp) and select the Preview tab (see below)

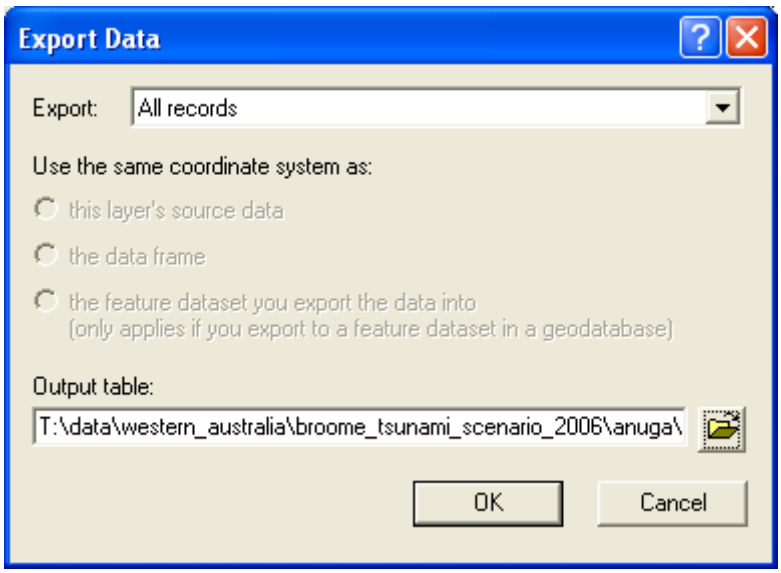


On the bottom of the left hand screen, select “Table”

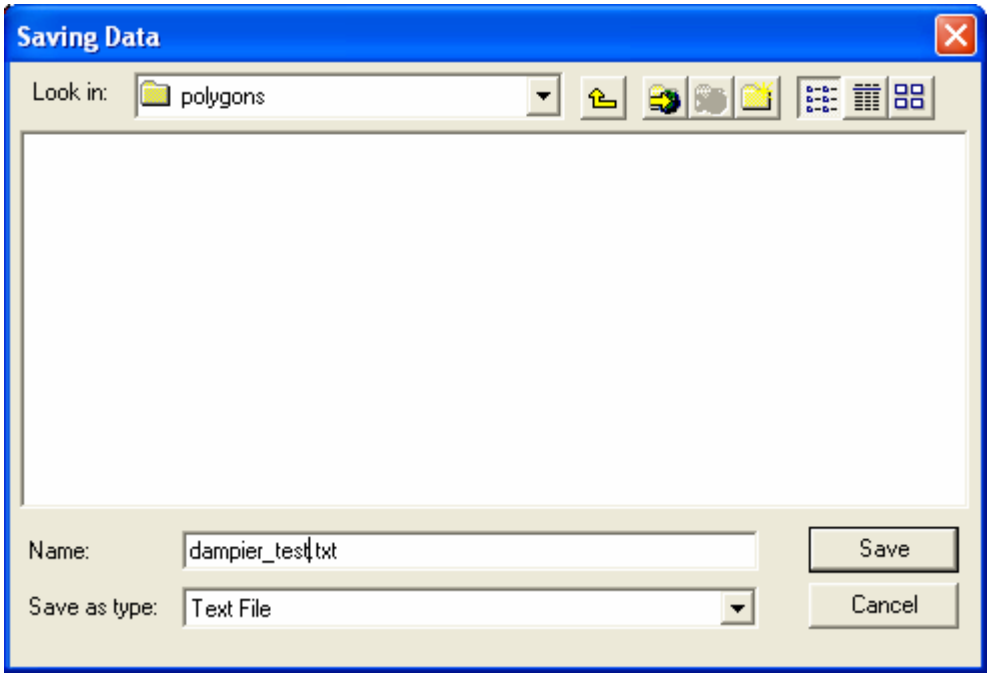


Next, select “Options” then “Export”.

Save to a text file by selecting the folder option



and saving into the polygon directory in the scenario you’re running as a text file.



Next, load into Excel and save as an .csv (after deleting the first two columns and first row).

One thing to remember is that these polygons are defined as closed in ArcGIS, so remove the last line so there are no duplicate points.

Welah!

P.S. Return the ArcGIS Licence to ArcView (ArcInfo is the top notch one).

How to modify a polygon for scenario models

- In “Editor” mode in ArcMap, select target polygon of interest.
- Select “Modify Feature” in Task pull down list in Editor toolbar.
- In “Selection” on the main menu list, choose “Set Selectable Layers”
- Choose “Clear All” then select polygon of interest.
- Click on the polygon and the vertices should appear. You can now move vertices, add vertices etc.
- Then follow procedure as above to export to x, y coordinates.

How to import points (which may be data files are may define a polygon)

Requirements: text file (.txt), comma separated with header information. For example
x,y
1,10
2,5
etc

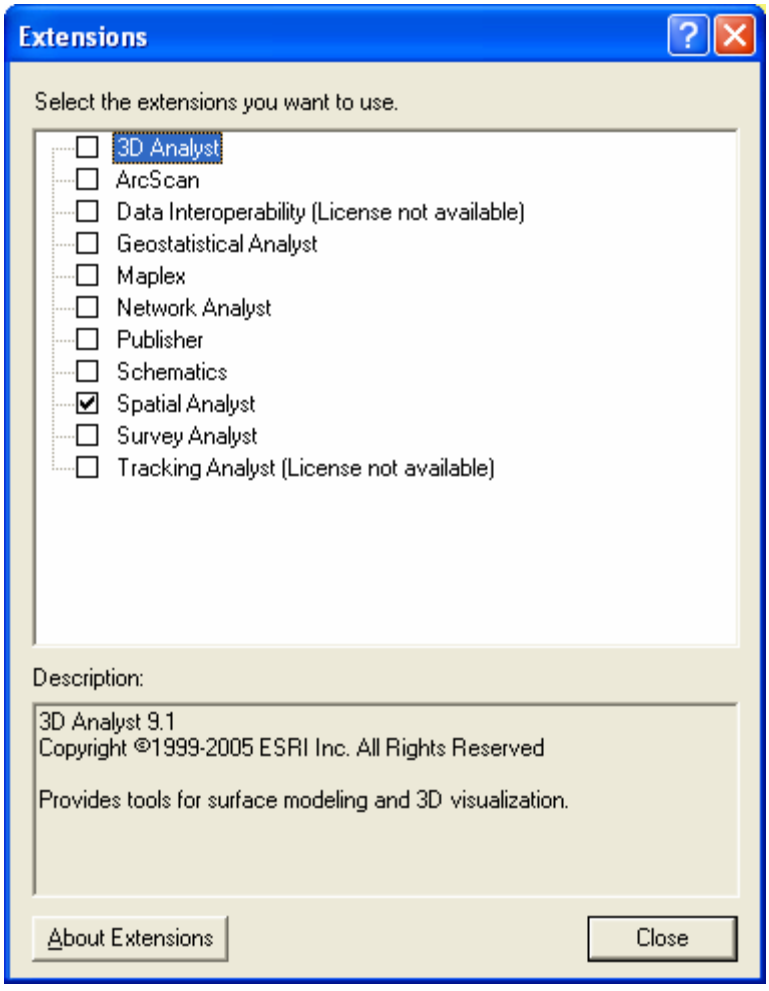
- In ArcMap, select “Add XY data” in Tools menu.
- Import text file from appropriate location
- Add coordinate system
- Point data should now appear in ArcMap
- Create a shape file of this data by right clicking on file name in Display section, select “Data” and “Export Data”

How to import .asc grid (output from ANUGA)

- In ArcCatalogue, select “ASCII to Raster” tool (Choose Red Toolbox and search for “ASCII to Raster”)
- Input relevant asc output and select output type to be Floating Point
- Define the projection by selecting “Define Projection” tool and drage in created raster (Use Red Toolbox again)
- Drag created raster into ArcMap

How to show depth values onshore and not offshore

- Select “Tools” then “Extensions” in main menu
- Ensure “Spatial Analyst Tool” is enabled (see below)
- Select “Extract by Mask” tool (Use Red Toolbox again)
- Drag required raster for Input
- Drag shapefile from Alex (talk to him about which clip is appropriate)
- Provide an output name
- Drag raster output into ArcMap!



How to make gauges

- In ArcCatalogue, make a shapefile for your gauges (say test_gauges.shp) but define as Points rather than a Polygon (remember to define the coordinate system).

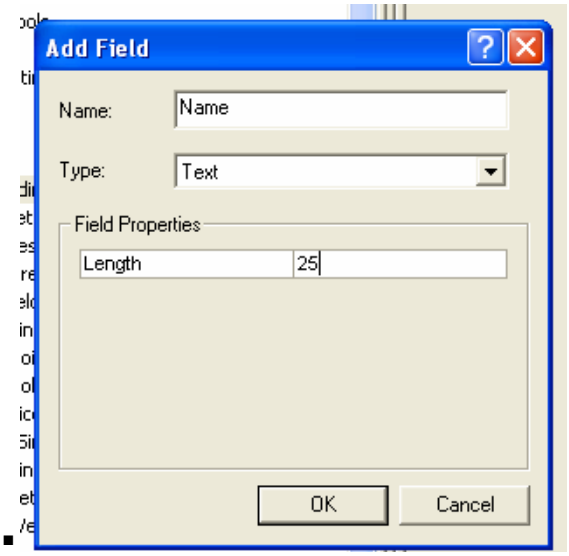
- Open Edit tool and “Create New Feature” for new gauge shapefile

- As the shapefile is defined as points, simply click where you want the gauges to be located

- Return to ArcCatalogue and use the “Feature Vertices to Points” tool followed by “Add XY Coordinates” tool.

- Click on the shapefile and go to Preview mode. Go to the Table tab, click on Options and add new field.

- A small dialogue box will open. In the “Name” field type Name, in the “Type” file, select “Text”. In the Field Properties, enter a Length (see below).



- Drag the shapefile back to ArcMap session

- Right click on the gauge shapefile and select “Open Attribute Table”.

- Get into “Editor” mode and click on one of the gauges you wish to name.

- Return to attribute table and select “Selected” at the bottom of the dialogue box.

- Insert desired name in the Name field.

- Continue to click on each gauge and enter name.

- Once complete, save and stop editing and return to ArcCatalogue.

- Export to .txt file as usual.

- Note, you can always add more gauges as desired by returning to “Editor” mode in the ArcMap session.

How to create a polygon for anuga based on a buffered coast contour

- First you need a contour as a polygon or a polyline, general the coast is the 0.5 contour.

Depending on what is provided you may need to make shape layer for individual contours and clean them up (remove small non lines and polygons in that contour)

Make shape features from a contour layer

- In ArcCat create a new shape layer as a polyline and select the right projection. Making sure the name is appropriate. This layer can be used for any other contour shape layer by coping and pasting.

- Drag the new layer into ArcMap

- If it is not empty, start editing and select and delete all the contents and stop editing.

- Use the “select feature” tool to select a particular contour or use “selection”-> “select by attribute” and create an expression like “[CONTOUR] = -30” to select all the -30 contours. Make sure that the “Layer” for selection is the contour layer

- Start editing the new contour layer and copy (ctrl-c) and paste (ctrl-v) selected layer

- The new layer should contain only the one contour height. Now select the main components of interest in this layer… eg the longest and most useful lines for the polygon generation. Use Shift and the select features to select multiple lines. Now RMB on the layer and “open Attribute table” -> options-> “switch selection”. Close table and “delete” selection. This should leave only the lines that were originally selected. Stop editing

- Now go to Make Simplified Polyline (bend simplify) and follow from there.

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Make Buffer Polygon

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- Find the Buffer (analysis tool) and drag the coast contour into “input features”, change the “output features” name (save to polygon directory)

- Change “Distance” to 500 meters or upto 1000m

- “Side Type” generally FULL, however if using a different contour might want to use LEFT and RIGHT on different contours

- End Type “ROUND”

- Dissolve Type “ALL” gets rid of overlaps and simplifies things

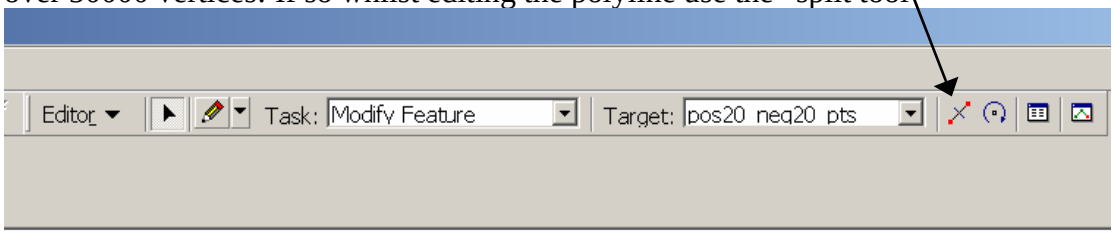
- Hit Finish and now you have a buffered polygon

Make a Polyline from Polygon

- Use ET wizard tools (to install go to \\Perlite\cit\1\cit\risk_assessment_methods_project\downloads\arc_gis plugin\readme.txt and follow instructions… it is very easy)
- Hit “convert” tab at bottom, select “polygon to polyline” and “GO”
- Follow instructions

Make Simplified Polyline (bend simplify)
- Find tool “simplify line” (Data Management Tools)
- Drag new polyline into “input features, rename “output features” to polygon dir
- Use “simplification Algorthm” BEND_SIMPLIFY with Tolerance of 1000m (or so) and Hit “OK”
- Now you have a polyline that should have less little bends if not repeat the simplification with a larger tolerance

NOTE: if this causes Arc to crash! It might be that your polyline is too long and has over 50000 vertices! If so whilst editing the polyline use the “split tool



Break the line into several smaller segments, stop editing and try again.

Make Simplified Polyline (remove points)
- Find tool “simplify line” (Data Management Tools)
- Drag new polyline into “input features, rename “output features” to polygon dir
- Use “simplification Algorthm” REMOVE_POINT with Tolerance of 500m (or so) and Hit “OK”
- Now you have a polyline that should have less little bends if not repeat the simplification with a larger tolerance

Making a polygon from 2 or more contours.
This is very useful in making polygons, you use 2 contours say -20 and +20 and a polygon that connects the 2, then end up with 1 polygon.
- Firstly is ArcCat make a new shape file that is a polygon with the right co-ord sys
- Drag this into Map and starting editing, with “task” as “Create new feature” then create a simple polygon that connects the 2 (or more) contour lines, remembering you want 1 polygon. Stop editing

- Find tool “features to polygon” and import the new polygon and the 2 contours and hit finish
- You should now have several polygons… now select the polygon you are interested in and now RMB on the polygon layer and “open Attribute table” -> options-> “switch selection”. Close table and “delete” selection. This should leave only the polygon that was originally selected. Stop editing (saving edits)
- Now QC the resulting polygon with reference to the coast and other features of interest. You may need to edit the polygon, use the editing and “modify feature” task

Make Points from Polyline (or polygon)
- Use ET wizard tools (ask how to install)
- Hit “convert” tab at bottom, select “polyline to points” (or “polygon to points”) and “GO”
- Follow instructions, save file to polygon dir

Export points to “dfb” file (which can be read by Excel)
- RHC the layer containing the points and hit “layer attributes feature”
- Hit “options” at the bottom right (might need to full screen window) and find “export”
- Change output file name to polygon dir with new name and hit ok

Open new “dfb” file with Excel, edit and save as a “csv”
- Find and open file with excel
- Select and delete all column except X and Y info, delete header
- File – save as, then change “save as type” at bottom to CSV (comma delimited *.csv)

Now you have a file that can be easily used in ANUGA with the “read_polygon” function

Tips:
You can use “calculate area” to determine the area of a polygon which in turn be used to determine the number of