AVON SITE SELECTION (RASTER ANALYSIS WITH ARCGIS)

Data Processing

Set new grids areal extent same as area of interest(aoi) and cell size same DEM(100M);

a. Geoprocessing > Environments > Processing Extent: change to 'same as layer aoi'
b. Geoprocessing > Environments > Raster Analysis: change cell size to 'same layer as AvonDEM'

1. First Criterion - Slope greater than 2 degrees. Calculate the slope or rate of change;
   Geoprocessing > search for tools > Slope > open 'Slope Spatial Analyst'
   Set the below parameters to generate a new grid;
   - Input raster data: AvonDEM
   - Output measurement: Degree
   - Z factor: 1

   A new grid layer is added to the map view(Slope avondem1 in my work).

   Now use Raster calculator to filter the areas that satisfy the criterion;

   Search 'Raster calculator(Spatial Analyst)'

   Create and run the expression ('Slope avondem1' <= 2)

   A layer is added to the table of content with values 0 and 1, where 1 represents 'True' for cells with slope less than 2 degrees and 0 represents 'False' for cells with slope greater than 2 degrees.

2. Second Criterion – Distance not within 1000m of A-class roads and Motorways;
   Using the Distance command:
   Search window > Euclidean Distance(Spatial Analyst)
   - Input raster: main road
   - Output cell size: 100
     Run

   The output layer is added to the map view and table of content as 'EucDist_main_ro1'.

   Use Raster calculator to identify all cells beyond 1000m with the expression ("EucDist_main_ro1" > 1000)

   A layer is added to the map view with its corresponding key in the table of content. Cells with value 1(True) are more than 1000m away from A-class roads and

motorways, whereas cells with value 0 (False) are less than 1000m away from the major roads.

Use symbology editor to change value 0 (False) to black and value 1 (True) to 'No colour'

3. Third Criterion – site within an area that has a population of at least 1000 per sq.km to maximise potential use;
   Using the Density command:
   Search window > Density > Point density (Spatial Analyst)
   - Input point feature: pop
   - Output cell size: 100
   - Neighbourhood: circle
   - Radius: 1000
   - Units: map

   The output layer is added to the map view and key in the table of content(PointDe_pop1).

   Use Raster calculator to identify cells that have a population density of at least 1000/km sq. or 0.001/m sq. with the expression("(PointDe_pop1" > 0.001).

   Similarly, cells with value 1(True) have a population density of at least 1000/km sq whereas cells with value 0(False) have a population density less than 1000/km sq.

   Again, use symbology editor to change value 0 (False) to black and value 1 (True) to 'No colour'.

Analysing The Data

Turn off all layers in the Map view.

Switch on these layers: the True and False values of Slope, Distance and Density.

To retain cells which satisfy the three main criteria(have true - values of 1), use the Raster calculator and the formula Slope x Distance x Density

A new layer is added to the map view.

4. Fourth Criteria – land size or area must be at least 1km sq.;
   To do this, we must convert grid layer to polygon to ascertain the size using the Raster to polygon (conversion)
   Search window > Raster to Polygon
   - Input raster: the newly combined grid layer
   - Field box: VALUE

A new layer is added to the map view.

Next, to calculate the size or area, open the attribute table of the new polygon layer and add a field called ‘Area’.

Using the ‘calculate geometry’ option, calculate the area for each polygon.

To filter the polygons that satisfy the criterion, use ‘select by attribute’ option in the Query builder. Create a new selection with the expression (“area” >= 1,000,000m i.e 1km sq.) Again select from current selection with the expression (“gridcode” = 1) to retain only the selected polygons in the map view.

Results: 9 out of 98 records should be selected.

5. Final (Desirable)Criteria – short distance to a significant number of schools to maximise efficiency;
   Using the Kernel density command:
   Search window > Density > Kernel Density(Spatial Analyst)
   - Input point: school
   - Population filed box: NONE
   - Radius: 3000m (3km - arbitrary)
   - Areal units: Square map units
   - Output cell size: 100

   Which site out of the 9 would you choose and why?