Brownfield land and deprivation in Sheffield

This example investigates the relationship between brownfield sites and deprivation using secondary data from the local authority and central government.

Brownfield sites

Download the National Land Use Database of Previously Developed Land (Excel file). These data are available for 45% of local planning authorities. Clean the data by completing the following steps:

1. Open the spreadsheet click on the data tab, then the 'LA' column. *Filter* this for *Sheffield*.
2. *Easting* and *Northing* values need to be converted to *Latitude* and *Longitude* to geolocate the data. To do this, copy the *Easting* and Northing columns into a new spreadsheet (include the column headers). Save the file as CSV, then convert the co-ordinates online. Download the resulting file, copy the latitude/longitude columns and go back to the original spreadsheet. Click on the column number the to the **right** of *Northing*, and **insert the copied cells**.
3. Select all of the data and paste it into a new spreadsheet (including the column headers). Give it a descriptive name and save it as a CSV file.
4. Open a new map in ArcGIS and drag the CSV file onto the map. Choose *location—single symbol* as the drawing style, then click done. You should see dark dots locating brownfield sites in Sheffield (see right).

Deprivation indices

The most recent ONS deprivation data in ArcGIS is from 2015 at LSOA level. Add it to the map by browsing **living atlas layers**, deselecting 'within map area', and entering *deprivation* in the search box. Add the map layer called '**Index of Multiple Deprivation 2015**'. *Filter* this layer to show only districts of Sheffield by creating the expression *Local Authority District Name (2013) - contains - Sheffield*. Increase the layer's transparency to about 80%.
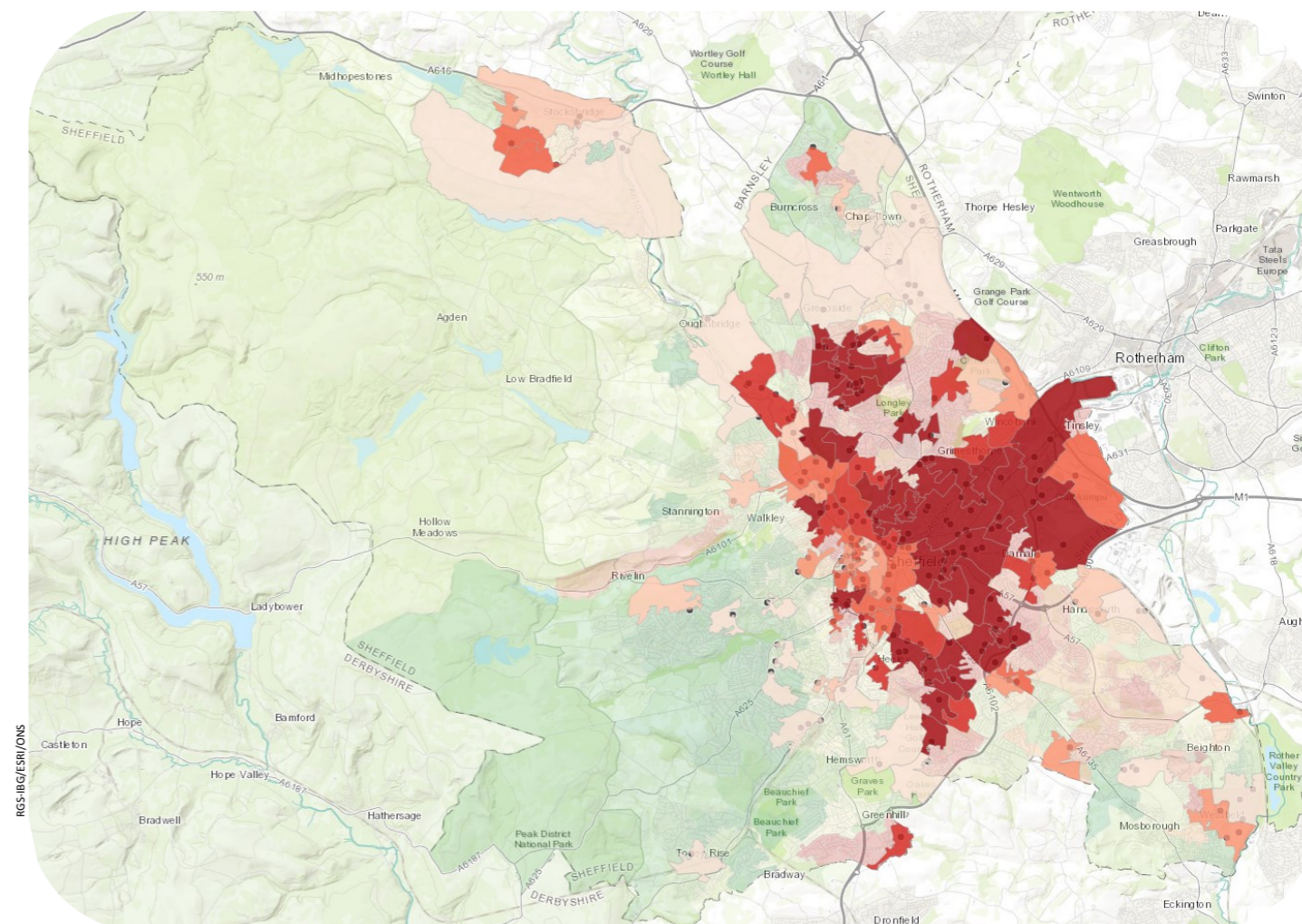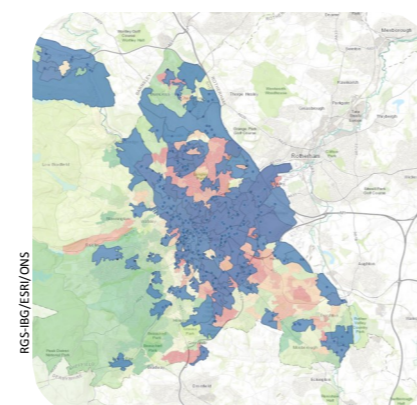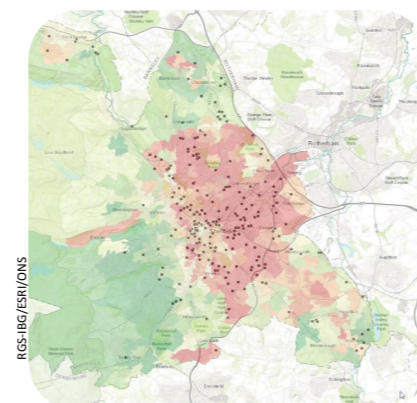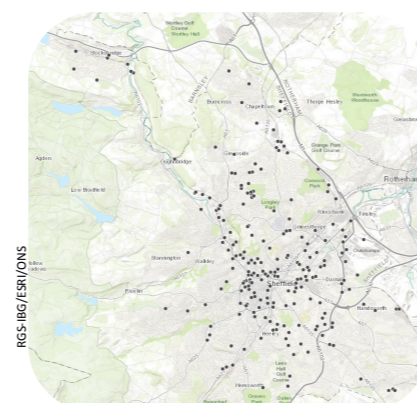
Analysis

Perform analysis on the deprivation layer to identify LSOAs which contain brownfield sites using *Find Existing Locations*. To do this, and having selected the deprivation layer, create an expression to find where the deprivation layer intersects with the brownfield sites layer (e.g. [Deprivation layer] - intersects - [brownfield layer]) and run the analysis.

To make interpretation easier change the layer style to represent the **Index of Multiple Deprivation Decile**, and the drawing style to *Counts and Amounts* (selecting a red gradient - see main image). The most deprived areas will now be displayed as the darkest, which makes any spatial relationship to brownfield sites easier to see.

Further development

- Performing further analysis to extract the data of both the deprivation and intersected layers would allow statistical analysis—from simple means of values/indices to more complex evaluation of correlation et al. using an appropriate test.

*(Anti-clockwise from top left) Dragging the CSV file into ArcGIS to plot **brownfield** sites using the single symbol plotting style. Adding filtered **deprivation data** and increasing layer transparency. **Running analysis** to find LSOAs which intersect with brownfield sites. Choosing the attribute **Index of deprivation** decile and changing the layer style to Counts and Amounts, with red gradient fill. The transparency of the original deprivation layer separates the two. Data can be extracted from the intersected layer and used to statistically evaluate any relationship between brownfield sites, and the deprivation index (or any of its constituent components).*
Source: RGS-IBG, (2017). ArcGIS.com. ESRI. Using data from ONS.

- The Indices of Deprivation list national ranks and deciles of the index itself in addition to income, employment, education, health and disability, crime, barriers to housing and services, and living environment. When combined with primary geospatial data (collected manually with a GPS, or using ESRI's apps) there are many research questions that could be explored at a variety of scales. This analysis could be used to determine the location(s) at which to complete fieldwork to explore these questions.

- The ONS has many other datasets available but be wary of analysing data without first creating a hypothesis. A good approach would be to formulate several potential hypotheses, then look for appropriate secondary data available in a format that you can use before making a choice.

Exploring the data

- Categorise the brownfield sites (e.g. by size) and replot them. Are there additional spatial patterns? Does the historical context of the location explain these patterns?
- Complete in-depth evaluation of two contrasting adjacent LSOAs.
- Use proportional symbols to plot further brownfield data (e.g. size of site, housing density if planning approval granted). Are there spatial patterns/correlations with deprivation metrics and/or other variables you could collect during fieldwork?
- Complete further analysis to explore brownfield development size in relation to the proximity of transport links (using buffers) or travel times.
- Is the pattern of deprivation and urban dereliction consistent between cities? For instance, is there always a West/East or inner/outer split?