Identifying Housing Land in the ‘Grey Belt’ using GIS

A Student Placement Project

Housing Crisis

300,000 new homes are needed per year.

UK housebuilding has regularly **fallen short of this each year.** For instance, in 2012/13, around 125,000 new homes were supplied, which increased to a **peak of 243,000 in 2019/20.**

The most recent stats return 234,000 net additional dwellings delivered in England in 2022-23. That’s 6% below their 2019-20 peak [1]



Fig.1 - Housing crisis protests

Grey Belt Solution

Case Study - England. Under the most pressure to hit housing targets.

Approximately **12.6%** of England's land area is designated as Green Belt, covering around 1,638,420 hectares [2]

HousingToday.co.uk estimate **+900,000 homes** could be built on Grey Belt sites. Taking up less than **1.6%** of England’s total greenbelt.

Not all greenbelt is equally effective. Current UK government keen to relax Greenbelt policy as it may be restricting development too much.

Targeted releases of the Greenbelt is the solution, but must be logical and have a convincing evidence base.



Fig.2 - Illustration of Grey Belt Land in an urban extension

Grey Belt in Planning Policy

As stated by the National Planning Policy Framework[3]:

“Grey Belt is defined as **land in the Greenbelt** comprising **previously developed land and/or any other land** that, in either case, **does not strongly contribute to any of purposes (a), (b), or (d)**.”

In other words, Greenbelt land that is restricting development despite not being ‘effective’ at the green belt purposes

Purposes of the Greenbelt (NPPF)

a) Prevent unrestricted urban sprawl
b) Prevent the joining together of major towns and cities
c) Assist in safeguarding the countryside from encroachment
d) Preserve the setting and special character of historic towns
e) Encourage urban regeneration, by encouraging the recycling of derelict and other urban land.

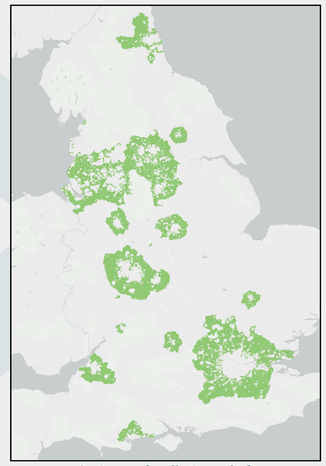


Fig.3 - England’s Greenbelt

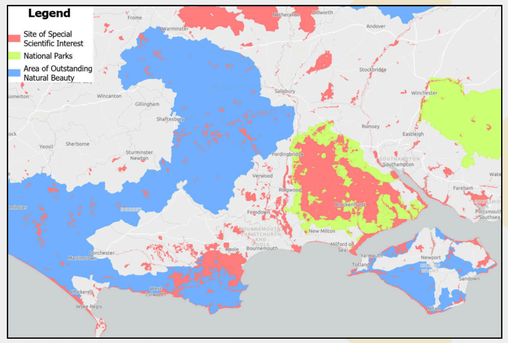


Fig.5 - Map showing some environmental constraints that our Grey Belt analysis takes into consideration

Constraint Identification

All sites have attributes to indicate what constraints would prevent development. Users can create their own masks, but for this project we decided on the following constraints for a ‘**strict sample**’:

- No environmental, historical, flooding and habitat constraints
- No existing allocated planning policy
- No planning applications
- Sites must not contribute to significant sprawl of a large city (purpose A)
- Sites must not merge neighboring settlements (purpose B)

Processing

- Data quickly extracted from LANDCLAN’s Web Feature Services
- Geoprocessing tools: queries, intersect, buffers, summarise within
- ArcGIS Pro ModelBuilder used for fast processing, also repeatable
- Spatial joins - **each site has over 200 attributes** for information

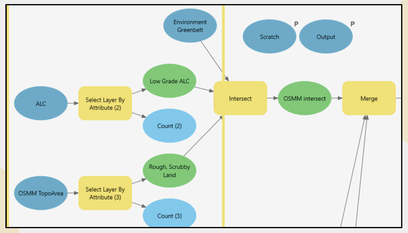


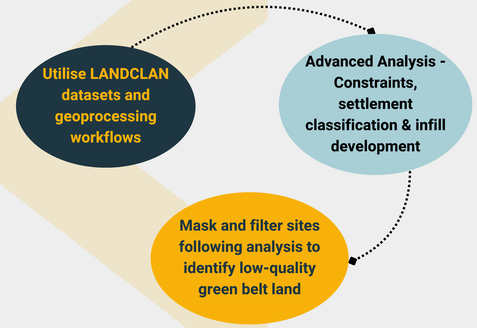
Fig.4 - Part of LANDCLAN’s Grey Belt geoprocessing model in ArcGIS Pro ModelBuilder

Search Criteria

We formed our search criteria from the NPPF and expertise of the spatial data available:

- Within the Greenbelt
- Within an urban extension of a settlement for sustainable development
- Specific land parcel characteristics (size, tenure)
- ‘Scruffy’ Land: utilise data from OS and OpenStreetMap as indicators of poor land quality
- Low Grade ALC: Ensures agriculturally valuable land is preserved
- Brownfield: includes land already identified as developable

Identification Methodology & Key principles



Settlement Classification Analysis

To accurately address Purposes A and B, there needed to be accurate built-up areas data, however we found the most authoritative data available was not sufficient for our particular use case.

Therefore, a bespoke ‘Degree of Urbanisation’ raster was created using multiple layers of urbanisation indicators. Informative layers included: roads, address points, land-use polygons and nighttime lights.

This analysis provides **an indicator of what type of settlement the Grey Belt site is within or adjacent to**. Each site was joined with this information.

The following Settlement Hierarchy was derived from the raster values representing the degree of urbanisation:

Large Built-Up Areas	Most Urban / Highest Values
Small Built-Up Areas	
Suburban / Large Settlement	
Isolated Dwelling/ Small Settlement	Least Urban / Lowest Values

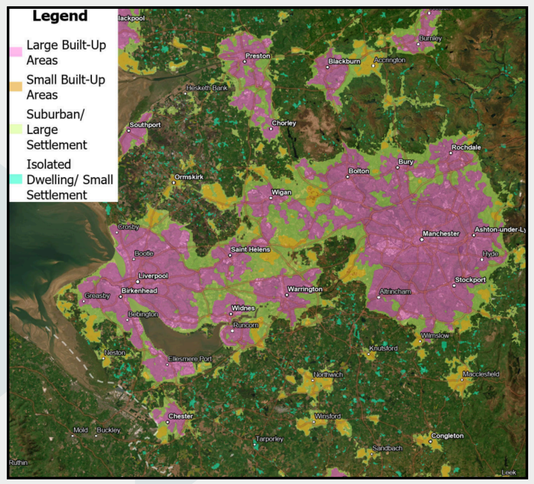


Fig.6 - Map showing our bespoke settlement classification dataset, allowing accurate identification of Grey Belt land in and around built-up areas

Infill Development Analysis

- Focused analysis on Purpose A (unrestricted sprawl)
- Uses infrastructure and physical features in LANDCLAN’s data - roads, rivers & railways
- Identifies sites that are **‘boxed-in’** and therefore will not contribute to urban sprawl
- Geometry analysis to identify well-contained, compact sites
- Successfully identifies sites for **logical and targetted releases** of the green belt
- Sites identified **should not lead to further, successive releases**

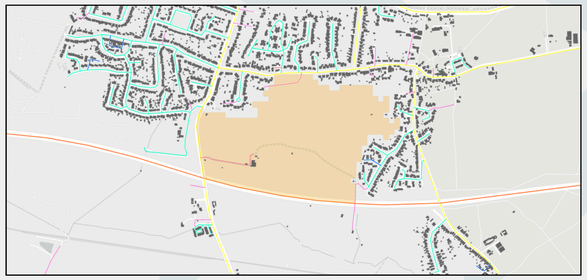


Fig.7 - Example of an Infill site (in orange), coloured lines are symbolised roads This site is boxed in and will not contribute to sprawl

LANDCLAN’s Real-World Results

- A **bespoke dataset** created that effectively identifies Grey Belt land
- An **objective analysis** and criteria was followed to help define this new policy
- Provides **evidence based justifications** for targeted green belt releases, allowing previously untapped & restricted land to be developed
- Strict sample analysis identified **8831 hectares of unconstrained Grey Belt land** nationally, with 13,712 Grey Belt sites
- Using a density of 40 housing units per hectare we estimate **353,240 potential houses built on unconstrained Grey Belt land**

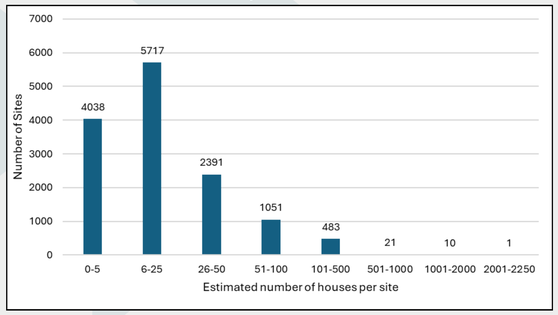


Fig.8 - Distribution of Housing Estimates, for a strict sample of 13,712 Unconstrained Sites.

Credits / Copy Rights

Fig.1 - Plutobooks.com
Fig.2 - Planning Resource
Fig.3 - Created in Arc Pro using open dataset from data.gov.uk©
Fig.5 - Created in Arc Pro using LANDCLAN data

[1] Gov.uk/new-homes-fact-sheet-1
[2] cpre.org.uk
[3] gov.uk/national-planning-policy-framework--2

Authors & Poster Purpose

This poster was created by Ulster University and Queen’s University students Andrew Logan and Jamie Harpur during a sandwich placement year at LANDCLAN to demonstrate the benefit of placement project work carried out in a private-sector company in the geospatial industry for professional development.