

Site Location for Housing Development with Neighbourhood Analysis in Manchester

Introduction

1. Project Background

Manchester is a city and metropolitan borough in Greater Manchester, England. The city has the country's fifth-largest population at 547,627 (as of 2018), and it is recently named as the UK's most liveable city, and in the top 50 in the world ahead of London, New York and Rome, Manchester has cemented itself as a desirable location to live.

The city is notable for its architecture, culture, musical exports, media links, scientific and engineering output, social impact, sports clubs and transport connections. Manchester is its own northern capital of culture. From sport to art, theatre, architecture and of course music, the city has more than made its cultural mark on the country. Historically a powerhouse of industry, Manchester has flourished under a sustained period of urban regeneration, all while retaining its own unique sense of identity.

Manchester City Council is the local government authority for Manchester, a city and metropolitan borough in Greater Manchester, England. It is composed of 96 councillors, three for each of the 32 electoral wards of Manchester.

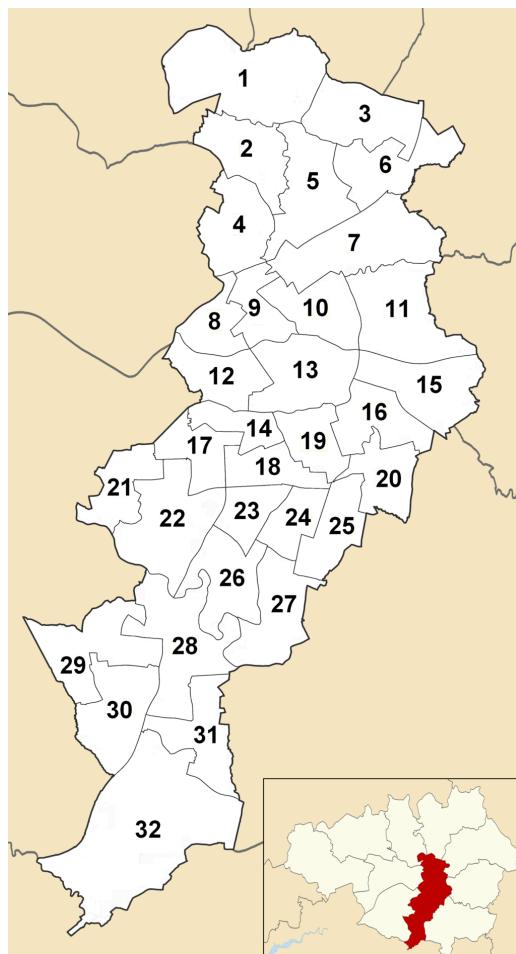


Figure 1. Manchester City Wards

2. Problem

Since 2015, 13,259 homes have been completed in the city - however, forecasting suggests that without intervention, the city may fall short of its affordable homes target, despite various successful partnerships with the city's registered providers where Council land is invested for affordable housing.

A new council-run house building company will be established in Manchester in a bid to boost the delivery of affordable homes. (*Manchester City Council, 2020*). The town hall is aiming to build overall 32,000 new houses by 2025, including 6,400 affordable home. By creating this company, the council will be able to control and set rent levels to better meet the needs of those on housing benefits. It is estimated that it could deliver around 1,800 new affordable homes, along with more than 1,000 homes for market sale and rent.



Figure 2. Manchester City Affordable Housing

3. Interest

It is expected that wards and areas, where there is a lower real estate cost and has a relatively lower density of local infrastructure and business, are preferred to achieve their goals. This can be due to various factors, not limited to but including:

- Delivery at least 500 homes per year hence location of lower average house price and lower average transactions
- Deliver a mix of affordable homes and market homes (with the latter helping to subsidise the affordable homes)
- Helping local community and small local business

By using the tools of data gathering and analysis, mapping and machine learning, the desire locations can be identified for the Manchester City Council house building company to back up their business case for planning permission application. The

clustering outcome and data visualisation will not just help identified site for affordable house building company, but also provide an opportunity for Manchester City Council to identify differences between each neighbourhood or electoral ward areas.

References

- Foursquare. (2020). Foursquare Developers. Retrieved May 2, 2021, from <https://developer.foursquare.com/>
- Mancheser City Council. (2018). Ward boundaries. Retrieved May 2, 2021, from https://www.manchester.gov.uk/directory/157/ward_boundaries
- Manchester City Council. (2020, June 1). Council's new housing company to build 500 affordable homes per year. Manchester City Council, p. 1. Retrieved from https://secure.manchester.gov.uk/news/article/8439/council_s_new_housing_company_to_build_500_affordable_homes_per_year
- Office of National Statistics. (2020). House Price Statistics for Small Areas (HPSSAs). Retrieved May 3, 2021, from <https://www.ons.gov.uk/peoplepopulationandcommunity/housing>

Data Gathering and Cleaning

1. Data Requirement

For the purposes of this project, which is to identify site for potential development location, the following data will be required to allow data analysis, mapping and clustering:

- Area boundaries and corresponding coordinates within the City of Manchester
- Existing available site locations
- Existing nearby venues and their features using Foursquare
- Recent mean and median housing price
- Recent house market transaction history

2. Data Sources and Feature Selection

Most player stats, position, age, and draft position data can be found in two Kaggle datasets here and here . These two datasets, however, lack data for certain years. For example, the player stats dataset ends in 2017, and the player draft dataset starts in 1978 and ends in 2015. To complement these two datasets, I scraped basketball-reference.com for player season stats of 2018 and player draft positions of 1965-1977 and 2016-2017 (players drafted in 2018 has yet to play in NBA).

Most of the data required can be obtained from the Manchester City Council site and Office for National Statistics (ONS). However due to the scope of this project and estimation purposes, some data will need to be manipulated to the form required using ArcGIS or QGIS (which is used in this project), before they are imported for analysis:

A. Area boundaries and corresponding coordinates within the City of Manchester

There is existing information of postal code area for Greater Manchester available on Wikipedia which can be scraped and used. However, the scope of this project will be focusing on the area of Manchester City instead of Greater Manchester, hence the 32 electoral ward areas within Manchester City will be used for area boundaries. This boundary information is available as shapefile from UK Ordnance Survey or as kmz file from Manchester City Council site. QGIS is used here to import the kmz file for centroid calculation and geoJSON which will be used for mapping during the analysis.

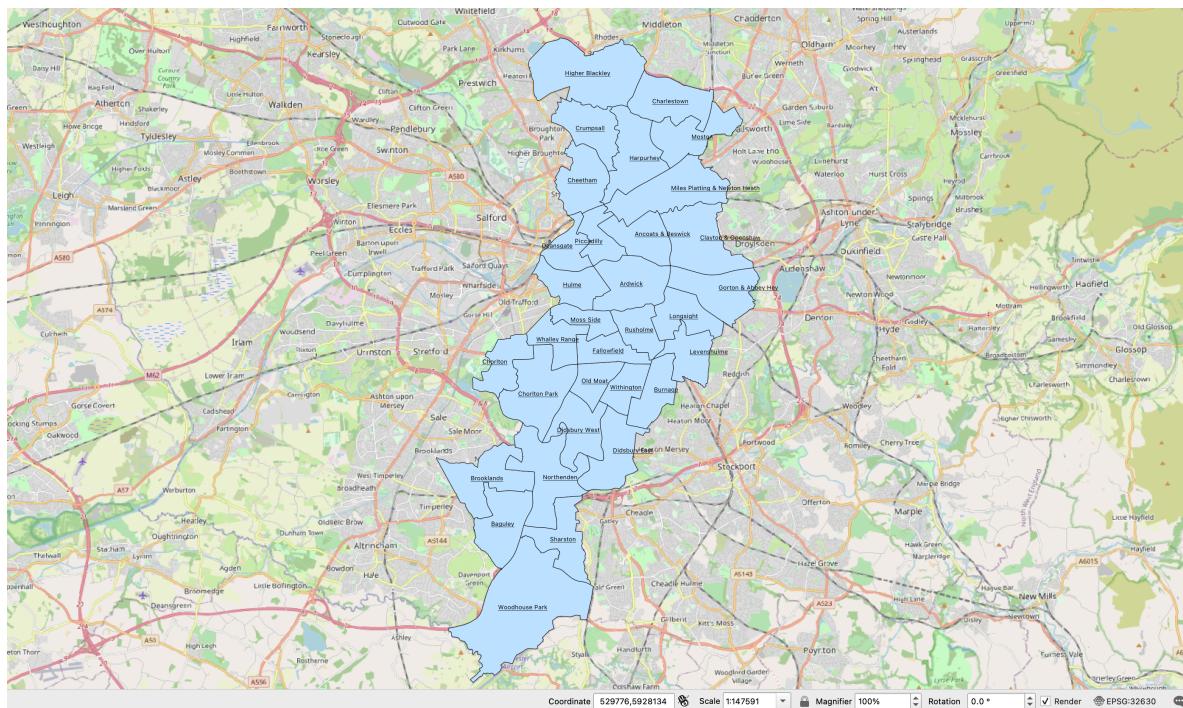


Figure 3. Ward Boundaries Imported to QGIS

B. Existing available site locations

Point data showing Brownfield land identified as being potentially available for housing development. Manchester's Local Plan and other frameworks and strategies, showing which areas within the city have the capacity to accommodate new housing. In addition it can be used by developers wanting to identify suitable sites for development in Manchester. These point data are also imported into QGIS in order to analyse which ward a site belongs to, as this action is spatial analysis based on ward boundaries, which is difficult to achieve within the notebook.

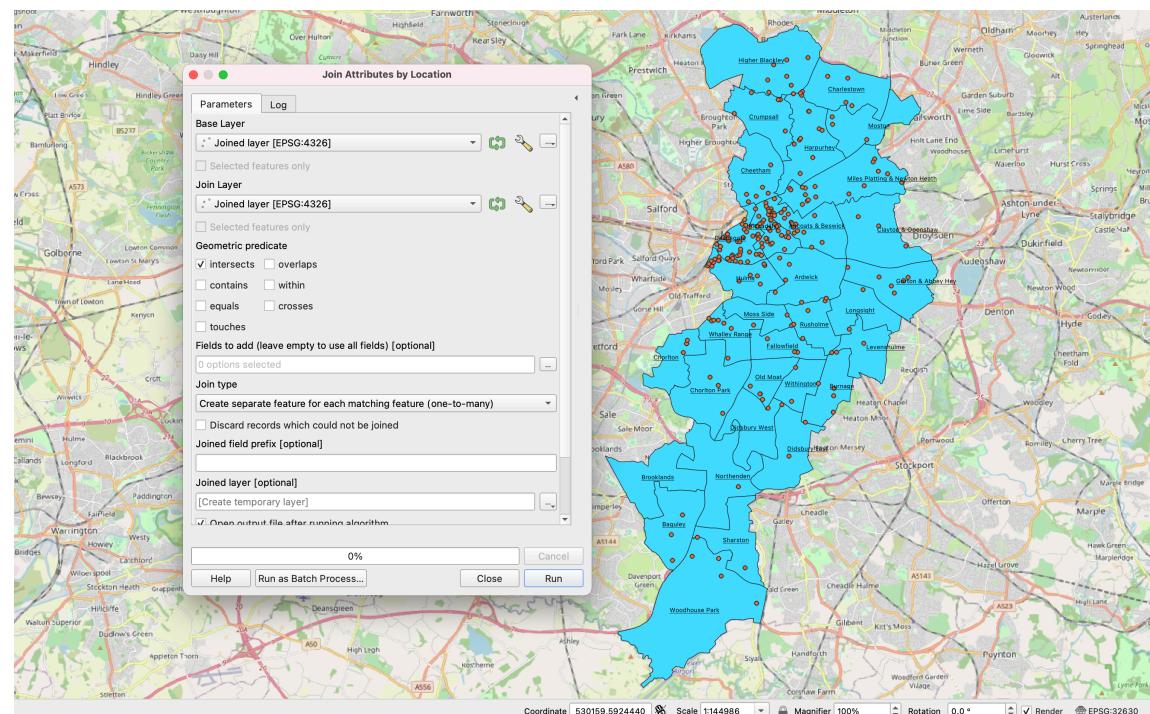


Figure 4. Intersecting and Matching Existing Sites with Local Ward

C. Existing nearby venues and their features using Foursquare

Using centroid coordinates of each ward in Manchester city, API calls to Foursquare can be used to get access to POI data for venues within each ward, and search rank venues and get real-time data access. Request package will be used to download venue content for features for each ward.

D. Recent mean and median housing price

Mean and median price paid for residential property in England and Wales, by property type and electoral ward. Annual data which is updated quarterly. These data are part of the House Price Statistics for Small Areas (HPSSAs) release, produced by Office of National Statistics and HM Land Registry. Statistics are reported for different types of dwelling including all types, detached, semi-detached, terraced houses and flats/maisonettes as well as a newbuild / existing dwelling breakdown.

These statistics report the count, median price, mean price, lower quartile price and tenth percentile price of all dwellings sold and registered in a given period of four consecutive quarters. For the scope of this project, the most recent mean and median overall house price data in 2020, including the last quarter in 2019 will be used for analysis, as the sample data shown below:

Local authority name	Ward code	Ward name	Year ending Dec 2019	Year ending Mar 2020	Year ending Jun 2020	Year ending Sep 2020
Manchester	E05011350	Ancoats & Beswick	230,000	240,000	237,000	250,000
Manchester	E05011351	Ardwick	204,498	210,995	218,995	222,495
Manchester	E05011352	Baguley	152,750	155,500	158,000	160,000

Table 1. Example of Median House Price Data from National Statistics

E. Recent house market transaction history

Number of residential property sales in England and Wales, by property type and electoral ward. Annual data, updated quarterly. These data are also part of the HPSSAs release as stated above.

References

Foursquare. (2020). Foursquare Developers. Retrieved May 2, 2021, from <https://developer.foursquare.com/>

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Office of National Statistics. (2020). House Price Statistics for Small Areas (HPSSAs). Retrieved May 3, 2021, from <https://www.ons.gov.uk/peoplepopulationandcommunity/housing>