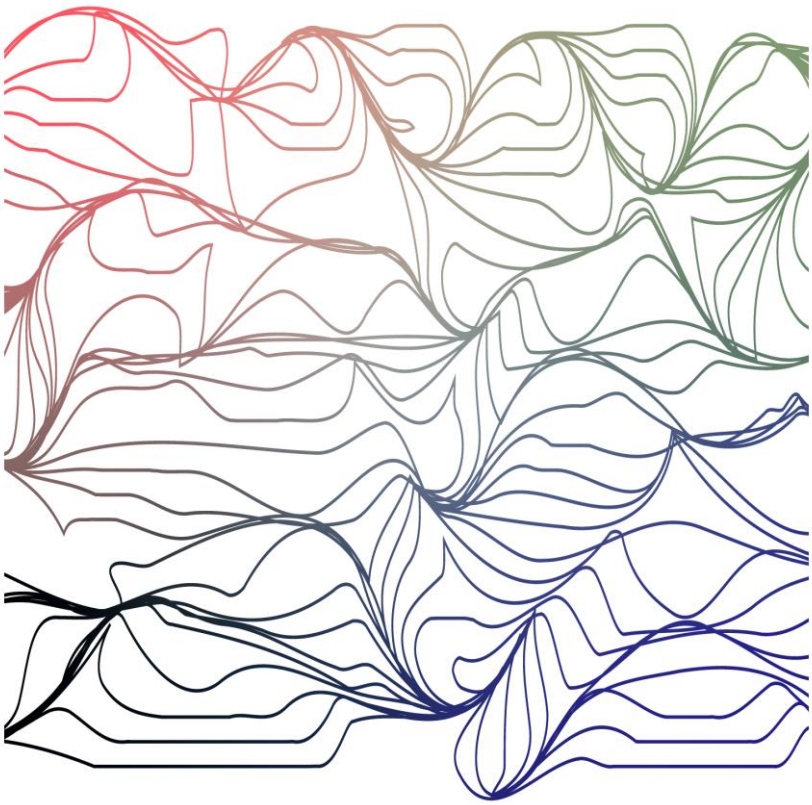
Testing Land Valuation Methodologies

Lot 1: Market-based statistical valuation
Lot 2: Advanced algorithmic and machine-learning applications

Prepared for the Welsh Government **March 2026**



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Executive Summary

Background

The Welsh Government is seeking to understand the potential of using alternative land valuation methods to inform future policy development in Wales. The objective is to produce a real-world proof of concept for land valuation, with the primary aim of identifying practical challenges, data requirements, limitations, and the applicability of different valuation methods.

To enable comparison and a thorough assessment of the challenges and outputs associated with alternative land valuation methods, the Welsh Government commissioned research from multiple organisations across five lots, with up to three organisations delivering distinct approaches within each lot.

- Lot 1: Market-based statistical valuation
- Lot 2: Advanced algorithmic and machine-learning applications
- Lot 3: Formula-based valuation by land area
- Lot 4: Conventional valuation approaches
- Lot 5: Innovative or experimental approaches

Alma Economics was commissioned to deliver work under Lots 1 and 2.

Methodology

Across both Lots, we applied methods intended for mass valuation, which are quantitative, rely on market prices, and focus on the value of the entire property (land and buildings) rather than land alone. Specifically, our approach follows three key steps to derive land values:

- **Step 1: Property valuations.** In the first step, we use statistical analysis to model property transaction prices as a function of property characteristics and socioeconomic factors. In Lot 1, we apply traditional statistical methods, such as hedonic regressions, whereas in Lot 2, we employ machine learning techniques, including random forests and gradient boosting machine.
- **Step 2: Land-to-building ratios.** In Step 2, property prices and land transaction data are used to derive land-to-building ratios.
- **Step 3: Land valuations.** Lastly, Step 3 combines the predicted property prices for a standardised property in Step 1 with ratios derived in Step 2 to obtain land valuations.

This approach is primarily motivated by the scarcity of land-only transactions. Assessing properties as a whole is more practical and likely to generate more accurate valuations, as there are significantly more property transactions available than land-only sales.

Findings

The table below presents average valuations for the selected Lower Super Output Areas (LSOAs) as specified in the brief, reported for terraced residential and non-residential properties. The valuations are derived from the estimated models, which serve two purposes: (i) to generate valuations for a standardised property—assuming identical property size, type, and attributes across LSOAs—and (ii) to capture differences in location characteristics, proxied by measures of deprivation, household income, rurality, and population density. Consequently, the variation in the estimated valuations shown below reflects differences in location characteristics, with property characteristics held constant.

The valuations are very similar across Lots 1 and 2. There is considerable variability across LSOAs, with valuations ranging from £1.7 to £14.7 per square foot for residential properties and from £0.5 to £11.3 per square foot for commercial properties. Among these areas, Rhondda Cynon Taf (001F) has the lowest average valuations, consistent across both residential and non-residential properties. In contrast, Monmouthshire (006F) exhibits the highest residential valuations, while Cardiff has the highest non-residential land valuations.

Table 1. Land valuations by LSOA (£/sqft)

	Residential (terraced properties)		Non-residential (commercial properties)	
	Lot 1	Lot 2	Lot 1	Lot 2
Gwynedd 009D	1.8	1.9	0.6	0.7
Flintshire 015A	5.7	4.8	2.6	2.3
Powys 011C	5.2	5.0	2.8	2.5
Ceredigion 002D	8.5	8.4	9.7	9.9
Pembrokeshire 002F	4.2	4.9	1.8	1.9
Bridgend 019D	9.2	7.5	7.2	7.2
Rhondda Cynon Taf 001F	1.7	1.8	0.5	0.7
Monmouthshire 006F	14.7	14.7	4.6	4.6
Cardiff 032H	14.1	12.1	10.5	11.3

Source: Alma Economics analysis.

The available data do not allow for valuations to be produced at a within-LSOA level. In particular, there is no information on socioeconomic factors (e.g., deprivation, population density) below the LSOA scale, nor are there detailed indicators of location attractiveness that would support valuation estimates within LSOAs.

Conclusion and further considerations

The valuations generated across the two Lots appear reasonable when compared with other valuation benchmarks and when sense-checked against socioeconomic factors, such as population density and deprivation. However, due to data limitations, they are not sufficiently robust to support valuations for the purpose of introducing policy reforms.

The primary limitation relates to land transaction data. Our sample includes only 141 land-only transactions in Wales over the past five years. This limited evidence base constrains the ability to robustly estimate land-to-building ratios and, consequently, land values. A second major limitation concerns non-residential data, which are insufficient to support valuations using mass valuation methods. While a relatively large sample of historical non-residential transactions is available (around 2,000 transactions between 2019 and 2025), there are many LSOAs—68% of them—for which no transactions are observed.

Overall, we have high confidence in the residential property valuations, medium confidence in the non-residential property valuations, and low confidence in the land valuations.

Notwithstanding these limitations, while the approach outlined in this document is not recommended for directly generating land valuations, it could be applied if more suitable data were available—particularly for land prices—or when used alongside other valuation methods. In particular, constraints arising from the limited availability of land transaction data could be mitigated by drawing on supplementary sources, such as property listing websites, to help infer land values. Integrating more robust estimates of land prices with the proposed methodology could lead to significantly improved valuation outcomes.

An alternative way to address limitations in land price data would be to combine the statistical models presented in this research with other valuation approaches, such as residual valuation methods. In practice, this would involve estimating Step 2 using a different methodology, rather than relying solely on market transaction data.

Future research could explore how the limitations identified above might be addressed through the incorporation of additional data sources and complementary approaches, particularly by combining statistical methods with other valuation techniques.

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