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Comparative Residential BER Measurement Case Study

iPad Pro 11-inch (M4) LiDAR vs Hilti PD-E

Four residential properties | BER Pro workflow | Ireland

Reference method	LiDAR hardware	Primary result
Hilti PD-E	**iPad Pro 11-inch (M4)**	**4.37% mean absolute difference**

Public-facing summary

Across the four independently compared geometry metrics - floor area, gross wall area, living area and total openings area - the four-property sample produced an overall mean absolute difference of 4.37% relative to the Hilti PD-E reference workflow. Storey heights were not treated as an independent LiDAR accuracy metric because BER height inputs require structural floor thickness that an internal LiDAR scan cannot directly determine.

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Executive Summary

This case study compares residential BER survey geometry captured using the LiDAR sensor on an iPad Pro 11-inch (M4) with measurements entered from a Hilti PD-E laser distance meter workflow. Four dwellings were surveyed and processed in BER Pro Version 5.1.7. The Hilti PD-E workflow was used as the reference for percentage comparisons; it is treated as a practical survey reference rather than as metrological ground truth.

Headline finding

The mean absolute difference across the four independently compared geometry metrics was 4.37%. Floor area showed a mean absolute difference of 3.04%, gross wall area 3.52%, living area 5.12%, and total openings area 5.78%.

The study also identified a specific BER workflow limitation. Internal LiDAR scanning cannot directly determine the structural floor thickness between storeys. Because BER storey-height inputs incorporate this thickness, the assessor should independently verify the applicable heights rather than rely solely on the LiDAR-derived room height. For the final comparison, the LiDAR reports were corrected to the Hilti reference heights before wall-area results were assessed.

For openings, doors and windows were combined into a single total openings area. This avoids treating BER-specific door/window classification as a LiDAR geometry accuracy test. Across all four dwellings, Hilti-derived openings totalled 55.29 m^2 and LiDAR-derived openings totalled 56.63 m^2, a pooled difference of +2.42%. The mean absolute house-by-house difference for total openings area was 5.78%.

Key finding	Result
Overall independent geometry comparison	**4.37% mean absolute difference**
Floor area	**3.04% mean absolute difference**
Gross wall area	**3.52% mean absolute difference**
Living area	**5.12% mean absolute difference**
Total openings area	**5.78% mean absolute difference**

1. Purpose and Scope

The purpose of this case study is to examine how closely an iPad Pro LiDAR-assisted survey workflow reproduces the geometry used in domestic BER assessments when compared with a conventional laser-measurement workflow. The study is focused on practical BER geometry inputs rather than on device laboratory specifications.

2. Equipment and Software

LiDAR surveys were captured using an iPad Pro 11-inch (M4). Reference measurements were obtained using a Hilti PD-E laser distance meter. The resulting building geometry was entered and reviewed in BER Pro Version 5.1.7. The comparison is based on the final BER calculation reports for four dwellings.

Component	Role in study	Treatment
Hilti PD-E	Laser distance measurement workflow	Reference workflow for percentage comparison
iPad Pro 11-inch (M4)	LiDAR-assisted internal geometry capture	Comparison workflow
BER Pro 5.1.7	BER geometry and calculation reporting	Common reporting environment

3. Methodology

1. Each dwelling was measured using the Hilti PD-E workflow and separately surveyed using iPad Pro LiDAR.
2. Reports were paired by BER Pro project number. The report whose project name included “LiDAR” was treated as the LiDAR survey; the matching report without that label was treated as the Hilti PD-E reference.
3. The final comparison used four geometry categories: total floor area, gross wall area, living area and total openings area.
4. Doors and windows were combined into total openings area because the objective was to compare captured geometry, not BER-specific opening classification.
5. LiDAR storey heights were corrected to match the Hilti reference heights before the final wall-area comparison, because BER storey-height inputs require structural floor thickness that internal LiDAR scans cannot directly determine.
6. For each independent metric, signed percentage difference was calculated as (LiDAR - Hilti) / Hilti × 100. Mean absolute difference was calculated from the absolute project-level percentage differences.

Important interpretation point

A 0.00% height difference in the final comparison does not mean LiDAR independently measured the BER storey height with perfect accuracy. It means the height was reference-corrected as part of the BER workflow. Height is therefore excluded from the headline independent-geometry accuracy figure.

4. Property Sample

Project	Dwelling type	Ground-floor BER height	First-floor BER height
B2600232	Semi-detached	2.42 m	2.65 m
B2600233	Mid-terrace, extended	2.39 m	2.64 m
B2600234	Mid-terrace	2.45 m	2.64 m
B2600237	End-terrace	2.44 m	1.94 m

5. Results

5.1 Mean absolute difference by metric

The chart below summarises the average absolute house-by-house difference for the four independently compared geometry metrics.

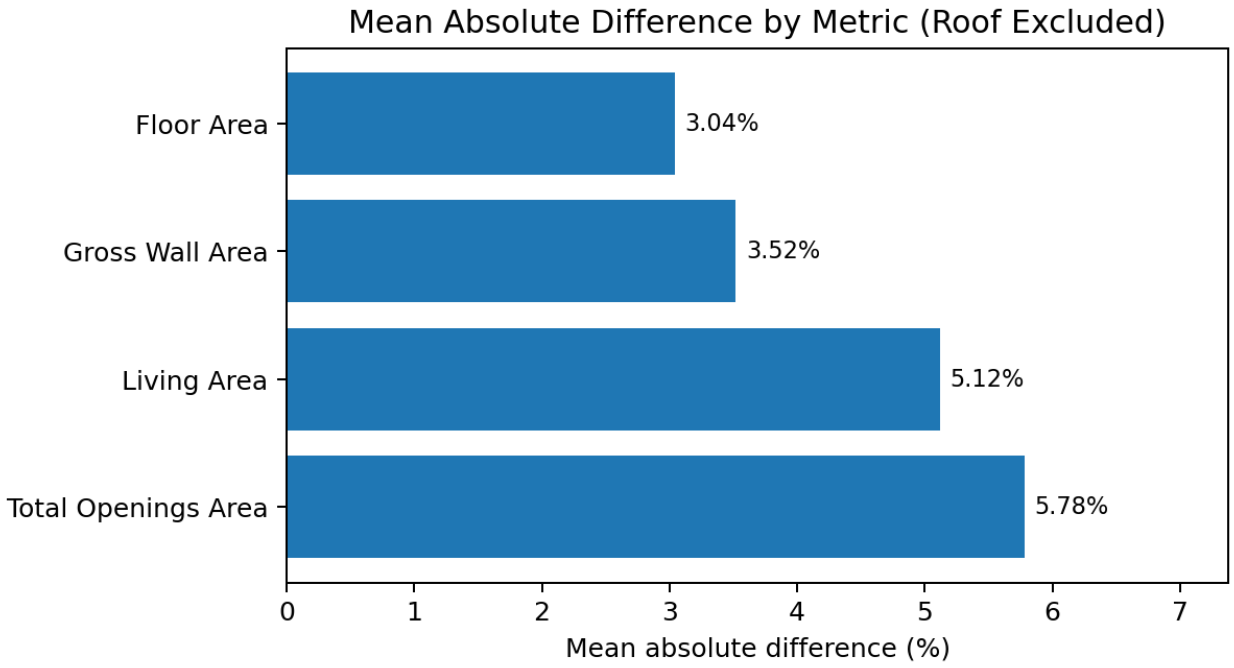


Figure 1. Mean absolute difference across four dwellings.

Metric	Mean absolute difference	Interpretation within this sample
Floor area	**3.04%**	Good agreement
Gross wall area	**3.52%**	Good agreement after height correction
Living area	**5.12%**	Greater variation

Metric	Mean absolute difference	Interpretation within this sample
Total openings area	**5.78%**	Greater variation
Overall across four metrics	**4.37%**	Headline comparative result

5.2 Project-by-project percentage differences

Project	Floor	Gross wall	Living	Openings
B2600232	-5.89%	-2.74%	+4.23%	+8.93%
B2600233	-2.32%	-8.96%	-10.98%	-4.76%
B2600234	-1.94%	-2.16%	-3.28%	+8.49%
B2600237	-2.01%	-0.24%	+1.98%	+0.93%

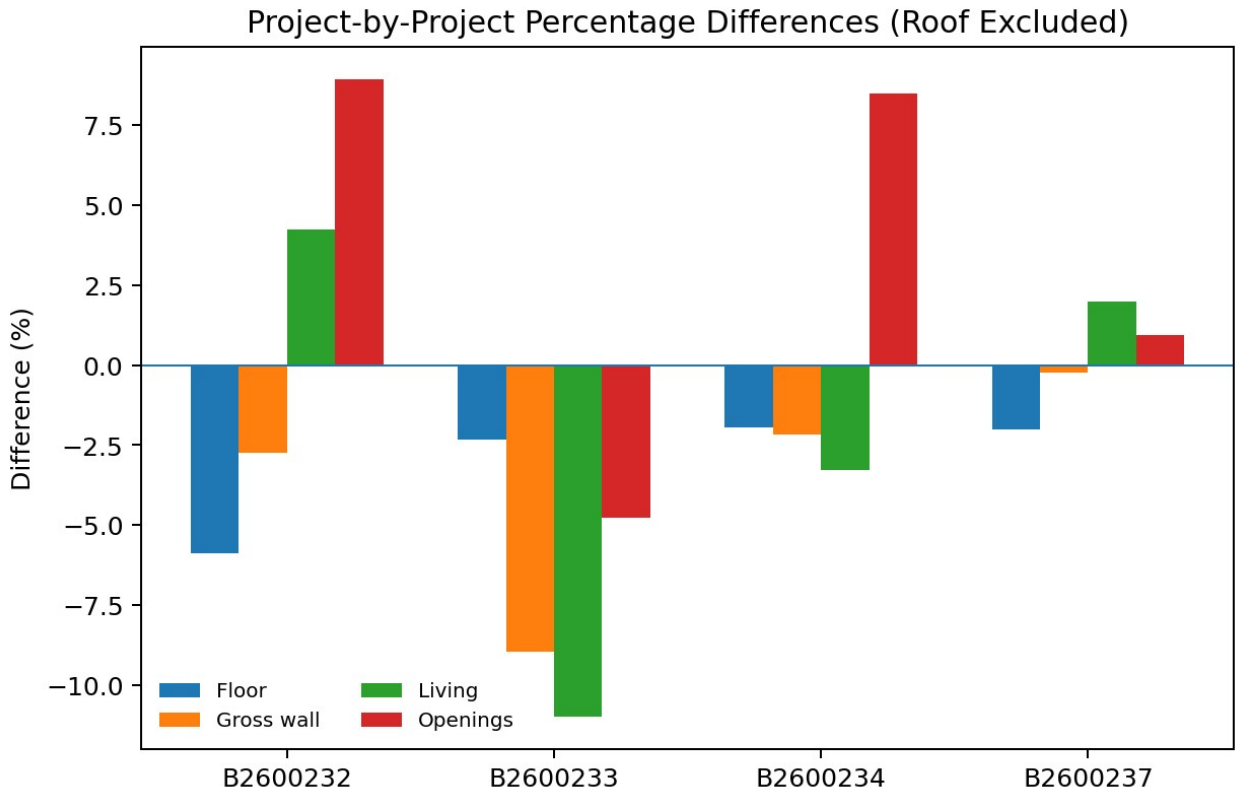


Figure 2. Signed percentage difference relative to the Hilti PD-E reference workflow.

6. Total Openings Area

Doors and windows were combined into one total openings area for each dwelling. This is the more appropriate comparison for a geometry-capture case study because LiDAR does not “understand” BER opening categories; it captures physical geometry. BER classification remains an assessor responsibility.

Project	Hilti openings	LiDAR openings	Difference	Difference %
B2600232	10.41 m²	11.34 m²	+0.93 m²	+8.93%
B2600233	18.28 m²	17.41 m²	-0.87 m²	-4.76%
B2600234	13.67 m²	14.83 m²	+1.16 m²	+8.49%
B2600237	12.93 m²	13.05 m²	+0.12 m²	+0.93%
Pooled total	**55.29 m²**	**56.63 m²**	**+1.34 m²**	**+2.42%**

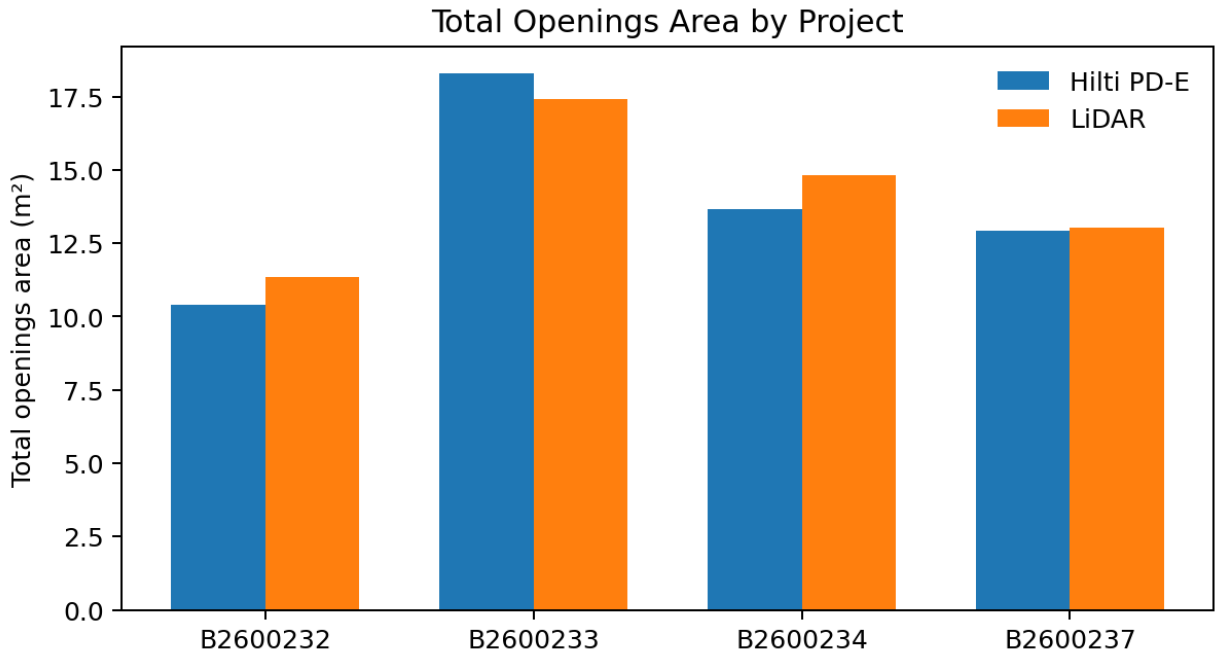


Figure 3. Combined door and window opening area by project.

Openings result

The mean absolute difference in total openings area was 5.78%. Across the complete four-property sample, total openings were 55.29 m² using the Hilti PD-E workflow and 56.63 m² using the LiDAR workflow, a pooled difference of +2.42%.

7. Discussion

Within this four-property sample, LiDAR-assisted capture produced geometry that was generally close to the Hilti PD-E reference workflow for floor and gross wall area. Living area and total openings showed more variability, indicating that these inputs deserve more deliberate assessor review before final BER submission.

Storey height is the clearest workflow limitation identified by the study. An internal LiDAR scan can capture room height, but it cannot directly determine the structural floor build-up between storeys. Because the BER methodology uses a storey-height input that includes this thickness, the assessor should verify the required height independently. Correcting the height can also change the calculated gross wall area, so wall comparison should only be made after that correction.

The results should therefore be interpreted as evidence about a practical LiDAR-assisted BER surveying workflow, not as a universal device specification or a laboratory validation of the iPad LiDAR sensor.

8. Limitations

- The sample contains four residential properties and is not statistically representative of all Irish dwelling types, sizes or construction forms.
- The Hilti PD-E workflow is used as the practical reference but is not treated as an independent metrological ground truth survey.
- Storey heights in the final LiDAR comparison were matched to the Hilti reference; therefore height is not an independent LiDAR accuracy metric in the headline result.
- Door and window classification can differ between workflows. For this reason, the study uses total openings area rather than separate door and window accuracy claims.
- Human survey technique, line-of-sight, room clutter, scan completeness and data-entry decisions can all affect results.

9. Recommended BER Survey Workflow

1. Use iPad LiDAR to capture internal geometry quickly and consistently.

2. Independently verify BER storey heights where structural floor thickness affects the required input.

3. Recalculate and review gross wall areas after any height correction.

4. When evaluating geometry capture accuracy, compare doors and windows as total openings area; apply BER-specific opening classification separately as an assessor judgement.

5. Review living-area boundaries and opening dimensions before final submission, as these categories showed more variation than floor and wall area in this sample.

6. Retain the laser meter as a verification tool for critical or ambiguous measurements rather than relying on a single capture method.

10. Conclusion

This four-property case study indicates that iPad Pro 11-inch (M4) LiDAR can be a useful geometry-capture tool within a domestic BER survey workflow when used with appropriate assessor checks. Across floor

area, gross wall area, living area and total openings area, the overall mean absolute difference relative to the Hilti PD-E reference workflow was 4.37%.

The practical conclusion is not that LiDAR replaces the assessor or the laser meter. Instead, LiDAR can accelerate geometry capture while the assessor remains responsible for BER-specific interpretation and verification. In particular, storey heights should be independently checked where floor thickness is required, and openings should be reviewed as geometry first and classified correctly for BER afterwards.

Recommended public conclusion

LiDAR is a useful and efficient geometry-capture aid for domestic BER surveys, but it should be used as part of an assessor-led workflow. Critical storey heights, opening classification and any ambiguous geometry should be independently verified before the BER is finalised.

Appendix A - Raw Geometry Comparison

The table below lists the final Hilti reference values and corrected LiDAR values used in the study. Areas are in square metres.

Project	Method	Floor	Gross wall	Living	Openings
B2600232	Hilti PD-E	71.48	92.23	9.92	10.41
B2600232	LiDAR	67.27	89.70	10.34	11.34
B2600233	Hilti PD-E	84.61	63.87	13.66	18.28
B2600233	LiDAR	82.65	58.15	12.16	17.41
B2600234	Hilti PD-E	79.40	58.82	13.72	13.67
B2600234	LiDAR	77.86	57.55	13.27	14.83
B2600237	Hilti PD-E	63.03	78.86	23.29	12.93
B2600237	LiDAR	61.76	78.67	23.75	13.05

Source data

BER Pro Version 5.1.7 calculation reports dated 27 September 2026 for projects B2600232, B2600233, B2600234 and B2600237. The final LiDAR reports used for comparison incorporated the corrected BER storey heights described in this report.