



H1 and orientation

An appendix to the new H1 requirements indicates the importance of orienting a building on site, including some prescriptive measures. Care must also be taken when using a compass to ensure true north is used in calculations – not magnetic north.

The latest versions of H1 *Energy efficiency Acceptable Solutions H1/AS1* and H1/AS2 both contain a very similar Appendix D: Orientation. This helps designers and architects ensure the data that they are using in their design and building consent documentation is consistent with the methodologies used to achieve compliance.

Evaluating a site

Before the design of the building even begins, architects and designers should consider the characteristics of the site if possible and the potential position and orientation options for the proposed building. I have even been engaged to evaluate the solar potential of proposed sites prior to purchase by the clients.

To that end, it is worth noting some of the basic passive solar design principles that should be considered and may be incorporated into the design of the new building. The primary factors to maximise are the location and orientation of both the site itself and the proposed building on the site. Then consider a compact floor plan with a high floor area-to-perimeter ratio and the weakest thermal link – the windows, including doors and skylights – and where they are positioned.

If these features are considered early and incorporated into the sketch design stage, the designer will be well on the way to creating



an H1-compliant building. As these passive design principles become more familiar through repeated use, they also become a more intuitive part of the design process.

If there is less redesign and tweaking of construction details needed to meet the H1 *Energy efficiency* thermal performance requirements, the spirit of the original design concept is more likely to remain intact and additional redesign time costs avoided.

What to note in Appendix D: Orientation

There are several details to be aware of with Appendix D. Firstly, the demarcation of the four compass orientations. Refer to Figure D.1.2.1 in H1/AS1 to see that, for example, a north-facing building wall – including its glazing areas – is considered to face north if it faces any direction in the north orientation quadrant or sector.

The north sector stretches between northwest – more than 315° – to northeast – less than 45°. While a range of 90° could indicate a broad, general position designated as north, it's important that actual north is established as accurately as possible.

If the proposed new building is to be erected on an existing site, there may be previous site details available. It will depend on where the proposed new building is to be sited, but there are multiple ways to establish the orientation of the site.

Building on a previously used site

If the section has had a previous dwelling or other building on it, there should be a file of information in the local council records. The records for some properties are extensive while others are comparatively threadbare. If a detailed site plan is present with a north point and boundary lengths shown and orientation – in degrees, minutes and seconds – indicated on each boundary, this will provide all the initial source information that is required.

However, be wary of more informal drawings that may be present in the council's file documentation for the site. As architects and designers, we should always include a north point on our documentation, but depending on where we source this information, it may only be approximately correct.

This is more common on older, historical hand-drafted site drawings. I recall one project where the building file contained only one solitary drawing with a north point present – a drainlayer's old hand-drawn as-built record of the drains they had installed on the site. This is a good example of a site record that is probably too risky and too inaccurate to replicate or use in H1 building consent analysis or documentation.

Modern CAD-based site documentation in the building file will generally tend to be more accurate and reliable, often having been based on a surveyed site plan. Look for some indication on the site plan acknowledging the source of the site data to establish confidence in the accuracy of the information.

In the absence of any council records for the site, a copy of the certificate of title

will provide details of all the boundaries of the site, including length and orientation. If the physical site has been pegged, this will aid an early visualisation on site of where the proposed building may be located and oriented and its relationship to the topography of the site.

Building on an undeveloped site

Many new builds will be located on undeveloped sites, and in this situation, the most accurate source of information will generally be a survey plan prepared by a registered surveyor. Again, the client and designer will be dependent on the presence of survey pegs to accurately visualise on site potential building platforms, proximity of boundaries and relevant site topography and natural features before beginning preliminary design.

Even at this early stage, well before H1 calculations are generated, the orientation of the site should be beginning to play a part in the proposed design of the building. Critical to this preliminary design will be the proximity of site boundaries along with their orientation. Appendix D in H1/AS1 also offers some very pertinent advice regarding on-site evaluation, specifically with respect to orientation.

Take care with compasses

Clients, architects and designers should take care with any orientation analysis undertaken on site while using a compass, including tablets and mobile phones. A compass will point towards magnetic north, not true north, and there is a significant difference.

In Aotearoa New Zealand, magnetic north is always east of true north, and this varies in different parts of the country. Magnetic north varies from true north by 21° in Auckland, while it is 24° in Wellington and Christchurch.

It is critical that true north is used for all site analysis and establishment of orientation rather than magnetic north. Appendix D also includes a helpful link to a GNS website that can be used to calculate the difference between magnetic north and true north – magnetic declination – in different locations around the country. ◀