

BASIX THERMAL COMFORT PROTOCOL

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1 Introduction

1.1 What is BASIX?

BASIX is the Building Sustainability Index. It is a web-based planning tool designed to assess the potential performance of new homes against a range of sustainability indices: Water, Thermal Comfort and Energy. BASIX aims to reduce the environmental impact of new residential development and to produce homes that are more comfortable and cheaper to run than most existing homes.

BASIX was introduced into the development approval process in NSW on 1 July 2004 under the *Environmental Planning and Assessment Act 1979*.

More information about BASIX, including the requirements for completing a BASIX assessment, is available on the BASIX website, www.basix.nsw.gov.au.

1.2 About the Thermal Comfort Index of the BASIX tool

The Thermal Comfort Index of the BASIX tool assesses the heating and cooling loads placed on a new dwelling by its fabric. It does not assess the heating and cooling appliance or fuel type – these are assessed in the Energy Index. The Thermal Comfort Section of BASIX aims to:

- Ensure thermal comfort for a dwelling's occupants appropriate to the climate and season.
- Provide the potential to reduce greenhouse gas emissions from artificial cooling and heating through good building design and use of appropriate construction materials.
- Reduce the demand for new, or upgraded, energy infrastructure by managing peak demand for energy required for cooling and heating.

1.3 About this Protocol

To complete the Thermal Comfort Index of a BASIX assessment, applicants can choose between a Rapid method which sets simple non-flexible standards for the dwelling, a DIY method which has minimum insulation and a flexible glazing assessment, and the 'Simulation' method for a more detailed assessment.

The Rapid and DIY methods can be completed entirely within the BASIX tool, whereas the Simulation method involves the assessment of the thermal performance of a proposal by an Accredited Assessor.

This Protocol applies to the Simulation method for the Thermal Comfort Index of BASIX, and ensures that thermal performance assessments under the Simulation method are carried out consistently and accurately. This Protocol establishes requirements for:

- the accreditation of organisations that may accredit assessors to conduct Simulations, and the accreditation of assessors by such organisations;
- the software which can be used by Accredited Assessors to conduct Simulations; and
- the manner in which Simulations are to be conducted by Accredited Assessors.

This Protocol is mainly intended for organisations seeking accreditation from DP&E to accredit assessors to conduct thermal performance Simulations for BASIX, and for assessors already accredited by Accrediting Organisations. Consent authorities (or certifying authorities) can refer to Tables 1a and 1b of this Protocol on the Approved Software for the Simulation method.

1.4 Definitions

Terms used in this document have the meaning given to them below.

Accredited Assessor means a person accredited by an Accrediting Organisation to conduct Simulations for the Thermal Comfort Index of BASIX.

Accrediting Organisation means an organisation approved by DP&E to accredit assessors for the purposes of conducting Simulations.

Approved Software means software that has been approved by DP&E for conducting Simulations.

Assessor Certificate means the Nationwide House Energy Rating Scheme Certificate issued from the online generation system by the software provider, with the first page showing the NatHERS logo with the total heating and cooling loads and the unique QR-code..

Assessor Certificate Number means the unique Certificate Number shown on the Assessor Certificate.

Attached dwelling house means a dwelling which is attached to, or less than 0.5m from, any other dwelling or building (excluding a garage or carpark), but which does not have another dwelling or building (excluding a garage or carpark) above or below it, such as a semi-detached house, terrace house, row house or townhouse.

BASIX means Building Sustainability Index

Conditioned floor area, in relation to a dwelling, means the total floor area of the dwelling, excluding:

- a) floor area that is not fully enclosed;
- b) bathrooms (but not ensuites) and laundries, with a ventilation opening; and
- c) voids, store rooms, garages and carparks.

DP&E means Department of Planning and Environment.

Multi Dwelling Development means a development with more than one new dwelling on a single lot.

NatHERS means the Nationwide House Energy Rating Scheme, a framework that allows approved software tools to rate the heating and cooling loads of Australian homes by their building fabric.

NCC means the current version of the National Construction Code.

QR Code means the unique scannable code which links to the Assessor Certificate and drawings.

Separate dwelling house means a dwelling which is separated from all other dwellings and other buildings (excluding a garage or carpark) by at least 0.5m.

Simulation means the modelling of a new dwelling using Approved Software for the purposes of demonstrating compliance with the BASIX Thermal Comfort Index.

Software Provider means a provider and/or distributor of thermal modelling software.

Unconditioned floor area, in relation to a dwelling, means the total floor area of all bathrooms (not including ensuites) and laundries, with a ventilation opening.

2 Accreditation of organisations and Assessors

2.1 Aim

The aim of this section of the Protocol is to establish requirements for the accreditation of organisations that may accredit assessors to conduct Simulations, and the accreditation of assessors by such organisations.

2.2 Scope

This section only applies to activities of Accrediting Organisations and Accredited Assessors that relate to conducting Simulations for the purposes of compliance with the Thermal Comfort Index of BASIX.

2.3 Application to be an Accrediting Organisation

Organisations must apply to DP&E for accreditation to accredit assessors to conduct thermal performance Simulations for BASIX. Applications are limited to organisations that have been accredited by NatHERS as Assessor Accrediting Organisations (AAOs) in accordance with the NatHERS Protocol for Assessor Accrediting Organizations. DP&E will not directly accredit individual assessors, or an organisation that has not been accredited by NatHERS as an AAO.

Applications to DP&E by an organisation seeking accreditation must include the following information (additional information may be requested):

- proof of the organisation's current accreditation by NatHERS as an AAO;
- a copy of the organisation's application to NatHERS for accreditation as an AAO together with the supporting information submitted with that application;
- a publicly accessible website from the organisation listing the names and contact details of all of its assessors to conduct Simulations. The list of assessors must be up to date at the time of application and must be updated regularly. Assessors with partial or limited accreditation must be identified to DP&E;
- explanatory material to be provided to Accredited Assessors such as guidelines and procedures for conducting Simulations;
- the criteria by which accreditation of assessors may be withdrawn;
- details of the proposed format of Accredited Assessor numbers (a maximum of 12 letters or numbers) to be entered into the BASIX on-line tool;

DP&E will assess applications for the accreditation of an Accrediting Organisation and determine whether an organisation will be accredited. DP&E may rely on expert advice when assessing applications. Following determination, DP&E will notify the applying organisation in writing of the outcome of the application.

As at the date of this Protocol, the Association of Building Sustainability Assessors (ABSA) and the Building Designers Association of Victoria (BDAV) are recognised as Accrediting Organisations.

2.4 Accreditation of assessors by Accrediting Organisations

An Accrediting Organisation may accredit qualified individuals as Accredited Assessors for the purposes of conducting Simulations to determine the heating and cooling loads of buildings for use in BASIX assessments.

Individuals to be accredited as Accredited Assessors must already hold the qualifications as required by NatHERS.

2.5 Quality assurance

As required by the NatHERS Protocol for Assessor Accrediting Organisations, an Accrediting Organisation must have a quality assurance system in place (such as a code of practice and/or standardised procedures) to ensure Simulations are conducted in a uniform manner.

2.6 Quality assurance review

An Accrediting Organisation must conduct reviews in accordance with the quality assurance system and the requirements from the NatHERS Protocol for Assessor Accrediting Organisations. A review report that includes (but is not limited to) the monitoring of conformity of assessor outputs in NSW to the assessor accreditation criteria must be provided to DP&E at suitable intervals. Accrediting Organisations must take steps to resolve serious and recurring issues that arise as a result of the review.

2.7 Periodic reporting

In addition to the auditing report required in Section 2.6 of this Protocol, an Accrediting Organisation must provide to DP&E a copy of the annual report to NatHERS when available. DP&E may request information specific to NSW or other states as need arises.

2.8 Accredited Assessor support

Software support is not provided by an Accrediting Organisation, but an Accrediting Organisation must provide Accredited Assessors with sufficient technical support in relation to their role of conducting Simulations and obligations under this Protocol. Accrediting Organisations must provide assistance to Accredited Assessors in their role of advising clients on compliance with the BASIX Thermal Comfort requirements.

2.9 Other Rules and Guidelines

An Accrediting Organisation may have other rules and guidelines relating to the conduct and activities of its Accredited Assessors. The Accrediting Organisation is responsible for ensuring these rules and guidelines are consistent with this Protocol.

2.10 Notification of operational changes

An Accrediting Organisation must inform DP&E of changes to its operations that may affect its status as an Accrediting Organisation.

3 Software used to conduct Simulations

3.1 Aim

The aim of this section of the Protocol is to establish a common and appropriate benchmark for all software used to conduct Simulations to demonstrate compliance with the Thermal Comfort Index of BASIX.

3.2 Applications to have software approved

Software providers must apply to DP&E for software to be approved for the purpose of conducting thermal performance Simulations for the Thermal Comfort Index of BASIX. Applications are limited to software accredited by NatHERS in accordance with the requirements in the NatHERS Software Accreditation Protocol. Applications to DP&E must include the accreditation outcome by NatHERS on the software, and information demonstrating that the software meets the criteria of the NatHERS Software Accreditation Protocol.

DP&E will assess applications and determine whether approval will be given. DP&E may rely on expert advice when assessing applications. Following determination, DP&E will notify the Software Provider in writing of the outcome of the application.

3.3 Support for Approved Software

Software Providers must provide sufficient support for Accredited Assessors to enable them to conduct Simulations using Approved Software. Details of support measures, including response times and communication methods (e.g. via email), must be provided to DP&E.

3.4 Updates to Approved Software

Software Providers must abide by the procedures outlined in the NatHERS Software Accreditation Protocol when updating software.

Software Providers must submit proposed updates to DP&E and Accrediting Organisations prior to the software updates being released. Depending on the changes involved in the updates, approval by DP&E and a suitable transition period to the updated version may be required.

3.5 Criteria for Approved Software

Software must meet the criteria outlined in the NatHERS Software Accreditation Protocol before it can be used for conducting Simulations.

Limitations of the software must be clearly documented and made available to Accrediting Organisations, Accredited Assessors and DP&E.

3.6 Current list of Approved Software

Approved Software and dates of approval are listed in Table 1a. Expiry dates of previously approved software are listed in Table 1b.

Note: Approved Software applies only to the version numbers shown.

Table 1a: Approved Software and dates of approval

Approved Software	Limitations	Date of approval
AccuRate Sustainability v2.3.3.13	Rating modules only	1 December 2014
BERS Pro version 4.3.0.x (3.13) (from 4.3.0.1 onwards)	All dwellings except house plans that include roof windows	1 May 2016
FirstRate 5 version 5.2.x (3.13)		1 February 2015

Table 1b: Expiry dates of previously approved software

Approved Software	Expiry date
AccuRate Sustainability v2.0.2.13	31 December 2014
AccuRate Australian Edition v1.1.4.1	31 December 2014
BERS Pro version 4.2 release 110811	30 April 2016
BERS Pro version 4.3.0.0 (3.13)	30 April 2016
FirstRate 5 version 5.1.x	30 April 2016

3.7 Revisions to Simulated Ratings

In the event that a simulated rating needs to be revised, the software version of the original rating may be used after Expiry date in Clause 3.6 if the software version of the original rating is available and a revised Assessor Certificate (according to the definition of the original rating) can be generated.

4 Conducting Simulations

4.1 Aim

The aim of this section of the Protocol is to establish procedures to be followed by Accredited Assessors when conducting Simulations of dwellings using Approved Software to demonstrate compliance with the Thermal Comfort Index of BASIX.

4.2 Accredited Assessors eligible to conduct Simulations

Accredited Assessors are only eligible to conduct Simulations if they are accredited to do so by an Accrediting Organisation under this Protocol.

Accredited Assessors must only conduct Simulations for those dwelling types or circumstances allowed by their accreditation.

4.3 Simulation procedures

When conducting Simulations, Accredited Assessors may only use Approved Software under this Protocol.

Accredited Assessors must abide by the following procedures when conducting Simulations.

4.4 Software use

Software must be operated in accordance with:

- a. Assessment Procedures set out in this Protocol (**which prevail over other procedures, including items b to e below**);
- b. current Technical Notes issued by NatHERS;
- c. the user manual or help files provided with the software;
- d. any training material received while completing the required qualification; and
- e. other procedures issued by an Accrediting Organisation.

4.5 Limitations on dwellings to be modelled by software

Software must be used to rate new dwellings for the purposes of demonstrating compliance with the BASIX Thermal Comfort Index. Without written approval from DP&E, the software must not be used to demonstrate BASIX compliance for only a part of a dwelling, or alterations or additions of existing dwellings.

4.6 Spaces to be included in conditioned and unconditioned zones

The definitions for conditioned and unconditioned zones in Approved Software and NatHERS Technical Notes may differ from the BASIX definitions for conditioned and unconditioned floor areas. When conducting Simulations:

- All spaces that fall under the **BASIX definition** of conditioned floor area must be included in a conditioned zone. Ensuites must be included in a conditioned zone whether or not they have a ventilation opening.
- All spaces that fall under the **BASIX definition** of unconditioned floor area must be included in an unconditioned zone.

Outdoor living spaces such as balconies, or rooms with mesh or open screens should not be included in either a conditioned or unconditioned zone.

BASIX definitions of conditioned and unconditioned floor areas have the following effects:

- Separate bathrooms and toilets and laundries with a ventilation opening (e.g. operable window) must be included in an unconditioned zone.

- Separate bathrooms and toilets and laundries **without** a ventilation opening (e.g. operable window) must be included in a conditioned zone as they will be required to have mechanical ventilation which will generally draw conditioned air in from an adjacent conditioned zone.

4.7 Modification of Approved Software outputs

Only where directed to do so through the process described in section 5.2 of the Thermal Comfort Protocol are modifications to the loads calculated by the Approved Software permitted.

4.8 Climate zone

Accredited Assessors must use the correct postcode for the site. If the Approved Software lists more than two climate zones for a postcode, the Assessor must use the first climate zone. Alternative climate zones for a postcode can only be used with the permission of the DP&E. If Accredited Assessors are convinced that the alternative or other climates zones are more appropriate to the site, contact the BASIX help desk for further advice.

4.9 Dwellings in a Multi Dwelling Development

Individual dwellings in a multi dwelling development must have their own individual rating even if it is of similar design, as required by the NatHERS Technical Notes.

4.10 Ground reflectance

The default value of 0.2 must be used regardless of the surfaces surrounding of the building.

4.11 Construction

4.11.1 General

Construction of the assessed building must be modelled as indicated on the drawings and specifications intended for lodgement with the consent authority (or certifying authority). Unusual construction systems must be clearly described with details.

Where information is not provided on the drawings and specifications, the Accredited Assessor should make a written request to the client for the information. That request should state that where information is not detailed the default values specified in this Protocol will be applied. If no default values are available from this Protocol, the worst case values specific to the location of the assessed building will be applied. Multiple simulations may be required to identify the worst case defaults.

4.11.2 Construction materials and systems

Accredited Assessors must only model construction systems (i.e. combinations of construction materials) that are embedded into Approved Software or have been issued by the software provider (or its support agency). When developing construction systems, software providers (or their support agencies) must give consideration to installation practices.

4.11.3 Sub-floor ventilation

Sub-floor spaces must be modelled as shown on the drawings. Enclosed sub-floor spaces include those with enclosing walls with not more than the minimum ventilation openings required by the National Construction Code (NCC).

4.11.4 Floor coverings

Floor coverings must be modelled as shown on the drawings and specifications. Where a floor covering is nominated on the drawings and specifications, the floor covering must be nominated. If no floor covering or finish is specified on the drawings and specifications, it must be modelled in accordance to the NatHERS Technical Notes.

4.11.5 Waffle pods

Waffle pods must be modelled in accordance to the NatHERS Technical Notes.

4.11.6 Curtains, pelmets and other internal window/glazed door treatments

Regardless of the internal window or glazed door treatments nominated on the drawings and specifications, all windows must be modelled as having low performance Holland blinds. Internal window coverings must not be modelled.

Insect screens must be modelled on all windows and glazed sliding doors regardless of whether shown on the plans of specifications.

4.11.7 External shading

External shading devices must not be modelled unless they are shown on the plan and are of exterior grade construction materials.

4.12 Colours

4.12.1 Roof colours

The external roof colour or shade (e.g. light) must be modelled as nominated on the drawings and specifications. If a specific colour is to be modelled, its solar absorptance must be nominated; otherwise the solar absorptance in Table 2 must be modelled. If the external roof colour is not specified, the worst case default as required by the NatHERS Technical Notes must be modelled.

The internal roof colour must be set to 'not specified' regardless of the colour nominated.

Table 2: Roof colour/shade and corresponding solar absorptance

Roof colour/shade	Solar absorptance
Light	< 0.475
Medium	0.475 to 0.70
Dark	> 0.70

4.12.2 Wall colours

The external wall colour or shade must be modelled as nominated on the drawings and specifications or set to 'medium' if not specified.

The internal wall colour must be set to 'not specified' regardless of the colour nominated.

4.12.3 External window and door frames

The colour of external window and door frames must be set to 'not specified' (if available) regardless of the colour nominated.

4.13 Insulation

The type and R-value of insulation must be clearly nominated in accordance with the following options:

- a. Specifically nominate bulk insulation as being used and state the material R-value (of the insulation only) on the Assessor Certificate and on the drawings and specifications;
- b. Specifically nominate foil insulation:

- I. in walls and state either the total system R-value of the wall including the product, or a clear description that identifies product or type including emissivities of foil surfaces and air gaps;
- II. in ceilings and state the total system R-value in both directions of heat flow, or a clear description that identifies product or type including emissivities of foil surfaces and air gaps;
- III. In roofs and state the total system R-value in both directions of heat flow, or a clear description that identifies the product or type including emissivities of foil surfaces and air gaps.

Where the information regarding foil insulation is not available the Assessor should make a written request to the client for the information.

Note that insulation installation must comply with the relevant requirements from the NCC. Accredited Assessors must ensure that the insulation type and thickness specified is appropriate for installation with the specified wall type. In some climate zones, insulation should be installed with due consideration of condensation and associated interaction with adjoining building materials.

4.13.1 Loss of ceiling insulation from ceiling penetrations

The loss of ceiling insulation must be considered if anything is installed which requires penetration through the ceiling including recessed luminaires, vents or exhaust fans. Refer to the NatHERS Technical Notes for details.

If the lighting plan is not available after written requests to the client have been made, Accredited Assessors may rate the dwelling with no ceiling penetrations from luminaires. Alternatively, Accredited Assessors may model the penetrations based on the following defaults:

- Halogen downlights with the default dimensions and clearance from the software, in each zone where the downlights are likely to be installed based on the professional judgement of Accredited Assessors, and
- At a rate of 4 ventilated recessed downlights per 10 square metres of ceiling area in each zone being considered by Accredited Assessors. For zones between 5 and 10 square metres allow 2 recessed downlights and 1 recessed downlight for zones less than 5 square metres. For example a combined living/kitchen area of 15 square metres would have 6 ventilated recessed downlights, and a living/dining of 30 square metres would have 12.

The certificate must be revised when the lighting plan becomes available and if the number of ceiling penetrations from recessed luminaires being modelled (none or the defaults listed above) is lower than the number in the lighting plan. Using the defaults above may reduce the impacts of simulated heating and cooling loads after revisions.

4.14 Glazing

4.14.1 General

Windows, glazed doors, skylights and glazed roofs must be modelled according to the drawings and specifications.

4.14.2 Openable proportion of windows

The openable proportion of windows, doors and other openings and the openable percentages of window units must be calculated and entered into the Approved Software in accordance to the NatHERS Technical Notes.

4.15 Zoning

4.15.1 General

All parts of the building capable of being fully enclosed, including storage spaces, must be included in a zone. This includes spaces with openings required for the safe operation of a gas appliance.

All spaces are to be included in separate zones, except for spaces which do not have an operable window/door or skylight (e.g. bathroom, storeroom). These spaces must be included in the zone from which they are accessed.

Spaces with different usage patterns must be modelled as separate zones even if there is no physical separation e.g. bedsits or open plan studio apartments.

Zoning of small air spaces and spaces with no physical separation must follow the rules set out in the NatHERS Technical Notes.

Garages should be zoned as per NatHERS Technical Notes.

4.15.2 Spaces, zoning and heating/cooling

Software zone types are set out in the NatHERS Technical Notes. Please note that the term “Conditioned” or “Un-conditioned” in the NatHERS Technical Notes may differ from the BASIX definitions for conditioned and unconditioned floor areas (Section 4.6).

4.16 Adjacent buildings

Where adjacent structures are existing or have development approval as indicated on the drawings, they must be modelled.

For the purposes of this clause, an adjoining space is considered to be conditioned if the zone type is heated or cooled, or, where no appropriate zone type exists, a “conditioned space” in accordance with definition in the NCC.

Where walls, floors or ceilings are shared with adjoining spaces that are conditioned, they shall be described as internal walls adjacent to “neighbours”, floors above “neighbours” or ceilings below “neighbours”.

Where walls, floors or ceilings are shared with adjoining spaces that are enclosed but not conditioned, they shall be described as external walls, floors above outdoor air or roofs, but with zero solar absorptance and modelled with an additional R0.5 insulation. However, where the adjoining space is a corridor with a majority of the external wall being glazing, the shared wall shall be described as an internal wall adjacent to a non-conditioned day-time zone, with the zone having the same length as the shared wall.

Where walls, floors or ceilings are shared with adjoining spaces that are neither enclosed nor conditioned, they shall be described as external walls, floors above outdoor air or roofs. Additionally, where the adjoining space is covered (e.g. corridor), a wall may be modelled with eaves having the same projection as the width of the corridor.

When conducting Simulations of a building on a new development site where no neighbouring houses are present or indicated on the plans but will be developed in the future, refer to the NatHERS Technical Notes.

4.17 Trees and vegetation

Only existing trees and vegetation protected by a planning instrument, namely preservation order or heritage protection, may be considered in a Simulation. Such trees (including canopy) and vegetation must be indicated on the drawings to scale or dimensioned. Vines or other vegetation intended to be grown over time cannot be modelled.

4.18 Building sealing

Accredited Assessors must model the dwelling in accordance with the NCC NSW Additions for building sealing.

4.19 Heating and cooling appliances

Mechanical heating and cooling appliances or systems (e.g. ceiling fans, air-conditioning systems and the like) cannot be considered in an Assessment. Electrical resistance heating systems cannot be considered in an Assessment. Systems that form part of the building fabric and provide some heating and cooling benefit (e.g. trombe walls and the like) may be considered through the process detailed in section 5.2 of this Protocol.

4.20 National Construction Code Energy Efficiency requirements

Accredited Assessors should note that BASIX Thermal Comfort (Simulation) does not replace all of the National Construction Code Part 3.12, Energy Efficiency.

Accredited Assessors must ensure that the simulated dwelling design allows for insulation to be installed in compliance with the National Construction Code Part 3.12.1.1.

Accredited Assessors must ensure that the simulated dwelling design allows requirements of the National Construction Code Part 3.12.5 for the design, location and insulation of services to be met.

5 Limitations of Approved Software

5.1 General

Accredited Assessors must conduct Assessments within any published limitations of the Approved Software used.

5.2 Circumstances outside software limitations

For dwellings, design strategies, construction systems or materials that are beyond the capabilities of the Approved Software, Accredited Assessors must seek the advice from the user support provided by the software provider, or experts nominated by the Accrediting Organisation. Accredited Assessors can apply for a BASIX Alternative Assessment that allows DP&E to consider the circumstances outside software limitations on an individual basis. A written advice from the user support provided by the software or experts nominated by the Accrediting Organisation must be provided with the application.

Please refer to the BASIX Help note (available on the BASIX website at www.basix.nsw.gov.au) for more information on the Alternative Assessment process.

6 Documentation required for Assessments

The Assessor Certificate must include the minimum reporting requirements for single and multi-dwellings set out in the NatHERS Technical Notes. Refer to the Definition section of this Protocol on what the Assessor Certificate comprises of.

Requirements in the box titled “Window selection” on the Assessor Certificate that shows the variation of star rating with SHGC values are not applicable to BASIX.

For Class 1a buildings on a single lot where individual certificate numbers of the buildings are available, a summary sheet issued from the same online generation system as the Assessor Certificate must be attached alongside the BASIX certificate.

Accredited Assessors must not issue an Assessor Certificate unless:

- The Assessor Certificate and the plans accompanying the DA or application for a CDC have been endorsed by the Accredited Assessor.
- The information on the Assessor Certificate is consistent with information on the drawings and/or specifications, and with the details of the DA or application for a CDC.

Only one Assessor Certificate per DA or CDC is to be issued. The information on zone types relating to each dwelling must be clearly identified in the records kept by the Accredited Assessor.

Completed Assessments must be accompanied with drawings and specifications, which define all features of the building that the Assessment was based on.

The information in Table 3 is required on drawings and/or specifications for the purpose of conducting thermal performance Simulations for the Thermal Comfort Index of BASIX.

Where the information in Table 3 is not provided on the drawings and/or specifications, the Assessor should make a written request to the client for the information. If no further information is received, the default values specified in this Protocol will be applied. If no default values are available from this Protocol, the worst case values specific to the location of the assessed building will be applied. Multiple simulations may be required to identify the worst case defaults.

Table 3: Information required on drawings and specifications to conduct Simulations for the BASIX Thermal Comfort Index

Element	Detail required on drawings and/or specifications
General drawing quality	a. Must be to scale. b. Must clearly show intended construction with labels or industry standard drawing conventions.
Specification quality	Must clearly identify relevant material types and any relevant standards.
Project details	Yes
Orientation	a. True north. b. Relationship of building to true north.
Overshadowing	Location and height of forms which may be either part of the assessed building or adjoining the assessed building. These may include: a. existing buildings; b. approved buildings; c. fences and screens; d. landforms; e. protected trees.
Room identification	a. Names of rooms or spaces shown on drawings to identify use, e.g. living, kitchen, bath, etc. b. Connecting doors, openings, stair voids, etc.
Typical construction	May be indicated with industry standard
Unusual construction	Must be specifically detailed.
External walls	a. Drawing to scale. b. Material. c. Insulation type, R-value and location. d. Colour and/or solar absorptance where a specific colour is modelled.
Internal walls	a. Drawing to scale. b. Material. c. Insulation type, R-value and location.

Element	Detail required on drawings and/or specifications
Windows (and other glazed elements)	<ul style="list-style-type: none"> a. Location and orientation. b. Drawing to scale. c. Shading. d. Glass type (including films). e. Frame material and type. f. Type (e.g. sliding, double hung) or openable panes clearly drawn to determine openable proportions. g. NFRC Solar Heat Gain Coefficient (SHGC) and U-value of complete glazing unit (glass and frame combined) – regardless of whether the glass is single clear or not. These may be based on default values of Approved Software.
Window internal covering	n/a
Fixed or adjustable external shading (eaves, pergolas, verandahs, awnings, skylight shading devices)	<ul style="list-style-type: none"> a. Location, type and dimensions shown on drawings. b. Sufficient detail to enable sun blocking factor of all external shading structures to be assessed. c. A detail for pergolas including structure and any battens if they are to be considered as a shading device. d. Whether the device is fixed or adjustable. e. Material properties such as shading coefficient for polycarbonate sheeting or shading factor for sail cloth.
Skylights, glazed roofs and polycarbonate roofs above an enclosed space.	<ul style="list-style-type: none"> a. Location, type and dimensions shown on drawings. b. Where constructed of moulded plastic – description of the construction. c. Where glass is single clear – description of glass and frame. d. NFRC Solar Heat Gain Coefficient (SHGC) and U-value of complete glazing unit (glass and frame combined) – regardless of whether the glass is single clear or not. These may be based on default values of Approved Software. e. Shaft type, insulation and length. f. Sufficient information or detail to determine openable proportions.
Roof	<ul style="list-style-type: none"> a. Pitch. b. Ventilation openings (passive and mechanical) c. Material. d. Insulation type, location and thermal properties e. Specific external colour or shade (light, medium or dark) and solar absorptance.
Ceilings	<ul style="list-style-type: none"> a. Material. Insulation type, location and thermal properties. b. Ceiling penetrations
Floors	<ul style="list-style-type: none"> a. Material. b. Covering (optional). c. Insulation type, location and thermal properties d. Sub-floor ventilation openings.

Appendix: Maximum Loads as at date of this Protocol

Table A contains the maximum loads for single dwellings. These maximum loads are also used as the maximum average loads allowed in the BASIX multiunit tool. Table B contains the maximum individual loads for each dwelling in a multi dwelling development.

Notes:

- While zones 19 (Charleville), 50 (Oakey) and 66 (Ballarat) are available for selection in the Simulation method for the Thermal Comfort Index of BASIX, they are not primarily located in NSW. They are applicable to a number of postcodes near the NSW border. Maximum loads in these zones are the same as zones 9 (Amberley), 46 (Cobar) and 24 (Canberra) respectively.
- There is no floor type delineation for units. The mud brick values may be used for any dwelling with primarily (at least 50%) mud brick or rammed earth walls, regardless of the floor type.

Table A: Maximum loads for single dwellings and average all dwellings in multi dwelling developments.

zone	Region	heating				cooling			
		Slab on ground	Suspended Floor, enclosed subfloor	Suspended Floor, open subfloor / mudbrick walls	Unit	Slab on ground	Suspended Floor, enclosed subfloor	Suspended Floor, open subfloor / mudbrick walls	Unit
8	Moree	68	75	80	68	87	96	103	87
9	Amberley	39.6	43.4	48.7	39.6	73.5	80.6	90.4	73.5
10	Byron	33.2	36.8	39.2	33.2	49.8	55.2	58.8	49.8
11	Coffs Harbour	37	41	47.5	37	37	41	47.5	37
14	Armidale	180	192	212.4	180	25	28	30	25
15	Newcastle	76	81	90	76	37	40	43	37
17	Sydney CBD	40	43	46	40	32	35	38	32
18	Nowra	105	112	118	105	30	33	37	30
19	Charleville	39.6	43.4	48.7	39.6	73.5	80.6	90.4	73.5
20	Wagga	150	165	177	150	50	55	59	50
24	Canberra	240	255	265	240	30	35	39	30
25	Cabramurra	580	638	684	580	No Max.	No Max	No Max	No Max
27	Mildura	95	105	112	95	68	75	81	68
28	West Sydney	74	82	80	74	70	77	83	70
46	Cobar	60	66	71	60	76	84	90	76
48	Dubbo	100	110	118	100	50	55	59	50
50	Oakey	60	66	71	60	76	84	90	76
56	East Sydney	51	58	63	51	45	49	53	45
65	Orange	290	319	342	290	16	17.6	19	16
66	Ballarat	240	255	265	240	30	35	39	30
69	Thredbo	499	549	589	499	No Max	No Max	No Max	No Max

Table B: Maximum loads for individual dwellings in multi dwelling developments.

zone	Region	heating				cooling			
		Slab on ground	Suspended Floor, enclosed subfloor	Suspended Floor, open subfloor / mudbrick walls	Unit	Slab on ground	Suspended Floor, enclosed subfloor	Suspended Floor, open subfloor / mudbrick walls	Unit
8	Moree	90.7	100	106.7	88	119.8	132.1	141.8	113
9	Amberley	47.8	52.3	58.7	51.5	94.8	103.9	116.6	95.6
10	Byron	37.9	42.1	44.8	43.6	70.6	78.3	83.4	65.4
11	Coffs Harbour	50.7	56.2	65.1	48	48.7	54	62.5	48
14	Armidale	213.6	227.8	252.1	234	28.6	32.1	34.4	33
15	Newcastle	104.1	110.9	123.3	99	47.4	51.2	55	47
17	Sydney CBD	56.6	60.8	65	50	45.2	49.5	53.7	41
18	Nowra	142.1	151.5	159.7	137	38.3	42.2	47.3	39
19	Charleville	47.8	52.3	58.7	51.5	94.8	103.9	116.6	95.6
20	Wagga	180	198	212.4	195	59.5	65.4	70.2	65
24	Canberra	284.8	302.6	314.5	312	34.4	40.1	44.7	39
25	Cabramurra	842.6	926.9	993.7	754	No Max	No Max	No Max	No Max
27	Mildura	116.8	129.1	137.7	124	81.9	90.4	97.6	88
28	West Sydney	92.5	102.5	100	88	87.5	96.3	103.8	91
46	Cobar	72	79.2	85.2	78	90.4	99.9	107	101
48	Dubbo	120	132	141.6	130	59.5	65.4	70.2	65
50	Oakey	72	79.2	85.2	78	90.4	99.9	107	101
56	East Sydney	72.1	82	89.1	66	63.6	69.3	74.9	59
65	Orange	348	382.8	410.4	377	19.0	20.9	22.6	21
66	Ballarat	284.8	302.6	314.5	312	34.4	40.1	44.7	39
69	Thredbo	724.9	797.6	855.7	649	No Max	No Max	No Max	No Max