

These modelling guidance notes describe step by step instructions on how to model NatHERS Example 3 using **FirstRate5** software (Chenath v3.22). If this example is modelled in Chenath v3.21, the results may differ slightly. These instructions should not replace appropriate software training, and are to be read in conjunction with the supporting documentation referenced, such as the FirstRate5 User Manual published by Sustainability Victoria, the NatHERS Technical Note and the NatHERS Handbook.

1. Enter project information

- 1.1 Enter the project details on the **Project tab**. This information is available on the accompanying drawing set. You can use the Tab key to enter and move to the following field. Refer to 'Getting started: Entering project details' in the FirstRate5 User Manual.
- 1.2 Enter the client name and address in the Client Details section as per the drawing set.
- 1.3 Complete the Assessor Details section, including the applicable 'Declaration of Interest'.
- 1.4 Under the Climate Zone section, enter the appropriate postcode; 3000. FirstRate5 will automatically select the most appropriate climate zone based on the postcode. For this example, it will be NatHERS Climate Zone 21, Melbourne.
- 1.5 Select the appropriate Dwelling Type; 'New home'.
- 1.6 Set the appropriate Exposure; 'Suburban'. Refer to the NatHERS Handbook and FirstRate5 manual for more information on defining exposure types.
- 1.7 Enter the Floor Height Above Ground Level based on the drawing set information.
- 1.8 Enter an assessment Date and Reference number (Ref. No.).
- 1.9 Enter the 'House Title' or project name.
- 1.10 Enter the dwelling address under the Dwelling Details section. This is different to the client address.
- 1.11 Select the appropriate Building Class as per the NCC; Class 1a.
- 1.12 Enter Key Construction and Insulation Materials information as per the drawing set.
- 1.13 Choose the Principal Downlight Type; 'LED'.
- 1.14 Enter the Plan Documents information, including the version number, plan reference and/or date and who prepared the drawing documentation.
- 1.15 Any specific project information can be reported under the Additional Information section. For instance, if any provisional or default values were used. This information is shown on the NatHERS certificate.
- 1.16 Any personal notes can be entered under the Assessor's Internal Comments section. This information is for your own reference and is not shown on the certificate.



2. Import and scale drawings

- 2.1 On the **Plan tab**, import all plans of the dwelling using Load Background. Select the site plan, lower plan, upper plan, and lower/upper reflected ceiling plan to load and create a series of backgrounds. Ensure 'Find Snappable Points' is enabled to use the Snap to Plan function. If loading the lower/upper reflected ceiling plan, it must be imported a second time as they are included on the same drawing sheet and a separate background is required. Refer to Task 1 in the FirstRate5 User Manual.
- 2.2 Switch backgrounds by right-clicking on a blank canvas area, choosing Switch Background then selecting the desired background.
- 2.3 Scale all backgrounds using the Dimension tool. Refer to Task 2 in the FirstRate5 User Manual.
- 2.4 The backgrounds are not automatically aligned to each other. Align all backgrounds using the Alignment Points tool. Refer to Task 3 in the FirstRate5 User Manual.
- 2.5 Add another level by clicking on the 'Add' button under Levels. Once completed, you can click on the level name and rename each level, e.g., Lower and Upper but make sure that Level 1 (the lower level) is shown above Level 2 (the upper level). Do not reorder the levels as this will interfere with the modelling results. Refer to Task 4 in the FirstRate5 User Manual.

3. Enter basic construction details

- 3.1 FirstRate5 should list the standard floor constructions available under the Construction Types, Floor subtab. If missing, click on the Constructions Libraries, Floor subtab and use Copy to Project to resolve. Refer to Task 9 in the FirstRate5 User Manual. To manage the floor construction library, refer to Task 12 (advanced) in the FirstRate5 User Manual.
- 3.2 Complete the previous step for standard wall constructions, also listed under the Construction Types. Refer to Task 19 in the FirstRate5 User Manual.
- 3.3 A range of wall constructions have been specified for Design 200, so additional custom wall constructions must be created using Wall Builder. Create or edit a wall construction to suit the specified wall constructions in the drawing set. Refer to Task 21 in the FirstRate5 User Manual and to Task 23 (advanced) to manage the wall construction library.
- 3.4 In the **Windows tab**, choose the Default Window library and select all applicable window groups. Refer to Task 26 in the FirstRate5 User Manual.
- 3.5 In the **Roof Windows tab**, choose the Default Roof Window library and select all applicable roof windows. Refer to Task 29 in the FirstRate5 User Manual.



4. Create zones

- 4.1 The next step is to draw or trace the background around the inside of each room to define the zone boundaries. The zone drawing tool is on the **Plan tab**. The default floor, wall and ceiling/roof construction will be used. It is suggested to complete this task using the Snap to Plan function (right-click on the blank canvas area and choose Snap to Plan). Refer to Task 5 and Task 6 in the FirstRate5 User Manual. Enabling Copy Prev Construction, Display Background Name and Display Drawing Line Length is highly recommended.
- 4.2 After drawing the first zone, the floor, wall and ceiling/roof construction can be changed. Double-click on the zone to enter the area properties. Subsequent building elements will match the previous construction. Alternatively, all building elements can be changed later via the **Zoning tab**.
- 4.3 Once all zones have been created, name all zones and assign the appropriate zone type. Refer to Task 7 in the FirstRate5 User Manual, the NatHERS Technical Note, and NatHERS Handbook for further guidance. It is best practice to name the areas for easy identification under the **Zoning tab**. The following table can be used as a guide to ensure all zones are covered and the correct zone type assigned. Note: The attic roof space and sub-floor is automatically created in FirstRate5.

ROOM NAME	ZONE TYPE
GARAGE	Garage
ENTRY	Daytime
HALL	Daytime
KITCHEN/MEALS	Kitchen/Living
LIVING	Living
LOUNGE	Living
BATHROOM	Unconditioned
WC	Daytime
LAUNDRY	Unconditioned
BED 1	Bedroom
BED 1 ENSUITE	Night-time
BED 1 WIR	Night-time
BED 2	Bedroom
BED 3	Bedroom
BED 4	Bedroom
BED 5	Bedroom
BED 5 ENSUITE	Night-time
BED 5 WIR	Night-time



5. Split areas for different construction

- 5.1 The Kitchen/Meals ceiling is flat and raked. To model this, use the Split Area Tool to define the ceiling/roof area separately. Refer to Task 18 (advanced) in the FirstRate5 User Manual.
- 5.2 Change the raked ceiling/roof area Ceiling type to 'Framed'.
- 5.3 Select the raked ceiling/roof area and use the Sloped Ceiling Helper to enter ceiling pitch (23°) to determine the correct ceiling/roof area. Refer to Task 15 and Task 17 in the FirstRate5 User Manual.

6. Assign construction properties

- 6.1 On the **Plan** or **Zoning tab**, assign or change the floor type to all areas/zones. Refer to Task 10 in the FirstRate5 User Manual.
- 6.2 Assign the specified floor covering to all zones. Refer to Task 10 in the FirstRate5 User Manual.
- 6.3 Under Connects floor, select 'Connect to ground' for all concrete slab on ground floor construction.
- 6.4 Under Connects floor, select 'Create subfloor' for all upper level suspended timber floor construction, then set the subfloor ventilation to 'Enclosed'.
- 6.5 Add floor insulation as specified on the drawing set. Refer to Task 10 in the FirstRate5 User Manual. Do not forget to include slab edge insulation to the lower ground floor by entering R2.7 into the Edge Insulation field.
- 6.6 For the ceiling/roof, assign the Ceiling type; 'Ceil' if there is a zone above and 'Cont' for all other roof except the raked ceiling in the Kitchen/Meals area (refer to Section 5 above). Refer to Task 15 in the FirstRate5 User Manual.
- 6.7 Add ceiling and roof insulation as specified on the drawing set. Refer to Task 16 in the User Manual.
- 6.8 Enter the roof colour (solar absorptance).
- 6.9 Check all typical external and internal wall heights are correct.
- 6.10 Assign or change the external wall types to all zones. Refer to Task 20 in the User Manual.
- 6.11 Most default internal wall types will be correctly assigned as 'FR5-Int'; however, some are different, e.g., the internal wall between the Garage and Lounge.
- 6.12 Not all walls in the design documentation are full height, especially those on the lower level adjacent to the subfloor. Horizontally split any applicable walls. Refer to Task 25 (advanced) in the FirstRate5 User Manual.



- 6.13 It is not always possible to horizontally split a wall due to the ‘as drawn’ adjacency on the **Plan tab**, so several walls must be manually entered on the **Zoning tab**. Notably, the external and internal walls from the Garage and WIR 5 to either outdoor air or the subfloor, as shown on the documentation. Refer to Task 26 in the FirstRate5 User Manual.
- 6.14 Other internal walls adjoining roof spaces, must also be manually entered on the **Zoning tab**; e.g. the Kitchen/Meals area due to the raked ceiling/roof. Refer to Task 36 and Task 37 (advanced) in the FirstRate5 User Manual.

7. Insert doors and windows

- 7.1 On the **Plan tab** add/insert all doors and enter the specified properties. Refer to Task 27 in the FirstRate5 User Manual.
- 7.2 Insert all windows and enter the specified properties, including the window frame colour (solar absorptance). Refer to Task 27 and Task 28 in the FirstRate5 User Manual. For this example, the following table can be used as a guide to select the type and set the openability. Note: You may need to override the suggested openability. Windows have been split for the different window types and window groups (refer to the NatHERS Technical Note for further information on openability).

WINDOW TYPE	OPENABILITY
AWNING	90%
FIXED	0%
SLIDING	45%

- 7.3. Insert the skylights to the Ensuite 1, Bathroom and WC, including the correct shaft length. Refer to Task 30 and Task 31 in the FirstRate5 User Manual.
- 7.4. Insert the roof window to the Kitchen/Meals zone and enter the specified properties, including the roof window colour (solar absorptance). Refer to Task 30 and Task 31 in the User Manual.
- 7.5. Insert all permanent openings as per the documentation (i.e. openings between zones that have no door). Note: A permanent opening will also need to be modelled where zone boundaries meet but there is no physical wall in the floor plan. Refer to Task 27 in the FirstRate5 User Manual.
- 7.6. Insert the horizontal opening as per the documentation (i.e. permanent opening between floors). Refer to Task 14 in the FirstRate5 User Manual.



8. Model ceiling penetrations

8.1 Enter all ceiling penetrations, e.g., recessed downlights, rangehood and exhaust fans. Refer to Task 32 in the FirstRate5 User Manual and the NatHERS Technical Note for appropriate clearances. This step is important to compensate for the loss of ceiling insulation and ventilation as a result of ceiling penetrations. The following table can be used as a guide when modelling this example, to ensure all ceiling penetrations are modelled.

NO.	TYPE	SIZE/DIAMETER (MM)	CLEARANCE (MM)
43	Recessed downlight (sealed)	90	50
1	Heat lamp and sealed exhaust fan	376 x 280 (as per manufacturer details)	35 (as per manufacturer details)
3	Ceiling exhaust fan (sealed)	250	50
1	Rangehood exhaust fan (sealed)	160	50

8.2 Ceiling insulation cannot be installed uncompressed above the typical external brick veneer wall, so use the Split Area Tool to define an area representing perimeter edge batts and change the R-value to that specified on the drawing set. Refer to Task 18 in the FirstRate5 User Manual.

9. Define shading

9.1 On the **Plan tab**, insert all horizontal shading schemes (eaves) to applicable external walls. (Note: You can also do this from the **Zoning Tab**.) The shading scheme should represent the entire length of the element, not each external wall length. The vertical offset can be entered when the shading scheme is created, whereas the horizontal offset is defined when the shading scheme is drawn on the **Plan tab**. Refer to Task 33 in the FirstRate5 User Manual.

9.2 The horizontal offset is relative to the right-hand end of the wall when standing on the inside looking out and vertical offset is relative to the top of the wall.

9.3 Insert all perpendicular vertical shading schemes (wing walls) to applicable external walls, i.e. dwelling, porch, fences, and neighbours (as documented and following the NatHERS Technical Note). Refer to Task 34 in the FirstRate5 User Manual.

9.4 The horizontal offset is relative to the wall end and vertical offset relative to the top of the wall.



- 9.5 Insert all vertical shading schemes (screens) to applicable external walls, i.e. dwelling, porch, fences, trees and neighbours (as documented and following the NatHERS Technical Note). Refer to Task 35 in the FirstRate5 User Manual.
- 9.6 A base offset can be entered to raise or lower the screen relative to the finished floor level (FFL).

10. Calculate north

- 10.1 On the **Plan tab**, enter the North offset in decimal degrees to change the North point (zero is due North); the value for this example should be 90°.
- 10.2 Simulate by clicking on the 'Calculate' button and view the results in the Provisional Diagnostic report under the **Reports tab**. Refer to Task 42 in the FirstRate5 User Manual.

11. Analyse the energy loads

- 11.1 Use the Provisional Diagnostic report or **Analytics tab** to analyse the energy loads. You can also use the 'Heat Map View' to help optimise the project. Refer to Task 41 and 43 in the FirstRate5 User Manual.
- 11.2 This example project will achieve 6.5 Stars.
- 11.3 To improve the energy star rating, see suggested improvements in the following section.



Improving your star rating

There are many ways an assessor can explore in order to improve a star rating. The following suggested improvements represent just one solution to improving the thermal performance of this example in Melbourne (Climate Zone 21), with considerations to both affordability and ease of construction.

1. Change the roof colour from Bristle 'Sunset' (SA = 0.678) to 'Grey' (SA = 0.935).
2. Change the window colour from painted Colorbond 'Shale Grey' (SA = 0.43) to 'Monument' (SA 0.73).
3. Add R2.3 rigid insulation to external wall type WT27 (retaining wall).
4. Add R2.3 rigid insulation to internal wall type WT16 (to sub-floor).
5. Increase R2.1 glass fibre batt to R2.7 for the floor construction above the sub-floor.
6. Increase R2.0 glass fibre batt to R2.7 for external wall types WT2, WT15, WT17 and WT28.
7. Increase R2.0 glass fibre batt to R2.7 for internal wall type WT9 (to Garage).
8. Add R1.1 rigid insulation to the lower level concrete slab on ground.
9. Remove lower level slab edge insulation.

Your improved rating for this example will now achieve 7 stars.

