



# Consenting Passive House Windows

Challenges and Solutions - A Case Study



# AUGUST MILLARD

BUILDING CONSULTANTS



New Zealand  
Institute of  
**BUILDING  
SURVEYORS**

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## ABOUT AUGUST MILLARD:

### BUILDING CONSULTANTS & PROJECT MANAGEMENT SPECIALISTS

- Extensive industry experience in New Zealand and the UK
- Professional services to the Property and Building Industry
- Commercial and Residential Property and Building Services
- Project Management and Building Consultancy Services
- Offices situated in both Auckland and Wellington



## BACKGROUND

### **Building Surveyor roles**

- More than weathertightness / leaky building investigators
- New Zealand Institute of Building Surveyors
- History of Building Surveying

### **August Millard involvement**

#### **Passive House**

- Stamford Insurance
- Izodom

#### **Peer Review**

- Wellington project
- Izodom building with uPVC windows and roller shutter





# Presentation November 2021

Darryl Sang and Alya Abed Ali  
Sang Architects

Passive House Windows – Challenges and Solutions

New Build Wunderbar Passive House

Aiming for Passive House Classic Certification & Homestar 8 - 9  
Design Specification

Questions

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# Sang Architects

Darryl Sang

Alya Abed Ali

Director

Senior Architectural Graduate

ANZIA BArch BEng (First Class Honours) BArch

Registered Architect NZ UK

Certified Passive House Designer

Sang Architects - Team

Certified Passive House Designers on Staff

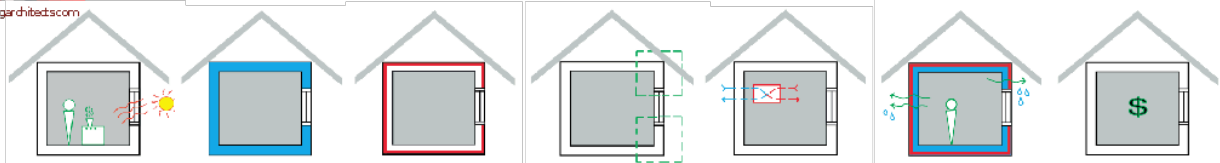
Mission - Totally Passive House



Architectural Council of New Zealand  
Whaihanganga  
Practice 2021



## Passive House vs Active House - What are the Differences?



	Heating	Insulation	Air Tightness	Thermal Bridge	Ventilation	Vapour Control	Cost Benefit
<p><b>Passive House</b></p> <p>Comfortable warm &amp; healthy homes for people who want to reduce their on-going energy use.</p> <p>Sang Architects can build Passive Houses from a wide range of materials &amp; in any location.</p> <p>Want to know more? Contact Sang Architects for more in depth information.</p>	<p>A comfortable 20-22°C indoor temperature all year round using the heat from the sun, people &amp; appliances, recovered through a heat exchange ventilation system. Extracts stale air from kitchen &amp; bathrooms &amp; supplies fresh air to bedrooms &amp; living spaces. Uses about the energy of a lightbulb = 70W.</p>	<p>Insulation comes in various forms from batts to strawbales. Thickness depends on climate, local availability &amp; building form. Thicker insulation does not always mean a warmer house. Factors like Thermal Bridging &amp; Air Tightness become far more significant for a more energy efficient home.</p>	<p>Air Tightness layer prevents air leakage around windows, doors or where different materials meet &amp; create gaps. Low air leakage means the heated air will not escape the house.</p> <p>This is checked using the Blower Door test. A Passive House has 0.6 air changes per hour.</p>	<p>Thermal bridges are pathways that allow heat to easily escape e.g. through a window frame. Passive House identifies the weak spots &amp; minimises the Thermal Bridges in the building envelope.</p>	<p>Ventilation is the management of indoor air quality. As well as opening windows, a Passive House ventilation system ensures ample fresh air supply &amp; contaminants are removed at all times, even with closed windows, resulting in great indoor air quality.</p>	<p>The Air Tightness and Weather Tightness layer work together to allow water vapour to leave the house in any weather conditions without condensation inside the structure.</p>	<p>The initial cost is about 10-15% more. On-going lifetime energy saving is high. High quality clean indoor fresh air is supplied &amp; contaminated air &amp; moisture are removed. No condensation or mould, reducing effects on illnesses such as hayfever &amp; asthma.</p>
<p><b>Active House</b></p> <p>Houses built to the Building Code achieve the minimal legal building standard. They require active appliances like a heat pump, air conditioner or a fridge.</p>	<p>Require high energy input from electricity &amp; gas for heaters, air conditioner &amp; fridge.</p>	<p>Building Code sets low minimal insulation standards.</p>	<p>Building Code does not specify Air Tightness.</p> <p>Standard house has approx. 5-10 uncontrolled air changes per hour.</p>	<p>Building Code does not address Thermal Bridging, so condensation &amp; mould occurs.</p>	<p>BuildingsCode specifies minimum size of openable windows.</p>	<p>BuildingsCode specifies that construction needs to be moisture / vapour permeable.</p>	<p>Minimum Building Code house is cheaper to build, but much more expensive to run. Condensation and mould are found.</p>

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 website - sangarchitects.com



# Wunderbar Passive House Site

Site Area 471-sqm

Sloping site in new subdivision

North facing

Very high wind zone

Zone:

Residential - Single House Zone

Orewa 3 Precinct Overlay -

H5 Residential Mixed Housing Urban Overlay

Sunny Heights Design Review Panel

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# **Wunderbar Passive House Design Specification**

**New build concrete house**

**Floor Area 255-sqm + Garage 45-sqm**

**2-storey 4-bedrooms 3-bathrooms**

**Izodom Insulated Concrete Formwork ICF - 250mm - PH Certified**

**Izodom Insulated Foundation System - PH Certified**

**Izodom mid-floor slab**

**Garage slab is outside thermal envelope - thermally separated from main house**

**StoArmat Miral render system**

**Gealan Festner S9000 uPVC triple glazed PH Certified windows**

**Aluproof SKT 230/120 external aluminium shutter system**

**ColorSteel longrun profiled roof**

**Commencement due December 2021**

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WUNDERBAR PASSIVE HOUSE  
60 PACIFIC HEIGHTS ROAD, OREWA

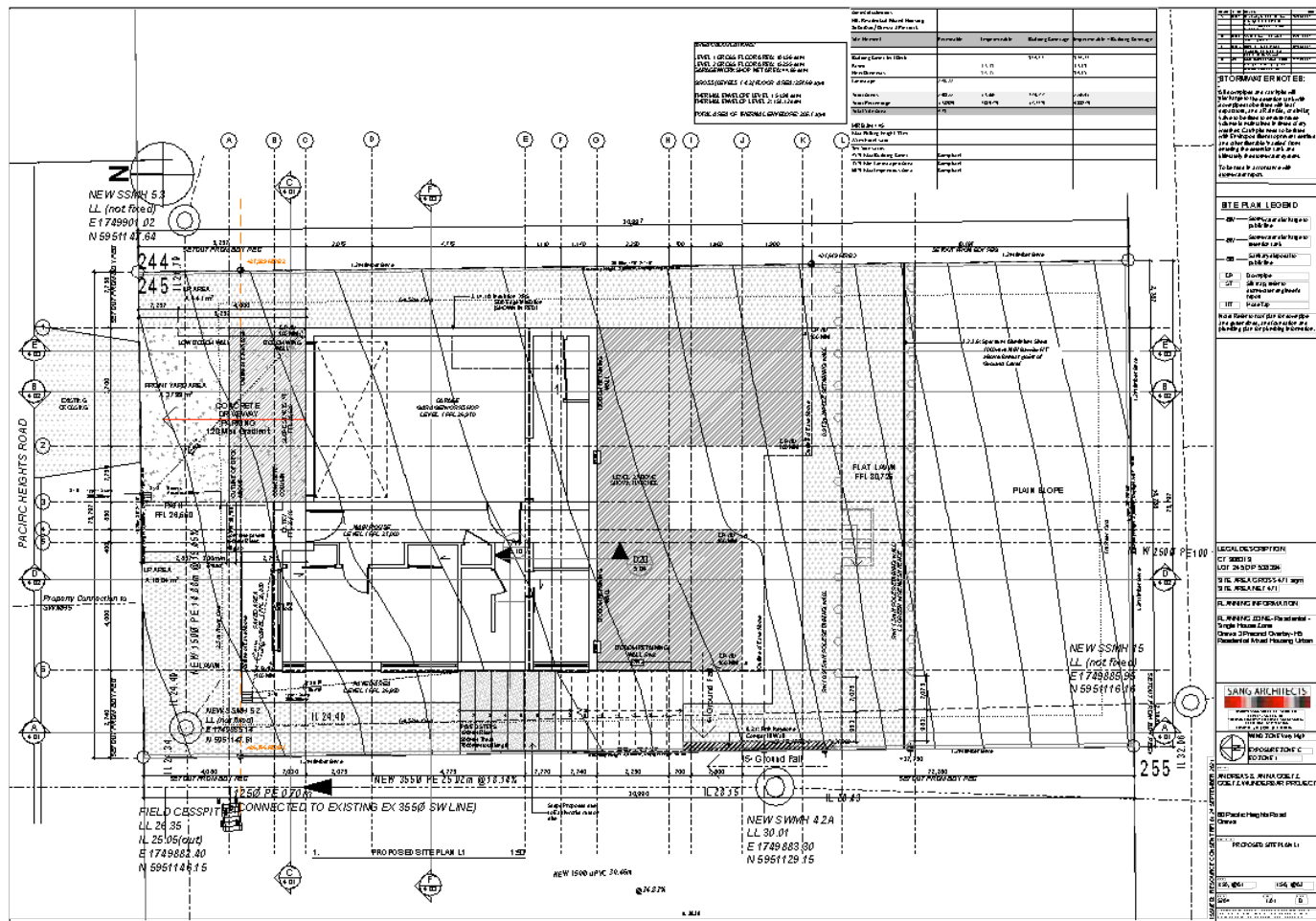


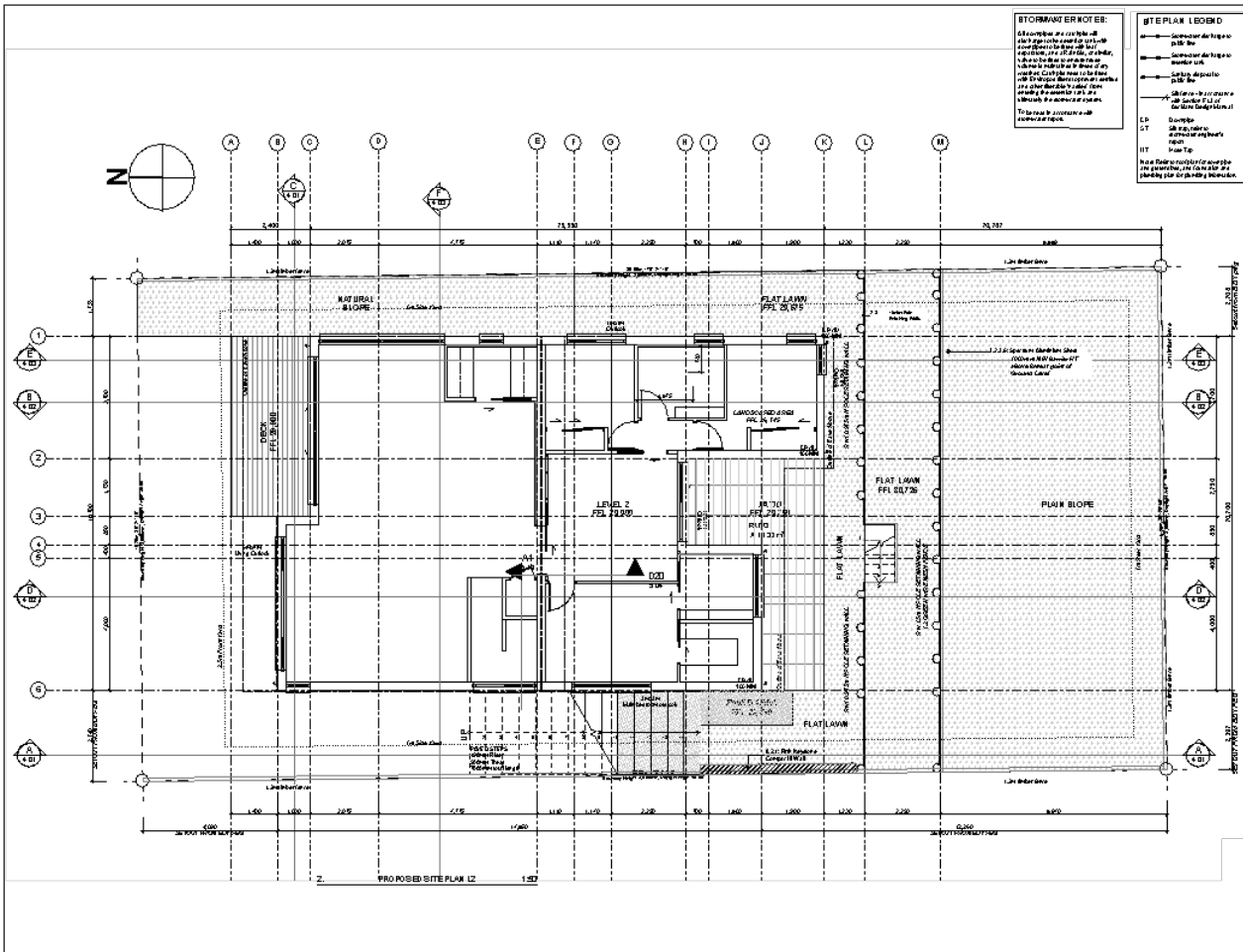


WUNDERBAR PASSIVE HOUSE  
60 PACIFIC HEIGHTS ROAD, OREWA



WUNDERBAR PASSIVE HOUSE  
60 PACIFIC HEIGHTS ROAD, OREWA





**BY ORDER OF THE BOARD:**

For example, an *acetylcholine* cell that stops to be a neuron and becomes a muscle cell will lose its *acetylcholine* *receptor* *proteins*, its *ATPase*, or other proteins that are necessary to its function as a muscle cell. In the case of any neuron, *acetylcholine* must be taken up by *cholinergic cholinergic* cells or by *cholinergic cholinergic* cells or by other *cholinergic* cells. There are only a few *cholinergic* cells in a *cholinergic* *cholinergic* system.

#### STEREOPHON LEGEND

- Sewerage discharge to public line
- Sewerage discharge to surface water
- Sanitary disposal to public line
- *Silicones - In accordance with Section 5.1.1 of the Marine Discharge Manual*

**GT** Gift wrap, return to address on any letter's return  
**HT** Home Tap  
 In a Radio Shack for coverage and guarantee, the company is planning for the planning business.

[illegible]

LEGAL DESCRIPTION  
 CT 900319  
 LOT 24-5 DP 503294  
 12.00 ACRES CROSS 471 30pm  
 12.00 ACRES NET 471


**PLANNING INFORMATION**

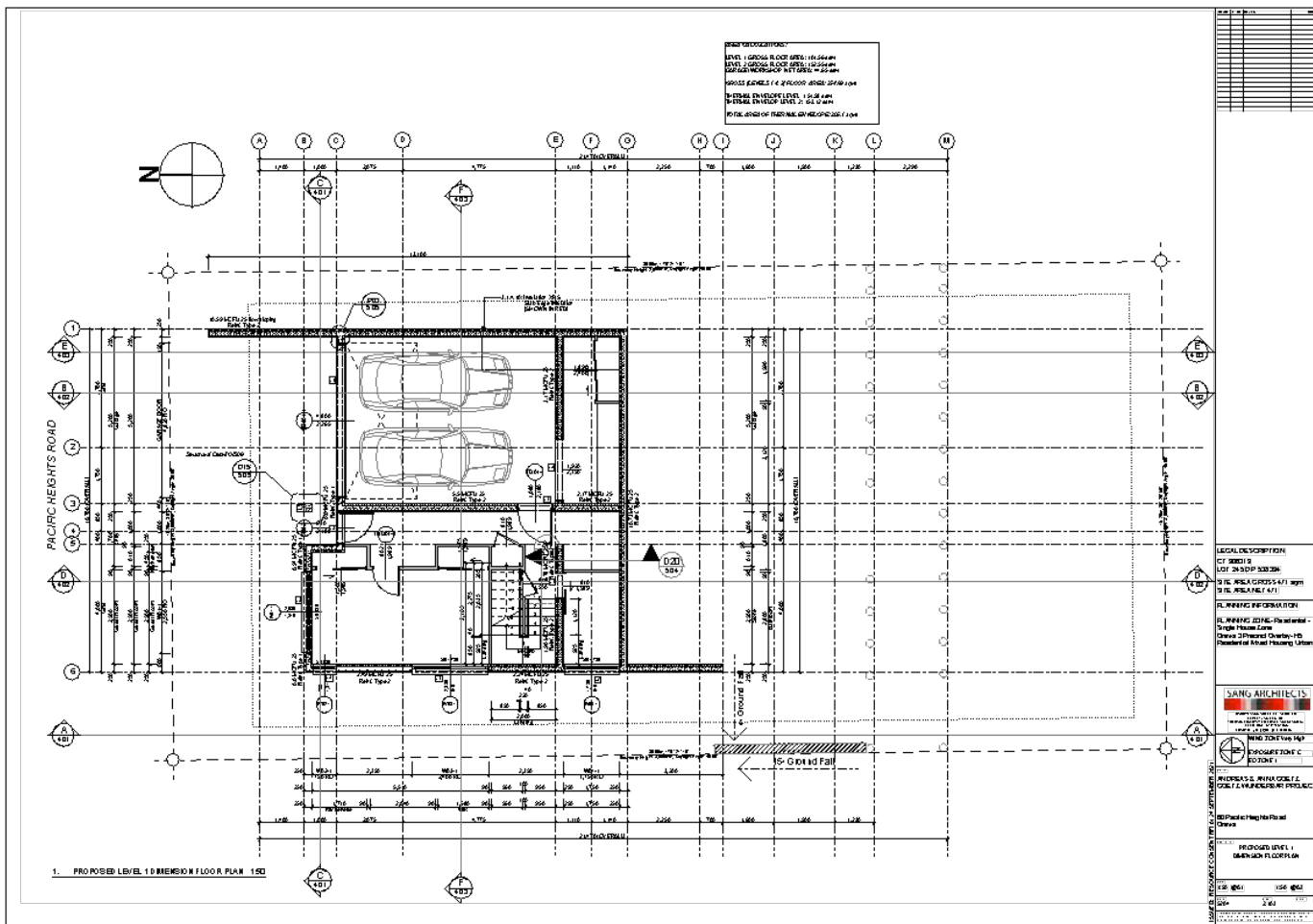
PLANNING ZONE - Residential - Single House Zone  
Overlays: SPRescued Overlay- PD  
Residential Arid Housing Urban

[illegible]

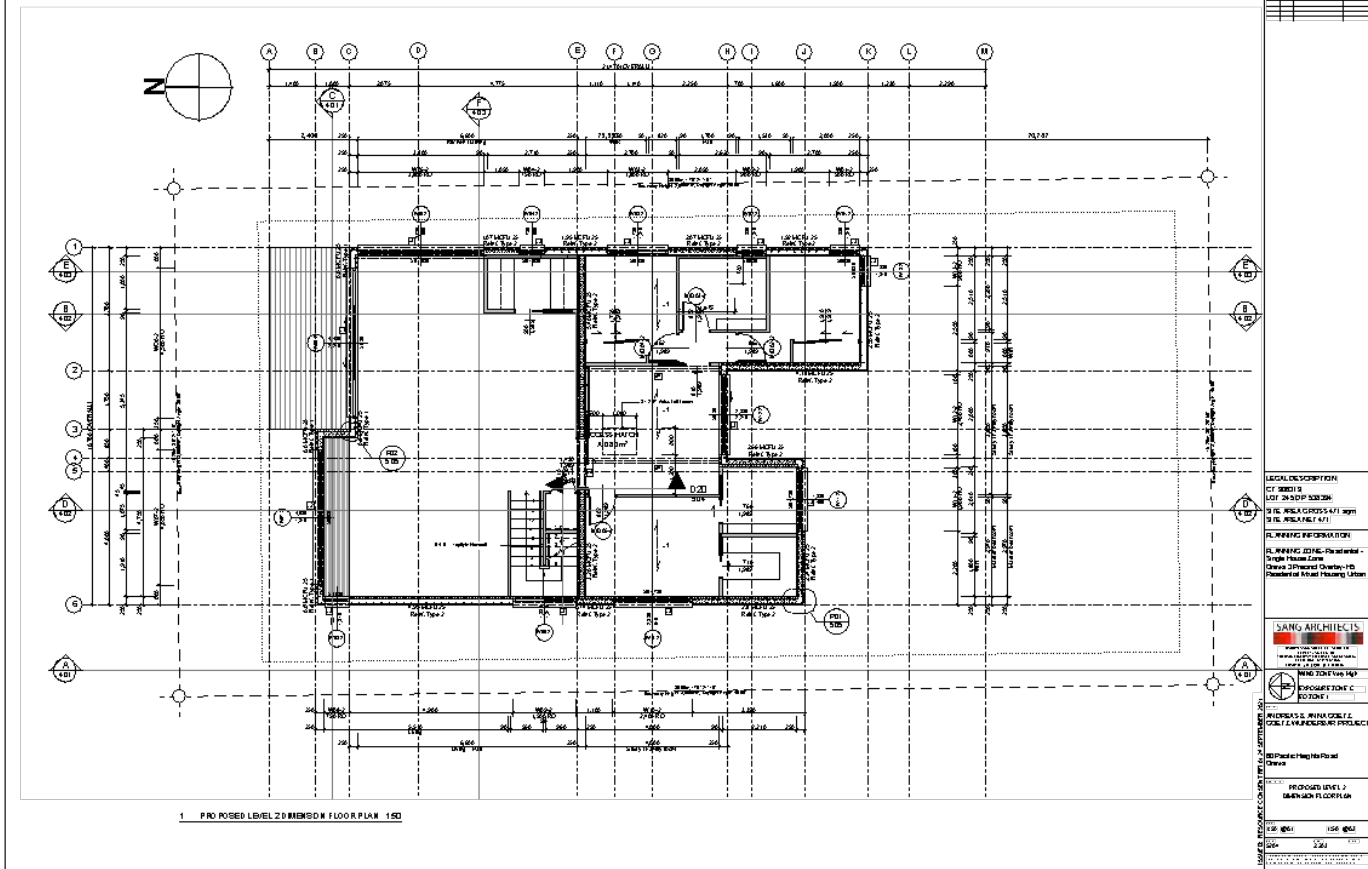

 NORTH ZONE 146 147  
 EXPOSURE TIME C  
 SECTION 1

80 Pacific Hing Hts Road  
Ottawa

126 











WINDOW HEAD FACADE DETAIL 12



WINDOW/ILL FACADE DETAIL 12

[illegible]

### APPENDIX C LEGEND

Flexible Window Membrane  
Profilma Extra Profil Tape  
"primary external & internal"  
seal

Run Adhesion Test to TCF surface prior to installation of ProClimax Pipes.  
Use ProClimax TEBON PRIMER R.P. under tapes for better adhesion if necessary.

Waterlightness Layer

Airlightness Layer

LEGAL DESCRIPTION  
CT 200312  
LOT 24 S/D P 533 224

**PLANNING INFORMATION**

PLANNING ZONE- Residential Single House Zone

Other 3P/Residential Overlay- PB Residential Mixed Housing Urban

**SANG ARCHITECTS**

ANDREAS-Z. ANNA GOELT Z.  
GOELT Z. WUNDERBAR PRODU

RICORDATI DI REGISTRARE IL

19 66

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# High-Performance Construction Details Handbook

<https://passivehouse.nz/hpcd-handbook/>

A close-up photograph of a wooden construction detail, likely a roof or wall joint. The image shows several wooden planks meeting at a corner. Two screws are visible, securing the joint. The wood is light-colored and shows natural grain patterns. The background is slightly blurred, showing more of the construction site.

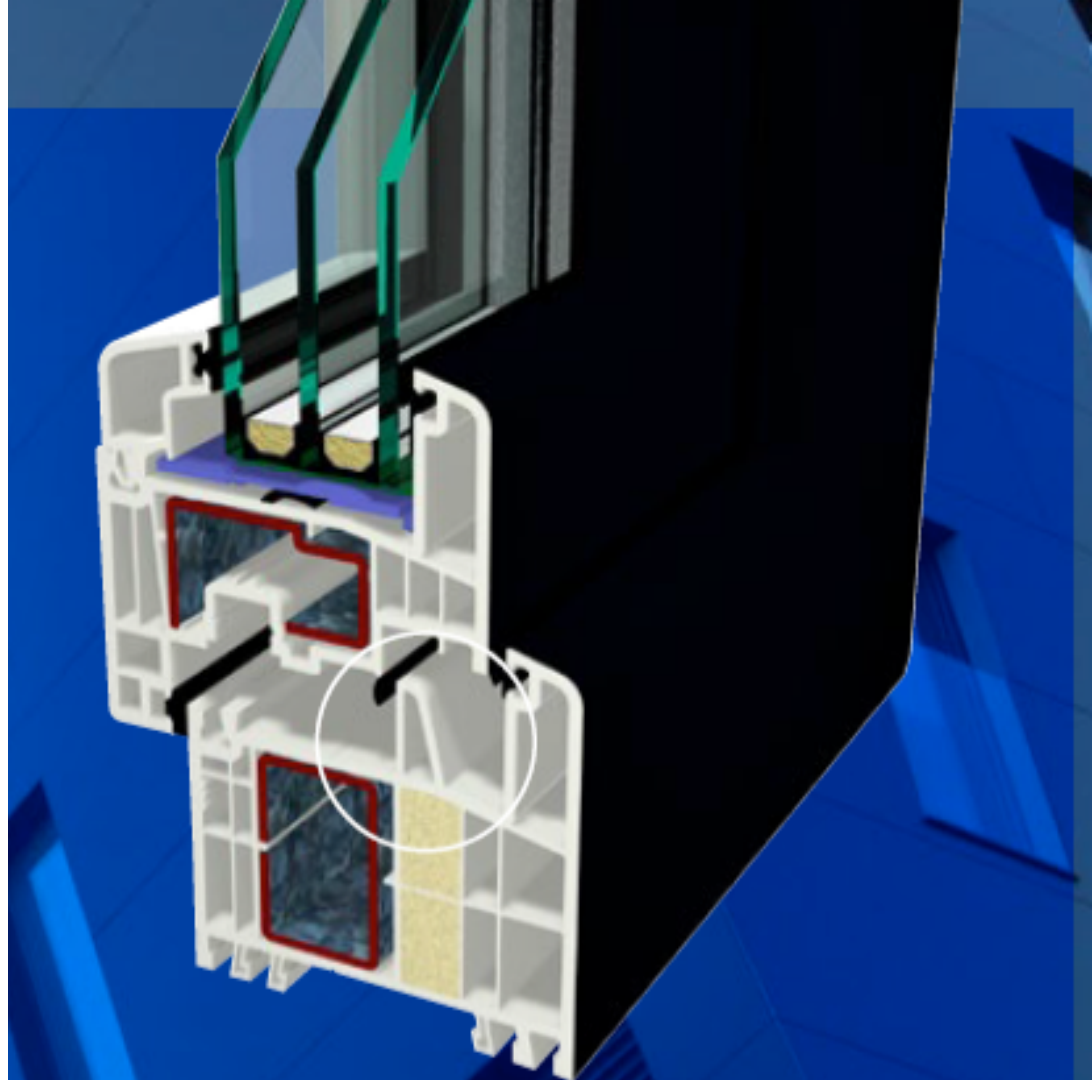
High-  
Performance  
Construction  
Details  
**Handbook**



# Case Study : Passive House compatible joinery

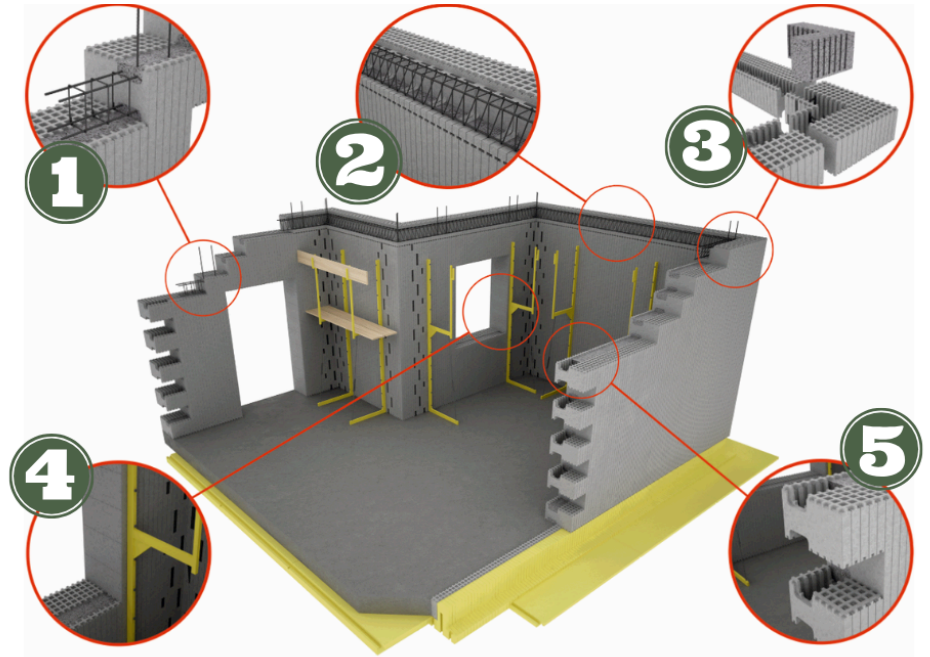
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- Site / building profile
- Compliance RFIs
- Process of resolution
  - Identify compliance pathway
  - Alternative solution – evidence
  - Joinery unit compliance
  - Weathertightness




# Site / Building profile

- Importance
- Site specific
- Fit for purpose = compliant




cool, temperate climate



**CERTIFIED COMPONENT**  
Passive House Institute

**KOMPLETNY SYSTEM DO BUDOWY  
DOMÓW PASYWNYCH I  
ENERGOOSZCZĘDNYCH**



**izodom 2000 polska**





# Compliance RFIs

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- Joinery elements
  - Test results (wind load?)
  - Drainage features
- Interface
  - Weathertightness



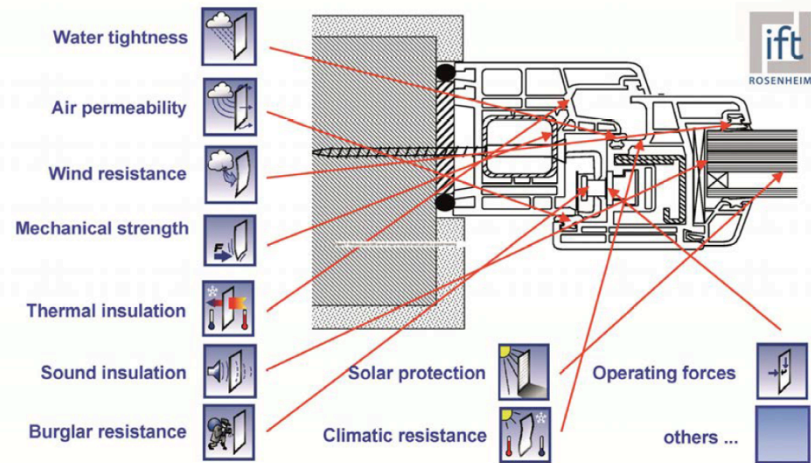
# Compliance Pathways

- E2
  - AS1?
  - AS2?
  - AS3?
  - AS4?
  - VM1?
  - VM2?



# Alternative Solution based on AS3

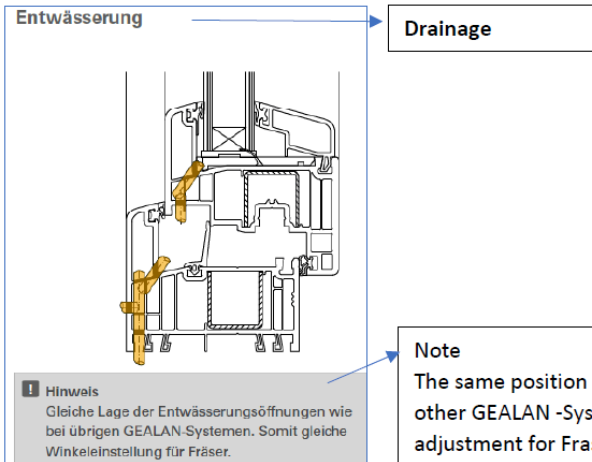
- NZS4211:2008
  - Wind load - Deflection
  - Air Infiltration
  - Water Penetration
  - Wind load UTS
- How?
  - Testing institute
  - Independent Lab tests
  - Lab results interpretation / mapping



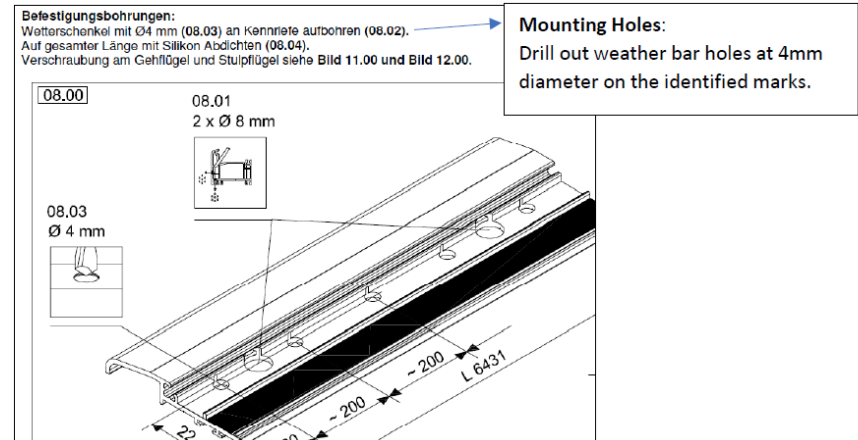
NZS 4211 Acceptance Level for Very High Wind Zone		
Test Type	EU Standard	Acceptance Level
Windlast [Wind load - Deflection / Ult. Str]	EN12210	≥ B4/B3
Luftdurchlässigkeit [Air Infiltration]	EN12207	≥ 4
Schlagregen [Water Penetration]	EN12208	≥ 8A

Test Type	EU Equiv	NZS 4211
Windlast [Wind load - Deflection / Ult. Str]	1600/1800	1250/1760
Luftdurchlässigkeit [Air Infiltration/m2]	1.11L/s @ 150Pa	1.6L/s@150Pa
Schlagregen [Water Penetration]	450Pa	375Pa

# Drainage



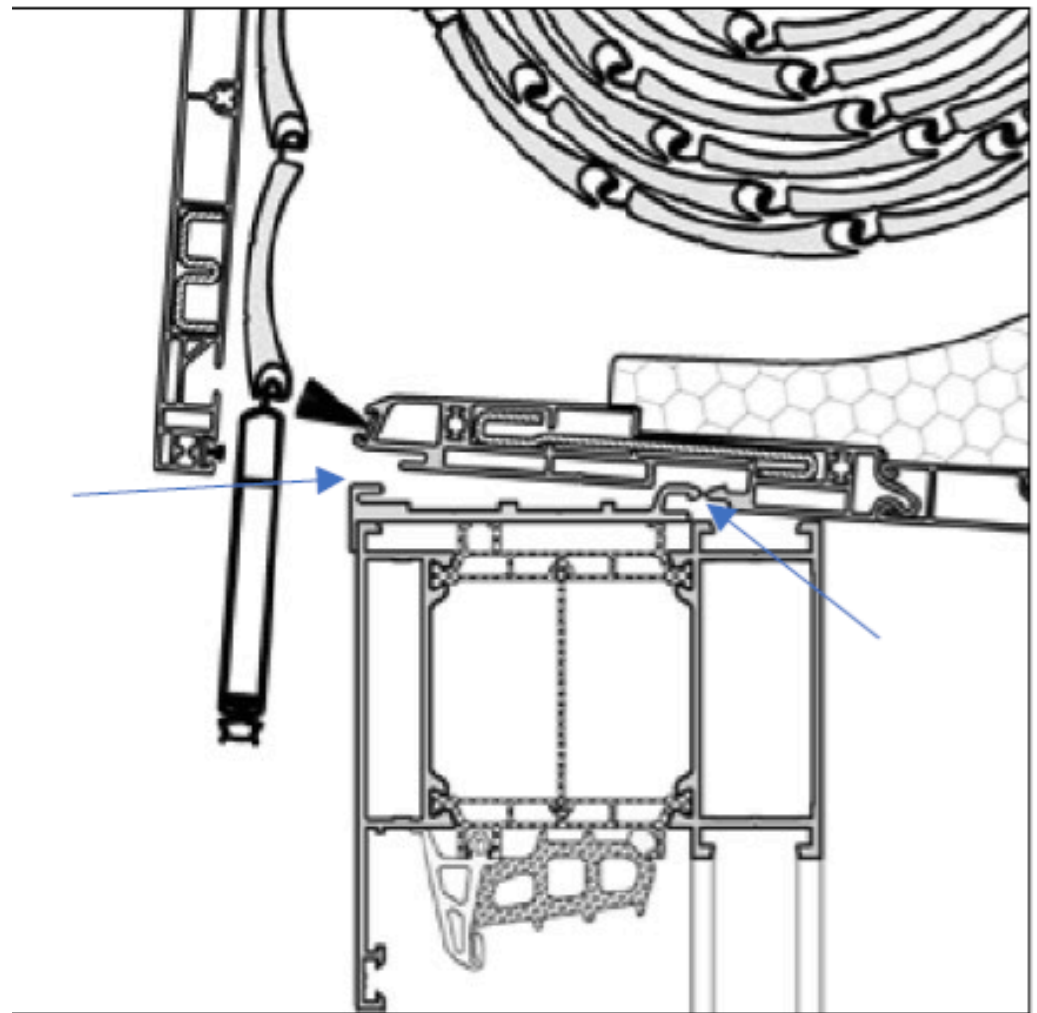
Extract from Guidance on Technical Features (Ref. P.15 Drainage Sys S9000)



Above – extract from Technical Details manual (Ref. P221 Weatherbar Technique Details) for manufacture of the joinery.

# Weathertightness

- Integrated inter-locking adapter profiles
- Deflection weathertight seal
- Ease of installation

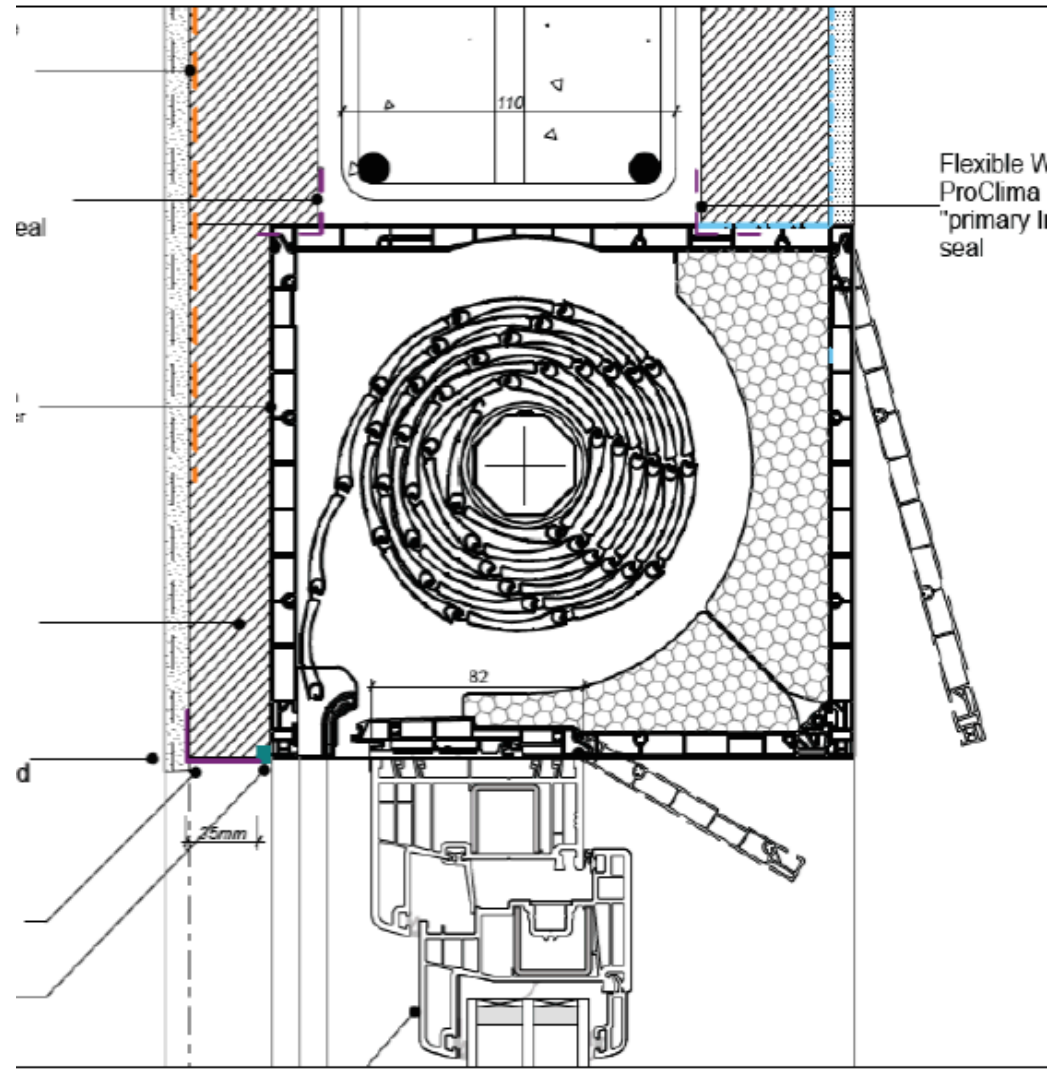


Extract from Aluprof Installation Manual illustrating ada



# Weathertightness Details

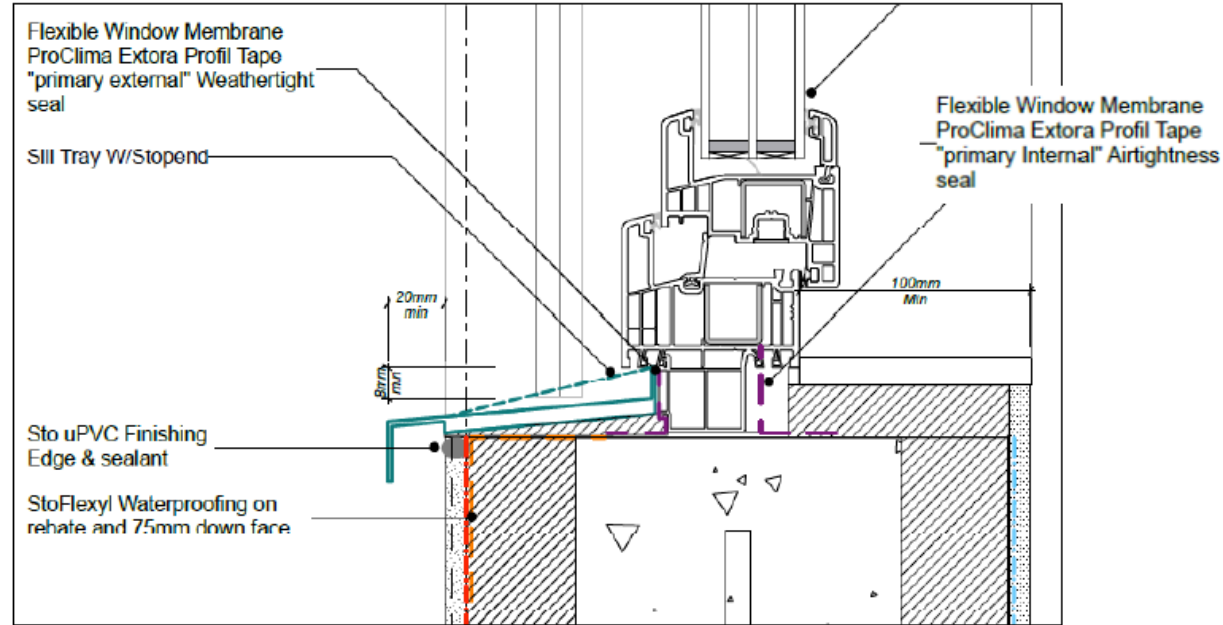
- Products (BRANZ Appraised)
  - StoFlexyl waterproof bandage
  - Flexible window membrane – ProClima Extora Profil
  - Sto basecap
  - Sika MS Sealant





# Weathertightness Details

- Flexible windows membrane
- Sill tray
- Sto uPVC Finishing edge
- StoFlexyl waterproofing



# Conclusion

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- Interpret RFI
- Fitness for purpose
- Code compliance pathways
- Evidence to support chosen solution
- Evidence to resolve RFI
- Passive House features - architect





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Questions?



Q & A