



Community benefits of roof upgrades

Improving the resilience of existing housing to severe wind events

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Cover: Roof of a building damaged by a severe wind event. Credit: James Cook University Cyclone testing Station



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INTRODUCTION

Legacy houses (Houses built Pre-1982) are at risk of damage from wind loads due to the often inadequate roof hold down provided by connection details. Improving wind resistance through replacing roof connections or retrofitting the existing structure can greatly improve building performance and community safety.

The Queensland Government Household Resilience Program (HRP) provides funding to help eligible home owners improve the resilience of their homes against cyclones. This program developed with advice from the Cyclone Testing Station is managed by the Queensland Department of Housing & Public Works (QDPWH) and commenced in late 2018.

Eligible home owners can apply to receive a Queensland Government grant of 75% of the cost of improvements (up to a maximum of \$11,250 including GST).

Eligibility criteria require that the homeowner:

Live in a recognised cyclone risk area (in the area from Bundaberg to the Queensland/Northern Territory border within 50km of the coast)

Own or be the mortgagor of a house built before 1984

Live in the home (primary place of residence)

Meet certain income eligibility requirements.

Approved applicants will be required to make a minimum 25% co-contribution towards the approved program works undertaken and may be able to arrange a loan to fund all or part of this co-contribution.

Improvements covered under the program were determined through collaboration with the Cyclone Testing Station, these include:

roof cladding replacement including upgrade to roof tie-down of supporting structure

roof structure tie-down upgrades using an external over-batten system

replacement of garage doors and frames

window protection including cyclone shutters or screens

tie downs of external structures (e.g. sheds)

replacement of external hollow core doors with solid core external grade doors

Undertaking any of these building upgrades covered under the program is expected to result in a reduction of home insurance premium.

This report provides the latest available data on the number of applications received, grants awarded, the breakdown of improvement options, the average cost of each option and the average insurance premium saving. In addition, examples of works for certain re-roof jobs are presented.



DATA FROM GRANT APPROVALS:

At the time of writing The Department of Housing and Public Works has indicated that approximately 1800 applications have been received to date of which about 800 valued at a total of \$8.5M have been approved. The total works value of this is \$13.2M. Table 1 gives the percentage breakdown of Improvement Options carried out and the average quoted price for each of these options. These works have resulted in reductions in insurance premiums ranging from about 4% to 15%, according to information provided by the QDPWH.

TABLE 1. IMPROVEMENT OPTIONS – FREQUENCY AND COST

Improvement Option	Percentage (%) of all grants by number	Average Quote (\$ per grant)
Roof replacement including upgrade to roof tie-down	73.4	17,898
Roof structure tie-down upgrades using an external over-batten system	0.93	13,023
Replacement of garage doors and frames	5.02	5,955
Window protection including cyclone shutters or screens	14.0	11,862
Tie downs of external structures (e.g. sheds)	0.47	16,665
Replacement of external hollow core doors with solid core external grade doors	4.2	4,510



CASE STUDY – EXAMPLE OF REROOFING

Selected houses that were being re-roofed in the Townsville region were surveyed to observe techniques used by builders and note the house structures that were being upgraded. Discussions with builders on site shaped the understanding of the works being done and the effect the grant program has had on such projects.

Re-roof of a highset house in Townsville:

The house was a 1950s or 1960's high-set hip roof house with metal cladding. Hardwood roof framing and timber wall framing. This house in Townsville had its roof cladding replaced along with upgrading of tie down connections within the roof structure. For this small, but complex roof shape with several hips and valleys, the estimated cost by the builder on site was approximately \$14,000.

Existing battens that were nailed to rafter were left in place however, an additional screw was installed to the batten to rafter joint. In some areas, additional battens were installed where existing batten spacing was too large. A tie metal strap was added to existing skew nailed roof rafter to wall connections.

Existing structure:

- Roof cladding - Lysaght orb profile (Fasteners unknown)
- Roof Structure: Hardwood battens and rafters, shown in Figure 1
- Wall Structure: Harwood studs and plates, Weatherboard cladding.
- Batten to rafter connections two plain shank nails
- Roof to wall connections - skew nailed to top plate with bolts from over batten at ever 2nd rafter.

Improved connections:

- New roof cladding (product not yet on site)
- Additional batten screw for each batten to rafter connection, shown in Figure 2
- Additional softwood batten added near apex of roof
- Hold down strap added to each roof to wall connection, shown in Figure 3
- Standard rafter to hip rafter strengthened with a batten screw.
- Strut connections and apex connections were not examined.



FIGURE 1 REROOF IN PROGRESS, ORIGINAL ROOF CLADDING REMOVED, NEWLY ADDD SOFTWOOD BATTENS CAN BE SEEN AND COROSION OF EXISTING ROOF CLADDING OBSERVED



FIGURE 2 EXISITNG NAILED BATTEN TO RAFTER CONNECTIONSSTRENGTHENED WITH A BATTEN SCREW



FIGURE 3 ROOF TO WALL CONNECTIONS STRENGTHENED WITH A TIE DOWN STRAP



FIGURE 4 CYCLONE RODS OF EXISTING STRUCTURE AT EVERY 2ND TO 3RD RAFTER SPACING



DISCUSSION AND CONCLUSIONS

This report has presented an update and commentary on roofing upgrades currently being undertaken through The Queensland Government Household Resilience Program. The predominant upgrading that has been performed is upgrading the roof structure connections above the top plate.

Based on the quality and workmanship observed on selected site visits, these upgrades will significantly improve the performance of the house under wind loads. However, care must be taken for houses without existing cyclone rods to ensure that the entire tie down chain is of adequate strength. Reroofing older houses can also improve resistance to water ingress during significant rain events. All three re-roofing site visits in Townsville revealed that there was significant corrosion of existing roof cladding in hidden areas under flashings etc.

A notable benefit of the grant is that it has increased the volume of work for re-roofing jobs and has allowed contractors to charge more competitive rates. Previous cost estimates for re-roofing in a similar fashion were significantly more expensive, \$30,000 to \$50,000. Retrofitting measures being developed in the current BNHCRC project must be designed carefully such that their costs remain competitive to current re-roofing contracts.

Additionally, damage surveys by the cyclone testing station have consistently highlighted that lack of maintenance can lead to significantly damage to houses during wind events, it is recommended that future grant programs also include funding for maintenance of critical tie down components.

In summary, the community benefits of roofing upgrades that have undertaken as part of The Queensland Government Household Resilience Program include:

- Improvement in resilience to wind-induced structural damage,
- Improved resistance to water ingress,
- Reduced insurance premiums, and
- Reduced cost of conducting roof cladding upgrades.