TTW Structural Civil Traffic Façade

Structural Condition Report

Allambie Cottages, 1256 Bells Line of Road, Kurrajong NSW

Transport for NSW / 28 February 2024

232063

TTW (NSW) PTY LTD (ACN 649 974 112)
(ABN 74 649 974 112) I Consulting Engineers
Level 6, 73 Miller Street, North Sydney NSW 2060

Your Partner in Engineering

DOCUMENT REGISTER					
Report Title		Structural Condition Report for Allambie Cottages, 1256 Bells Line of Road, Kurrajong NSW			
Client		Transport for NSW			
Rev	**Date**	**Revision Details**	**Author**	**Reviewer**	**Approver**
2	28 February 2024	Condition assessment and intervention advice	AN	OB	GM
1	2 February 2024	For coordination and review	AN	OB	GM

APPROVAL	
Author Signature	
Name	Adrian Navarro
Title	Senior Structural Engineer (Heritage Structures)
Reviewer Signature	
Name	Olivia Britt
Title	Engineer (Heritage Structures)
Approver Signature	
Name	Garth Miller
Title	Associate (Heritage Structures)

© 2024 Taylor Thomson Whitting

Contents

p

Executive Summary 4

1.0 Introduction 5

2.0 Scope of Works 5

3.0 Site Inspection 6

4.0 Description of Building Structure 6

5.0 Observations & Discussion 7

5.1 Foundational and Floor Structures 7

5.2 Wall and Roof Structures 11

5.3 Other Notable Areas 13

5.4 Comparisons to Previous Findings 15

5.5 NCC Compliance of Current Condition 18

6.0 Recommendations and Conclusions 19

6.1 Condition 19

6.2 Intervention Options 19

Appendix A 21

© 2024 Taylor Thomson Whitting

Executive Summary

At the request of Transport for NSW, TTW (NSW) Pty Ltd were commissioned to undertake a site inspection and structural condition assessment of the Allambie Cottages at 1256 Bells of Line Road, Kurrajong NSW. The building is timber framed with metal sheet roofing and is composed of two single-storey cottages with a single-storey addition in between, connected together by a common area along the front of the property.

An inspection of the buildings was carried out by Garth Miller and Adrian Navarro of TTW on 25 January 2024, as well as a review of previous engineering reports as part of our scope of works. Our inspection was limited to the exterior of the building only, as it was deemed unsafe to enter.

It is our opinion that the structure is, overall, in a very poor condition and does not comply with the provisions outlined in the National Construction Code (NCC) on account of the severity of defects, the degree of deterioration, the extent of termite damage (as is reported in the Timber Inspection NSW report dated 30 January 2024), and the construction issues observed during our site inspection and has been previously reported in other structural engineering assessments.

Damage observed on site included:

- Leaning, cracking, and missing units to sandstone foundations (walls and piers),
- Leaning, deformed and failed timber stump foundations,
- Frass and termite trails to timber stump foundations,
- Extensive termite damage to floor and wall framing, including failed and collapsed members at multiple locations,
- A large portion of structural timbers along the perimeter of the building exhibiting severe water rot and weathering as a result of being exposed to the elements, including failed and collapsed members at one location,
- Significant deflections and deformations of external walls as a result of failed foundations,
- Partial collapse of an external wall and window bay at the northern cottage, and
- Failed, missing and blocked gutters.

Based on our observations and review of previous engineering reports, the building is currently undergoing progressive collapse and is determined to be unstable due to the lack of bracing to the above-ground foundations and to the load-bearing walls.

Considering the very poor condition of the building, it is our opinion that it is not structurally viable to repair or refurbish the building, nor is it viable to lift and move the building to another site. This is due to:

- Loss of structural integrity requiring that most structural materials throughout the building would need to be replaced, meaning that very little of the original building fabric and original construction would remain.
- Lack of sound/stable material to facilitate temporary propping.
- Attempts to repair the building will have a heightened risk of causing disproportionate damage, including partial collapse.
- All works would be highly invasive, including partial demolition to obtain adequate access.

Consequently, it is our recommendation that the building be demolished, noting that it is possible for some materials to be salvaged and re-used.

© 2024 Taylor Thomson Whitting

1.0 Introduction

At the request of Transport for NSW, TTW (NSW) Pty Ltd were commissioned to undertake a site inspection and structural condition assessment of the Allambie Cottages at 1256 Bells of Line Road, Kurrajong NSW. The purpose of this assessment was to determine the current condition of the building structure in order to provide engineering advice on the viability of different intervention options to the building, including repairs, relocation and demolition.

All descriptions, references to conditions and other details are a general guidance only and are given as our opinion but any interested parties should not rely on them as statements or representations of fact and must satisfy themselves as to the correctness, quantity, costs, etc of each of them.

The particulars set out in this report are for the exclusive use of Transport for NSW, and are copyright and the property of TTW (NSW) Pty Ltd. No responsibility or liability is accepted as a result of the use of this report by any other party, and the report is not to be used for any other purpose.

2.0 Scope of Works

In order to form our opinion on the building structure, the following level of review was undertaken:

- Review of previous engineering reports provided by Transport for NSW
  - *Allambie Cottages 1256 Bell's Line of Road Kurrajong - Structural Report* prepared by Shreeji Consultant (9 October, 2023)
  - *Structural Report - 1256 Bells Line of Road, Kurrajong Heights* prepared by Dunnings Consulting Engineers (1 February, 2022)
  - *RFI Appendix C Structural Reports* prepared by Taylor and Hubert Structural (17 August 2016 and 26 September 2016)
- Visual and photographic building inspection of accessible areas from building exterior at ground level.
- Detailed survey was not taken.
- Materials testing and invasive investigations were not carried out.
- Original structural documentation and documentation of later structural modifications was not available.
- Existing maintenance reports were not available for review.

Our scope was limited to the main building and did not include inspection or assessment of the tanks and drainage pits to the rear of the site.

Note that our scope of works did not include undertaking detailed engineering capacity/strength checks of any elements, nor did it include provision of measured drawings of the existing structure.

Figure 1 - Site location (Source: Nearmaps)

© 2024 Taylor Thomson Whitting

3.0 Site Inspection

An inspection of the buildings was carried out by Garth Miller and Adrian Navarro of TTW on 25 January 2024, with the assistance of a timber/termite expert from Timber Inspection NSW and accompanied by personnel from Heritage 21. Access was safely available to the exterior perimeter of the building only, including views of the sub-floor structure. Roofs were inspected from ground level only. The interior of the building was not inspected as it was deemed unsafe to do so at the time of the inspection.

The following structural elements were observed during the inspection:

- Above-ground foundations, as could be viewed along the perimeter of the building,
- Sub-floor and floor structure,
- Some wall framing (as was not obscured by cladding), and
- Some roof framing (as was not obscured by cladding).

Note that access around site was limited by the following factors:

1. Unsafe and unstable condition of structure, including missing access stairs, preventing any observations of the interior of the building,
2. Presence of asbestos,
3. Plant overgrowth, and
4. Presence of active hornets/wasp nests.

Only visual assessment of accessible areas of the extent of defects were taken and this report does not cover detailed measurement of defects.

Weather was clear and fine on the day of inspection.

The level of review undertaken is limited to what is recorded in the following pages of this report and was not sufficient to certify that the building was constructed in accordance with the design documents or structurally adequate in accordance with design codes at the time of construction nor present codes.

This report does not cover issues such as drainage, services, plant, cladding, waterproof membranes, asbestos, fitouts, architectural items. Cladding, sealants or waterproof membranes were not inspected and thus water tightness in this respect was not assessed and our comments would be limited to observed water leaks only.

4.0 Description of Building Structure

The single-storey building is composed of two cottages and a later addition in between, connected together by a common area at the west end of each along the front of the property facing Bells of Line Road.

The building is a timber-framed residential construction composed of floorboards, joists and bearers, stud walls, and timber roof framing. The building has a hipped roof with corrugated metal sheet roofing. Original portions of building are clad in timber weatherboards, while later additions and infills appear to be clad in compressed fibre cement sheeting (potentially asbestos containing material).

The foundation structure comprises several timber stumps driven into the earth in a grid pattern (with a maximum height of approximately 1.5 meters to suit the ground profile) and which appear to be split timber, not sawn or milled. Foundations also include a sandstone wall along the western perimeter and other sandstone piers toward the interior of the building, including underneath the chimney. The external blocks to the larger sandstone piers are dressed and mortared but are filled with loose rubble.

The site slopes down eastwards (away from Bells Line of Road) and several sandstone boulders were observed above ground level, underneath the building.

© 2024 Taylor Thomson Whitting

It is understood that the building was erected circa. 1920s with some later additions and has been vacant since approximately 2000 (i.e. over twenty years).

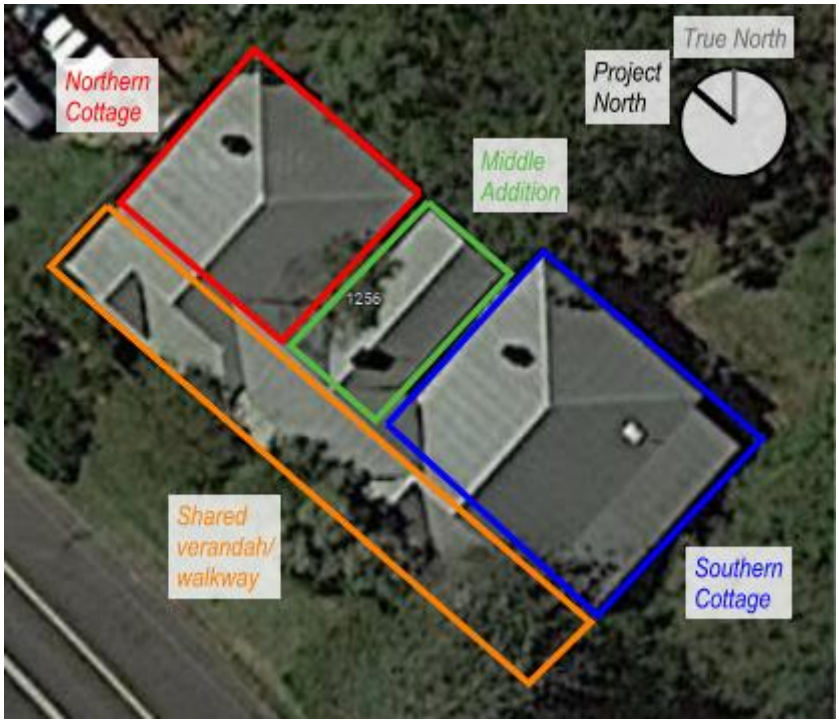

Figure 2 – Mark-up of areas

5.0 Observations & Discussion

5.1 Foundational and Floor Structures

All elements composing the timber floor structure (joists, bearers, etc), the supporting timber stumps, and the sandstone foundation walls and piers are in a poor to very poor condition. This is due to the extent and severity of damage, deterioration and loss of integrity observed to the structural members, which included a number of failed/collapsed members. Moreover, the foundation structure overall is determined to be unstable resulting in movement of the entire building above.

The observations detailed below and the findings outlined in the Timber Inspection NSW report (dated 30 January 2024) have contributed to our conclusion that the foundation and floor structures are in a poor to very poor condition.

Sandstone walls and piers:

1. Wall at south-eastern corner is leaning by more than 15° (to the vertical) and is consequently eccentrically loaded.
2. Wall along southern perimeter of building is leaning southwards (away from the building interior) along entire length.
3. Large pier to the southern cottage is also leaning southwards and has several cracks (up to approx. 3 mm in width) propagating through mortar and through sandstone units.
4. Single-width piers at eastern end of the middle addition are eccentrically loaded and appear to lean southwards/eastwards.
5. Piers to the northern cottage are cracked through the mortar.
6. Pier along northern perimeter is split at the corner:
    - Either because of missing units or movement.

© 2024 Taylor Thomson Whitting

- Missing mortar between units.
- Split reveals that the pier is filled with loose sandstone rubble.

Timber stumps (as viewed along the eastern perimeter):

7. Several stumps are twisted and bent and are no longer plumb.
8. Under the southern cottage, the majority of stumps appear to be leaning southwards.
9. All stumps are noticeably weathered, with splintering rough surfaces and occasional fine cracks along the grain.
10. Frass and termite trails were identified to the majority of observable stumps under the southern cottage and along the perimeter of the northern cottage.
11. Water rot and 'necking' (i.e. cross-sectional loss) observed towards the base of the stumps, particularly under the middle cottage.

Foundations overall:

12. No bracing between stumps nor rigid lateral supports to sandstone walls were observed.
13. Foundations have a general lean towards the south, with corresponding movement of the main building structure above.
14. Several stumps are missing or have fallen over, resulting in significant movement to the load-bearing walls above, particularly at:
    - Eastern face of the southern cottage,
    - Southern face of the northern cottage (where there has been a partial collapse of the wall), and
    - Along the entire northern wall of the northern cottage.

Figure 3 – Leaning and deteriorated sandstone walls and piers and deflection to eastern wall

Figure 4 – Leaning sandstone wall with missing units, and water-rot to exposed flooring timbers along southern side

Figure 5 – Leaning and eccentrically loaded sandtone piers to middle cottage

Figure 6 – Cracking to sandstone pier at northern cottage

© 2024 Taylor Thomson Whitting

Figure 7 – Splitting at corner of pier (northern cottage), note loose rubble fill

Figure 8 – Deteriorated and deformed stumps below northern cottage

Figure 9 – Close up of cracking to sandstone pier below southern cottage; frass and termite tracks visible in stump

Figure 10 – Termite damage above leaning stump to northern cottage

Figure 11 – Failed stumps below southern doorway means that supported is provided by a 75 x 50 mm stud

Figure 12 – Failed stump at southern wall of northern cottage

Figure 13 – Disconnected bearer below middle addition

Figure 14 – Failed stump at southern cottage. Note failed joist in foreground and floor framing in background, due to termite damage

© 2024 Taylor Thomson Whitting

Flooring (bearers, joists and floorboards):

15. Extensive termite damage observed to several members.
    - Partial collapse of flooring as a result of termite damage was observed to the southern and middle cottages.
    - Several members have disintegrated and failed as a result of termite damage, particularly along the eastern perimeter.
16. Water rot and weathering to various degrees observed throughout the building, notably:
    - Extensive and severe water rot at the southern wall of the northern cottage, contributing to the partial collapse of the wall.
    - Along the southern perimeter of the building, exposed flooring and framing is severely weathered, including cross-sectional loss to floorboards and joists.

Figure 15 – The is extensive water rot damage to the southern wall of the northern cottage

Figure 16 – Water rot to the corner post in the middle addition

Figure 17 – Typical weathering to exposed flooring, wall framing and wall sheeting (southern side of building)

Figure 18 – Deteriorated floor joist due to exposure and water rot

© 2024 Taylor Thomson Whitting

5.2 Wall and Roof Structures

While only the exterior faces of each wall and roofs could be inspected along the perimeter of the building, there is sufficient evidence to suggest that the structural integrity of the timber framing in all perimeter walls and roofing above has been compromised. The findings in the Timber Inspection NSW report (dated 30 January 2024) reveal that there is extensive termite damage to the timber framed walls throughout the building.

Based on our limited observations, it appears that individual wall studs and rafters are severely damaged or deteriorated across the extent of the building. Dilapidation to the walls and movement of the roofs is more generally as a direct result of failed supporting members below.

We note the following elements and components determined to be in a poor or very poor condition:

- Exposed wall studs and posts (supporting the roof above) across the perimeter of the building, damaged by a combination of water rot and weathering.
- Wall framing, particularly to the eastern side of the building, where evidence of termite infestation was observed.
- The entire northern perimeter wall which has deflected and deformed as a result of foundational failures.
    - The shape of the wall suggests that it is cantilevering at the western end, and that the weatherboards are effectively acting as bracing (similar to plyboard bracing in contemporary timber construction).
- Partial collapse of the southern wall and window bay of the northern wing of the building. Collapse is attributed to three key factors identified during the inspection:
    - Missing/failed foundations directly below,
    - Extensive and severe water rot in the area, particularly to structural members at the base of the wall, and
    - Insufficient lateral bracing/support to the wall and window bay.

With respect to the wall cladding, an estimated 30-40% of timber weatherboards appear to be relatively sound, exhibiting only typical signs of weathering (i.e. loss of paint, minor splintering and splitting at the ends). Weatherboards with biological growth and extensive staining are in a poor condition as these timbers are affected by water rot. Stains, cracking, deformations and holes were observed to the compressed fibre cement sheeting (potential asbestos containing material).

The roofs are in a relatively better condition compared to the remainder of the structure, without obvious deformations or damage observed. However, given the wholescale movement of walls and supporting structure below, it is likely that the roof has consequently moved but has remained more rigid compared to the wall and floor structures. Without being able to inspect the roof framing directly, this suggests that fewer roof members have lost structural integrity (with respect to both extent and severity of damage and deterioration) or the roof framing has more bracing than other parts of the building.

Some timber rafters are exposed on the southern and western sides of the building. These exposed timbers exhibit a combination of water rot and termite damage, the latter likely being more extensive than could be determined on site.

We note that the corrugated roof sheeting appears to be in a fair condition, without extensive surface corrosion or discernible gaps/holes.

© 2024 Taylor Thomson Whitting

Figure 19 – Typical weathering and deterioration to southern side of building

Figure 20 – Typical weathering to weatherboards to eastern side of building

Figure 21 – Deflection and deformation to northern wall

Figure 22 – Swelling and waterrot to eaves at northern side, directly below failed gutters

Figure 23 – Partial collapse of wall and window bay to southern side of northern cottage

Figure 24 – Close up of framing below failed window bay, noting lack of lateral restraint; note also failed stump to right of image

© 2024 Taylor Thomson Whitting

Figure 25 – Close up of water rot damage to remaining stump and failed timber bearer

Figure 26 – Deteriorated fascia and gutters to wetern side of building

Figure 27 – Deteriorated fascia, cladding and gutters to wetern side of building

Figure 28 – Deteriorated cladding and gutters to southern side of building

5.3 Other Notable Areas

1. Gutters are either completely missing, corroded through, or filled with debris across the entire perimeter of the building.
    - The resultant lack of stormwater management means that rainfall is free to flow across the external walls of the building (leading to water rot and accelerated weathering), ingress into the building interior, or directly reach the timber foundations and soil below.
2. The outhouse to the east side of the building has collapsed or been dismantled.
3. Treads to the entrance stairs at the east side of the building are missing.
4. Fascia boards (namely to the original portions of building at the northern and western sides) are missing or are noticeably deteriorated from weathering (including swelling and splitting).
5. On the southern perimeter, a post supporting roofing above is resting directly onto a PVC pipe.
6. Active hornets/wasp nests were found in four locations.
7. Plant growth in between weatherboards and roof framing, namely at the north-west corner of the building.
8. We note the close proximity of several large trees and other plants around the building.
    - Leaf litter from these trees compromises the performance of gutters, downpipes and stormwater management systems (as was observed on site).
    - Plants immediately against the building allow for retention and pooling of water, exacerbating weathering and water rot.
    - It is likely that some movement of the footings can be attributed to invasive roots of these nearby trees, although this could not be confirmed on site.

© 2024 Taylor Thomson Whitting

Figure 29 – Failed gutters to southern side of building

Figure 30 – Collapsed/dismantled outhouse

Figure 31 – Missing stair treads at eastern entrance

Figure 32 – Deteriorated fascia, cladding and gutters to wetern side of building

Figure 33 – Roof-support post resting directly over a PVC pipe

Figure 34 – Hornets/wasp nests under middle addition

Figure 35 – Plants growing between cladding boards at western side of building

Figure 36 – Tree growing immediately adjacent a stump to the northern cottage; note staining/bological growth to cladding

© 2024 Taylor Thomson Whitting

5.4 Comparisons to Previous Findings

Of the three previous engineering reports supplied, inspections of the interior spaces were undertaken on 16 August 2016 (per the Taylor and Hubert Structural report) and on 22 September 2021 (per the Dunnings Consulting Engineers report).

The findings and photographs in these two reports of the interior condition indicates that a number of structural elements to the floors, walls and roofs have failed or are in a severely deteriorated state as a result of termite damage, water rot, and foundation failures. The two reports also reveal a lack of bracing/lateral support in the construction of the wall framing.

By comparing photographs in the three previous reports against our observations on site, it is possible to track changes in the condition of the building since August 2016. In so doing, we note the following structural findings:

1. Collapse of the window bay to the southern side of the northern cottage was progressive and occurred since September 2021.
    - The founding stump immediately below this area had already detached by 2016, causing deflection to the wall above. The stump continued to lean away and eventually fall in the years since.
    - The extent of biological growth (and thusly water ingress) in the area increased over time, indicating that the failure was ultimately as a result of loss of structural integrity caused by water rot.
2. Movement of the timber stumps has continued across the period of the structural assessments. Deterioration of these timbers is an ongoing process, primarily as a result of weathering and water rot.
3. The lean of the sandstone wall at the south-eastern corner of the building appears to have worsened over the period 2016-2021.
4. Deterioration of the sandstone piers does not appear to be ongoing.
5. Collapse/dismantling of the outhouse structure occurred after September 2021.
6. Treads to the eastern entrance stairs collapsed/were dismantled between August 2016 and September 2021.

Figure 37 – Termite damage to flooring in Northern cottage (Taylor and Hubert Structural, 2016)

Figure 38 – Ceiling collapse due to water damage (Taylor and Hubert Structural, 2016)

© 2024 Taylor Thomson Whitting

Figure 39 – Termite damage to flooring in verandah (Taylor and Hubert Structural, 2016)

Figure 40 – Collapsed ceiling panels (Dunnings Consulting Engineers, 2021)

Figure 41 – Exposed roof framing, note lack of insulation/sarking (Dunnings Consulting Engineers, 2021)

Figure 42 – Internal wall with sheeting removed, noting no noggings to framing (Dunnings Consulting Engineers, 2021)

Figure 43 – Southern wall of northern cottage, 2016 (Taylor and Hubert Structural, 2016)

Figure 44 – Southern wall of northern cottage, 2021 (Dunnings Consulting Engineers, 2021)

© 2024 Taylor Thomson Whitting

Figure 45 – Sandstone wall at south-east corner, 2016 (Taylor and Hubert Structural, 2016)

Figure 46 – Termite damaged sump, 'necking' from water rot (Dunnings Consulting Engineers, 2021)

Figure 47 – Sandstone wall, south-east corner, 2021 (Dunnings Consulting Engineers, 2021)

Figure 48 – Splitting to sandstone pier, northern cottage is unchanged since 2021 (Dunnings Consulting Engineers, 2021)

Figure 49 – Outhouse building, as pictured 2021 (Dunnings Consulting Engineers, 2021)

Figure 50 – Eastern entrance stairs, as pictured 2016 (Taylor and Hubert Structural, 2016)

© 2024 Taylor Thomson Whitting

5.5 NCC Compliance of Current Condition

**The following findings are based on our site inspection undertaken on 25 January 2024, as well as findings from previous engineering inspections to the interior spaces undertaken on 16 August 2016 (per the Taylor and Hubert Structural report) and on 22 September 2021 (per the Dunnings Consulting Engineers report). These findings are based on our understanding of the NCC and how it applies to this building and are therefore provided for information only. While we do not anticipate that it is reasonable or feasible to retain the building, should retention of the building be proposed, we would recommend engagement of a BCA consultant to advise on specific NCC requirements as applicable to this building.*

We understand that the building could be used as either a single dwelling or operate as a boarding/guest house (or of a similar nature) that would not ordinarily accommodate more than 12 people. Therefore, the building would be considered as a Class 1b building per the NCC.

Based on our understanding of the provisions outlined in the current NCC – 2022, the building in the current condition does not comply with the NCC requirements.

It is our opinion that the building does not comply with structural provisions outlined in Part H of the NCC, including:

- Performance requirement H1P1 in that the building would not perform adequately under reasonably expected design actions, withstand extreme design actions (i.e. ultimate limit state design), nor sustain local damage without compromising a disproportionate extent of remaining structure.
  - The above design actions include dead, live, wind, differential movement and termite actions.
- Performance requirement H2P2 in that the roofs and external walls do not prevent penetration of water into the building, resulting in both unhealthy or dangerous conditions, or loss of amenity for occupants, and undue dampness or deterioration of building elements.

Non-structural issues identified include:

- Use of hazardous materials (namely asbestos sheeting),
- Lack of insulation/sarking to the roofs and ceilings to address thermal bridging,
- Lack of floor/subfloor insulation, noting the unenclosed space below the floor along the east side of the building,
- No insulation (for thermal, sound or fire protection) was identified within the walls, and
- Insufficient fire protection.

We anticipate that in order to make the building comply with the NCC, aside from the necessary repairs and interventions to deteriorated and dilapidated structural components, the above issues will need to be adequately addressed. Changes to the current construction of the building are likely to include:

- Construction of fire separation walls between individual cottages or tenancies and the shared verandah/enclosed walkway space along the front of the building, per Clause 9.3.1 of the ABCB Housing Provisions Standard.
  - Such walls will need to extend down to foundation/ground level (i.e. cannot be framed above stumps) and will need to be appropriately waterproofed at the base.
- New fixings will be required to all weatherboards to comply with Clause 7.5.2 of the ABCB Housing Provisions Standard.
- Sheet cladding to the walls will need to protect structural framing behind (including preventing water ingress), be composed of a compliant material, and be installed as per Clause 7.5.3 of the ABCB Housing Provisions Standard.
- Installation of insulation/sarking to the roofs, walls and floor framing per Part 13.2 of the ABCB Housing Provisions Standard.

Note that the insulation will increase the superimposed dead loading to the structural framing.

© 2024 Taylor Thomson Whitting

6.0 Recommendations and Conclusions

6.1 Condition

It is our opinion that the structure is, overall, in a very poor condition on account of the severity of defects, the extent of deterioration, and the construction issues observed during our site inspection and has been previously reported in other structural engineering assessments. The building is currently undergoing progressive collapse, which is forecast to continue, leading ultimately to collapse of the whole building. The cottages remain standing (for the most part) because of redundancy in the structural arrangement and materials used in construction, although it is our opinion that several elements are subsequently already at or close to structural capacity.

Of particular concern is the termite damage observed, which has affected structural and non-structural elements alike across the entire extent of the building. Termite-affected timbers to the walls and roof framing appear to have diminished structural integrity due to loss of cross-sectional area, while a number of flooring members have already collapsed as a result of termites. Moreover, termite frass, boreholes and cross-sectional loss was also observed to the majority of timber stumps, equating to compromised foundations.

More significantly is the scale of movement observed to both the building as a whole and to individual components. Aside from eccentrically loaded stumps, the foundations have an inherent construction flaw in that the stumps and sandstone walls are not braced together or are insufficiently supported against lateral loading. This is a key contributor to the movement of the structure overall and evidences that the building is structurally unstable. Additionally, detached or failed stumps indicate that there is a degree of differential settlement across the building, a result of differences in founding soil, inequal concentrations of loading, and variability in section size and shape between individual stumps. This movement is only expected to continue as founding elements are loaded increasingly eccentrically (introducing forces that were not originally designed for) and as other individual foundations and floor and wall frames above progressively fail.

The fact that the roof appears to be relatively intact and dimensionally stable compared to the remaining structure suggests that large portions of the building (if not the whole building) will collapse at once should a primary foundation element fail. The failure of a pile, sandstone wall or pier will cause significant movement or collapse of a load-bearing wall above. This in turn will result in large movement to the roof, which is rigid enough to then ‘pull’ other already-structurally-compromised walls along out of alignment, leading to further collapse.

Water rot is a comparably minor issue affecting the building. In isolation, this could be easily remedied through improved stormwater management, waterproofing, and replaced structural components. However, in this instance, water rot has exacerbated other issues and accelerated the deterioration of timber elements.

Taking these factors into account, we therefore determine that it is not safe to access the building and recommend that a structural engineer or experienced builder be present for any future site visits to identify potential structural risks.

6.2 Intervention Options

Due to the extent, severity and nature of the damage and deterioration observed, it is our opinion that it is not structurally viable to repair or refurbish the building for the following reasons:

- The majority, if not all, foundation stumps and sandstone walls are compromised and have lost structural integrity. All such elements would need to be either replaced or augmented.
- Any repairs/replacements to foundations and load-bearing walls would require temporary propping of the structure above, however, there is insufficient sound/stable material to do so.
    - I.e. the bearers, joists and bottom plates that would be utilised to isolate the footings below or support roofing above themselves require replacing due to severe deterioration.
    - Moreover, such works would be highly invasive and require partial demolition (of floors, walls and roofing) to provide adequate access to undertake the works, including excavation for new footings.

© 2024 Taylor Thomson Whitting

- Due to the extent of termite damage and water rot, it is likely that the majority if not all flooring timbers and wall framing members would need to be replaced.
  - This is likely to extend to several roofing components also.
- Due to insufficient bracing in the foundation and wall construction, removal of load-bearing walls (even in the temporary state) has heightened risk of jeopardising other parts of the structure as this would compromise an already insufficient lateral load system.
  - Note that temporary bracing of existing walls could only be undertaken after the foundations have been repaired and rectified to be sufficiently braced.
- Attempts to straighten or realign leaning foundations or deformed walls are likely to further damage the structure.
  - The process of jacking the structure will introduce concentrated and increased loads into already compromised elements that are currently overstressed or unable to support originally designed loading.
  - Due to the nature of timber as a material, it would be impossible to reshape deformed, creeped and deflected timber without damaging it (either visibly or within the timber fibres).
- The building is in a vulnerable condition, such that minor accidents typical during construction (e.g. bumping into walls/stumps with mobile plant equipment) have a heightened risk of causing disproportionate damage, including partial collapse.

Moreover, repairs to make the building compliant with NCC requirements will include introduction of new elements to improve stability and robustness, including strengthened foundations, bracing throughout to the foundations and load-bearing walls, tie downs, and new wall framing that complies with AS 1684.2. Such works would be highly invasive, requiring partial demolition to obtain adequate access, replacement of multiple components and removal of inadequate fabric.

Undertaking such repairs would involve the replacement of most structural materials throughout the building, meaning that very little of the original building fabric and original construction will remain.

We note also that the costs of repairs and remediation, with the intention of retaining as much of the original structure as possible, is likely to significantly outweigh the costs of a complete demolition and re-build.

For similar reasons as discussed above, it is our opinion that it is structurally not viable to potentially lift and move the building to another site, neither as a whole nor in portioned parts.

Consequently, it is our recommendation that the building be demolished.

During demolition of the structure consideration would need to be given to how asbestos containing materials can be removed given the poor condition of the structure and lack of safe access.

We note that it is possible for some materials to be salvaged and re-used. Should these materials be used as part of a new structure, we estimate that:

- <10% of timber stumps could be re-used.
- Individual sandstone blocks could be re-used. All existing mortar would need to be removed.
- <10% of original flooring or wall timbers could be re-used.
- Some roof framing timbers could be re-used.
- Approximately 30-40% of timber weatherboards could be re-used.

Prior to re-use of any materials, individual components would need to be closely inspected to identify any defects and assessed to be appropriate for use. The volume of materials that could be salvaged would increase if the materials are to be re-used for non-structural purposes, such as heritage interpretation or decoration.

© 2024 Taylor Thomson Whitting

Appendix A

Timber Inspection Report

© 2024 Taylor Thomson Whitting

Timber Inspection NSW Pty Ltd
4310 The Bucketts Way
Forbesdale NSW 2422

luke@timberinspectionnsw.com.au Mob: 0401296447

==========

Our Ref: 2237a-Jan-24

30 January 2024

Garth Miller | Associate (Structural)
| +612 9439 7288 | garth.miller@ttw.com.au
TTW Engineers | Sydney
Read our latest news here

Termite Inspection
Allambie Cottage
1256 Bells Line of Road, Kurrajong Heights

As requested by Mr Garth Miller, Mr Robert Roach from Timber Inspection NSW carried out an inspection of Allambie Cottage at 1256 Bells Line of Road, Kurrajong Heights NSW on the 25th of January 2024.

1. BASIS OF THE INSPECTION

1.1. To carry out a termite inspection of the building at Allambie Cottage, 1256 Bells line of Road, Kurrajong Heights NSW provide a written report advising on the level of termite activity or damage.

1.2. To initiate termite treatment where active termites are found.

1.3. To make further recommendations.

1.4. Also present at the inspection were representatives from Heritage 21, Transport for NSW and TTW.

1.5. The building appeared to be in a state of imminent collapse, and after assessing the situation, it was decided by all that it was too hazardous to enter the structure.

2. LIMITATIONS

2.1. The inspection is essentially a visual inspection. No destructive testing will be carried out.

2.2. Alates (future termite Kings and Queens swarming from existing nests) take flight and after landing pair off and go in search of a suitable nest site. This happens thousands of times per year. Due to poor nest selection sites and predators, very few survive.

2.3. It takes 3 to 5 years for a colony to establish to a stage where substantial damage will begin to occur. Finding these establishing colonies particularly at this early stage is not always possible as nests may be as quite small therefore the best approach is yearly inspections.

2.4. Some timber members were viewed from a distance (e.g., The underside of the floors timbers and/or the roof timbers). Where this occurred, visual evidence of termite activity may increase if closer access could be made available.

2.5. There was no access into or under the building due to the hazardous condition of the structure and the inspection was limited what could be seen from the outside.

3. Type of construction

3.1. The building was a weatherboard and fibre cement clad construction, with metal sheeting roofs.

4. RESULTS OF THE INSPECTION

4.1 A visual inspection of the exterior of the building was carried out.

4.2 The inspection was for termites only. If obvious structural defects where encountered, they were recorded unless recorded on previous reports.

4.3 There was moderate to extensive termite damage and decay to many timbers at the time of inspection. (Refer to photos below).

4.4 No active termites were sighted at the time of the inspection.

4.5 Photos were taken as part of the report. Some further comments may appear on the photos. Photos appear below.

Photo 5998 There was extensive termite damage in flooring timbers.

Photo 5902 There was extensive termite damage in wall and flooring timbers.

Photo 6003 There was termite damage in stump but close inspection was not possible.

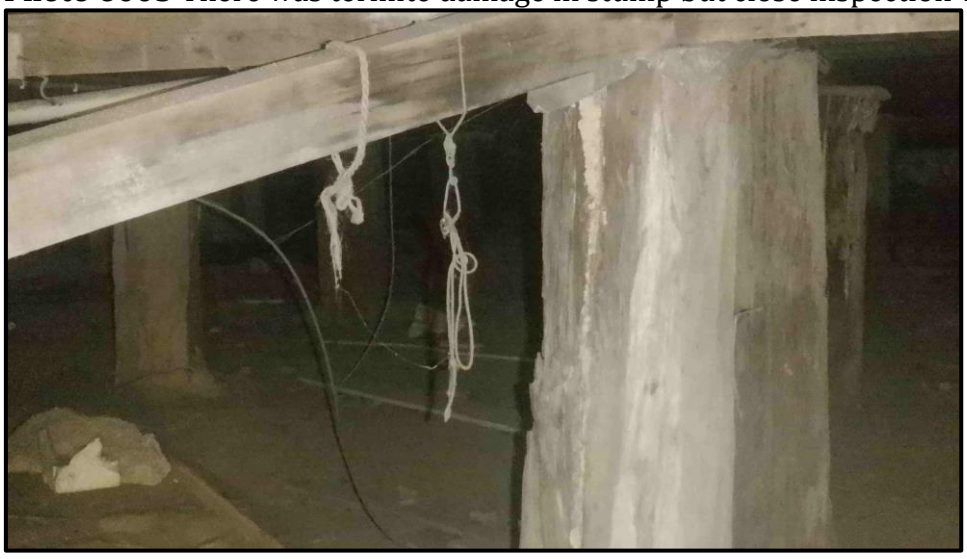

Photo 6005 There was termite damage in stump but close inspection was not possible.

Photo 6004 There was extensive termite damage in flooring timbers.

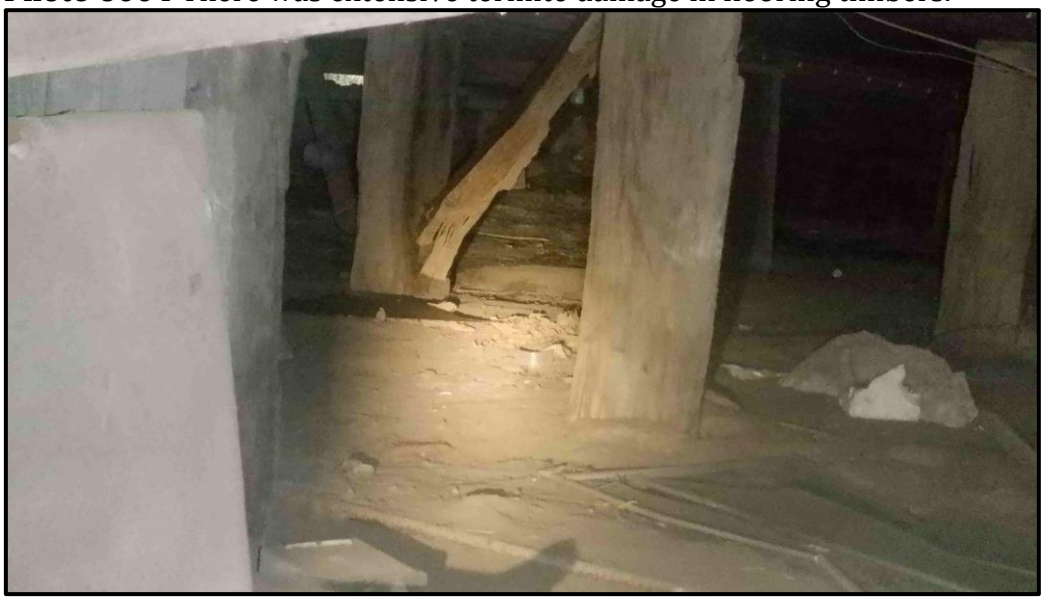

Photo 6024 There was extensive termite damage in exterior timbers.

Photo 6020 There was extensive termite damage in exterior timbers.

Photo 6009 There was extensive decay in parts of the exterior walls.

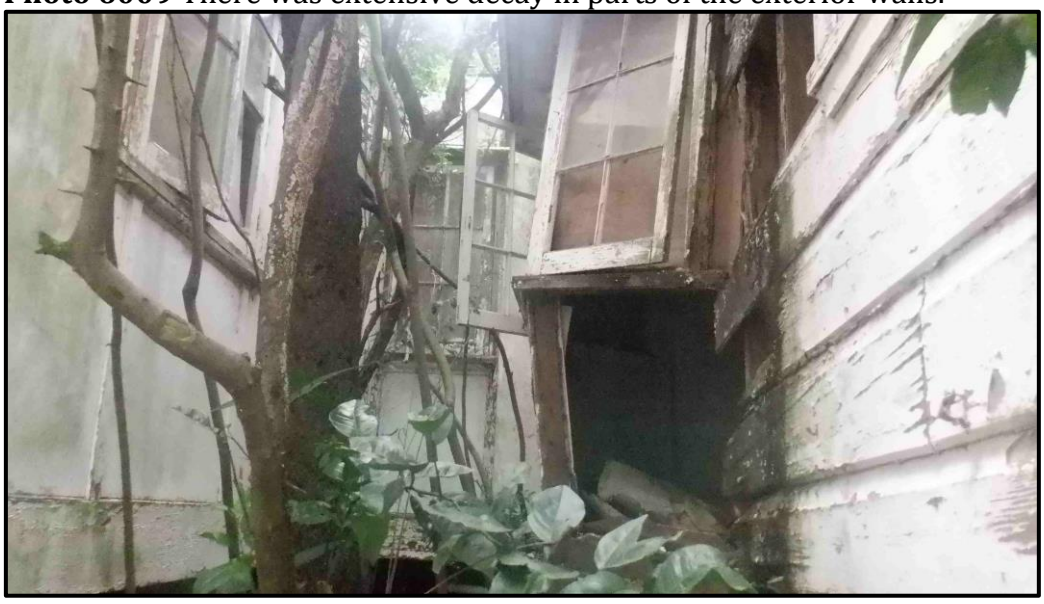

Photo 6010 There was extensive decay in wall and flooring timbers.

Photo 6027 There was extensive decay in exterior timbers.

Photo 6019 There was soil build-up along parts of the south western sides of the building allowing for the potential undetected entry of termites.

Photo 6026 There was severe corrosion of the guttering.

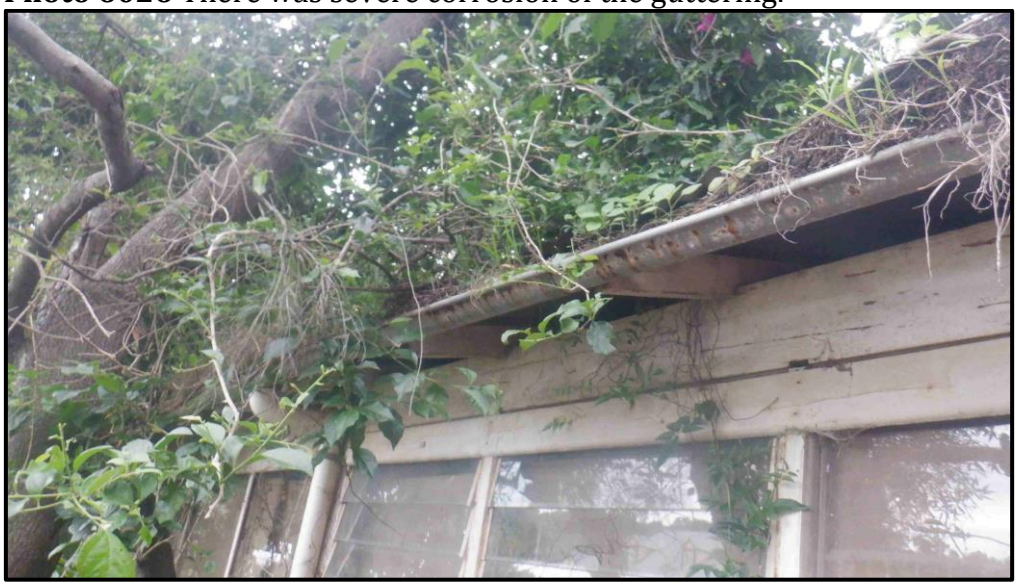

Photo 6029 There was severe corrosion of the guttering.

Photo 6042 There was severe corrosion of the guttering and downpipes.

Photo 5999 Piers had collapsed, and the rear stairs were unsupported.

Photo 6033 There were untreated timbers in ground contact used for supports under the south western side of the subfloor.

Photo 6016 there were debris timbers on the ground with extensive termite damage.

Photo 5989 Foundation walls and piers collapsing.

Photo 6046 Foundation walls and piers collapsing.

Photo 6015 A pier on the south eastern side of the building had collapsed and that part of the building was being supported by a small shrub.

Yours sincerely

LUKE JOYCE
MANAGER TIMBER INSPECTION NSW PTY LTD