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Our Ref: 2303705RE Allambie Cottages - 1256 Bell's Line of Road, Kurrajong - Structural Review
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'ALLAMBIE COTTAGES' - 1256 BELL'S LINE OF ROAD, KURRAJONG STRUCTURAL REVIEW



heritage conservation remediation

1. INTRODUCTION

We are acting on behalf of Hawkesbury City Council and have been commissioned to review the Structural Report submitted by 'TTW, Structural Condition Report - Allambie Cottages, 1256 Bell's Line of Road, Kurrajong NSW - Reference 232063 Rev B, Dated 28 February 2024.'

Site inspection of the cottages was undertaken on 18 March 2024 in the company of Christow Aitken, Heritage Architect. The access to the site was provided by Angela Frew (TfNSW). On the day the access was provided at 11.30am and was terminated at 12.45pm.

The inspection was to review the condition of the building.

The inspection was on foot from the ground level to the external areas and the areas that can be viewed from outside. The cottages were not accessed on the inside.

This report is prepared for Hawkesbury City Council.

2. OBSERVATIONS

2.1.

South Cottage - southeast corner - sandstone pier is leaning out and unstable.

NOTE:
A disconnected rainwater down pipe in the corner.



2.2.

South Cottage - South Elevation - the wall at the base is tilting.

Gutter above the area is missing.
Ground is sloping from the west to the east, front to the back.



2.3.

South Cottage - South Elevation - gutter above has corroded through and has collapsed.



2.4.

South Cottage - South Elevation The edge of the floor boards under the missing gutter.

NOTE:
Advanced weathering from excess moisture over the period.



2.5.

South Cottage - East Elevation - Sandstone pier has developed a crack through the mortar joints.



2.6.

Middle Addition - North East corner.

Corroded through down pipe.



2.7.

Middle Addition - North East corner.

Corroded through down pipe discharging water to the sandstone pier and its base.



2.8.

North Cottage - North Elevation.

Sandstone base to the chimney has cracked exposing the internal rubble fill.

NOTE:

Water logged ground at the bottom of the base.



2.9.

North Cottage - North Elevation.

Sandstone base to the chimney has cracked exposing the internal rubble fill.

NOTE:

Water logged ground at the bottom of the base.



2.10.

Shared Verandah - West Side.

Missing gutters and over grown vegetation to the gutter level.



2.11.

Shared Verandah - West Side.

Collapsing gutters full of vegetation and debris.



2.12.

Shared Verandah - West Side.

Corrode through gutter.



2.13.

South Cottage - view from the east side.

Timber stumps some with termite trail through the splits



2.14.

Middle Addition - sandstone piers - view from the east side.



2.15.

North Cottage - Timber stumps - view from the north side.

Piers have metal ant caps.
The bases appear to be affected by wet soil.



2.16.

North Cottage - south side east end.

Gutter corroded through.



2.17.

North Cottage - south side east end.

Gutter corroded through.
Area under the gutter affected by wet rot and possible fire.



2.18.

South Cottage - view from the east.

Later timber support in sawn timber.



2.19.

North Cottage - view from the north side.

Timber stumps.



2.20.

North Cottage - East side.

Timber boards affected by moisture - pilling paint.



2.21.

South Cottage - East side.

Timber boards affected by moisture - pilling paint and some wet rot.



2.22.

Middle Addition - East side.

Fibre cement board lining.



2.23.

South Cottage - south side.

Fibre cement board and windows.



2.24.

North Cottage - West Wall.

View from an opening in the verandah - boards are in very good condition.



2.25.

South Cottage - West Wall.

View from an opening in the verandah - boards are in very good condition.



3. OBSERVATIONS - COMMENTS

- 3.1. The site falls from the west to the east - front to tieback., guiding the surface water in the front to the back flowing through and over the ground supporting the timber and masonry piers and bases. The water bearing soli over a prolonged period has affected the timber stump bases.
- 3.2. Most of the gutters have corroded through and are missing. The roof water discharges to the base of the walls affecting the wall framing and the foundation soils to the piers and bases supporting the buildings. The foundation soils are weakened by the excess moisture over a prolonged period and the bases are pushed out of plumb.
- 3.3. The down pipes, which are present have corroded through and are not connected to any drains. The down pipes discharge the water to the foundation soils over a prolonged period and have softened the soil affecting the bearing capacity. These piers have tilted out of plumb.
- 3.4. Excess moisture in the timbers have encouraged termites to establish and thrive in the buildings.
- 3.5. Termite trials are observed in the splits in the timber stumps.
- 3.6. In some areas the floor joists and beards are affected by termite. This is observed at the east end of the building.
- 3.7. The timber studs are affected by termite at the east end of the south wall to the North Cottage.
- 3.8. Fire damage is observed in the same area and the wall has collapsed.
- 3.9. The timber boards on the north side to the North Cottage are in reasonable condition with paint flaking from excess moisture delivered to the area from non existence of the roof gutters.

- 3.10. The boards on the east elevation have some wet rot and flaking paint. This damage again from lack of gutters.
- 3.11. The boards on the west side to the North and the South cottage are in excellent condition, being protected from the weather by the vernal enclosing the area.
- 3.12. The inside of the buildings were NOT accessed and the condition of the floor framing, walls and the roof framing can not be commented on.

4. SITE CONDITIONS - COMMENTS

- 4.1. The site falls from the front to the back and all surface water in the front is channels to the back from under the b building. This constant flow over a prolonged period charging of the soil with excess moisture has severely affected the foundation soil and its bearing capacity.
- 4.2. The bases of the chimney in sandstone have damed the water against the walls on the upside of the ground. These have weakened the soils and affected the foundation developing cracks in the mortar joints.
- 4.3. The normal construction of the sandstone bases of the period, primer walls set in mortar with the inside filled with rubble, is exposed through the crack in the north cottage chimney base.
- 4.4. The excess moisture in the soil has weakened the foundation soil and the piers and basses have been pushed out of plumb.
- 4.5. The excess moisture in the foundation soils have encouraged wet rot in the bases of the timber stumps.
- 4.6. The excess moisture have encouraged termites to establish in the stumps and are the perfect entry to the building frame above.
- 4.7. The extent of water damage to the timbers can be established from the weathered ends of the floor boards exposed on the south side. This is from prolonged exposure to the moisture from the gutters above.
- 4.8. The bases at the location of the down pipes are severely affected by the moisture delivered over an extended period. The base have lost their bearing capacity and have moved out of plumb.
- 4.9. The moisture damage to the external timber boards can be gauged by comparison of the protected boards on the west side to the other area boards. The west side boards are in pristine condition.

5. TTW - STRUCTURAL CONDITION REPORT - ALLAMBIE COTTAGES, 1256 BELLS LINE OF ROAD, KURRAJONG NSW - REPORT REF: 232063 REV 2

The content of the report is reviewed by us, followed by our comments.

Item 5.1 Foundation and Floor Structure

"Sandstone walls and piers:

1. Wall at south-eastern corner.....
2. Wall along southern perimeter.....
3. Large pier to the southern cottage.....
4. Single with piers at.....
5. Piers to the northern cottage.....
6. Piers along northern perimeter...with loose sandstone rubble."

COMMENTS:

Deterioration observed in the sandstone piers and walls is purely from excess moisture to the foundation soils to the sandstone walls, bases and piers. These are built in locally won sandstone and set in lime mortar. The lime mortar affected by moisture will deteriorate from salt activity where the evaporating moisture from the mortar leaves behind salts in the exposed mortar and the mortar fails from salt crystal growth.

The softening of the foundation soils from the excess moisture will present uneven weaker than before bearing pressure capacity in the base and the base will crack.

The building practise at the time was to have the perimeter walls set in mortar and the inner area filled with sandstone cuttings and work rubble. This is exposed in the split in the northern chimney base.

“Timber stumps (as viewed along the eastern perimeter):

- 7. Several stumps are twisted and bent and.....*
- 8. Under the southern cottage, the majority of stumps app.....*
- 9. All stumps are noticeably weathered, with splintering rough surfaces and occasional fine*
- 10. Frass and termite trails were identified to the majority of observable stumps under the*
- 11. Water rot and ‘necking’ (i.e. cross-sectional loss) observed towards the base of the*”

COMMENTS:

The stumps were set in ground, the ends with bearing pressure and the embedded end providing lateral stability from soil pressure.

Excess moisture in the soil has affected the bearing pressure and the lateral capacity of the soil. This will create differential settlement and the structure with lesser resistance to lateral loads than before, creating leaning.

Timber with moisture content more than 15% will encourage termite and fungal growth. The excess moisture in the ground transfer to the timber has encouraged termite and the rotting of the timber ends embed in the ground.

Termites travel through ‘least path of resistance’, a soft wood or splits in hardwood. The hardwood with splits and trails generally does not lose its total structural capacity.

“Foundations overall:

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

COMMENTS:

Bracing between stumps was not common during the period and the building relied on the lateral capacity of the buried ends of the stumps and the sandstone chimney bases.

Lean in the building is from weakening of the foundation soils from excess moisture.

Missing stumps is the progressive deterioration from the excess moisture and possible termite activity.

“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.”*

COMMENTS:

WE DID NOT HAVE THE OPPORTUNITY TO INSPECT THE INSIDE OF THE COTTAGES. OUR COMMENTS ARE BASED ON OBSERVATIONS AND ASSESSMENTS OF SIMILAR STRUCTURES WE HAVE ENCOUNTERED.

Termites have thrived in these cottages from presence of timbers having moisture content of more than 15%, the moisture fed from leaking roof, which is most likely, considering the condition of the external visible elements.

The termites have not being deterred from their breeding from any treatment to curb them.

“Extensive and severe water rot at the southern wall...”

This is from excess moisture fed from non-existent gutters and down pipes over a prolonged period.

“Along the southern perimeter of the building, exposed flooring and framing...”

The extent of the weathering of the exposed flooring and framing on the southern side proves the time period over which the hardwood timbers have endured the weathering condition, excess moisture from the failed gutters.

5.2 Wall and Roof Structures

COMMENTS:

WE DID NOT HAVE THE OPPORTUNITY TO INSPECT THE INSIDE OF THE COTTAGES. OUR COMMENTS ARE BASED ON OBSERVATIONS AND ASSESSMENTS OF SIMILAR STRUCTURES WE HAVE ENCOUNTERED.

"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.*
 - o *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:*
 - o *Missing/failed foundations directly below,*
 - o *Extensive and severe water rot in the area, particularly to structural members at the base of the wall, and*
 - o *Insufficient lateral bracing/support to the wall and window bay."*

COMMENTS:

The distress and damaged noted is purely from excess moisture to the foundation soils causing failure of the piers, tilting of the bases, rotting of the timber stump bases and damage from the termite infestation.

"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."

COMMENTS:

Timber wall cladding is affected by excess moisture fed from failed and missing gutters. This is evidenced by the pristine condition of the boards protected from the weather by the shared verandah to the building.

"Stains, cracking, deformations and holes were observed to the compressed fibre cement sheeting (potential asbestos containing material)."

COMMENTS:

The stains are from excess moisture pouring over the sheet from failed garrets and down pipe. Cracking and deformation in the sheets is from differential settlement of the structure from failed foundation from weakening of the foundation soils from excess moisture. Holes are from vandals entering the inadequate secured site.

"The roofs are in a relatively better condition compared to the remainder of the structure, without obvious deformations or damage observed. However, given the wholesale 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."

COMMENTS:

The roof is NOT original and was renewed some time ago. It was looked at and remediated. Had this not been undertaken, the building would be in worst condition than current. The termites have most probably entered the building from the timber stumps, a direct access.

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."*

COMMENTS:

Missing gutters have directed the roof water to the foundation soils over a prolonged period. The slope of the site from the west to the east has directed the surface and the roof water under the buildings over prolonged period. The excess moisture has affected the foundation soils affecting the sandstone bases and piers, encouraged wet rot in timber stumps and exacerbated the termite activity.

2. *"The outhouse to the east side of the building has collapsed or been dismantled."*

COMMENTS:

NIL

3. *"Treads to the entrance stairs at the east side of the building are missing."*

COMMENTS:

Structure exposed totally to the weather and drenched by the roof water from failed gutters did not survive.

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).*

COMMENTS:

This is the result of failed gutters directing roof water over the fascia.

"On the southern perimeter, a post supporting roofing above is resting directly onto a PVC pipe."

COMMENTS:

The pier has suffered from excess moisture from the roof water being discharged to the pier base as the down pipes were not connected to the drainage system. The pier has suffered from this excess moisture before the gutter failed and exhibits this advanced distress.

"Active hornets/wasp nests were found in four locations."

COMMENTS:

Indicates no disturbance from any attendance to maintenance.

"Plant growth in between weatherboards and roof framing, namely at the north-west corner of the building."

COMMENTS:

Indicates total lack of maintenance.

5. "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."

COMMENTS:

Proves total lack of maintenance to the cottages over a prolonged period.

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.

5.5 NCC Compliance of Current Condition

"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.
 - o 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."

COMMENTS:

- The building was built at the time when none of the current requirements for buildings were in place.
- Despite these the buildings have survived more than 100 years standing up to all the weather incidents and usage. This attests to the sturdiness of the structure.
- All elements of the structure that do not comply with the current code can be strengthened by additional elements by simple procedures and can be made to comply. The stress and serviceability criteria can be easily complied with, if required.
- The floor bears and joists can be strengthened by bolting a new element to the existing.
- The lateral loads can be resisted by, if required by new strategically placed bracing system.
- All changes to be in line with the principals of Burra Charter.

"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."*

COMMENTS:

All these items can be easily remedied and complied with.

"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.*

COMMENTS:

All these items can be easily remedied and complied with. Some of the items will fall outside this as there are exceptions in place for Heritage Structures.

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.

COMMENTS:

The structure is TOTALLY NEGLECTED AND LACK MAINTENANCE.

This leads to the deterioration and progressive collapse by neglect.

"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."

COMMENTS:

Termites have thrived in the building due to ideal conditions to breed in. No attempts seem to have been made to check them.

"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, unequal 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."

COMMENTS:

The distress, deflection and lateral movement in the buildings are from failure of the structural elements affected by excess moisture and thriving termite activity.

"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."

COMMENTS:

Excess moisture leading to wet rot and encouraging termite and lack of maintenance are the main cause of the deterioration observed in the buildings.

"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*
- 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."*

COMMENTS:

- Remediation to the building will require plumb and partly rebuilding sandstone piers. The timber stumps will require new water isolated base, trimmed base seating on concrete footings.*
- Remediation is to be undertaken progressively, temporarily supporting areas that are affected.*
- Removing of original elements and reinstating these is part of the Guidelines of Burra Charter.*
- Replacement of timber flooring and stud walls is exaggerated as no investigations of the current structure have been undertaken.*

- Bracing can be provided to the structure with careful and progressive remediations while temporary bracing is in place.
- Timber members have “set deformation” from long term loading and can not be straitened. This is part of the Heritage of the structure.
- Collapse and accidents during construction are always considered and managed.

“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.”

COMMENTS:

Burra Charter requires retention of the original fabric as much as possible. The original members are retained and strengthened by splicing and booting new elements to the existing. New elements are identified as new, an accepted principal of remediation of Heritage Listed Structures.

“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.”

COMMENTS:

In the process of relocating the buildings, the existing fabric will be required to be stabilised. This can only be established once the full condition of the structure is investigated.

Relocation presents window to remediate the foundations, the sandstone piers, bases and the timber stumps.

“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.”

COMMENTS:

The remediation of contaminants on building sites is a normal process and can be dealt with adequate planning and process.

6. CONCLUSION

6.1. DAMAGE.

- 6.1.1. The distress, damage and failure on the site are from total lack of maintenance. The structure is deteriorating day by day by neglect and lack of maintenance.
- 6.1.2. The degree of damage observed on the site to the sandstone piers and bases, wet rot damage to timber stumps, boards and facia can only occur over a prolonged period of lack of maintenance.
- 6.1.3. Termite infestation and damage in the building has progressed unchecked over a long period.
- 6.1.4. The building is progressively collapsing from lack of maintenance.
- 6.1.5. The one main cause of damage is from lack of management of the surface and roof water.

6.2. REMEDIATION

- 6.2.1. The buildings are over hundred years old and are built with simple traditional skills in simple basic elements and can be remediated with simple trades.
- 6.2.2. Simple trades will be involved in remediating the buildings.
- 6.2.3. Compromised, damaged and over stressed elements are to be strengthened by splicing and bolting a new member next to the damaged one.
- 6.2.4. The stumps to have the wet rot affected bottom sections removed and and section scarf joined with a shoe to rest on a new concrete pad.
- 6.2.5. The lateral stability, if required, to be addressed by adding bracing in the piers at strategic locations. This will be new and identified as new.
- 6.2.6. The buildings were built at the time when the current codes did not exist. The survival of the structure for more than 100 years attest to the sturdily and robustness of the structure. The deficiencies can be dealt with recognised methods.
- 6.2.7. The roof is to be made water tight.

- 6.2.8. The roof water is to be effectively connected by adequately designed gutters and down pipes and drain the collected water with out leakage to the storm water system, away from the foundation soils.
- 6.2.9. The surface water is to be collected before it enters the building foundation soils and diverted away and further from the building foundation soil.
- 6.2.10. Termites are to be eradicated from the site and a management system to be in place to keep them out.
- 6.2.11. The buildings are to be analysed for their heritage significance and the intrusive elements are to be removed. This will simplify the remediation of the significant structure.
- 6.2.12. The buildings are to be remediated adopting the principals of the Burra Charter, as less as possible disturbance to the original fabric and retain as much as possible of the Heritage Fabric.
- 6.2.13. Damage and distress to the buildings from neglect and lack of maintenance are not the grounds for demolition of the buildings.



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