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STRUCTURAL ENGINEERING REPORT

On

Policeman's Cottage

at

Reservoir Road, Prospect NSW

Job Number: 14391
15th July 2014

Report by: Leo Meng

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15th July 2014
Our Ref: 14391-S01/lm

Village Roadshow Limited
Att: Chris Warhurst

RE: Structural Engineering Report on the Condition of the Policeman's Cottage on Reservoir Road, Prospect NSW

1.0 Introduction

Further to your request, Phil Lahif and Leo Meng of our office inspected the premises at the above address on 24th April 2014. This was followed by subsequent inspections by Leo Meng, Jackson Brennan-Seymour from H&H and, Asbestos and Timber contractors to get their expert opinion. The asbestos inspection was carried out on the 11th June 2014 by CIVILEX Australia which involved 6 samples being taken from various internal and external areas of the house to test for the presence of asbestos. A timber inspection was carried out on the 17th June 2014 by Timber Inspection Pty Ltd to assess the stress grade of the structural members and provide comment on any damage caused by borers, decay and termites. The purpose of these inspections was to provide an overall structural engineering assessment on the existing condition of the Policeman's Cottage at the above address.

2.0 Background

The former Policeman's Cottage consists of a timber framed duplex residence circa early 1800's. It has been unoccupied for many years and as a result the building has become severely dilapidated. The Policeman's Cottage was identified by Blacktown City Council as a draft heritage item; however the building was not formally listed and gazetted. The Policeman's Cottage is located within and adjacent to the entrance of the new Wet n' Wild Theme Park. Our review is a result of concern for the structural integrity and thus safety & stability of the dwelling. An aerial view of the Policeman's Cottage and surrounding area is shown in Figure 1 below and a floor plan which should be viewed in conjunction with the report is shown in Appendix A.

Figure 1 – Aerial view of Policeman's Cottage

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3.0 Findings from Structural Inspections

This section of the report generally focuses on the findings from our site inspection in structural perspective and including following items,

3.1 Verandah framing
3.2 Brick piers and footings
3.3 Internal areas
3.4 Roof framing
3.5 Brick chimney

3.1 Verandah framing
The external timber frame verandah comprises 90x90mm hardwood posts, header beams around, 90x50mm hardwood or Oregon rafters and same size bridging member in between as shown in Photo 1 below. Most of the rafters are spaced at approximately 2000mm centres.

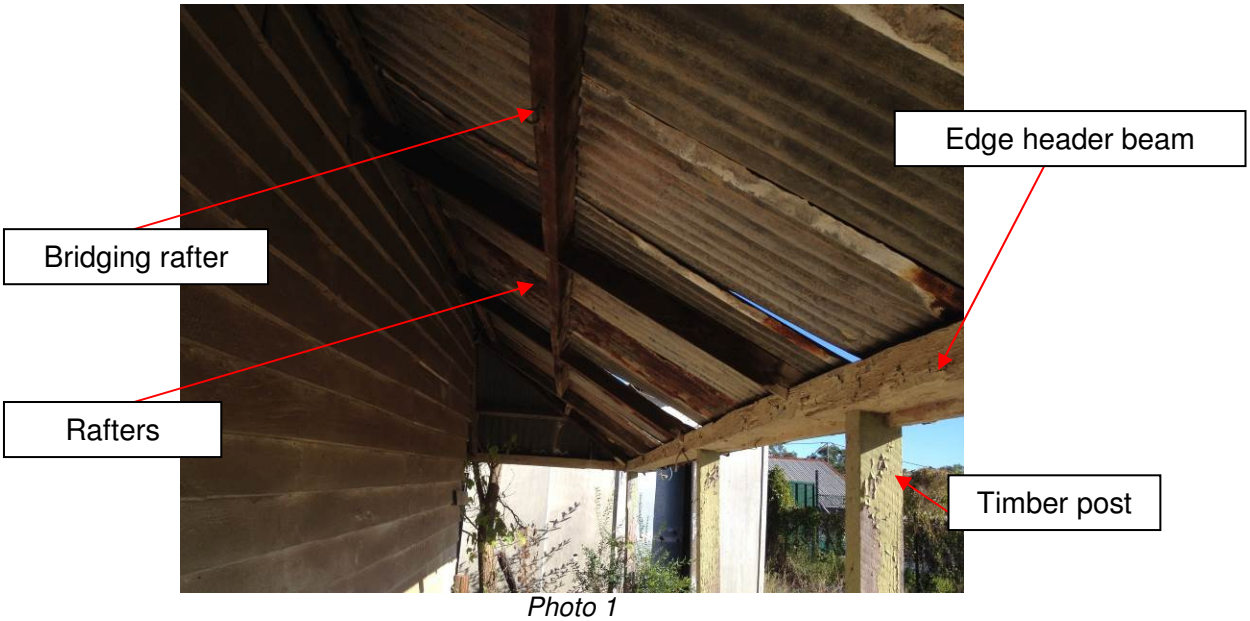

Photo 1

The condition of the timber post varies from extensive weathered to aged with wood rot; some of the posts are leaning due to the condition of footing below or missing.

Most of the posts show signs of wood rot, splitting and deterioration as shown in Photo 2 below.

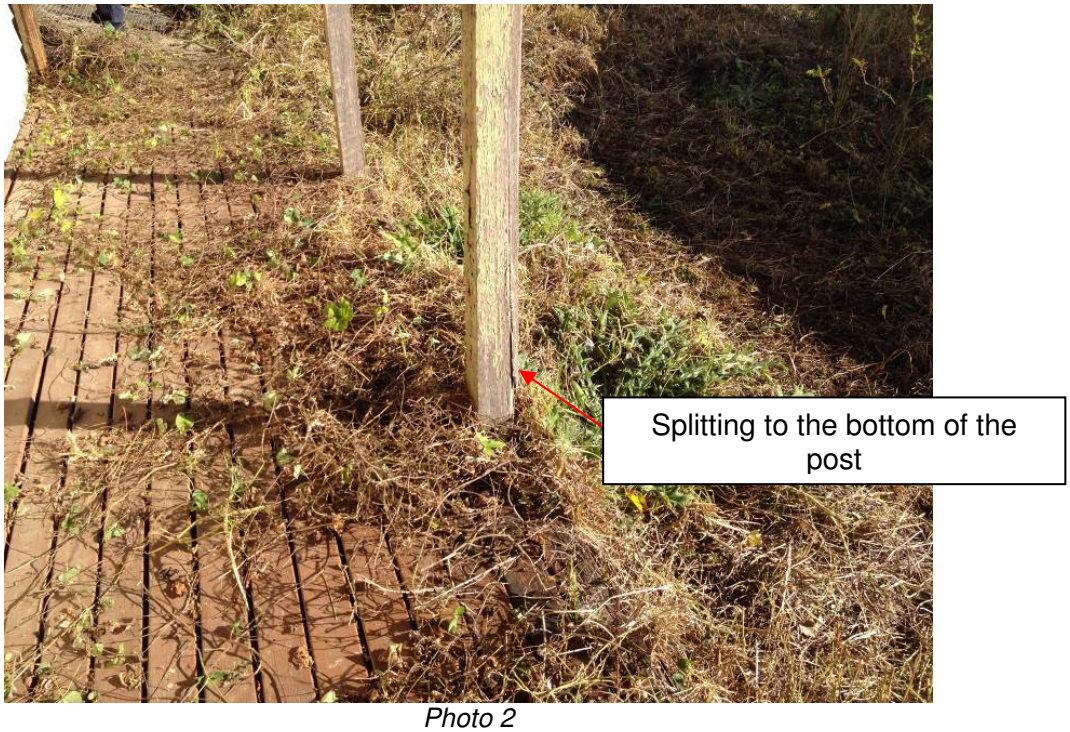

Photo 2

Most of the rafters are showing signs of deterioration and the tie down fixings have compromised due to corrosion as shown in Photo 3 below. We believe some connections have lost the full tie down capacity.

Photo 3

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The timber post adjoining the entry door to the western elevation is noted to be out of plumb excessively as shown in Photo 4 & 5. If this timber post keeps leaning away, there is a potential risk of localised collapsing of the verandah roof.

Photo 4

Photo 5

A timber post is noted to be missing at the northeast corner of the verandah as shown in Photo 6. The roof shows evidence of excessive deflection at this location; it is our opinion that this may potentially cause the roof to fail partially due to the wind uplifting because there is no tie down provided without the post. This has also caused excessive deflection and eventually would cause the roof to collapse.

Photo 6

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The existing timber decking at the northeast corner of the verandah has deteriorated excessively as shown in Photo 7 & Photo 8 below. The decking is supported by 90x50mm bearers and joists. The forestry inspector has failed to provide a strength grade on them due to their poor condition. The entire decking at this corner is unsound in its current state.

Photo 7

Photo 8

The roof sheeting for the verandah has corroded over the years and is in poor condition as shown in Photo 9; the roof screws are missing at multiple locations throughout the entire area, this is a high potential risk for public safety under windy condition as the roof sheet may be ripped off.

Photo 9

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3.2 Brick piers and footings

The entire policeman cottage has timber floor framing throughout; the floor bearers for the southern kitchens are supported by 230x230mm brick piers as shown in Photo 10 below.

Photo 10

Multiple brick piers are noted to be leaning as shown in Photo 11; excessive deterioration to the mortar joints is evident. It is our opinion that the integrity of these brick piers has been compromised due to the low bearing capacity of the foundation material and the condition of the brick piers. There is potential risk of structural failure of the timber floor frame and load bearing stud walls supporting the roof for this section of the cottage. A schematic is shown in Figure 2 below to show the consequence of this.

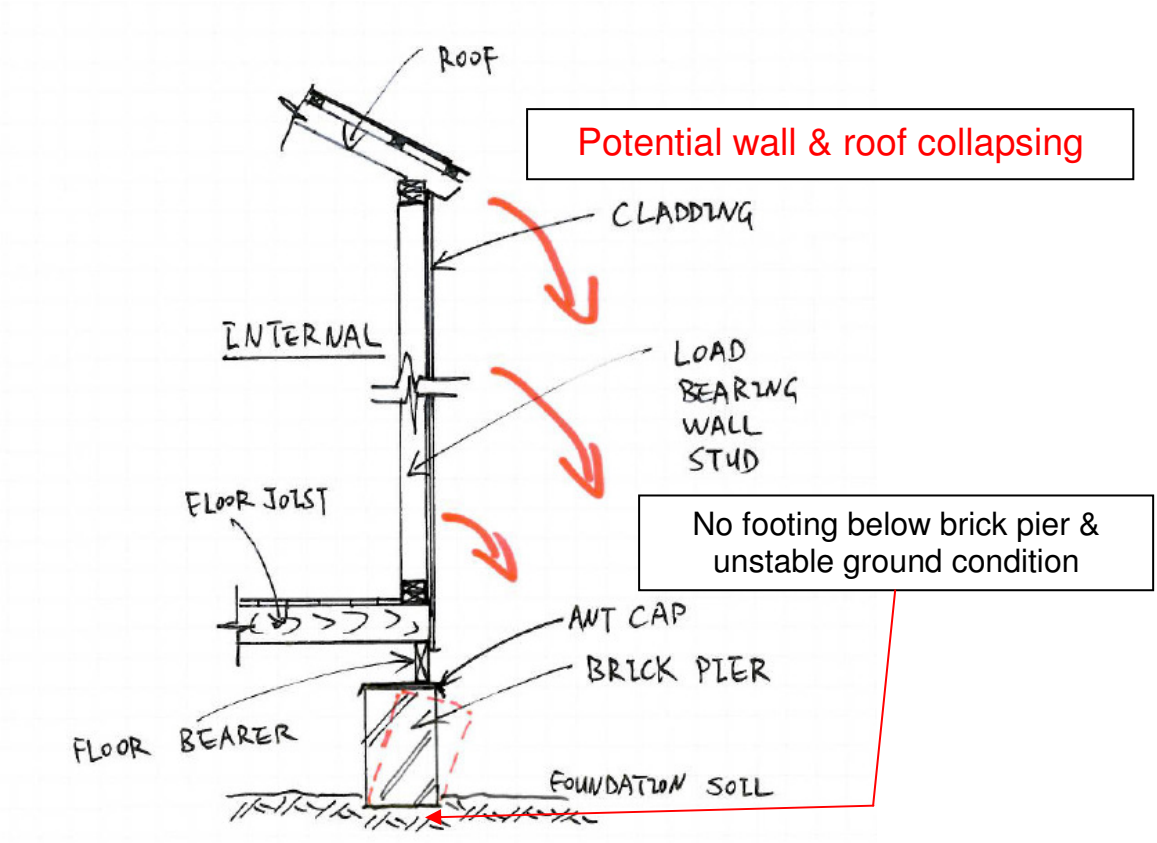

Figure 2: Consequence of leaning brick pier

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There is likely foundation subsidence throughout the entire cottage as the internal floor level is not leveled; a settlementof up to 90mm was measured during our inspection by using a survey equipment.

The measurements are shown in Figure 3 and Figure 4 below.

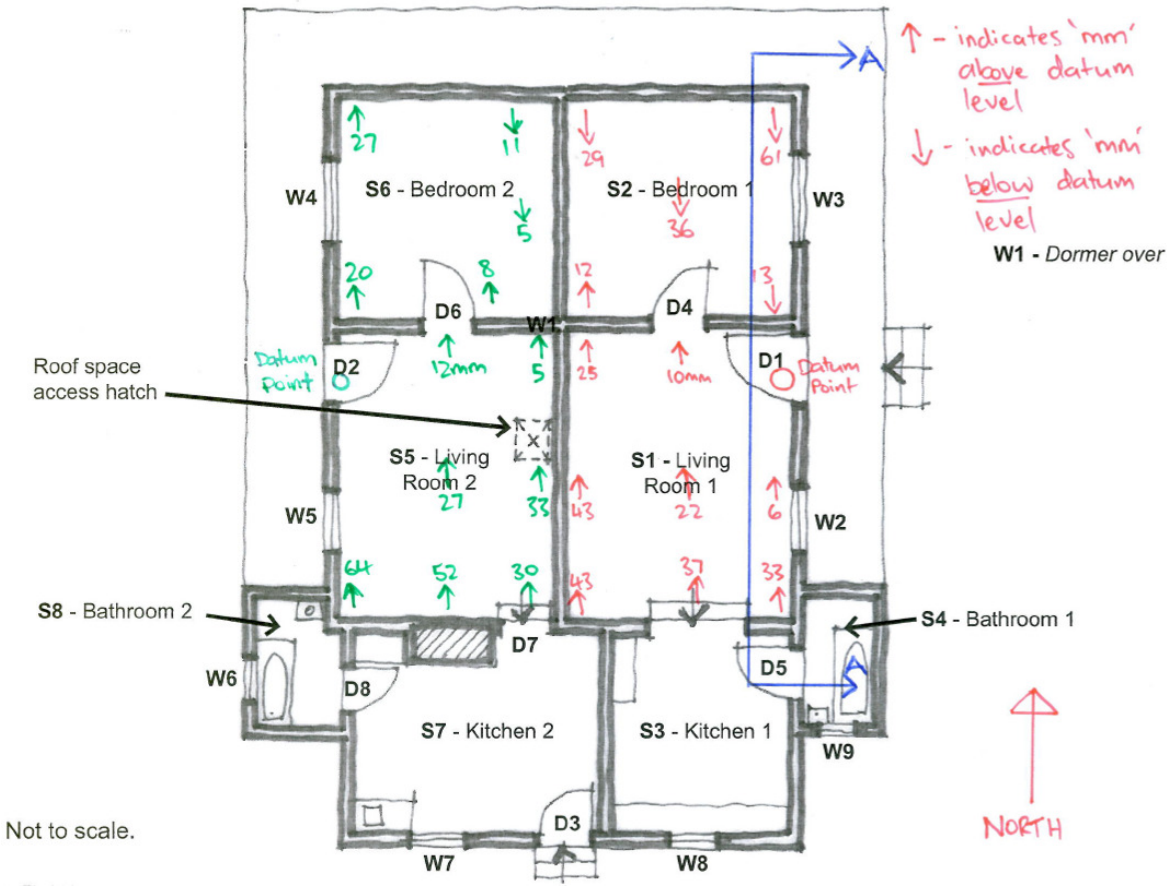

Figure 3 – Floor Level Readings

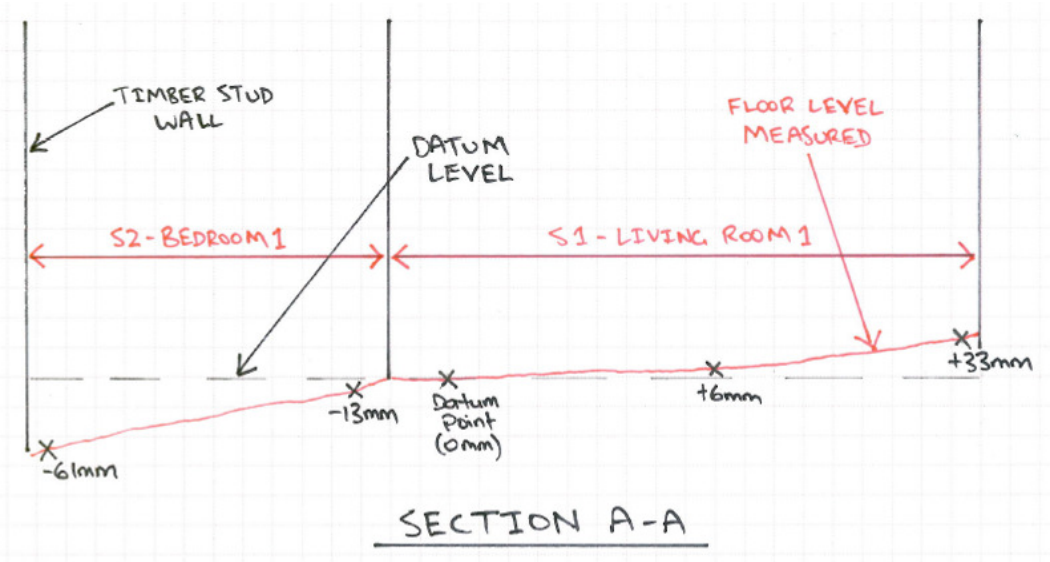

Figure 4 – Section A-A of Floor Level

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3.3 Internal areas

The ceiling of the western kitchen has been completed damaged due to the water ingress as shown in Photo 11; it is our opinion that this is not safe and there is risk of ceiling collapsing due to prolonged period of water ingress.

Photo 11

The asbestos inspector has identified that the internal wall sheeting contains asbestos at multiple locations; therefore internal timber studs wall were not exposed during our structural inspection.

3.4 Roof framing

The roof consists of hardwood rafters and rafter struts which are from round small growth trees varies from 50 to 120mm in diameter. The forestry inspector has identified termite and lyctid borer damages to this roof frame. Splitting and/damage to timber frame is evident at multiple locations as typically shown in Photo 12 & Photo 13.

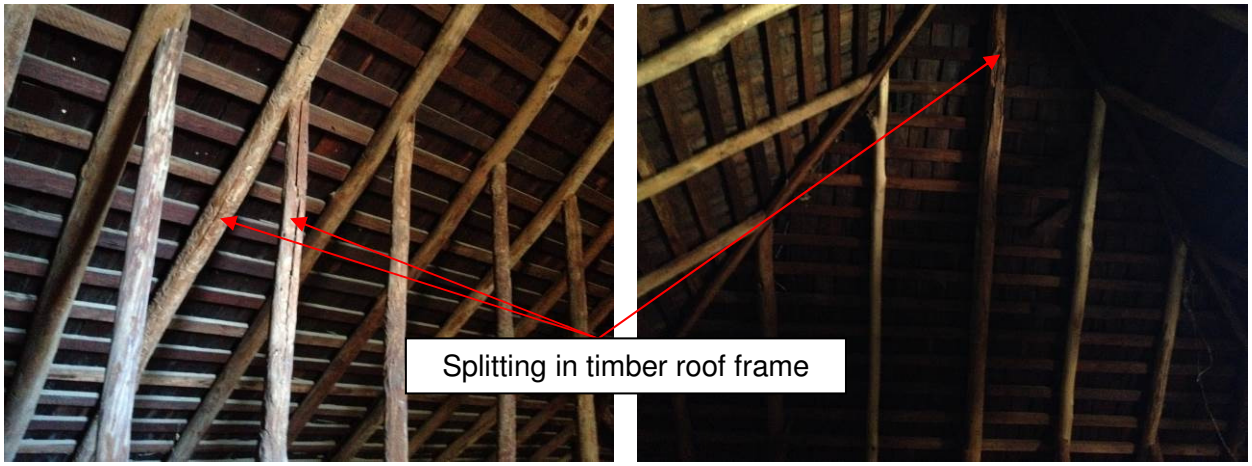

Photo 12 *Photo 13*

The existing corrugated roof sheet shows evidence of corrosion at multiple locations throughout as shown in Photo 14. Corroded & missing roofing screws make this a potential public safety issue.

Photo 14

3.5 Brick chimney

There is a brick chimney located towards the southern elevation of the cottage as shown in Photo 15 below.

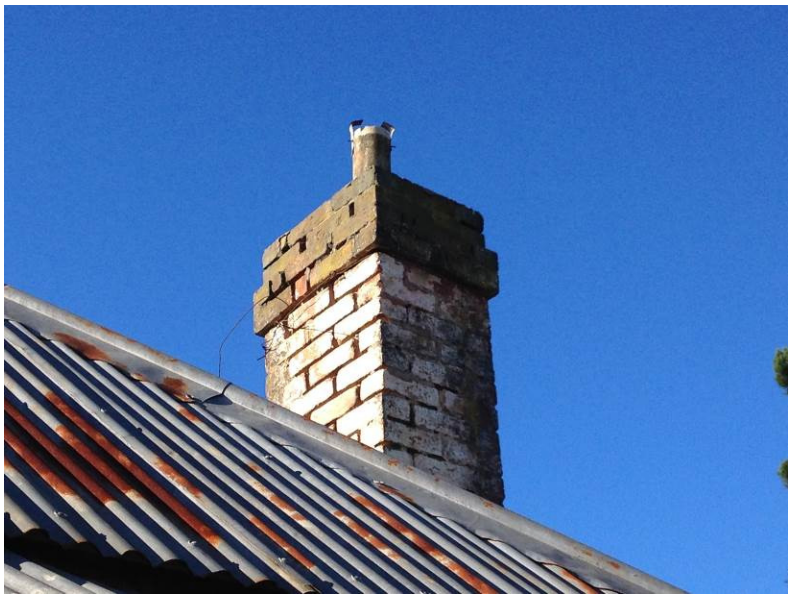

Photo 15

Mortar joints are noted to be severely deteriorated due to aging & weathering of the lime mortar. This has increased the risk of structural failure of the brick chimney.

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4.0 Summary of Timber & Asbestos Reports

Asbestos Inspection Findings:
Asbestos was typically present in the external and internal wall linings of the dwelling at multiple locations, along with the external detached sheds. No asbestos was detected in the floor or ceilings of the dwelling. Refer to Appendix B for a copy of the asbestos report.

Timber Inspection Findings:
The timber report highlights the following findings and issues:

- Timber floor bearers and joists of the dwelling typically showed signs of decay in various areas.
- Flooring under both kitchens was found to be badly affected by Anobium borers. As a result the area is potentially unsafe.
- The subfloor of the balcony was typically in poor repair and most members had slight to extensive decay.
- The verandah hardwood support posts could not be graded as they were decayed above and in contact with the ground. The posts were also often considerable distances apart.
- Some rafters supporting the roof over the balcony are considered to be low strength.
- No access could be obtained to the subfloor under the living room's and bedrooms.
- Decay to exposed rafters adjacent to collapsed ceiling in S7 - Kitchen 2.
- Considerable defects were to many of the rafters supporting the roof in the ceiling space including limbs, termite damage, overgrowths injury' splits and Lyctid borer damage. The rafters and props consisted of small round growth trees and thus could not be graded. The ceiling joists were also not graded.
- No termite barrier was evident, thus the building is a high risk to termite attack.

5.0 Immediate Safety or Structural Issues

There are a number of immediate safety and/or structural issues associated with the findings discussed above, including:

Compromised brick piers
It is our opinion that the integrity of multiple brick piers has already been compromised due to aging and subsidence. This is an immediate safety issue as the flooring, loadbearing walls and roof may partially collapsing.

Timber framed verandah
The structural condition of the timber framed verandah is in poor condition. Immediate attention is required in order to prevent any sudden collapsing. It is our opinion that most of the tie down connection between timber edge beam and rafters are not adequate due to corrosion and timber decay; therefore the risk of verandah roof collapsing is high.

Loose metal roof sheeting
Loose metal roof sheeting has the potential to rip off in strong winds and would cause continuing decaying to the internal timber members due to presence of moisture.

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Circular uncut timber roof framing for the main roof
Evidence of termite damage was noted by the forestry inspector as noted in their report attached in the Appendix of this report. Multiple rafters and vertical struts are showing signs of excessive splitting; therefore it is our opinion that some timber elements may have lost their structural capacity.

We don't believe the roof structure itself will collapse suddenly at this stage, however excessive foundation subsidence is noted throughout the entire property, this will cause the loadbearing wall to rotate and potentially cause the roof to collapse or partially collapse.

In addition, condition of the connection between each circular uncut timber is unknown; if excessive corrosion is evident, sudden partial roof collapsing may occur.

Brick Chimney
The exposed brick chimney above the roof level shows excessive deterioration of the mortar joints and it is our opinion that the structural integrity of chimney has been compromised.

Asbestos content in the wall lining across the cottage
Asbestos would be a potential risk to people's health to anyone who comes in contact with wall lining contains asbestos.

6.0 Recommendation and Conclusion

Based on the findings highlighted above we believe that most elements of the cottage are severely dilapidated and beyond repair. Therefore our recommendations are as follows,

The brick pier footings and timber framed veranda are far beyond repair; the main roof frame may be retained and should be dismantled, treated, strengthened & conserved if it has any heritage significance.

We would recommend the cottage to be demolished and rebuilt in order to minimise the risks of sudden structural failure or any items become loose during high winds in their current conditions.

We hope this satisfies your requirements, please do not hesitate to contact myself on 9417 8400 to discuss this matter or any future concerns.

Yours faithfully,

Leo Meng
For, and on behalf of
H & H Consulting Engineers Pty Ltd

Reviewed by

Phillip Lahiff

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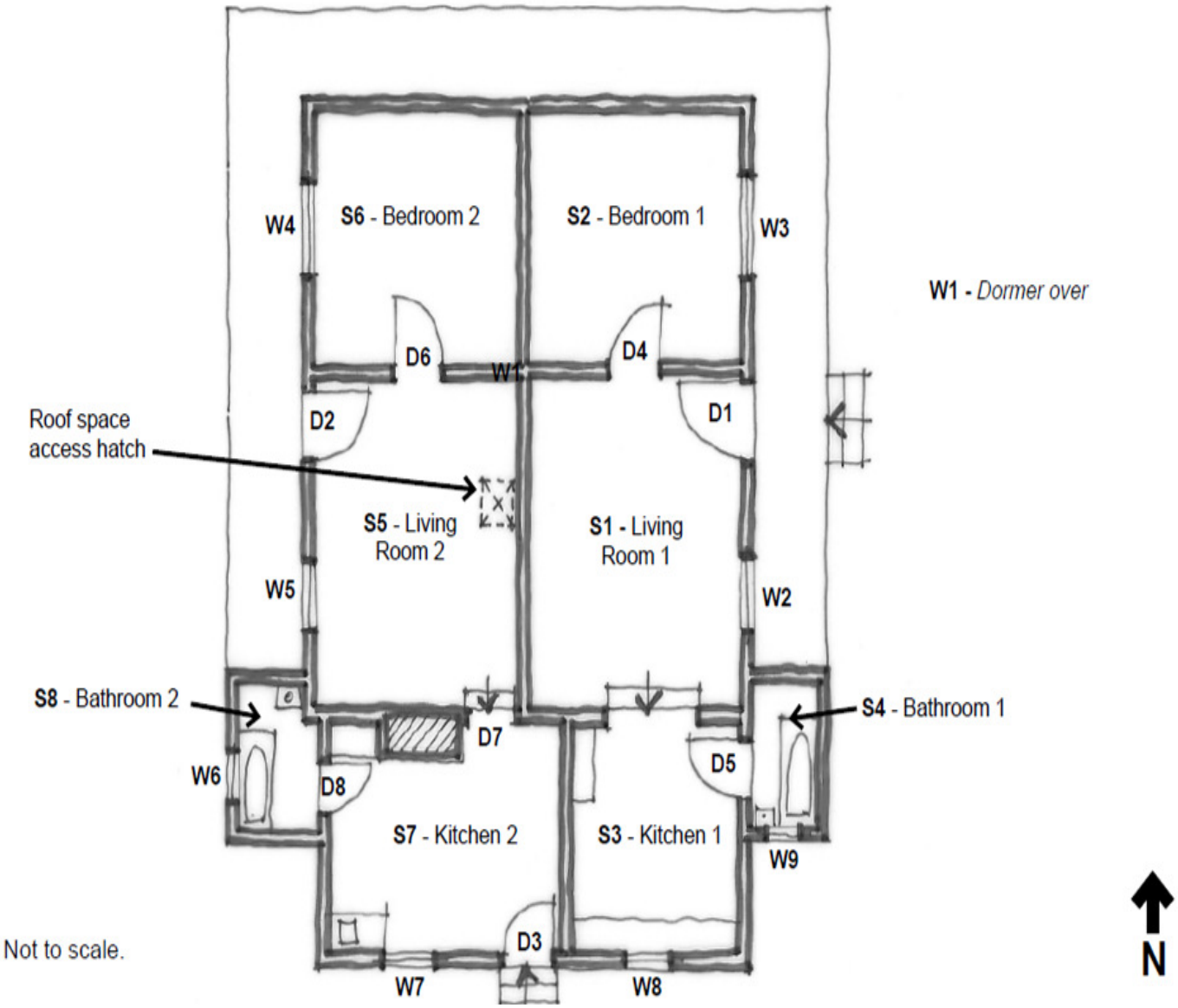
Appendix A – Floor Plan



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Appendix B – Asbestos Report & Timber Inspection Report

CIVILEX AUSTRALIA *Asbestos management solutions.*

TEST REPORT

CERTIFICATE OF ANALYSIS - ASBESTOS IDENTIFICATION

HENRY & HYMANS STRUCTURAL ENGINEERS
LEVEL 5, 79 VICTORIA AVE
CHATSWOOD, NSW 2067

Inspection report No. ASET39682/ 42862 / 1 - 6 **Inspection Date: 11/05/2014**

Client: HENRY & HYMANS STRUCTURAL & CIVIL ENGINEERS **ABN:** **STRATA:**
Address: Police man's cottage, Resovoir Road, Prospect, NSW
Job Number: ASET39682/ 42862 / 1 - 6
Phone: (02) 9417 8400
Asbestos Identification:
This report presents the result of six samples, received for analysis of asbestos.

1. Introduction: (6) sample was examined and analysed for the presence of asbestos.

2. Methods: The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized light Microscopy in conjunction with Dispersion Staining.

3. Sample details:

- Sample collected by: Civilex Australia Pty Ltd
- Sample locations: (listed below)
- Sample details: Fragments.
- Date Sampled and analysed: 13/06/2014

Results: Asbestos fibre is a category 1 carcinogen known to cause cancer in humans.
Microscopic analysis revealed that samples 42862 / 1 - 6 consisted of the following;

Sample	Location/Reference	Dimensions (mm)	Asbestos ID
1. ASET39682 / 42862 / 1	West side vinyl flooring (living)	20 x 2 x 23	No asbestos detected
2. ASET39682 / 42862 / 2	West side vinyl flooring (kitchen)	30 x 20 x 2	No asbestos detected
3. ASET39682 / 42862 / 3	West side kitchen chimney	20 x 6 x 4	Chrysotile & Amosite asbestos
4. ASET39682 / 42862 / 4	East side internal wall sheeting	22 x 10 x 3	Chrysotile asbestos
5. ASET39682 / 42862 / 5	External wall sheeting dwellings	20 x 10 x 2	Chyrsotile asbestos
6. ASET39682 / 42862 / 6	External detached sheds	35 x 30 x 5	Chrysotile & Amosite asbestos

Methodology: Samples have been analysed using polarised light microscopy including dispersion staining in accordance with the Method for the qualitative identification of asbestos in bulk samples [AS 4964 – 2004] and in-house method AS102 - Method for the Qualitative Identification of Asbestos in Bulk Samples.

Sampling: Samples have been analysed on an "as received" basis.

Note: The results relate only to the samples tested.

Comment: Even after disintegration of certain bulk samples (vinyl tiles and bituminous type materials), the detection of fibres may be difficult when using Polarised Light Microscopy and Dispersion Staining Techniques. This may be due to the matrix of the sample (uneven distribution), or fine fibres that are difficult to detect and positively identify.

The results of the test, calibrations and/or measurements in this document are traceable to Australian/national standards. Accredited for compliance with ISO/IEC 17025

NATA
WORLD RECOGNISED ACCREDITATION

Timber Inspection Pty Ltd
PO Box 3102
Tuggerah NSW 2259

www.timberinspection.com.au Richard@timberinspection.com.au Mob: 0429 646 112

Our Ref: 0202a-May-14

22 June 2014

The Manager
Henry & Hymas Structural & Civil Engineers
Level 5, 79 Victoria Avenue
Chatswood NSW 2067

Attn: Leo Meng

Phone: 02 9417 8400
Email: lmeng@hhconsult.com.au

Dear Sir

Timber and Timber Pest Inspection
Policemans Cottage Prospect

Reference is made to quotation Ref. No. 0202-May-14.

1. BASIS OF THE INSPECTION

1.1 Carry out a timber inspection to accessible structural members to determine the likely stress grade of these members to relevant Australian Standards where possible (see limitations). Structural members that were accessible were the subfloor timbers, verandah timbers and the roof timbers.

1.2 Detail useable timber related facts such as species weatherboards, joinery etc.

1.3 Investigate and document any damaged caused by borers, decay and termites.

2 LIMITATIONS

2.1 Allocating a grade to some of timber was not practical.

2.2 Not all the timber surfaces were able to be seen.

2.3 Termite damage, decay, and sloping grain may go undetected when timber is examined from a distance (no access available to sound or probe).

2.4 Characteristics used to determine a timbers grade may differ substantially in individual pieces of timber.

2.5 Most Australian Standard requires verification of the timbers grade. At mill sites this is done via taking samples from the milling run and testing to destruction. As this is not possible Timber Inspection can only rely on the testing carried out when the grading rules were originally determined.

2.6 Timber Queensland have carried out some research that suggests timber may lose some strength over time.

2.7 Ceiling lining, insulation and platforms restricted access to ceiling joists.

2.8 Access was restricted to most wall framing timber as it was lined on both sides. Only a small section of the subfloor was accessible. Some roofs were ceiling in line with the ceiling fixed to the underside of the roof so roof timbers in these areas were not inspected. Some access restrictions are recorded on plans.

3 INSPECTION

3.1 Plans were supplied by Henry and Hymas. These should be viewed in conjunction with this report. All sizes given are in millimetres and are nominal.

3.2 **Subfloor**

3.2.1 The only subfloor access was under the room marked S3 Kitchen. The bearers and joists were hardwood 95mm x 50 mm nominal and except where detailed on the plans met the grade requirement of F17.

Photo 1

The joists were spaced at 700mm centre and the bearer spacing was 1800mm centres.
The joist and bearer was decayed under one corner of the room.

Photo 3

3.2.2 The bearers and joists under the room marked S7 – Kitchen could be viewed from the surrounding grounds and from under room S3. Some decay was observed in the bearers above piers.

Photo 2

3.2.3 Flooring under S3 and S7 was softwood and was badly affected by Anobium borers. It may not be serviceable.

Photo 11

Photo 12

Photo 4

3.2.4 Subfloors under verandahs on the eastern and northern sides were viewed from the grounds and from above. Bearers and joists were 90mm x 50mm. Joists appeared to be at approximately 700mm centres. The timber was in poor repair and most members had slight to extensive decay. They were not graded.

Photo 14

3.2.5 Verandahs on the western side were slab on ground.

3.2.6 The subfloor under Rooms S1, S2, S5, and S6 appear to have supporting timber structures sitting directly on the ground and no access was possible.

Photo 8

Photo 9

Photo 10

3.2.7 The subfloor under S4 was too low to access and possible asbestos sheeting on the ground nearby prohibited inspection.

3.3 Exterior

3.3.1 The external wall lining was where inspected Tallowwood. There was also some fibrous sheeting.

3.3.2 The verandah was supported by hardwood posts and Lintels. That were 90mm x 90mm approximately. The verandah posts were not graded as they were decayed above and in contact with the ground. One post was made up of splicing two sections together. The posts were often considerable distances apart. Some were missing including one which leaves the north east corner of the verandah roof unsupported.

Photo 13

Photo 15

Photo 17

The lintels where they could be seen would make the grade of F17. The top side and where the gutter is attached could not be seen. There may be some decay along the top and edge where the gutter is fixed.

3.3.3 The rafters were 90 x 50mm. The spacing between, in most instances, were approximately 2000mm however some were greater. There was a spacer mid span between rafters that was the same size. Some rafters were of low strength group 3 hardwood and some were Oregon. The grade of the hardwood rafters were they could be seen was F14 and the Oregon where it could be seen F7.

Photo 16

3.4 Interior

3.4.1 In Room S7 part of the ceiling had collapsed revealing Oregon Rafters. There was some decay in these exposed rafters. The rafters were 100 x 50mm and were spaced at 1100mm centres.

Photo 18

3.4.2 Wall and ceiling lining restricted access to the framing timber.

3.5 Roof Void

3.5.1 The roof consisted of rafters and rafter props that were hardwood. The rafters and props were from round small growth trees from about 50mm in diameter to 120mm in diameter. They were spaced at approximately 450centres. The species could not be identified however the species was mixed and reasonable dense. There were considerable defects in many of the rafter including limbs, termite damage, overgrowths of injury' splits and Lyctid borer damage. The rafters and props were not graded.

Photo 21

Photo 22

Photo 23 Termite damage.

Photo 24 Termite damage

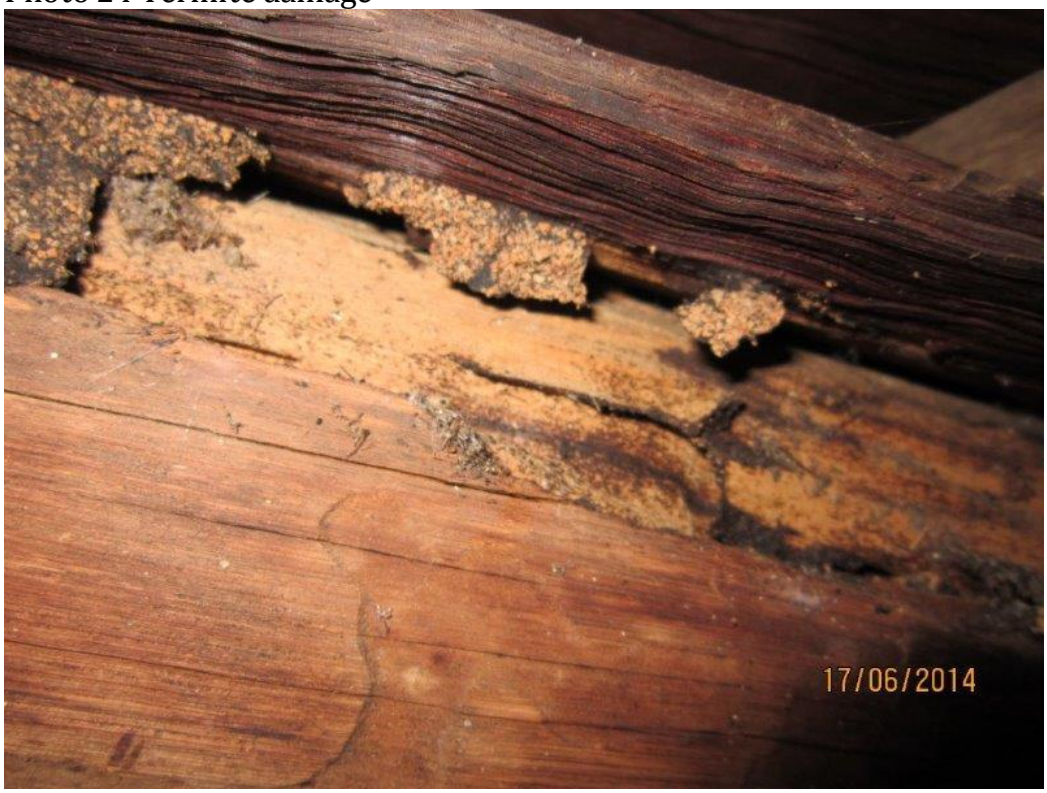


Photo 28 Lyctid borer damage turning large sections of the timber to dust.

3.5.2 The ceiling joists were also round but were flattened on two sides. They tapered from the large end to the small end but were approximately 90mm deep by 90mm wide. Ceiling insulation restricted access to the ceiling joists therefore no grade was allocated.

3.6 There is no termite barrier and termites could enter the building undetected. This makes the building a high risk to termite attack.

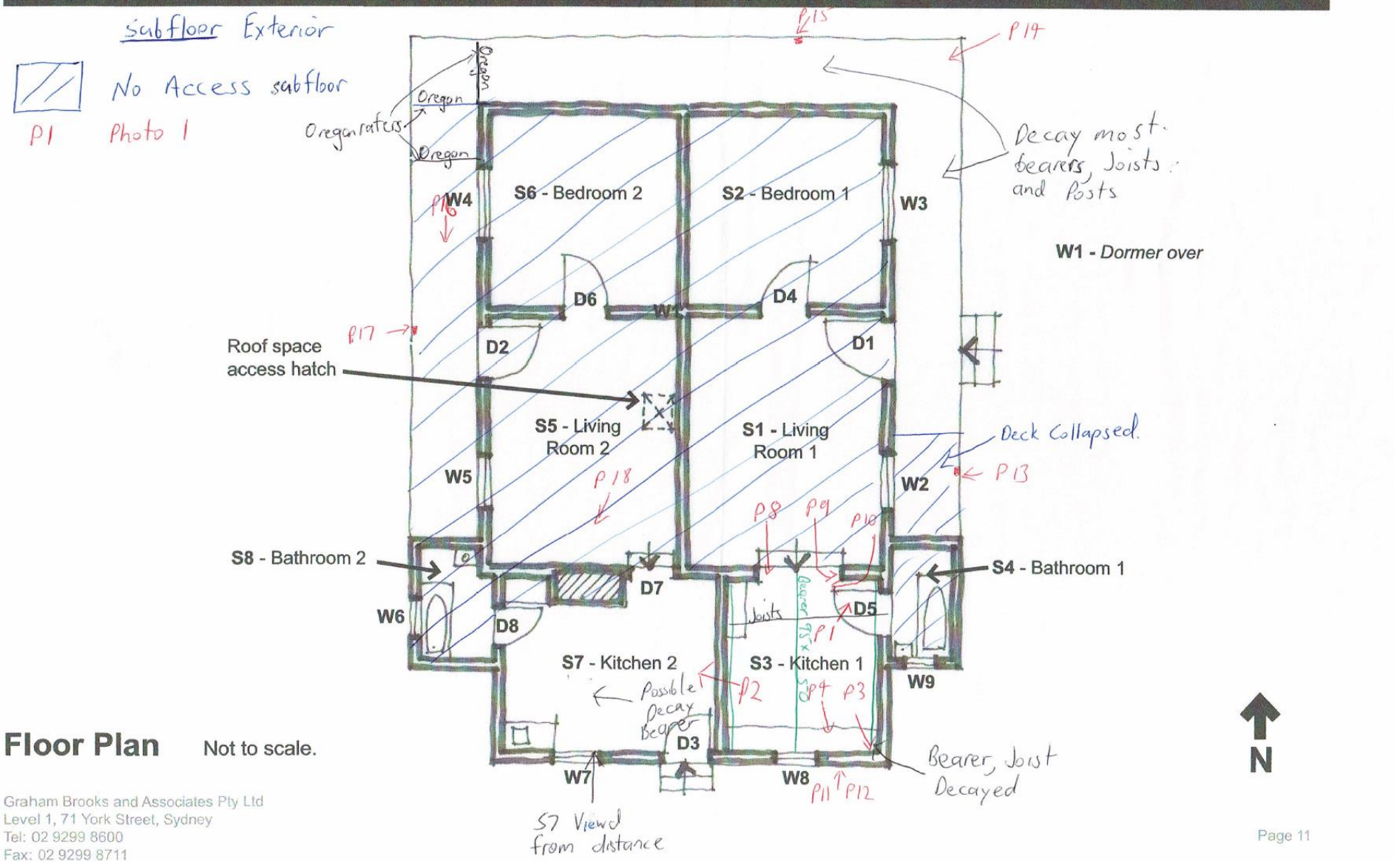
3.7 The internal joinery appears to be Pacific Maple (meranti) commonly used around 1970 to 2000 and still used today.

3.8 The decking boards were Tallowwood.

Yours sincerely

RICHARD FORRESTER
MANAGER TIMBER INSPECTION PTY LTD

1/2



Floor Plan

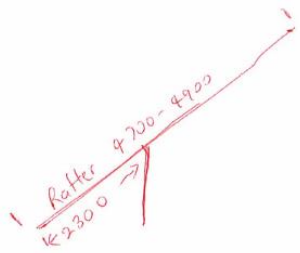
Not to scale.

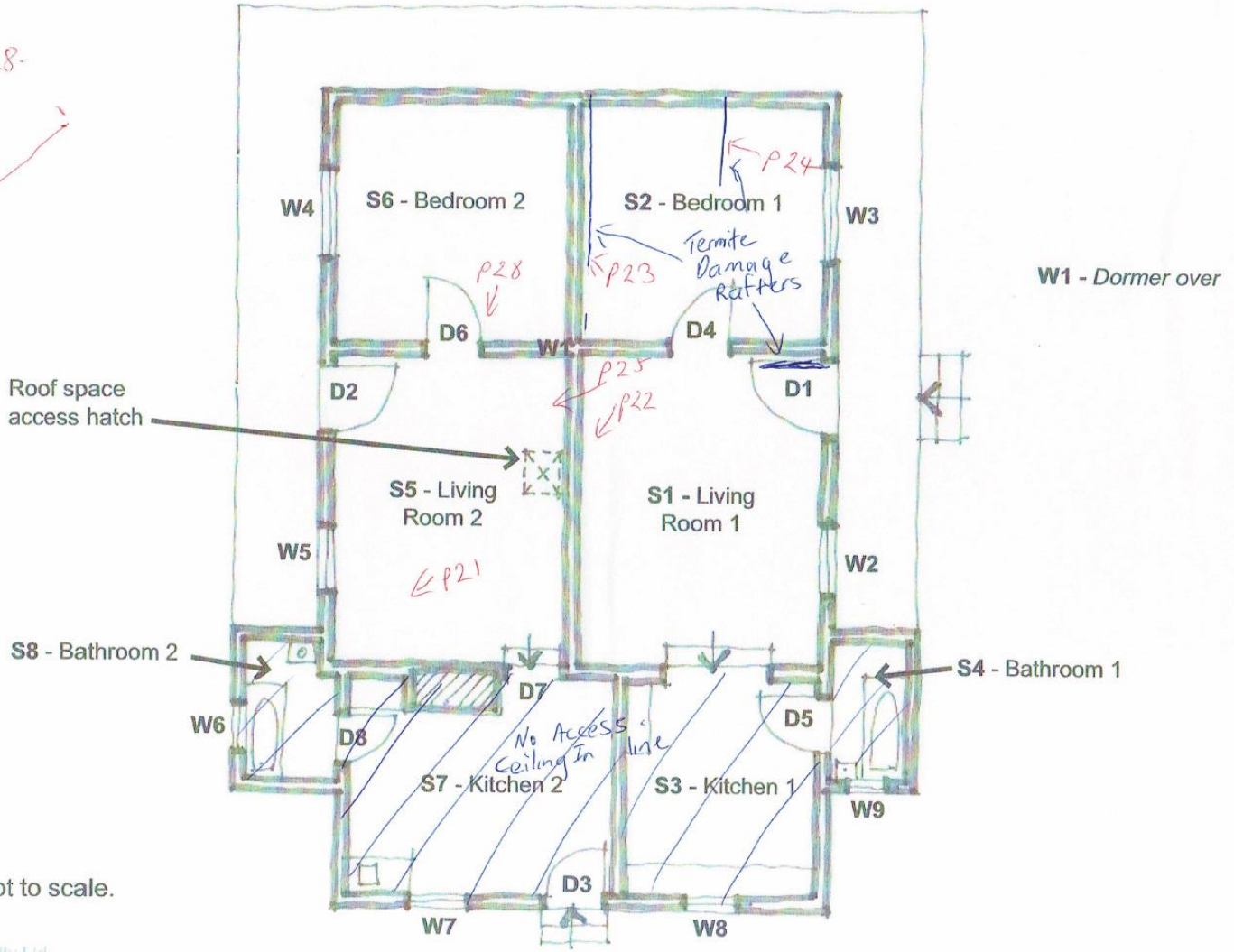
Graham Brooks and Associates Pty Ltd
Level 1, 71 York Street, Sydney
Tel: 02 9299 8600
Fax: 02 9299 8711

2/2

Roof Void

P28 — Photo 28.





Floor Plan

Not to scale.

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Level 1, 71 York Street, Sydney
Tel: 02 9299 8600
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