DA Structural Report

Malthouse 3

The Maltings, Mittagong

Colliers International / 6 February 2024

221582

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APPROVAL	
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Contents

Executive Summary

At the request of Colliers International, TTW (NSW) Pty Ltd were commissioned to prepare a structural report for The Maltings complex building Malthouse 3 (M3). This has been prepared to support the Development Application submission for M3 and new M4.

In the preparation of this report, we have carried out inspection of the structure, materials testing and investigation works, and further design development in coordination with project architect Snøhetta.

Based on structural inspection of the building condition, we anticipate that the following components may be retained, with repair works to remediate defects:

- Masonry walls
- Existing piers and footings
- M3 steelwork
- M3 concrete silos

We recommend that the following components of M3 are not retained:

- Existing roof sheeting/tiling in M3
- All structural timbers in M3

A wholistic review of the structures to resist lateral loads will need to completed as part of design development. As a minimum, strengthening of the existing structure is required to provide resistance to lateral loads at the following locations:

- The masonry façade will be unstable without additional support, hence it is proposed to be tied back to the new concrete construction within M3.
- Strengthening/stabilisation of the M3 masonry walls surrounding the silo is expected to be required where not supported by the new M4 construction, given the large height of the unreinforced masonry walls and low lateral load resistance.
- Additionally, it is noted that the rear masonry wall of the silo has been removed previously (potentially due to previous fire) which had provided some support to the side masonry walls surrounding the silo. These walls in particular may require strengthening.

Key structural elements of the proposed design are as follows:

- New concrete structure to be constructed within and above the existing M3 façade (note that the internal components are largely to be removed due to poor condition)
- Construction of a new lift core through the existing M3 building
- Construction of a new M4 hotel structure at the south-western side of M3

New structural elements will be designed and certified in accordance with the National Construction Code and referenced Australian Standards. Where existing building elements are not able to be upgraded achieve compliance with the NCC, e.g. seismic loading for existing unreinforced masonry, performance solutions will be sought.

1.0 Introduction

At the request of Colliers International, TTW (NSW) Pty Ltd were commissioned to prepare a structural report for the Maltings precinct at Mittagong. The purpose of this report is to provide discussion on the concept structural design for the revised architectural scheme prepared by Snøhetta for M3/M4 for the Development Application submission. Additional discussion is also provided on strengthening and remediation works that will be required to the existing structures as part of the adaptive re-use of the buildings.

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 Colliers International and their Client and is 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 is not to be used for any other purpose.

2.0 Scope of Review

In order to form our opinion on the elements we could view, the following level of review was undertaken:

- Building inspection (visual and photographic) of accessible areas including steel and cast iron columns, slabs, masonry facades, and timber framing.
- Measurements of structural items has been undertaken of items able to be accessed for measurement, in order for calculations to be undertaken as part of design works.
- Material testing was carried out by BCRC as part of this assessment. Inspection of all structural timber elements was also undertaken by BCRC and is appended to this report. Outcomes of the assessments undertaken by BCRC have been used to inform this report.
- Initial analysis and capacity checks of the structure have been undertaken, for structural concept design informed by the current architectural design as prepared by Snøhetta architects and the condition and stability of the existing structure, as outlined in Section 5.0.

A discussion of items which may be retained, items which must be removed for structural reasons, and the required extent of repair works (anticipated to be as close to like-for-like as feasible) is provided in Section 5.0.

Structural strengthening for stability and/or compliance with National Construction Code/ Australian Standard requirements has been found to be required in areas as discussed in 6.0.

Structural design concepts for new and upgraded/modified building elements is discussed in Section 7.0.

3.0 Description of Building Structure

The Maltings site is located adjacent to the Old Hume Highway in Mittagong, NSW. This project involves the adaptive re-use of all structured on the site (as indicated in Figure 1). This report refers to the existing M3 complex proposed to be modified, and the proposed M4 new construction.

Figure 1: M3 location plan (M4 to be new construction, connecting to M3)

Maltings 3 (M3) was completed in 1916. A summary of the building construction types of the M3 building is provided below.

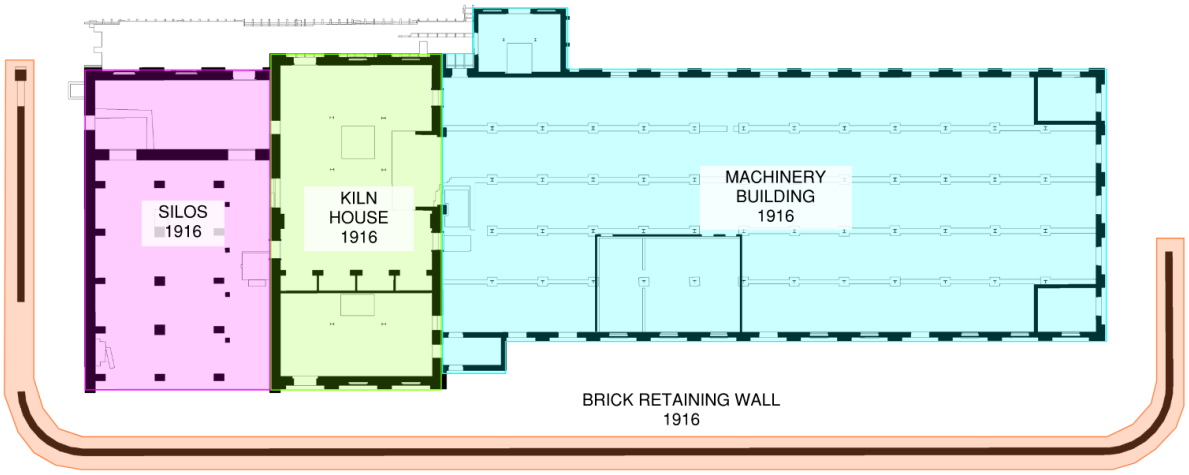

Figure 2. Building Separation and Dates – M3

- Machinery Building c. 1916 - Consists of load bearing masonry façade walls. Lower floors are constructed of reinforced concrete slabs spanning onto mild steel beams which are supported by a grid of mild steel columns. Upper levels consist of timber floor structure and columns. The roof is a timber framed truss supported off the façade and walls and internal timber columns.

- Kiln House c. 1916 – Constructed of load bearing brick façade walls and steel columns. A series of brick archways exists at ground level, supporting additional steel columns above. The bases of the silos have previously been demolished, i.e. the silos can be seen into from below.

- Silos c. 1916 - Constructed of reinforced concrete beams walls and columns, housed within a brick masonry façade. Timber framing is present within the space between the concrete silos and brick façade, noting that some of this framing, and the rear masonry wall (to the south-east) has previously been demolished.

Note that the M3 building included materials novel at the time including 2134m^2 of FC sheeting expected to contain asbestos. It is anticipated that this is largely limited to the roof tiling which is proposed to be removed as part of works due to the poor roof condition.

4.0 Site Geotechnical and Environmental Conditions

A geotechnical investigation report has been prepared by EI Australia for the site, dated July 2023 (report reference E25829.G03). Refer to geotechnical report for full details of the site geotechnical conditions.

M3 is located on the southeast side of the site, with ground to the rear of the building sloping upwards away from the building.

Note boreholes BH3, BH4M and BH5M are located nearest to the M3 site, as are TP15 and TP18 test pits.

4.1 Fieldwork summary

A total of five boreholes and 18 test pits were carried out over the site (comprising the M3/4 area, and the M1/2 site which is the subject of a separate submission report). The following key findings were made:

- **Fill (Unit 1):** Topsoil/fill of various composition was found at surface level, in a layer 0.15 to 3.43m thick (dependent on location). Fill was poorly compacted and poorly controlled.

- **Residual Soil (Unit 2):** Soils were found from starting from 0.15m to 1.7m below existing ground level in a layer 0.25-3.7m thick (dependent on location), and tended to be composed of medium to high plasticity silty clay and low to medium sandy clay, soft to firm becoming hard with depth.

- **Low strength rock (Unit 3)**: Laminite/claystone was found starting from 1.25 to 4.07m below ground level, in a layer 0.93 to 3.15m thick. In the three boreholes nearest to M3, low strength/weathered laminite/claystone was found from approx. 3-4m depth below ground level. This stone was very low to low strength and distinctly weathered.

- **Medium-high strength rock (Unit 4):** Stronger laminite/sandstone was found starting from 3.11 to 6.05m below ground level across the site. In the three boreholes nearest to M3, medium-high strength laminite/sandstone was found from approx. 4.5-6.8m depth below ground level. This stone was medium to high strength, slightly weathered to fresh.

4.2 Groundwater

Observed groundwater seepage was found to be approximately 2-3m below existing ground level across the site, based on groundwater observed within borehole and test pit locations.

Groundwater seepage was not noted in either test pits located immediately adjacent to M3 (TP15 and TP18). After well development, groundwater was noted at 2.6m below existing ground level in BH4M.

4.3 Basement Excavation

The proposed M4 design involves construction of a basement level below existing ground. Laminite/claystone bedrock is expected to be exposed at the basement floor level (Unit 3 material per geotechnical report). Pad or strip footings may be founded in this material to an allowable bearing capacity of 700kPa based on serviceability, or foundations may be piled.

Design of the basement floor is to be undertaken in conjunction with advice provided by the project geotechnical engineer. The completed excavation should be inspected by the geotechnical engineer to determine that the required bearing capacity has been achieved and identify any variations that may occur between boreholes and inspected location.

The geotechnical report recommends that the basement structure is to be designed as a drained basement in lieu of a tanked basement. This will be designed in coordination with the geotechnical engineer and hydraulic engineer.

5.0 Existing Structure and Condition

5.1 Summary of Condition of Structure

A review of the existing M3 building was carried out to inspect the general condition of the building and identify items which require repair or replacement found during the inspection of the accessible structural elements, in order to inform requirements for design.

Building inspection, visual and photographic, was undertaken of accessible areas including steel and cast iron columns, slabs, masonry facades, and timber framing. Materials testing and timber inspection were carried out by BCRC as part of this investigation and have been used to inform this report.

Several elements of the structures within the Maltings site are in poor condition, given that the structure has been unmaintained for several decades. However, it is expected that many components should be able to be retained for use, if repair works are undertaken.

We anticipate that the following components of M3 may be retained, with repair works to remediate defects:

- Masonry walls
- Existing piers and footings
- M3 concrete silos
- M3 steelwork
- M3 concrete slabs

We recommend that the following components of M3 are not retained:

- Existing roof sheeting/tiling in M3
- All structural timbers in M3

Localised repair or replacement of retained items found to require repairs is to be like-for-like or as minimally intrusive as possible, e.g. localised plate augmentation for locally corroded steel columns to be retained.

5.2 Machinery Room

The machinery room area is a steel column construction, with load bearing masonry walls. A concrete slab is present between ground and first floor level; above this, timber framed floor structure is present. Steel beams span between columns underneath the concrete slab (concrete encased) and underneath timber floor framing.

At ground level, a series of masonry strips are present. these are intact and in good condition.

5.2.1 Steel columns

Columns at this level display surface corrosion, and notable thinning near the bases of the columns; it is noted that this occurs above the level of riveted plate thickening. This same thinning was observed on first floor level also; it is thought that this is likely to have occurred due to the use of these floors for turning malt with water, and thinning has occurred at a ‘tidal zone level’ of sorts due to this activity.

5.2.2 Concrete Slab

The first floor slab is in reasonable condition, however cover to reinforcement is very low and several areas of

spalling to reinforcement are noted. Mossy growth is also noted, indicating high damp levels. Spalling is also noted to the soffit of the slab, and several previous repairs have been undertaken along the mid-points of encased beams to the soffit. Two instances of poorly finished repairs are noted to the soffit around original openings.

The concrete slab is considered to be in adequate condition to re-use, and has been found to have a mean compressive strength of 35MPa (mean of all sampled concrete throughout M3). However, localised remedial works would be required in areas that have spalled, and to remove corrosion and provide cover to reinforcement that is exposed due to low cover.

5.2.3 Timber framing

Timber structure is present within M3 from the second floor and up. Level 2 is framed with timber joists spanning approx. 3.4m between steel beams which are supported by steel columns. A timber truss roof structure is present above.

The timber structure within the M3 machinery room is overall in very poor condition due to the high levels of exposure experienced. Much of the roof framing is deteriorated and there has been significant loss of roof cladding; this has allowed water ingress to all levels of roof framing, timber support posts and timber flooring. These elements are exhibiting signs of rot throughout.

On the basis of site inspections conducted in March 2023, BCRC advise that less than 5% of existing timber including timber floor structure, timber posts and roof framing is likely to be able to be re-used. We recommend that all timber elements of M3 be replaced on this basis. The timber inspection report for M3 is provided in Appendix A.

The timber floor structure, timber posts and timber roof framing are overall unacceptable to be re-used.

Figure 3: M3 machinery room timber roof condition

5.3 Kiln Room

5.3.1 Steel columns

All steel columns located within the kiln room are in poor condition overall, displaying corrosion particularly towards the base. One column at ground floor has corroded through full thickness of the web. Localised repairs will be required to be undertaken should these be retained.

5.3.2 Timber framing

Timber floor framing at first floor level is in very poor condition, with several joists and nogging pieces out of alignment in addition to widespread rot. These timbers should not be retained.

Timber roof elements have experienced significant weather exposure due to a loss of almost all roof cladding, and is therefore expected to be in a more severe condition than the machinery room roof framing, which is itself severely deteriorated. It is therefore considered that these timbers are unsuitable for re-use and should be removed.

Figure 4: M3 kiln room timber roof condition

5.3.3 Slab

A concrete slab roof is located at the top of the kiln room. The slab soffit was inspected visually from ground floor level, as there is no floor level located underneath the slab within an accessible height range. Spalling was noted in several areas of this slab, as well as a number of previously cut openings. Cover to reinforcement in this slab is very low.

Structural steelwork under this slab area displays widespread surface corrosion, and several areas appear to have significantly corroded flanges.

It is noted that there is no roof over this area above the slab, hence all top side concrete is exposed. The condition of this area could not be accessed for inspection, however it is expected to be unsuitable for re-use in the proposed development.

5.4 Silos

It is noted that the rear masonry wall of the silo building has been fully removed; the stability of this area of the structure without this wall has not been assessed at this stage. While we are not aware of when this wall was removed, the site CMP notes extensive damage to the site after a fire in 1980; it is likely that the wall was removed following this.[1]

The bases of these silos have been previously removed, although it is noted that this removal has left large amounts of reinforcement exposed corroding. If the openings at the silo bases are proposed to be retained, this will need to be tidied, with reinforcement corrosion removed and cover provided.

The silo wall concrete is carbonated to approximately 35mm, i.e. through the cover provided to reinforcement in this area. It is expected that surface corrosion of reinforcement has initiated, however we note that the wall itself still appears generally sound with minimal spalling observed over reinforcement at this time. Cracking typical of an alkali-carbonate reaction in the concrete (ACR) was identified by BCRC on the concrete topping within the silo (refer Figure 5), however, as this was observed in the concrete topping rather than the structural concrete it is not considered a significant concern. Concrete samples extracted from the silo wall were found to have a mean strength of 28.6 MPa.

[1] Davies, P. (2020), *The Maltings Mittagong Conservation Management Plan – Volume 1,* Section 2.11.

Figure 5: Map cracking on M3 silo internal topping

Concrete columns supporting the silo were generally intact, although localised spalling was visible. Concrete samples extracted from these columns were found to have a mean strength of 33.6 MPa.

5.5 Masonry walls

5.5.1 Building walls

As M3 was constructed in one phase, the building masonry walls are assessed as a whole.

Generally the brick masonry is in good condition (noting that some areas have been deliberately removed e.g. rear wall of silo area). No significant movement or cracking was observed.

While the brickwork itself appears in generally reasonable condition, large areas of damp are noted, with mossy and mouldy growth developing. This is mostly apparent in areas with limited ability to dry out, including internal areas with roof damage, and the rear façade of the building which is semi-sheltered by sloped ground and a retaining wall. While mortar was generally found to be adequate and of class M3 strength/hardness, it is likely that localised repointing may be required in areas that have been consistently damp.

Masonry in M3 was found to have a mean compressive strength of 12.2MPa for single bricks, and a mean characteristic strength of 8.6MPa.

5.5.2 Retaining wall

The retaining wall, original to the building, is in very good condition despite trees existing in close proximity. No cracking, bulging or displacement is visible.

It is noted that an opening has previously been cut in the wall; this is not located at an area that is retaining fill, and does not present a structural issue for the wall.

6.0 Analysis of Existing Structure

6.1 BCA Provisions

BCA information has been provided by a BCA consultant engaged for this project (Group DLA; refer separate BCA report for further information). Note that this BCA assessment is preliminary only and will be concluded following further development of the design.

The building classification to be considered for structural assessment of M3 and M4 is summarised in the following table:

Proposed Classification	Ground Floor: Class 7a (Car Park) Class 7b (Storage) Class 9b (Gym - Assembly Building) Level 1: Class 3 (Hotel) Level 2: Class 3 (Hotel) Class 9b (Gallery - Assembly Building) Level 3: Class 3 (Hotel) Class 6 (Restaurant) Class 9b (Function Room - Assembly Building) Level 4: Class 3 (Hotel) Class 6 (Bar) Class 9b (Function Room - Assembly Building) Level 5: Class 3 (Hotel)
Proposed Rise in Storeys	7
Proposed Type of Construction (BCA Table C2D2)	A
Effective Height	TBC by BCA consultant (approx. 19m)
Importance Level (BCA Table B1D3a)	3
Annual probability of exceedance (BCA Table B1D3b)	1:1000

6.2 Masonry seismic performance

A lateral load review of the masonry structure is required to be carried out. This will make reference to the following Australian Standards and International Technical publications:

Number	Edition	Title
AS/NZS 1170.0	2002	Structural design actions Part 0: General Principles
AS/NZS 1170.1	2002	Structural design actions Part 1: Permanent, imposed and other actions
AS/NZS 1170.2	2002	Structural design actions Part 2: Wind Actions
AS 1170.4	2007	Structural design actions Part 4: Earthquake loads
AS 3700	2011	Masonry Structures

AS 3826	1998	Strengthening Existing Buildings for Earthquake
ASCE/SEI 41-17	2017	Seismic Evaluation and Retrofit of Existing Buildings – American Society of Civil Engineers
FEMA 440	2005	Improvement of nonlinear static seismic analysis procedures – Applied Technology Council
FEMA 356	2000	Pre-standard and Commentary for the Seismic Rehabilitation of Buildings – Federal Emergency Management Agency
FEMA 273	1997	NEHRP Guidelines for the Seismic Rehabilitation of Buildings – Federal Emergency Management Agency
NZSEE	2017	Part A: Assessment objectives and Principles
NZSEE – C8	2017	Section C8 – Seismic Assessment of Unreinforced Masonry Buildings – New Zealand Society for Earthquake Engineering

New structures and elements will be designed to meet 100% NBS for seismic loading, and certified to AS1170.4 and the NCC. As a wholly new lateral load resisting system is to be introduced to M3 and only the existing masonry façade and silos are proposed to be retained, the full M3/M4 system is expected to be able to be certified to AS1170.4 and the NCC, as the façade is to be tied into the new compliant structure.

6.3 Wind Stability

Wind stability of the existing structure is to be assessed against the following standard:

Number	Edition	Title
AS/NZS 1170.2	2002	Structural design actions Part 2: Wind Actions

Tall masonry walls, particularly when cantilevering from the base as in this case, offer negligible lateral load resistance. The existing unreinforced masonry façade will be fixed back to the new construction, which will be designed to comply with AS1170.2.

Wind loading will be based on the following parameters, in accordance with AS1170.2:

Parameter	Value
Region:	A3
Importance Level (BCA Table B1.2a):	3
Annual probability of exceedance (BCA Table B1.2b):	1:1000 (ultimate) 1:25 (serviceability)
Regional Wind Speed:	V1000 = 46 m/s (ultimate) V25 = 37 m/s (serviceability)
Terrain Category (all directions):	2

6.4 Proposed strengthening

It is envisaged that strengthening of the existing structure will be required to provide resistance to lateral loads at the following locations:

- The masonry façade will be unstable without additional support, hence it is proposed to be tied back to the new concrete construction within M3.

- Strengthening/stabilisation of the M3 masonry walls surrounding the silo is expected to be required where not supported by the new M4 construction, given the large height of the unreinforced masonry walls and low lateral load resistance.
- Additionally, it is noted that the rear masonry wall of the silo has been removed previously (potentially due to previous fire) which had provided some support to the side masonry walls surrounding the silo. These walls in particular may require strengthening.

Other locations may also require strengthening following future structural reviews.

7.0 New Structure and Design Principles

7.1 Proposed Development

Key structural elements of the proposed design are as follows:

- New concrete structure to be constructed within and above the existing M3 façade (note that the internal components are largely to be removed due to poor condition)
- Construction of a new lift core through the existing M3 building
- Construction of a new M4 hotel structure at the south-western side of M3

7.2 Design Criteria

7.2.1 Australian Standards

The new building elements will be designed to comply with the following Australian Standards, as referenced by the National Construction Code (NCC) 2022:

Number	Edition	Title
AS/NZS 1170.0	2002	Structural design actions Part 0: General Principles
AS/NZS 1170.1	2002	Structural design actions Part 1: Permanent, imposed and other actions
AS/NZS 1170.2	2002	Structural design actions Part 2: Wind Actions
AS 1720.1	2010	Timber Structures – Design Methods
AS 2312	2002	Guide to the Protection of Structural Steel Against Atmospheric Corrosion
AS 3600	2018	Concrete Structures
AS 3700	2018	Masonry Structures
AS 4100	2020	Steel Structures

7.2.2 Loading

On the basis of the above standards, building elements will be designed for the following design **live loads**:

Load type	Area	Live Load
Floor load	Gallery areas	2.0 kPa
	Function spaces	4.0 kPa
	Restaurant/bar areas	4.0 kPa

	Kitchens	5.0 kPa
	Office areas	3.0 kPa
	Terraces	4.0 kPa
	Hotel rooms	2.0 kPa
	Residence rooms	2.0 kPa
	Egress/hallways/landings	4.0 kPa
	Storage	5.0 kPa (minimum)
	Plant areas	5.0 kPa (minimum)
Roof load	Lightweight roofs	0.25 kPa NOTE: Superimposed dead load to allow for solar panel array
	Concrete roof (not trafficable)	1.0 kPa

Building elements will be designed for **superimposed dead loads** on the basis of architectural finishes selected for each area, and are to be not less than the following:

Area	**SDL allowance**
Office areas	1.0 kPa (Including carpet, ceilings, services under. No raised access floors considered)
Gallery areas	1.0 kPa (Including floor finishes, ceilings, services under. No raised access floors considered)
Communal Area potential area subject to overcrowding	3.0 kPa (Including floor finishes, ceilings and services under. No raised access floors considered)
Hotel rooms	1.0 kPa (Including carpet, ceilings, services under. No raised access floors considered)
Residence rooms	1.0 kPa (Including carpet, ceilings, services under. No raised access floors considered)
Store & Plant Areas	2.5 kPa (Plant plinths, falls. No raised access floors considered)
Concrete roof areas	3.5 kPa (Includes 50mm ave falls +60mm pebbles+ services under)
Concrete roof areas with soil planting	12 kPa (600mm of soil & slab falls)

7.3 New Concrete Structure within M3

Most internal elements of M3 are proposed to be removed due to overall poor condition. The masonry façade walls, masonry internal walls and concrete silos are proposed to be retained with new openings per the architectural design.

All new elements within M3 are proposed to be constructed as a concrete box construction, including outer concrete walls within the existing M3 masonry façade, and the existing retained façade tied back to this to provide stability to the masonry.

The slab within the M3 machinery room at Level 01 is proposed to be demolished in order to accommodate the proposed Northern Gallery. The Northern Gallery is proposed to be a new concrete box structure internal to the existing M3, constructed at the Northern end of the machinery room, and is to be a double height gallery space through Ground Level and Level 01. This box structure will assist in providing lateral stability to the retained M3 elements, as the retained façade is to be tied back to the new internal box.

In the southern portion of the M3 machinery room, noting that some of this space is currently a void, select

columns at ground floor are to be retained. A new Level 01 slab is to be constructed above (proposed Southern Gallery). The decision has been made to construct new slab in the area rather than retaining the small portion of existing slab present beside the existing void, due to the complexity in temporarily supporting a relatively small portion of slab and demolishing/rebuilding around it. New concrete columns will be located at ground floor to support the concrete structure above from Level 01, to be located in such a manner as to minimise their intrusion into gallery spaces (e.g. columns to be located partially within walls where feasible).

A pool services area, above which is located a pool and terrace (Level 03), is located over the Northern Gallery. These are to be supported on deep concrete transfer beams designed for pool loading, for a depth of pool to architect's specifications. The pool itself will a separate reinforced concrete structure supported on isolation pads on the main structure.

Above the southern gallery is a kitchen and dining area at Level 02, and an amenities area, bar and lounge at Level 03. These are supported by transfer beams at each level due to variations in floor and wall layout level by level.

At Level 04, above the Level 03 pool terrace and bar/lounge area, a cantilevering guest suite and landscaped terrace is proposed to be constructed. This is intended to cantilever over the existing masonry façade below. The concrete support structure will be designed to support the proposed cantilever out from the existing building footprint via the use of deep concrete edge beams; columns are intended to be minimised in this area to create the appearance of a stacked overhanging volume.

7.3.1 Footings

New footings are required to be constructed under new concrete load-bearing construction (walls and columns). New foundations are likely to be piled and will be designed in coordination with the project geotechnical engineer.

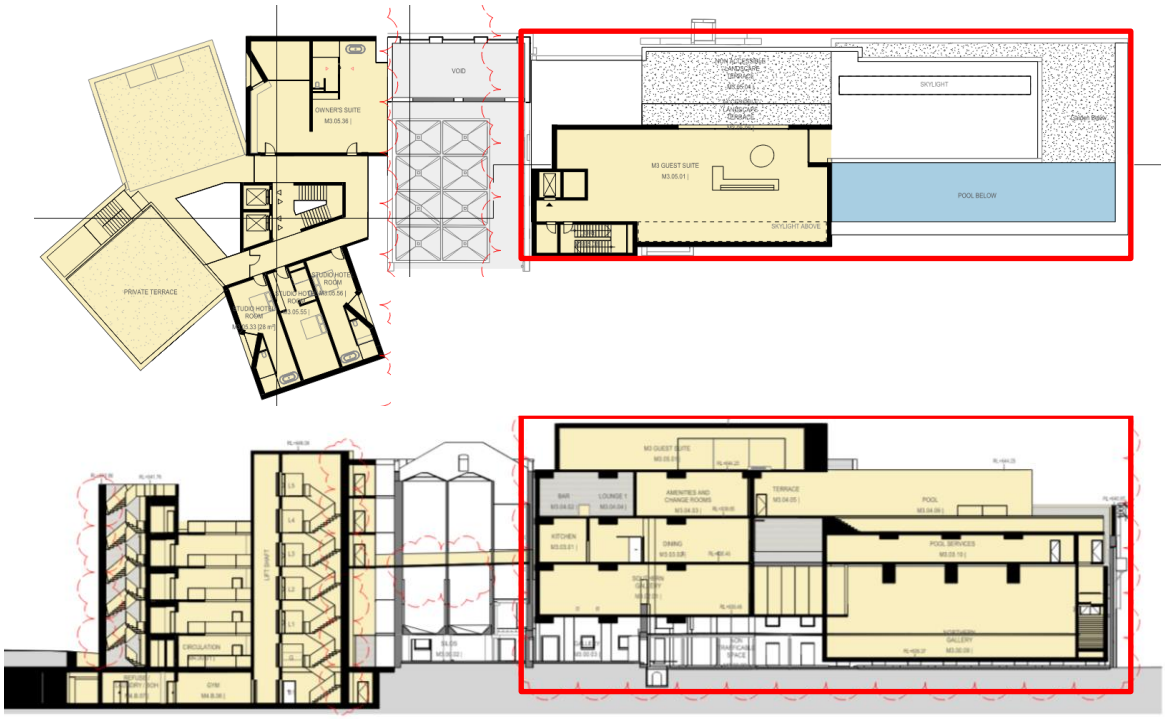

Figure 6: New concrete structure within M3

7.4 New access core

A new access core consisting of two lifts and a stairwell is to be constructed within the M3 machinery room

space adjacent to the kiln room. The lift core is to be constructed of reinforced concrete and will serve as the primary lateral load resisting system for the new structure.

The lift pit base is to be constructed on a new concrete piled foundation. As existing footings (masonry piers) are founded onto rock approximately 2.8m below ground, the new lift is not proposed to undermine existing footings or require works to modify existing footings.

A new ramp will be located within the silo at Level 3 connecting the new M3 spaces from the location of the lift core with the proposed M4 structure (refer Section 7.5). The ramp is to be constructed of conventionally reinforced concrete or steel framing and a permanent formwork system with in-situ concrete.

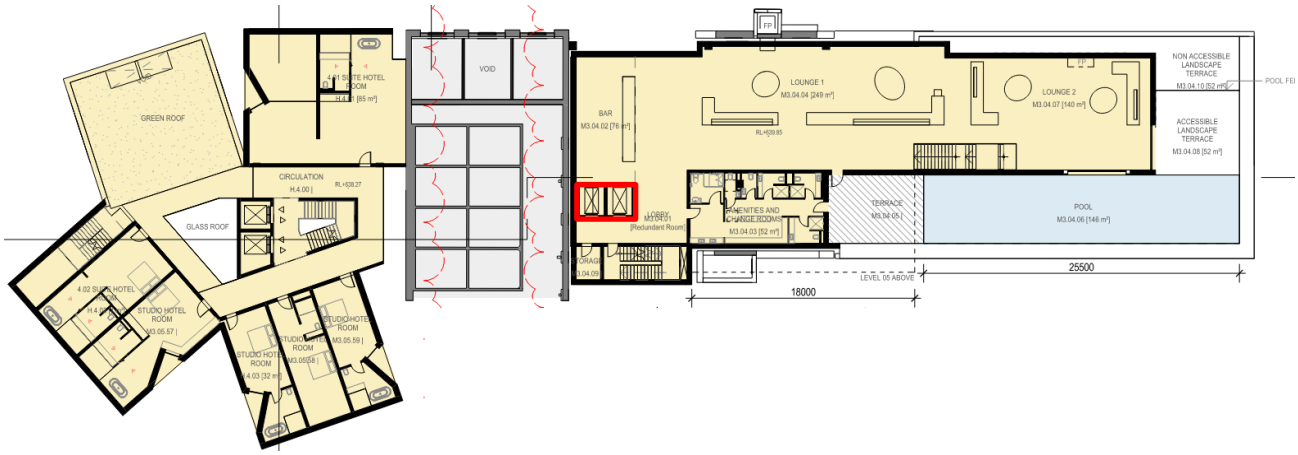

Figure 7: New lift core

7.5 M4 Hotel Structure

This structure is the subject of Development Application reference DA20/1400. The structural solutions for the proposed M4 building have not been modified from this previous submission.

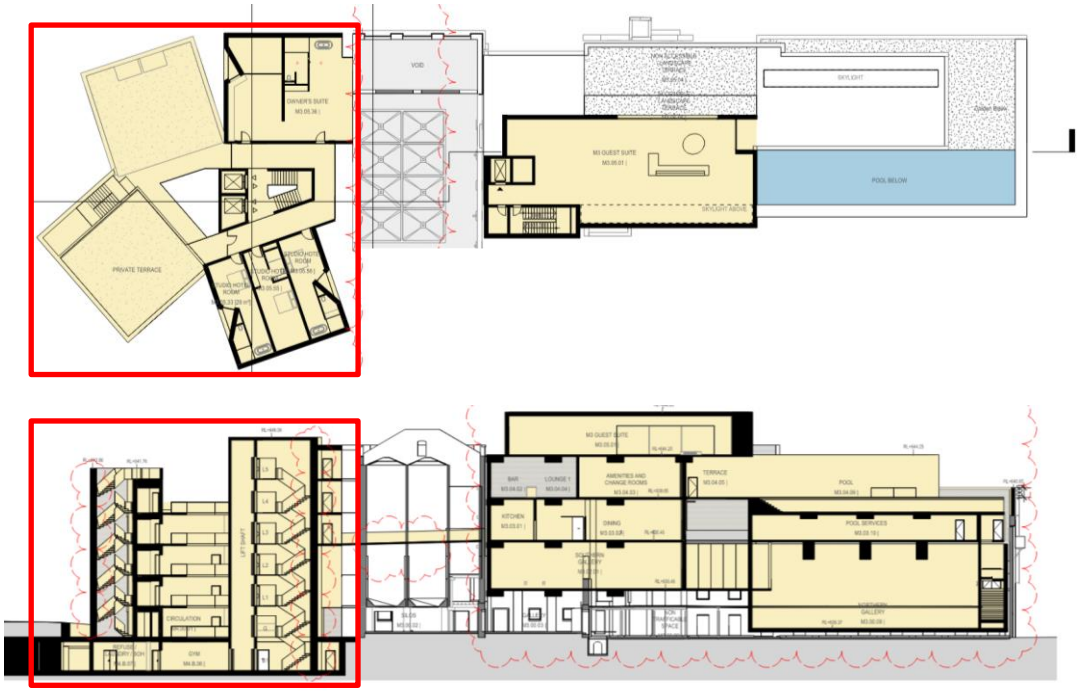

Figure 8: M4 hotel area

8.0 Conclusions

The structural design for repair, strengthening and upgrade (where required) and of the existing structure and construction of new elements, per the architectural design prepared by Snøhetta, are to be designed in accordance with the National Construction Code and referenced Australian Standards. Where existing building elements are not able to be strengthened to enable certification to current Australian Standards or the NCC e.g. seismic loading for existing unreinforced masonry, performance solutions will be sought.

Appendix A

BCRC Timber Inspection Report

BCRC Durability Consultants

BCRC Pty Ltd
ABN 91 116 565 265
Unit 7, 9-11 Chaplin Drive Lane Cove West NSW 2066|
m.rutkai@bcrc.com.au www.bcrc.com.au

REPORT TITLE:	**Grading report of timber members at Abandoned Maltings Brewery M3**		
CLIENT:			
REPORT AUTHOR:	M. Rutkai	**REVIEWED BY:**	Edgar (Ted) Stubbersfield
REPORT DATE:	06 April 2023	**FILE REF:**	N10479

EXECUTIVE SUMMARY

On 29-30 March 2023, Mihaly Rutkai inspected the existing timber members of M3 of the Abandoned Maltings Brewery Mittagong. BCRC observed a variety of construction techniques which involved the use of Douglas Fir (Oregon pine), mixed NSW Hardwood and in repaired sections, Pine. The timber members were in general severely deteriorated throughout the structure due to excessive exposure to the elements. A mixture of defects was observed including rot, checks and fractures. All of the Oregon members and the mixed NSW Hardwood members are at minimum suspect thus deemed out of grade due to the roof being compromised. This meant that the timber members have been exposed to the elements for a long time compromising their structural grade.

The individual spots will detail the observations and defects related to the timber members which can be found in Appendix A.

KEY WORDS: Oregon pine, Douglas fir, NSW Hardwood, Out of Grade

REVISION SHEET

Revision Number	Description of Revision	Prepared By	Checked/ Reviewed By	Approved	Issued to Client
1		M Rutkai			

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Table of Contents

1. SCOPE OF THIS REPORT

Figure 1. Maltings Brewery Malthouse 3 at Mittagong

The Mittagong Maltings was a large three-malthouse complex first established in 1899 by the Malting Company of New South Wales, Australia, to supply malt to breweries throughout the state. The Maltings site is listed as a local council heritage item.

The building is being redeveloped and, as construction was long before the concept of F grades was developed, BCRC was engaged to advise what the species and grades of the various timber members.

2. THE METHODOLOGY BEHIND DETERMINING THE STRESS GRADE

BCRC's Lead Timber Consultant, Edgar Stubbersfield, made an initial assessment of The Maltings M3 when he inspected M1 and M2 on march 6 and 7, 2023. A comprehensive assessment was not possible at the time due to the presence of asbestos at M3. Mihaly Rutkai with supervision from Mr. Stubbersfield, is basing his comments on a site visit carried out by him, 29-30 March 2023. This confirmed our Lead Consulatnts initial assessment.Mr Stubbersfield is uniquely qualified to comment on the stress grade of the timber joists as he has over forty years' experience with grading. He has also completed an all species grading course conducted by Toowoomba TAFE (Cert. No. SAJ00435). Further, he has also researched and written a book on grading hardwood to AS 2082. Similar principals apply when grading softwood to AS 2858.

Construction at The Maltings was done in stages and the construction methods and timber sizes vary on the different floors and buildings, however, in Mr. Stubbersfield's opinion, one predominant species of timber was used, Douglas fir. This timber is also known as Oregon pine or simply and more commonly known in the building trade as Oregon. The grain of Oregon is distinctive and easily distinguishable from other softwoods. .

There are a limited number of Australian Standards, such as *AS 1684 Residential Timber Framed Construction*, and *AS 1720 Timber Structures Design methods*, which are mentioned as primary references in Section A1.3 of Volume 1 of the National Construction Code as part of the Building Code of Australia. Standards like *2082-2007 Timber - Hardwood - Visually stress-graded for structural purposes* and *2858-2008 Timber - Softwood - Visually stress-graded for structural purposes* are secondary references that get applied through being referenced in the primary Standard. This gives a legal basis for accepting grading to Australian Standards.

Because of the age of the building, the timber is seasoned. Each kiln dried or seasoned timber species marketed in Australia falls into one of eight strength groups. The visual grading standards recognise four Structural Grades for hardwood and five for pine. These Structural Grades describe the amount of natural feature permitted in a piece for a given Structural Grade, i.e., what the timber looks like, not its structural properties. Each Structural Grade represents a percentage of the strength of wood free of any defect. The lesser the amount of natural feature the higher the percentage. Refer Table 1.

Structural Grade:	% of clear wood strength
No. 1	75%
No. 2	60%
No. 3	48%
No. 4	38%

Table 1. Structural grades as a percentage of solid hardwood.

TABLE A1

SEASONED SOFTWOOD

Standard trade name	Source	Average density at 12% MC	Minimum density at 12% MC	Method of assigning F grade	Strength group	Stress grade (F grade) Structural grade number 1	2	3	4	5
cedar, western red	Can	380	300	A	SD8	F8	F7	F5	F4	—
	USA	360	300	A	SD8	F8	F7	F5	F4	—
cypress	Aust	—	—	C	SD6	See Section 3				
fir, alpine	Can	390	300	A	SD7	F8	F8	F7	F5	F4
fir, amabilis	Can	440	330	A	SD6	F11	F11	F8	F7	F5
	USA	460	345	A	SD6	F11	F11	F8	F7	F5
fir, balsam	Can	410	310	A	SD7	F8	F8	F7	F5	F4
	USA	380	300	A	SD7	F11	F8	F7	F5	F4
fir, Calif. red	USA	430	325	A	SD6	F11	F11	F8	F7	F5
fir, Douglas	N Amer	540	405	B	SD5	F11	F11	F8	F7	F5
	Elsewhere	400	300	B	SD6	F11	F11	F8	F7	F5

Figure 2. Correlation between Structural Grade and F Grade with Douglas Fir

After a Structural Grade has been determined, and when the species or Strength Group is known, tables in the Standards equate this to an F rating. Figure 2 from AS 2858-2008 shows that the highest grade that can be given to Douglas fir is F11 which applies to both Structural Grade 1 and 2. Grading was done to the rules for Structural Grade 2. In a production setting this is predominately governed by assessing the knot size and position. Briefly, If knots are contained in the inner half of the face, singly or combined, they can cover 40% of the face but if in the outer 50% of the face the knots can only cover 25%. Knots are measured as the average of the measurement on each face (AS 2858-2008 2.2.2 (a)). Structural Grade 2 describes a reasonable framing grade, not select timber however, old timber usually has very few knots.

When assessing installed timber, care is taken to determine if there has been subsequent end decay, notching for services and, decay associated with water leaks from say a bathroom. Deterioration is invariably associated with a change of colour, such as a water stain or a change in texture.

When timber is protected from the weather, subsequent water ingress and, termites it has an indefinite lifespan as the historic buildings of the UK and Europe demonstrate. However, longevity in weather exposed applications is completely dependent on the natural durability of the timber which varies considerably between species. Under AS5604-2005 Timber—Natural Durability Ratings, Douglas fir is rated as Durability Class 4 for both in ground and above ground used. This is the lowest durability on a scale of 1 to 4. This standard is also a secondary reference under the NCC.

TABLE A1 (*continued*)

1	2	3	4		5
Standard common name and scientific/botanical name	Lyctid susceptibility of sapwood	Termite resistance of heartwood (inside above ground—applicable to H2 in AS 1604 series)	Natural durability class of heartwood		Marine-borer resistance of heartwood
			In-ground contact, D_{ig}	Outside above ground, D_{ag}	
dabarima *Planchonia* spp.	NS	—	—	—	—
fir, amabilis *Abies amabilis*	NS	—	4	—	4
fir, Douglas (oregon) *Pseudotsuga menziesii*	NS	NR	4	4	4

AS5604 is unusual among durability standards. International standards frequently simply rate one species durability against another. The Australian Standard provides a table of expected life when weather exposed.

TABLE 1

NATURAL DURABILITY—PROBABLE LIFE EXPECTANCY*

Class	Probable in-ground life expectancy (years)	Probable above-ground life expectancy (years)
1	Greater than 25	Greater than 40
2	15 to 25	15 to 40
3	5 to 15	7 to 15
4	0 to 5	0 to 7

* The ratings in this Table are based on expert opinions and the performance of the following test specimens:

(a) In-ground: 50 × 50 mm test specimens at four sites around Australia.

(b) Above-ground: 35 × 35 mm test specimens at eleven sites around Australia.

While many factors impact actual longevity, BCRC's experience has been Table 1 of the Standard is a useful guide. This means that any Douglas fir that has an extended period of weather exposure must be considered compromised.

2.1 In Depth Review of Members

After careful assessment of the data and on-site observations, BCRC recommends that only a maximum of 5% of the timber members can be retained in their current positions. The battening and rafters in sections where the roof remains intact are the elements that are mostly undamaged. However, the structural members exhibit various defects that compromise their integrity. It should be noted that these members are not entirely unusable but will require significant trimming, and if feasible, can be repurposed in other areas of the structure.

In each inspected location, the members need to be individually removed and assessed due to the extensive rot and water damage they have sustained. While it is possible to examine them in their current positions, it is not advisable as it would be costly to reconfirm the findings of the visual inspection, which concluded that most of the pieces are below the required grade and need trimming to be usable in other parts of the structure, wherever possible.

On level 2, every joist is compromised in some way. These pieces either suffer from severe rot or require trimming of approximately 50-100mm where they connect with the bearers and the top 20-30% where the floorboards are connected due to water damage and rot between the members.

As for level 3, the timber posts and beams exhibit significant rot at their connection points. Additionally, each member loses 10-20mm of timber from each side due to extensive water damage, substantially reducing their cross-sectional area. Some beams also display notable fractures and splits along their entire length. In cases where rot and water damage are present, these members can be cut to a shorter length and, if sufficient material remains, reused in other sections of the structure.

BCRC advises that once the timber structure has been dismantled, it would be more efficient and cost-effective to sort the members individually for grading. This will allow for a detailed assessment of each piece and determine the extent of trimming required to bring them within the required grade.

3. ASSESSMENT AT SPECIFIC LOCATIONS

As well as a general observation of the timber members (including joists, trusses, posts, beams and battens), specific locations were inspected, and their defects detailed below. The areas were broken down into sections T1-T7 for easier referencing. The numbers in this report are the same as those used in the report compiled by Mihaly Rutkai. Their location is shown on the INSPECT report which can be found in the Appendix.

3.1 M3 LEVEL 1 T1, T2 AND T3

The posts and beams at T1 are mixed NSW Hardwood. The posts are 300x300mm and the beams are 290x175mm with spans of 2400mm. The Joists are Douglas Fir (Oregon Pine) 205x75mm at spans of 3500mm. The timber members all show rot and degradation due to exposure to the elements. This section is uncovered, and rot is severe at the bottom of posts and at the bearers of both beams and joists. All members at T1 are out of grade.

T2 was divided into 6 sections A1-3 and B1-3. The joists at T2 are Oregon, 220x75mm at spans of 3450mm and 270x60mm at spans of 3500mm. The joists show signs of significant degradation due to extended exposure to the elements. Significant staining and rot observed especially at bearers. All joists at T2 are out of grade.

At T3 the all the timber members are Oregon. The rafters are125x50mm Oregon, with pine bolted on as it has been previously repaired. The beams are 125x50mm. All the timber members have been exposed to the elements for an extended time and show significant decay. All members at T3 are out of grade.

Figure 3. Layout of Level 1 T1, T2 and T3

3.1.1 Level 1 T1, T2 and T3 Defect List

Spot Number	Component	Defect	Severity	Remarks	Member Location	Member Number	Grade
1	post	Rot	Major	Mixed NSW hardwood Size: 300x300mm All posts (Upper and Lower) have been exposed to the elements. Severe rot at the ground connection of all the columns. Section loss of at least 50mm all round	T1	All	Out of grade
2	Beam	Rot	Major	Size 290x175mm Span 2400mm All beams exposed to elements Rot at bearing location	T1	All	Out of grade
3	joist	Rot	Major	Size 205x75mm Span 3500mm All members exposed to elements. Rot	T1	All	Out of grade
4	joist	Rot	Major	Oregon Size 220x75mm Span 3450mm Weather exposed Rot	T2 1B	All	Out of grade
5	joist	Rot	Major	Joists are exposed to elements Bearers show signs of water damage and rot	T2 2B	All	Out of grade
6	joist	Rot	Major	Exposed to elements Signs of rot and water damage	T2 3B	All	Out of grade
7	joist	Rot	Major	Size 270x60 Span 3500 Exposed to elements Rot and water damage especially at bearers	T2 1A	All	Out of grade
8	joist	Rot	Major	Rot and water damage Exposed to elements	T2 2A	All	Out of grade
9	joist	Rot	Minor	Waterlogged bearers Exposed to elements Fracture in member 5 End splits	T2 3A	All	Out of grade

10	rafters	Rot	Major	Oregon and pine has been previously repaired Size 125x50mm Weather exposed Rot and water damage	T3	All	Out of grade
11	beams	Rot	Major	Oregon and pine previ-ous repairs Size 125x50 Rot and water damage Exposed to elements	T3	All	Out of grade

Figure 4. Table of Defects M3 Level 1

Figure 4 details the timber members that are out of grade. The severity entails the extent of damage, though these have no bearing on the grade due to the nature of the defects. The remarks were made while on site inspecting the timber members.

The defects throughout L1 are primarily rot. In all cases where the members were exposed to the elements they are deemed to be out of grade.

3.2 M3 LEVEL 2 T4

The joists on Level 2 T4 are Oregon 290x75mm at 3380mm spans. All the joists show some level of water damage ranging from staining to rot. Some members are sound when probed but show significant weather damage throughout (moss and severe staining). Damage usually most severe at bearers. Where visible top of joists showed more degradation than the bttom of the joists. Rot was visible due to extended exposure to water in perpetually inanduated areas, such as between floorboard and on bearers. Due to extended expoisure to elements all joists are deemed out of grade.

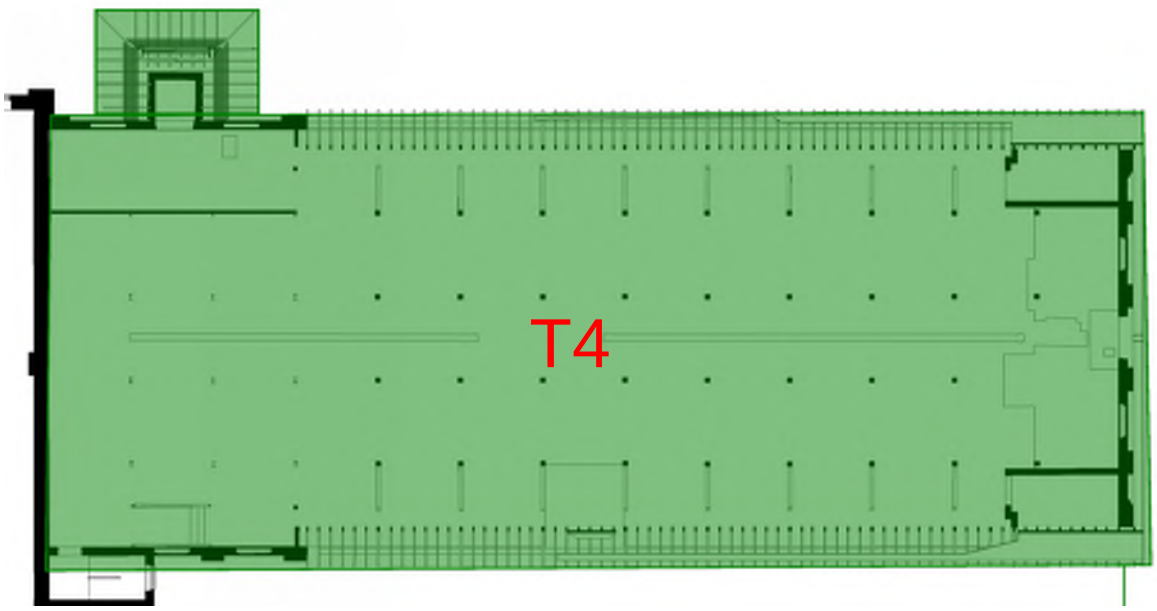

Figure 5. Layout of Level 2 T4

3.2.1 M3 Level 2 T4 Defect List

Spot Number	Component	Defect	Severity	Remarks	Member Location	Member Number	Grade
12	Floor Joist	Rot/Weather damage	Major	Size: 290x75mm Span: 3380mm Species: Oregon All the joists show some to significant water damage and/or rot. Timber members have been exposed to the elements for an extensive amount of time due to barely intact roof Top of joists unable to be inspected in most places but viewed from bottom show signs of water damage or rot	All	All	Out of grade

Figure 6. Table of Defects M3 Level 2

Figure 6 details the timber members that are out of grade on M3 Level 2. The severity entails the extent of damage, though these have no bearing on the grade due to the nature of the defects. The remarks were made while on site inspecting the timber members.

The defects throughout L2 are primarily rot and weather damage related to extended water exposure. Although some members probed sound, they showed signs of decay thus have been deemed out of grade. In all cases where the members were exposed to the elements they are deemed to be out of grade.

3.3 M3 LEVEL 3 T5

The timber members on level 3 are Oregon. The posts are 200x200mm. Bottom chord is 250x250mm. Purlins are 200x105mm. Beams are 300x200mm. Rafters are 120x50mm. The posts are missing inclined struts which caused the water to pool in these areas. Due to this pooling severe rot has been found in the bottom of these posts, with al of them showing at least 10mm section loss but most being more severe in the indents where the struts have been removed from, with some probing 50mm or more section loss. At Spot 14 a post is completely missing. Bottom chord shows significant water damage and rot in sections, at least 10mm section loss. Several chords have horizontal checks running through them. Purlins, beams and rafters all show significant water damage due to extended exposure to the weather. At least 10mm section loss in most members. All timber members are out of grade due to the severity weather exposure throughout the structure,

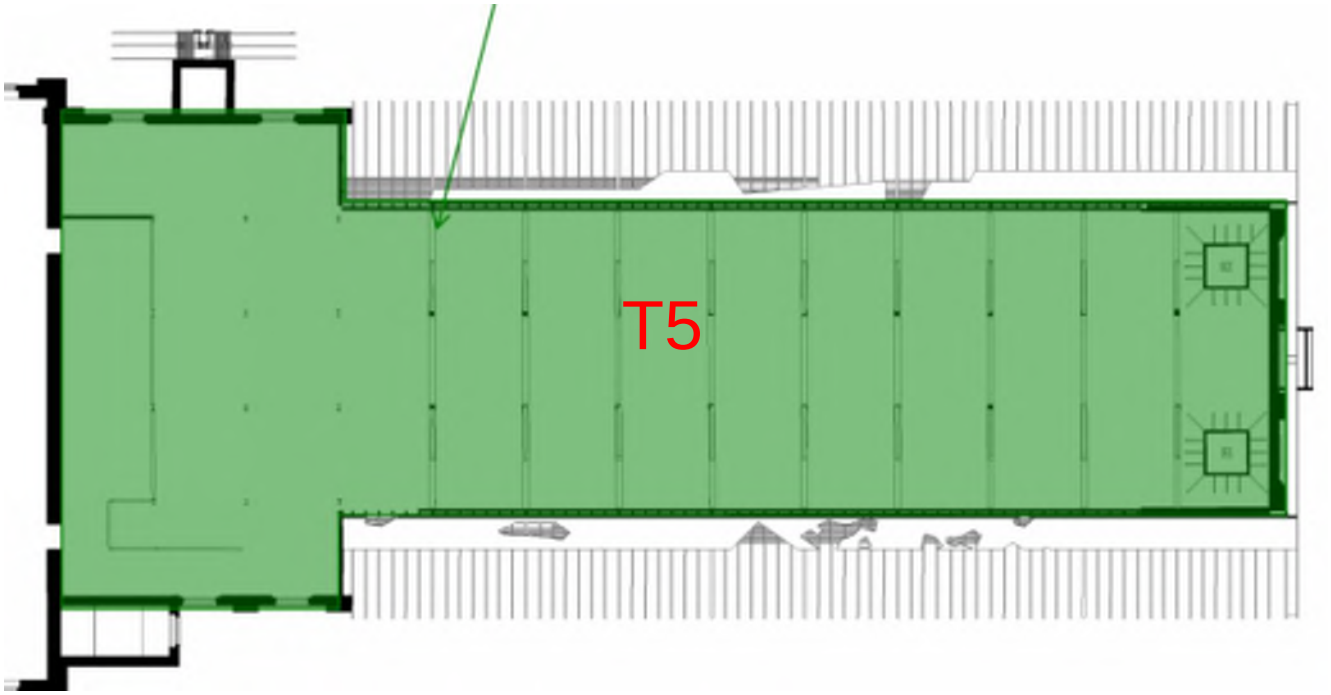

Figure 7. Layout of Level 3 T5

3.3.1 M3 Level 3 T5 Defect List

Spot Number	Compo-nent	Defect	Sever-ity	Remarks	Member Location	Member Number	Grade
13	post	Rot	Major	Size: 200x200 Oregon Posts show significant de-terioration due to ex-tended exposure to ele-ments Posts probed show at least 10mm section loss from all sides Inclined struts removed in the past led to complete rot in indented sections	All	-	F22
14	post	missing	Major	Missing post	All	-	Out of grade
15	bottom chord	rot/water dam-age/checks	Major	Size: 250x200 All beams show signs of rot or water damage due to exposure to the elements Severe checks through middle of chord	All	-	Out of grade
16	purlin	Rot	Major	Size: 200x105mm All purlins severe water	All	-	Out of grade

				damage and degradation due to exposure to elements When probed at least 10mm section loss			
17	Beam	rot/water damage/check	Major	Size 300x200mm Severe water damage/rot Severe checks	All	-	Out of grade
18	rafter	rot/water damage	Major	Size: 120x50 Severe weather exposure and rot in some places	All	-	Out of grade

Figure 8. Table of Defects M3 Level 3

Figure 8 details the timber members that are out of grade on M3 Level 3. The severity entails the extent of damage, though these have no bearing on the grade due to the nature of the defects. The remarks were made while on site inspecting the timber members.

The defects throughout L3 are primarily rot, weather damage and checks. The members showed significant damage due to extended exposure to weather. All members deemed out of grade.

3.4 M3 LEVEL 4 T6 AND 5 T7

The timber members on level 4 and 5 are Oregon. The top chord is 250x200mm. Joists are 250x50mm. The top chords show significant water damage and some vertical fractures. The joists showed water damage including rot as well as general decay due to extended exposure to the elements. The decay is most severe around where bolts have been installed through the timber members as well as where two timber members are adjoined or connected. The members at T6 are all considered to be out of grade.

Level 5 was unable to be inspected up close due to unsafe or unsound access to the higher levels (rotted floorboards, no rails etc). The roof was missing or patchy at best throughout the structure. The inspection from level 4 showed that most members were exposed to the elements for an extended time as weather degradation such as rot and moss was visible. All members at T7 are considered out of grade.

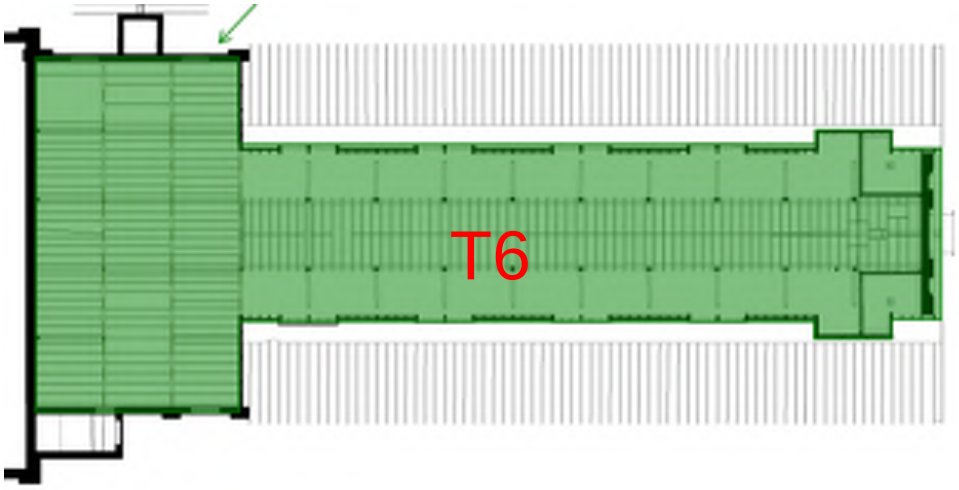

Figure 9. Layout of Level 4 T6

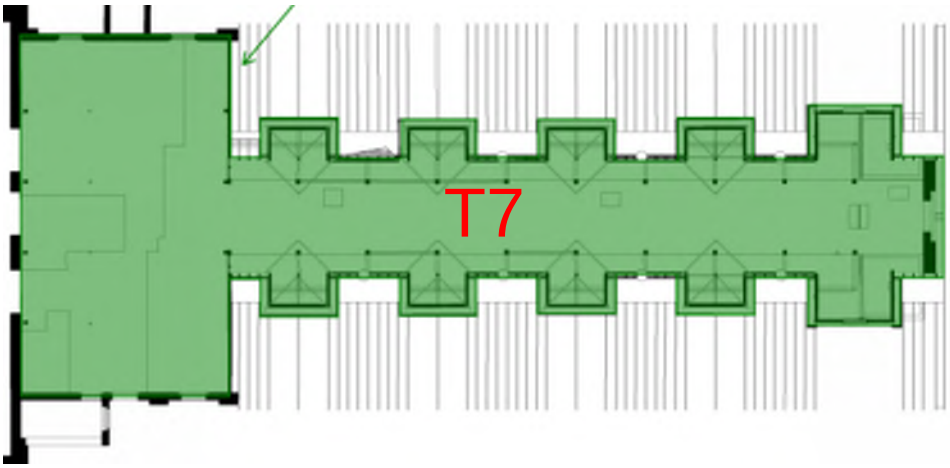

Figure 10. Layout of Level 5 T7

3.4.1 M3 Level 4 T6 and Level 5 T7 Defect List

Spot Number	Component	Defect	Severity	Remarks	Member Location	Member Number	Grade
19	top chord	Rot	Major	Size 250x200mm Severe weather exposure Water damage and rot	All	-	Out of grade

20	joists	water dam-age/ex-posure	Major	Size: 250x50mm Weather exposure and rot on many joists Been exposed to elements	All	-	Out of grade
21	roof struc-ture	weather expo-sure	Major	Unable to be assessed close up Due to broken roof structure is exposed to the elements Rot can be observed from a distance	All	-	Out of grade

Figure 11. Table of Defects M3 Levevel4 T6 and Level 5 T7

Figure 11 details the timber members that are out of grade on M3 Level 4 and 5. The severity entails the extent of damage, though these have no bearing on the grade due to the nature of the defects. The remarks were made while on site inspecting the timber members.

The defects throughout L4 and 5 are primarily rot and weather damage. The members showed decay primarily at connection points. The lack of complete roof has exposed most of the members to constant weather. All members deemed out of grade.

APPENDIX A

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Maltings M3 Timber Inspection Report

PREPARED BY
BCRC NSW

CREATED DATE
18 Apr 2023

ASSET NAME
Malting Timber M3

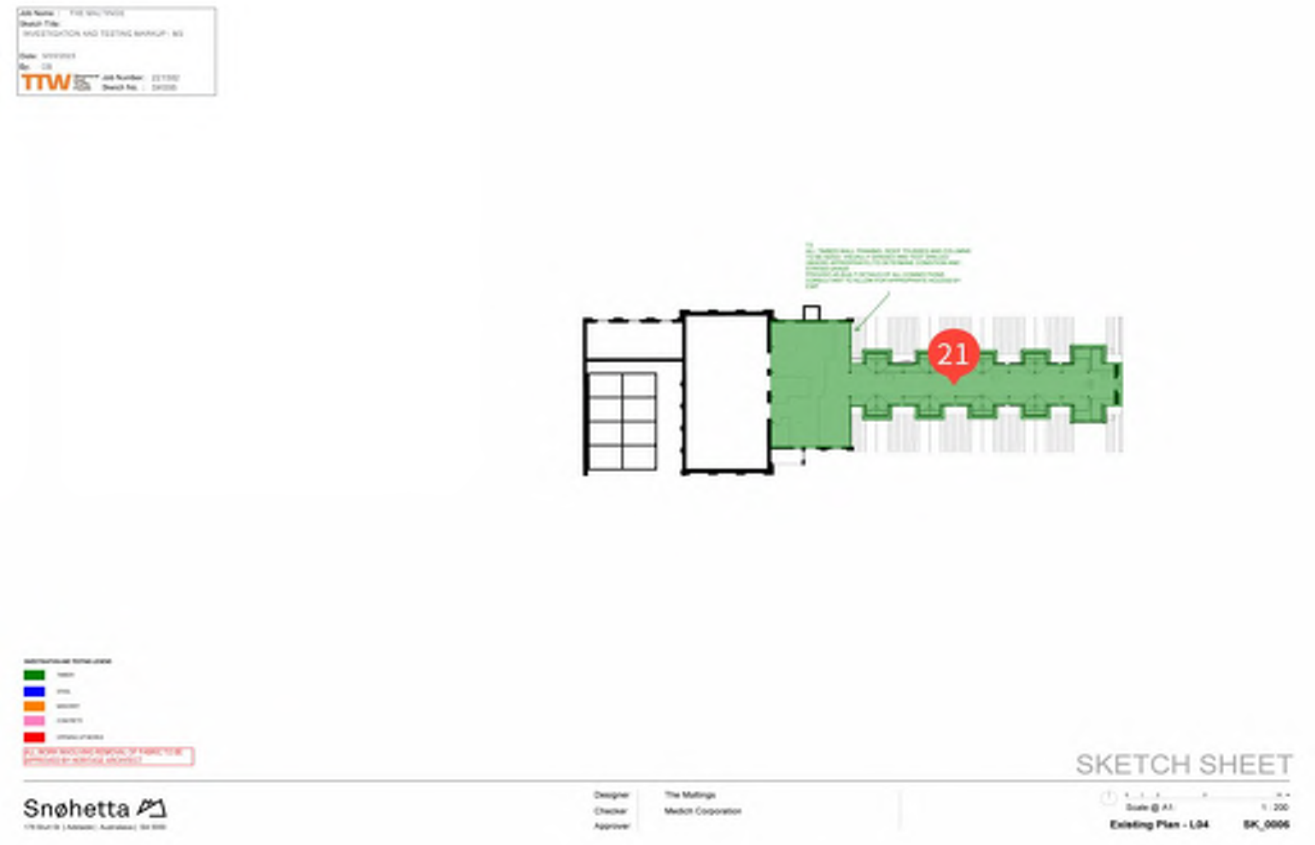
ASSET LOCATION
Mittagong, Mittagong NSW Australia

INSPECTION DATE
29 Mar 2023 - 31 Mar 2023

2D View

FILE NAME
6 - 221582-TTW-ST-SK-0006-C-M3 INVESTIGATION AND TESTING MARKUP 230309 OB

TOTAL SPOTS IN VIEW
1 Spot



Spot 21

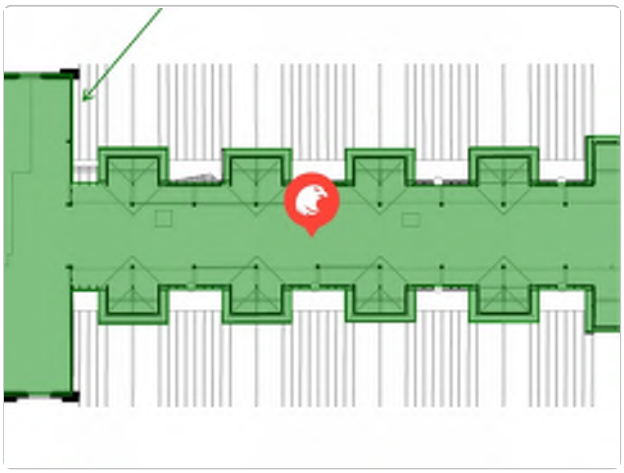
SEVERITY
Major

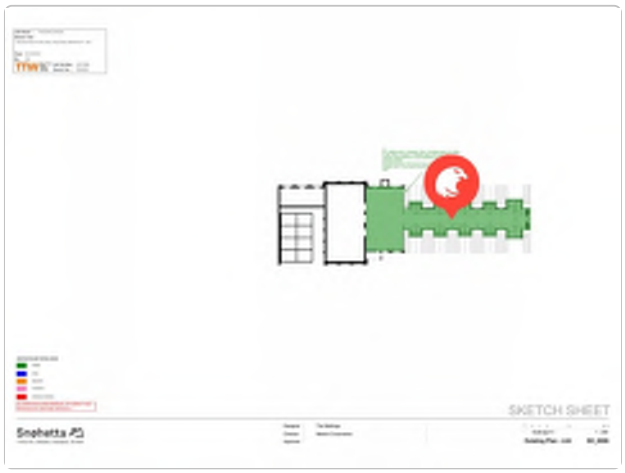
REPORTER
BCRC NSW

COMPONENT
roof structure

REMARKS
Unable to be assessed close up
Due to broken roof structure is exposed to the elements
Rot can be observed from a distance

Location





Photos and Sketches

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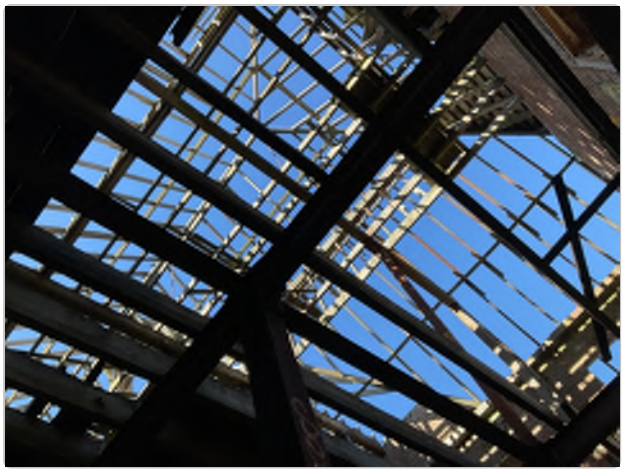
Spot 21



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2D View

FILE NAME
5 - 221582-TTW-ST-SK-0006-C-M3 INVESTIGATION AND TESTING MARKUP 230309 OB

TOTAL SPOTS IN VIEW
2 Spots

Spot 20

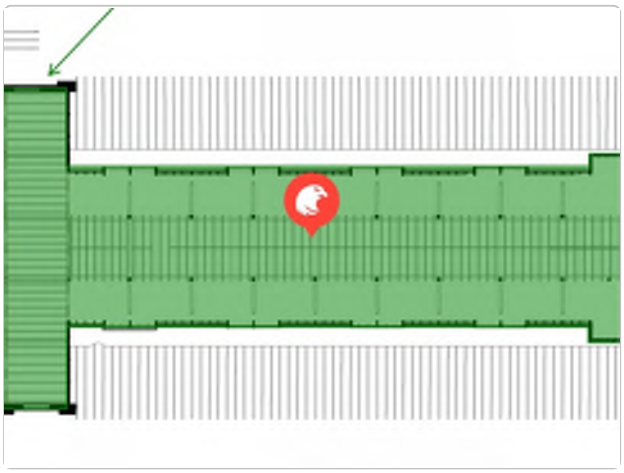
SEVERITY
Major

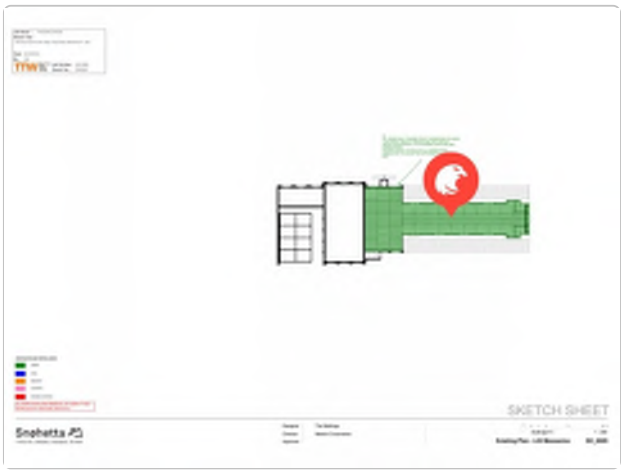
REPORTER
BCRC NSW

COMPONENT
joists

REMARKS
Size: 250x50mm
Weather exposure and rot on many joists
Been exposed to elements

Location





Photos and Sketches

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Spot 20

31 Mar 2023, 9:20 AM / BCRC NSW

31 Mar 2023, 9:20 AM / BCRC NSW

31 Mar 2023, 9:20 AM / BCRC NSW

31 Mar 2023, 9:45 AM / BCRC NSW

31 Mar 2023, 9:45 AM / BCRC NSW

Spot 19

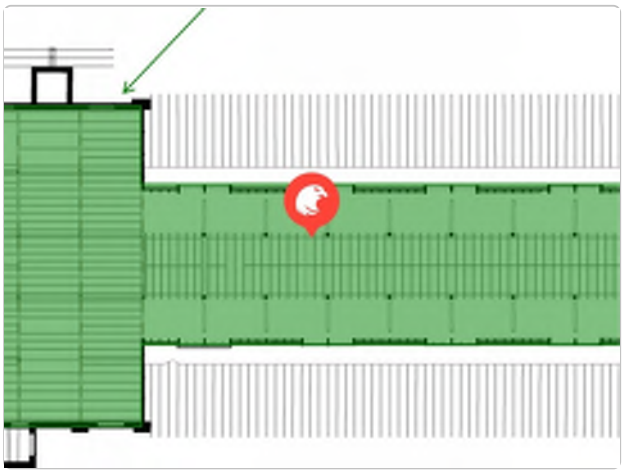
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
top chord

REMARKS
Size 250x200mm
Severe weather exposure
Water damage and rot

Location



Photos and Sketches

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Spot 19

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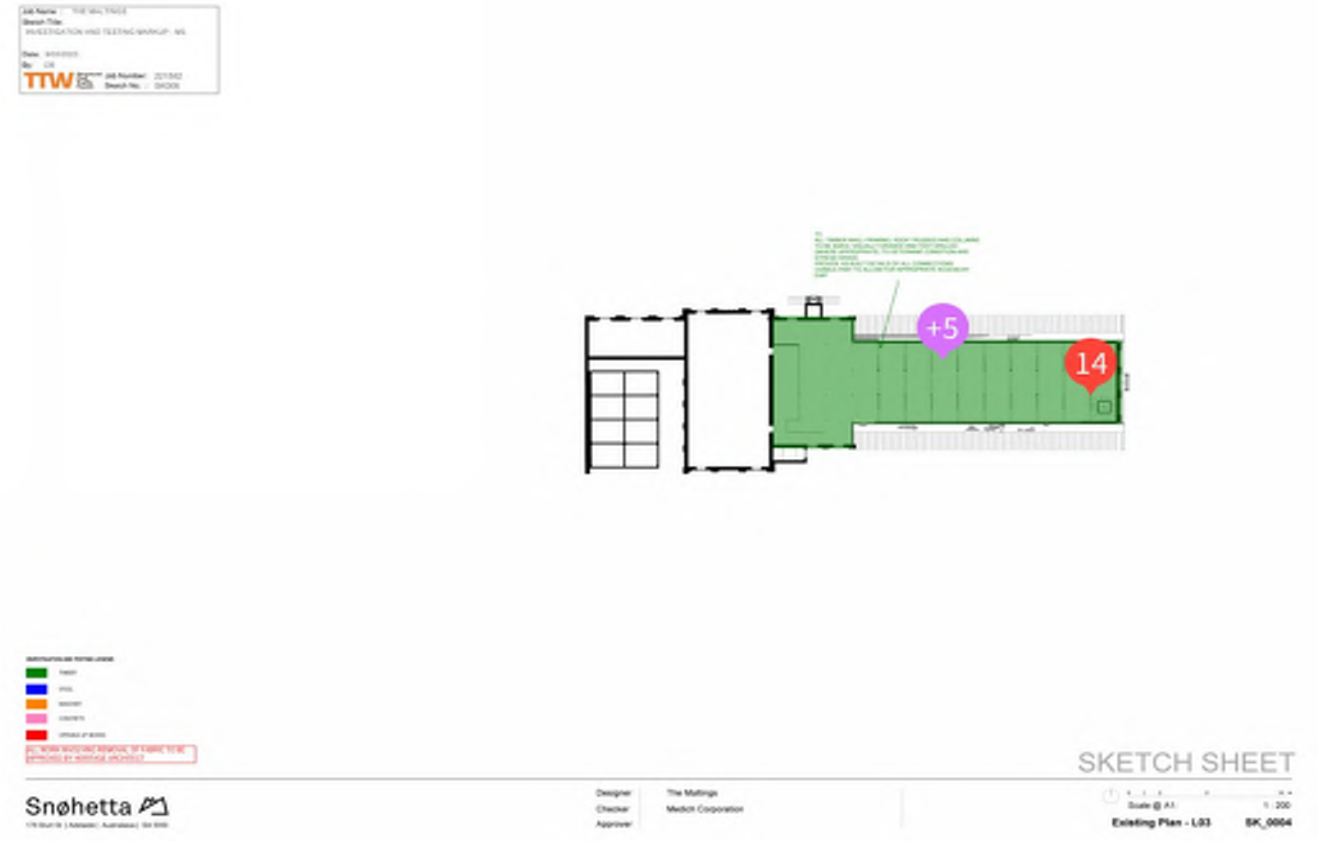
31 Mar 2023, 9:55 AM / BCRC NSW

2D View

FILE NAME
4 - 221582-TTW-ST-SK-0006-C-M3 INVESTIGATION AND TESTING MARKUP 230309 OB

TOTAL SPOTS IN VIEW
6 Spots



Spot 18

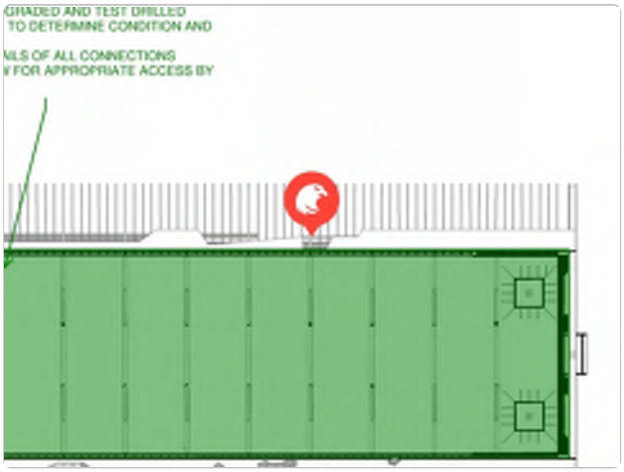
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
rafter

REMARKS
Size: 120x50
Severe weather exposure and rot in some places

Location



Photos and Sketches

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31 Mar 2023, 9:05 AM / BCRC NSW

Spot 18

31 Mar 2023, 9:05 AM / BCRC NSW

Spot 17

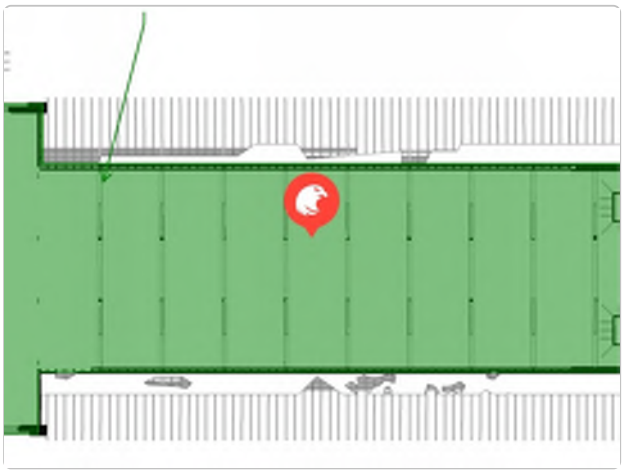
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
Beam

REMARKS
Size 300x200mm
Severe water damage/rot
Severe checks

Location



Photos and Sketches

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31 Mar 2023, 9:02 AM / BCRC NSW

Spot 17

31 Mar 2023, 9:02 AM / BCRC NSW

31 Mar 2023, 9:02 AM / BCRC NSW

31 Mar 2023, 9:02 AM / BCRC NSW

31 Mar 2023, 9:02 AM / BCRC NSW

31 Mar 2023, 9:02 AM / BCRC NSW

31 Mar 2023, 9:02 AM / BCRC NSW

Spot 17

31 Mar 2023, 9:02 AM / BCRC NSW

Spot 16

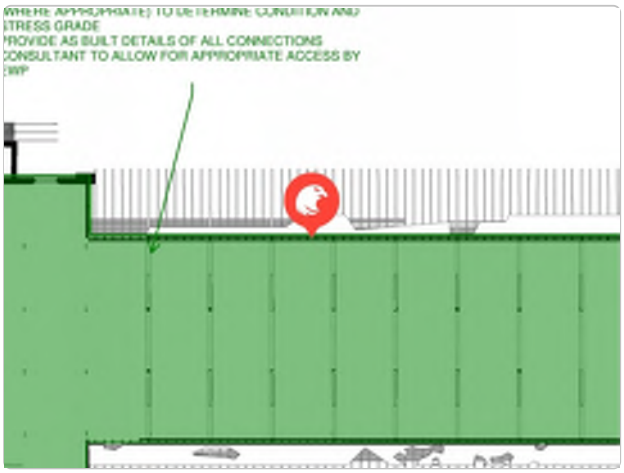
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
purlin

REMARKS
Size: 200x105mm
All purlins severe water damage and degradation due to exposure to elements
When probed at least 10mm section loss

Location



Photos and Sketches

31 Mar 2023, 8:54 AM / BCRC NSW

31 Mar 2023, 8:54 AM / BCRC NSW

Spot 16

31 Mar 2023, 8:54 AM / BCRC NSW

31 Mar 2023, 8:54 AM / BCRC NSW

Spot 15

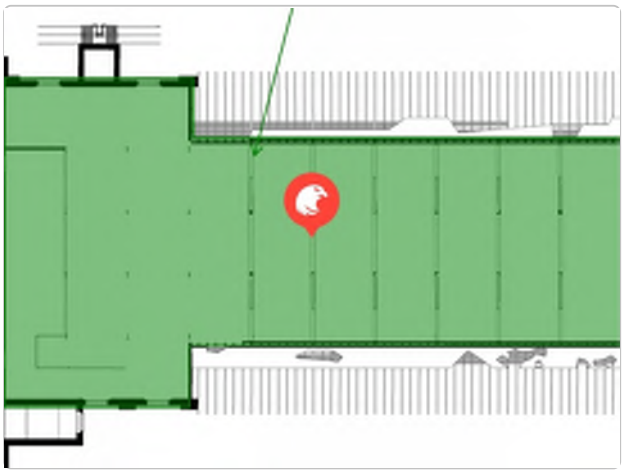
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
bottom chord

REMARKS
Size: 250x200
All beams show signs of rot or water damage due to exposure to the elements
Severe checks through middle of chord

Location



Photos and Sketches

31 Mar 2023, 8:52 AM / BCRC NSW

31 Mar 2023, 8:52 AM / BCRC NSW

Spot 15

31 Mar 2023, 8:52 AM / BCRC NSW

31 Mar 2023, 8:52 AM / BCRC NSW

31 Mar 2023, 8:52 AM / BCRC NSW

Spot 14

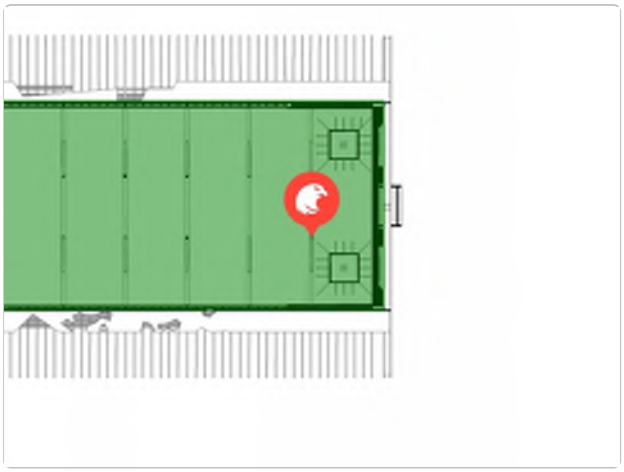
SEVERITY
Major

REPORTER
BCRC NSW

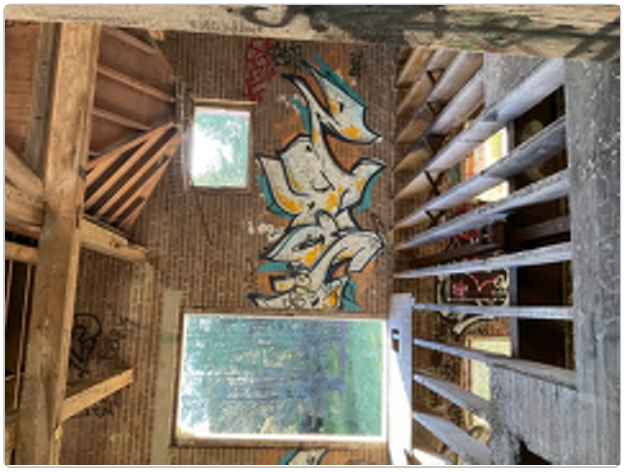
COMPONENT
post

REMARKS
Missing post

Location



Photos and Sketches



31 Mar 2023, 8:38 AM / BCRC NSW

31 Mar 2023, 8:38 AM / BCRC NSW

Spot 14

31 Mar 2023, 8:38 AM / BCRC NSW

Spot 13

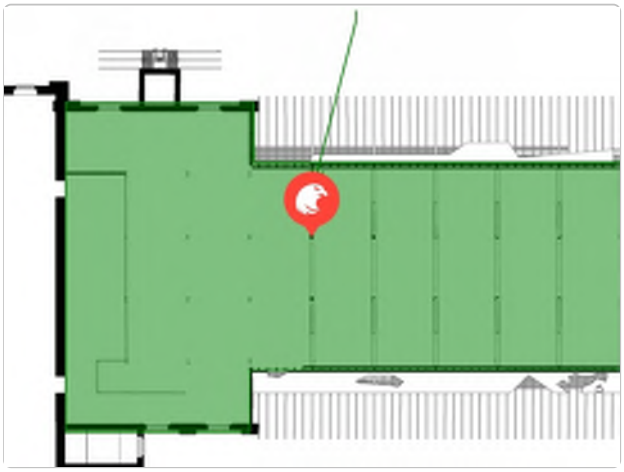
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
post

REMARKS
Size: 200x200
Oregon
Posts show significant deterioration due to extended exposure to elements
Posts probed show at least 10mm section loss from all sides
Inclined struts removed in the past led to complete rot in indented sections

Location



Photos and Sketches

31 Mar 2023, 8:37 AM / BCRC NSW

31 Mar 2023, 8:37 AM / BCRC NSW

Spot 13

31 Mar 2023, 8:37 AM / BCRC NSW

31 Mar 2023, 8:37 AM / BCRC NSW

31 Mar 2023, 8:37 AM / BCRC NSW

31 Mar 2023, 8:37 AM / BCRC NSW

31 Mar 2023, 8:37 AM / BCRC NSW

31 Mar 2023, 8:37 AM / BCRC NSW

Spot 13

31 Mar 2023, 8:37 AM / BCRC NSW

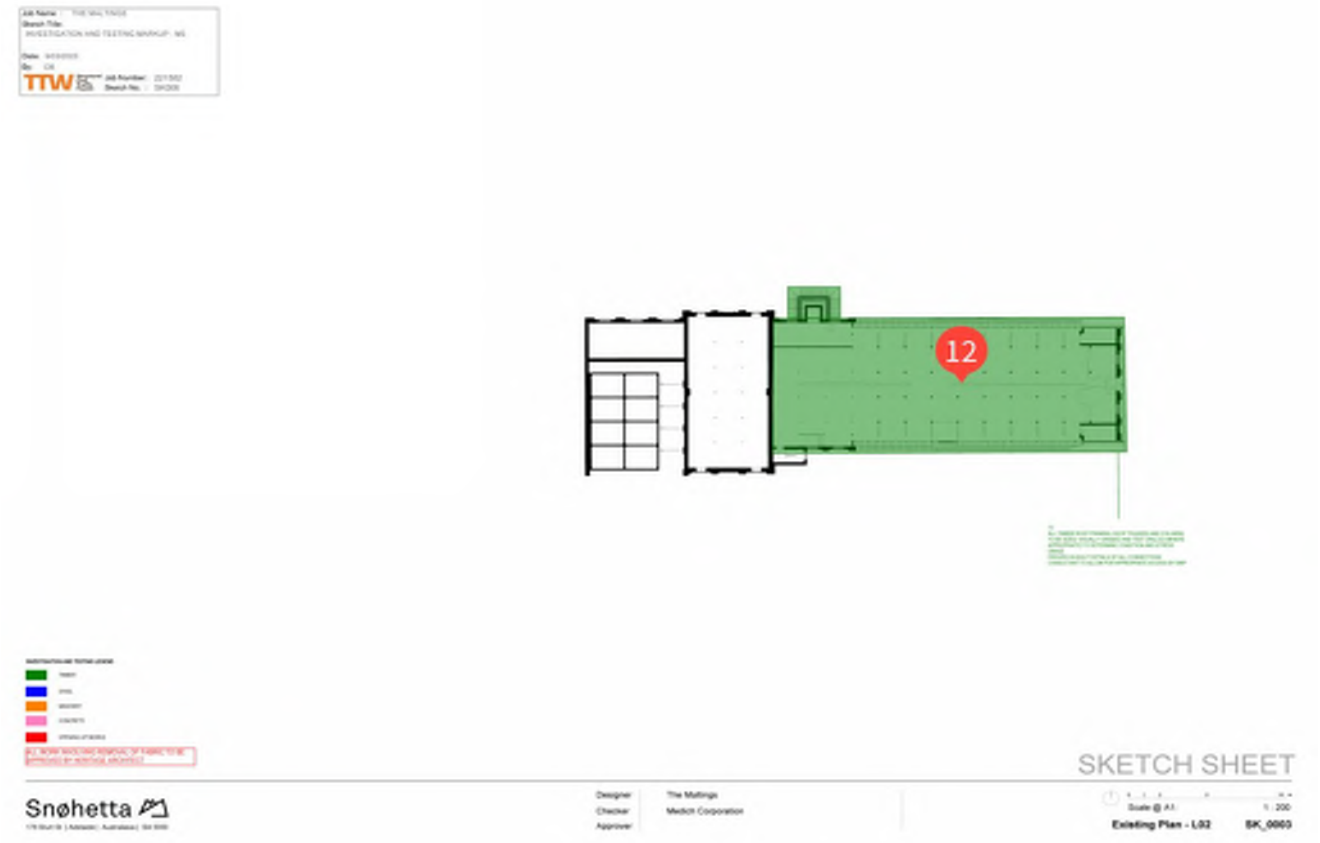
31 Mar 2023, 8:37 AM / BCRC NSW

31 Mar 2023, 8:37 AM / BCRC NSW

2D View

FILE NAME
3 - 221582-TTW-ST-SK-0006-C-M3 INVESTIGATION AND TESTING MARKUP 230309 OB

TOTAL SPOTS IN VIEW
1 Spot



Spot 12

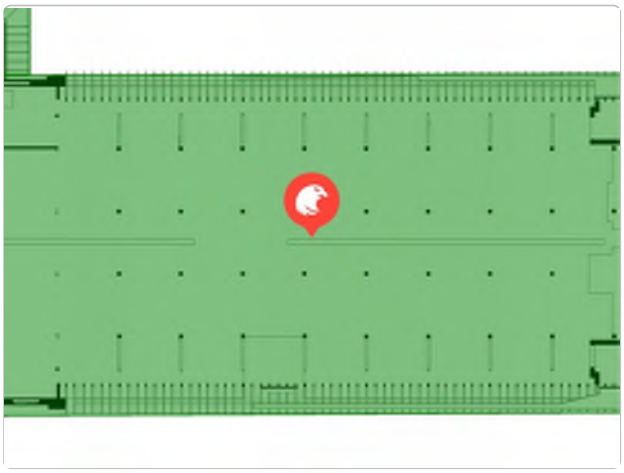
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Size: 290x75mm
Span: 3380mm
Species: Oregon
All the joists show some to significant water damage and/or rot. Timber members have been exposed to the elements for an extensive amount of time due to barely intact roof
Top of joists unable to be inspected in most places but viewed from bottom show signs of water damage or rot

Location



Photos and Sketches

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

Spot 12

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

Spot 12

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

Spot 12

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

30 Mar 2023, 1:33 PM / BCRC NSW

Spot 12

30 Mar 2023, 1:48 PM / BCRC NSW

30 Mar 2023, 1:48 PM / BCRC NSW

30 Mar 2023, 1:48 PM / BCRC NSW

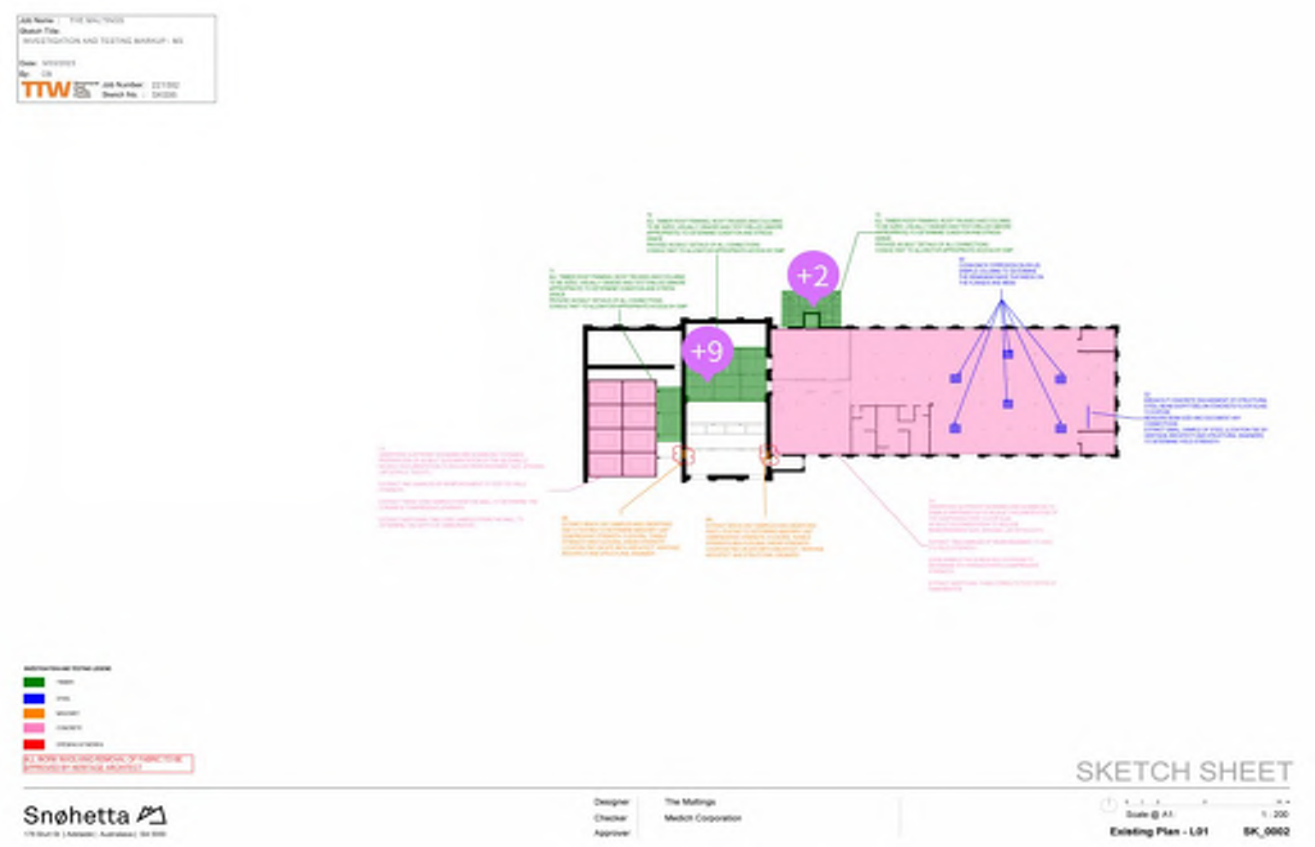
31 Mar 2023, 9:46 AM / BCRC NSW

31 Mar 2023, 9:46 AM / BCRC NSW

2D View

FILE NAME
2 - 221582-TTW-ST-SK-0006-C-M3 INVESTIGATION AND TESTING MARKUP 230309 OB

TOTAL SPOTS IN VIEW
11 Spots



Spot 11

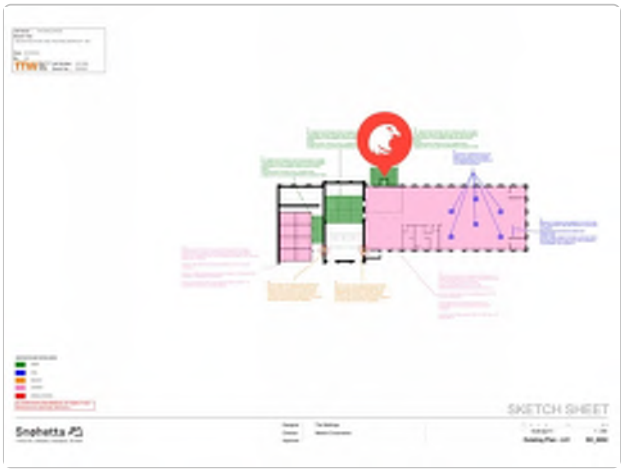
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
beams

REMARKS
Oregon and pine previous repairs
Size 125x50
Rot and water damage
Exposed to elements

Location



Photos and Sketches

30 Mar 2023, 8:50 AM / BCRC NSW

30 Mar 2023, 8:50 AM / BCRC NSW

Spot 11

30 Mar 2023, 8:50 AM / BCRC NSW

30 Mar 2023, 8:50 AM / BCRC NSW

Spot 10

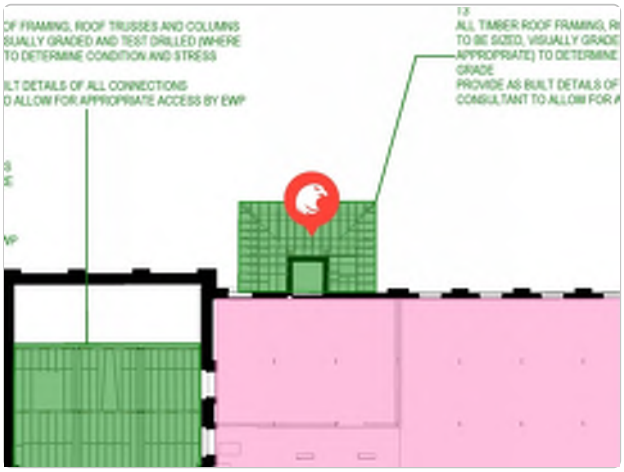
SEVERITY
Major

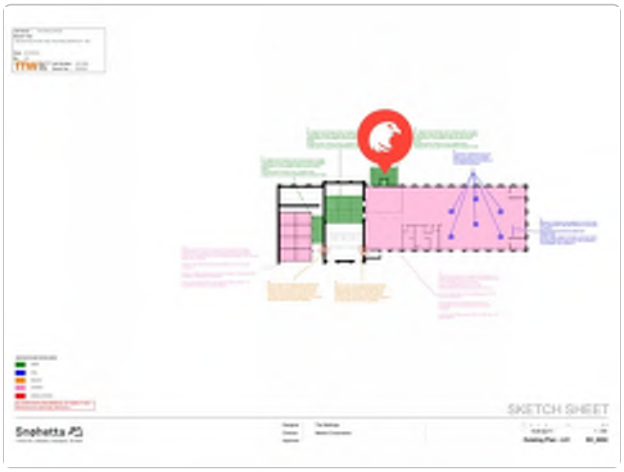
REPORTER
BCRC NSW

COMPONENT
rafters

REMARKS
Oregon and pine has been previously repaired
Size 125x50mm
Weather exposed
Rot and water damage

Location





Photos and Sketches

30 Mar 2023, 8:44 AM / BCRC NSW

30 Mar 2023, 8:44 AM / BCRC NSW

Spot 10

30 Mar 2023, 8:44 AM / BCRC NSW

Spot 9

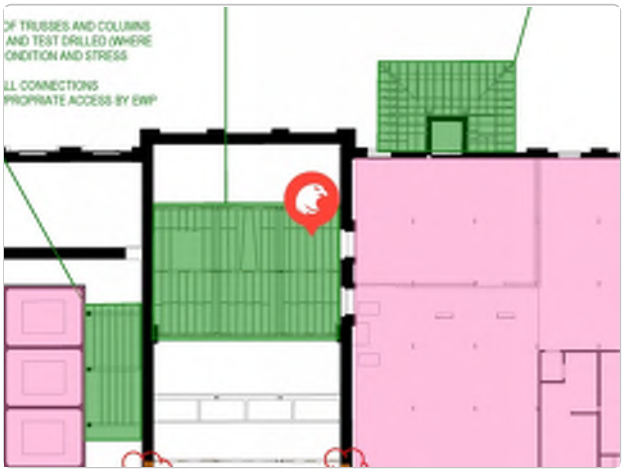
SEVERITY
Major

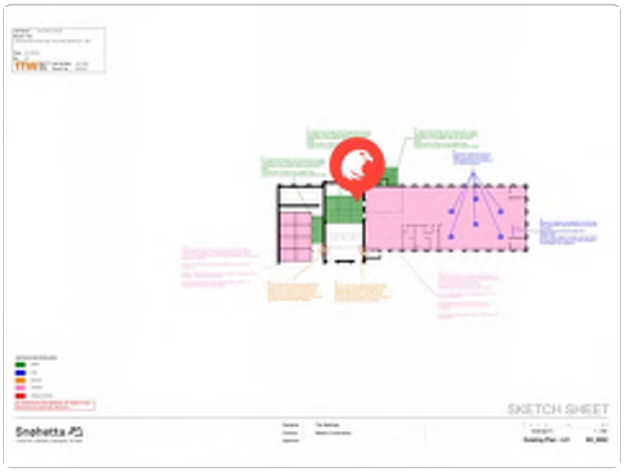
REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Waterlogged bearers
Exposed to elements
Fracture in member 5
End splits

Location





Photos and Sketches

30 Mar 2023, 8:05 AM / BCRC NSW

30 Mar 2023, 8:05 AM / BCRC NSW

Spot 9

30 Mar 2023, 8:05 AM / BCRC NSW

30 Mar 2023, 8:05 AM / BCRC NSW

Spot 8

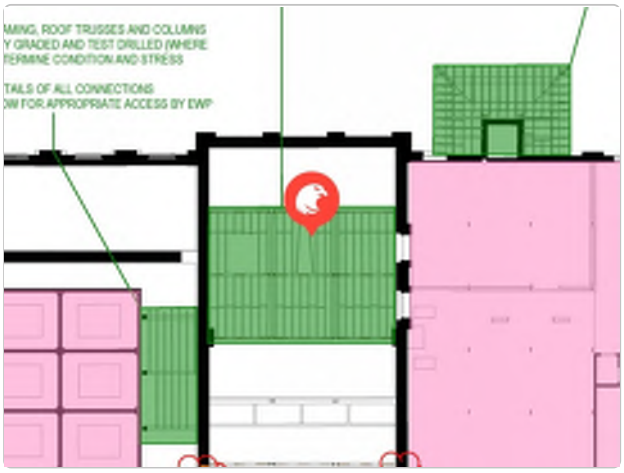
SEVERITY
Major

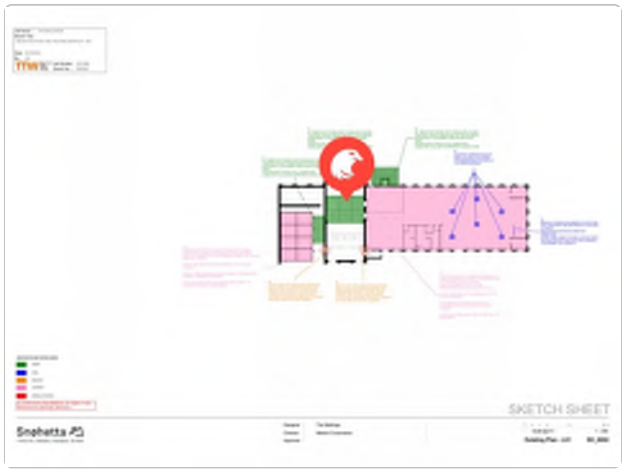
REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Rot and water damage
Exposed to elements

Location





Photos and Sketches

29 Mar 2023, 3:49 PM / BCRC NSW

29 Mar 2023, 3:49 PM / BCRC NSW

Spot 8

29 Mar 2023, 3:49 PM / BCRC NSW

Spot 7

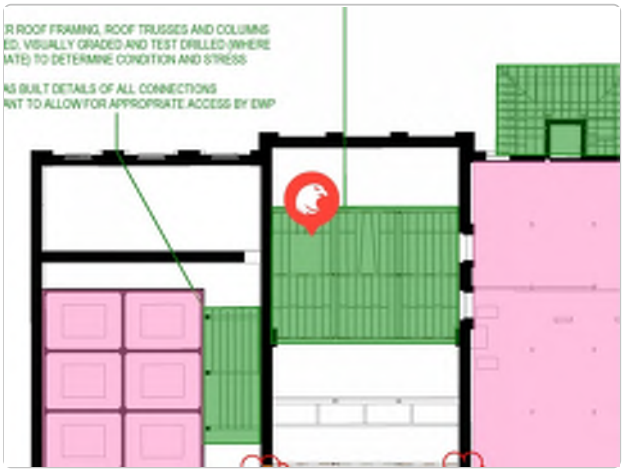
SEVERITY
Major

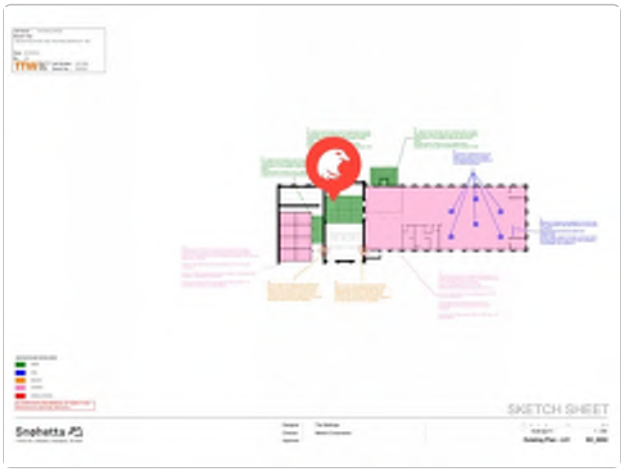
REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Size 270x60
Span 3500
Exposed to elements
Rot and water damage especially at bearers

Location





Photos and Sketches

29 Mar 2023, 3:43 PM / BCRC NSW

29 Mar 2023, 3:43 PM / BCRC NSW

Spot 7

29 Mar 2023, 3:43 PM / BCRC NSW

29 Mar 2023, 3:43 PM / BCRC NSW

Spot 6

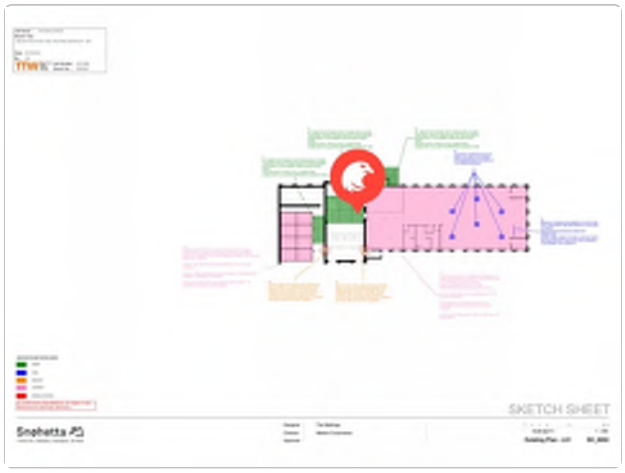
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Exposed to elements
Signs of rot and water damage

Location



Photos and Sketches

29 Mar 2023, 3:25 PM / BCRC NSW

29 Mar 2023, 3:25 PM / BCRC NSW

Spot 6

29 Mar 2023, 3:25 PM / BCRC NSW

29 Mar 2023, 3:25 PM / BCRC NSW

29 Mar 2023, 3:26 PM / BCRC NSW

Spot 5

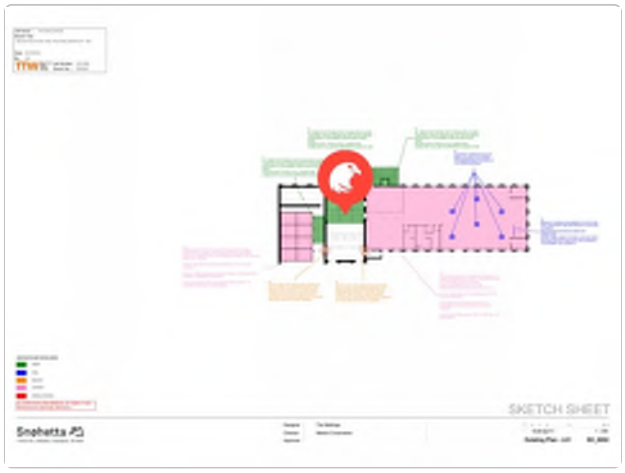
SEVERITY
Major

REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Joists are exposed to elements
Bearers show signs of water damage and rot

Location



Photos and Sketches

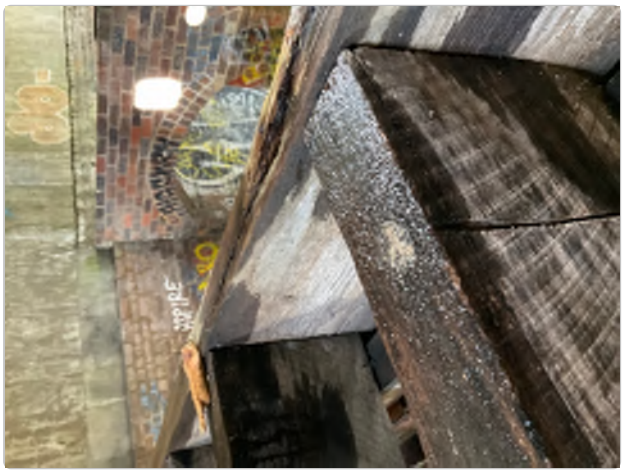
29 Mar 2023, 3:20 PM / BCRC NSW

29 Mar 2023, 3:20 PM / BCRC NSW

Spot 5

29 Mar 2023, 3:20 PM / BCRC NSW

29 Mar 2023, 3:20 PM / BCRC NSW



29 Mar 2023, 3:20 PM / BCRC NSW

29 Mar 2023, 3:20 PM / BCRC NSW

Spot 4

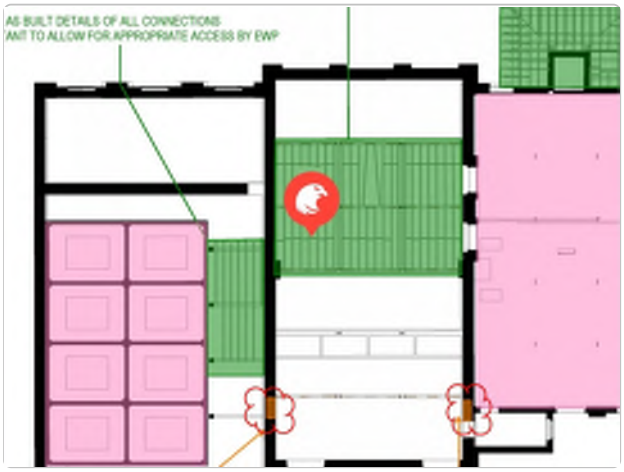
SEVERITY
Major

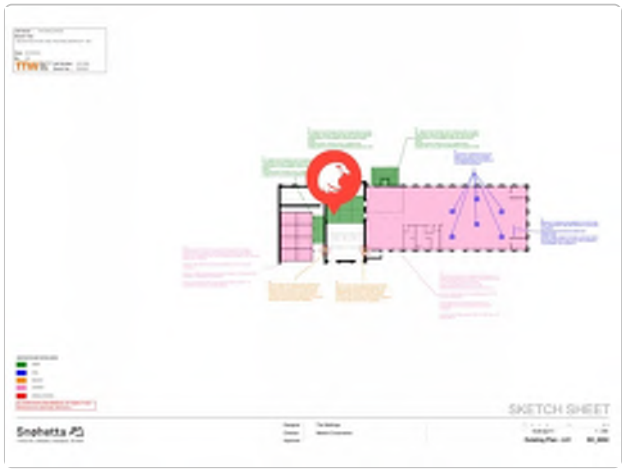
REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Oregon
Size 220x75mm
Span 3450mm
Weather exposed
Rot

Location





Photos and Sketches

29 Mar 2023, 3:14 PM / BCRC NSW

29 Mar 2023, 3:14 PM / BCRC NSW

Spot 4

29 Mar 2023, 3:14 PM / BCRC NSW

Spot 3

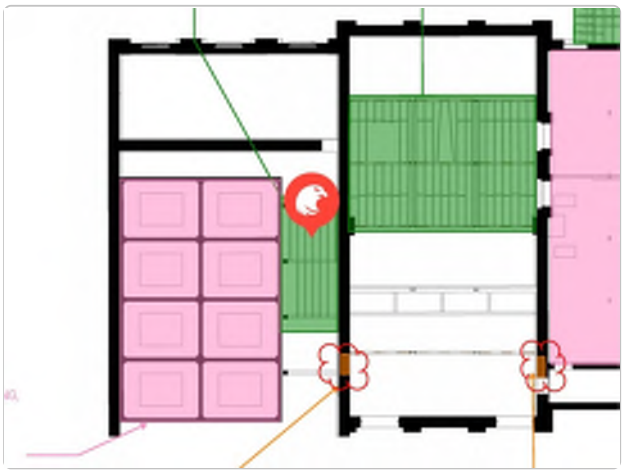
SEVERITY
Major

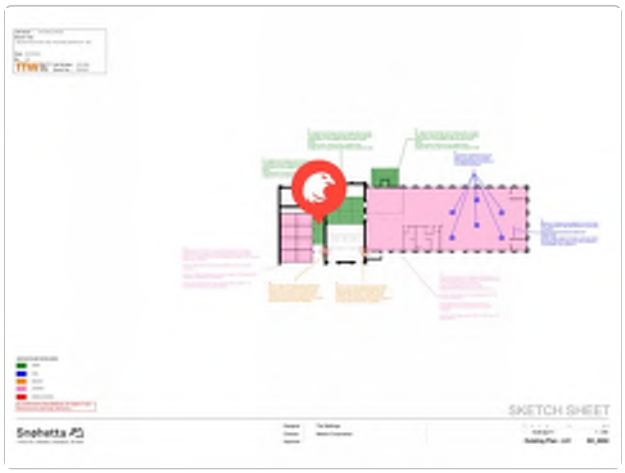
REPORTER
BCRC NSW

COMPONENT
joist

REMARKS
Size 205x75mm
Span 3500mm
All members exposed to elements. Rot

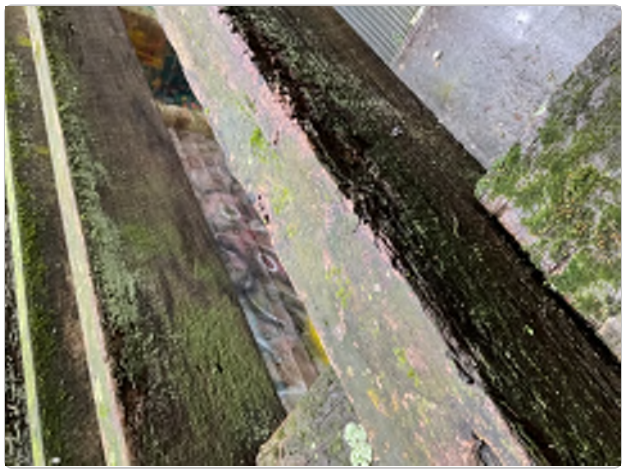
Location





Photos and Sketches

29 Mar 2023, 2:47 PM / BCRC NSW



29 Mar 2023, 2:47 PM / BCRC NSW

Spot 3

29 Mar 2023, 2:47 PM / BCRC NSW

Spot 2

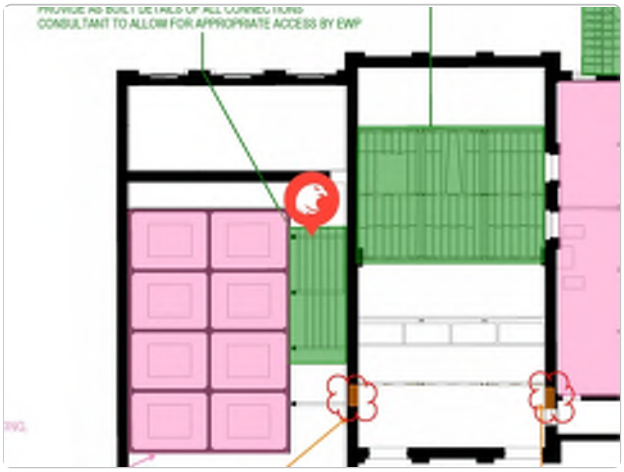
SEVERITY
Major

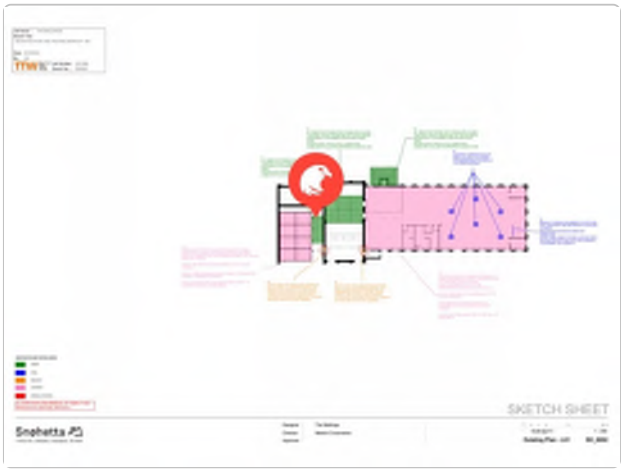
REPORTER
BCRC NSW

COMPONENT
Beam

REMARKS
Size 290x175mm
Span 2400mm
All beams exposed to elements
Rot at bearing location

Location





Photos and Sketches

29 Mar 2023, 2:40 PM / BCRC NSW

29 Mar 2023, 2:44 PM / BCRC NSW

Spot 2

29 Mar 2023, 2:44 PM / BCRC NSW

Spot 1

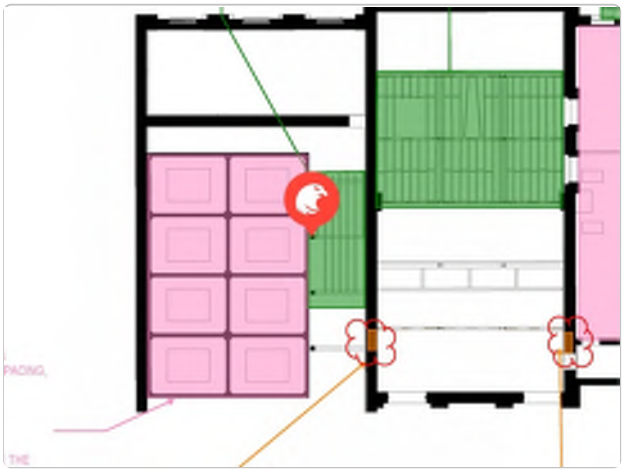
SEVERITY
Major

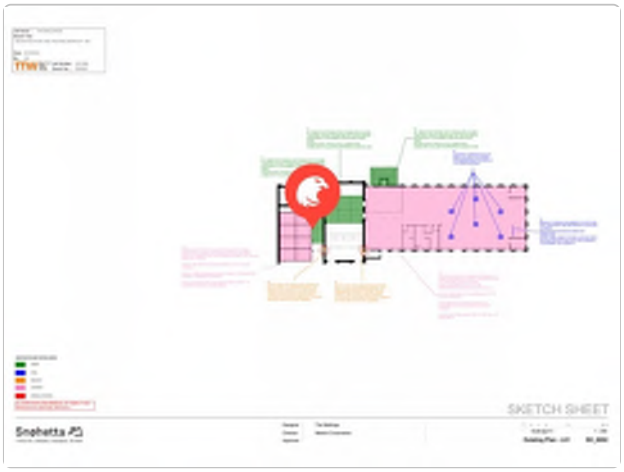
REPORTER
BCRC NSW

COMPONENT
post

REMARKS
Mixed nsw hardwood
Size: 300x300mm
All posts (Upper and Lower) have been exposed to the elements. Severe rot at the ground connection of all the columns. Section loss of at least 50mm all round

Location





Photos and Sketches

29 Mar 2023, 2:33 PM / BCRC NSW

29 Mar 2023, 2:33 PM / BCRC NSW

Spot 1

29 Mar 2023, 2:33 PM / BCRC NSW

29 Mar 2023, 2:33 PM / BCRC NSW

29 Mar 2023, 2:33 PM / BCRC NSW

29 Mar 2023, 2:33 PM / BCRC NSW

29 Mar 2023, 2:37 PM / BCRC NSW

Closing

This is a sample text which can be edited in the web.screeningeagle.com under the Report Template section.

NAME

JOB TITLE

Signature