Golden Valley Homestead, Golden Valley Tree Park, 164 Old Padbury Road, Balingup WA
Structural Engineering Services Assessment

Prepared for:

Department of Biodiversity, Conservation and Attractions

Date: March 2023

Our Ref: 2234B

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Contents

Document Revision

REVISION	DATE	COMMENT	BY
0	02 March 2023	For Client Review	Peter Baxendale

1. Introduction

Peter Baxendale Consulting Engineer (PBCE) was commissioned by the Department of Biodiversity, Conservation and Attractions (DBCA) to investigate and advise on the structural condition of the Homestead building at Golden Valley Tree Park (GVTP) at 164 Old Padbury Road, Balingup.

The intent of this report is to provide professional guidance on the necessary scope of remedial and maintenance works required to enable the existing building structures to continue to perform their current tasks and be safe in operational use into the foreseeable future.

Structural Engineering services site inspection and appraisal was undertaken by Peter Baxendale in November 2022.

1.1 Background Summary

DBCA has engaged heritage architects Stephen Carrick Architects (SCA) to prepare a Conservation Management Strategy (CMS) for the heritage place. Input from a structural engineering perspective is foreseen as essential for development of the CMS.

PBCE was engaged by DBCA to provide the required input. DBCA Acting PVS Operations Officer Natasha Moore (NM) facilitated the inspection and assisted with responses to PBCE queries.

Prior to this detailed report, and interim verbal summary report was provided to SCA in December 2022.

2. Scope of Work

2.1 Requirements

The following scope of work was agreed:

- Study existing documentary evidence for the building such as may exist, including any Conservation Plan and Inherit database information.
- Visual inspection of the structure from ground level and at higher levels as may be facilitated by ladder, plus from accessible floor and ceiling spaces.
- Direct any opening up works as may be deemed important to understanding of building behaviour during the course of the inspection (client to supply operator if required).
- Interview any individuals with long association or knowledge of the building's maintenance history.
- Report findings of the inspections and provide recommendations for appropriate action, attributing a priority ranking to actions using the Heritage Council's recommended ranking scale for Building Condition Assessment Reports. Report to be used by architect (SCA) in preparation of Conservation Management Strategy for the place.

2.2 Qualifications

The following qualifications apply to this report:

- Defects noted in this report were correct at the time of inspection. Due to the present condition, the building could deteriorate further due to exposure post inspection.
- It should be noted that some areas of the building could not be visually examined. As such it is probable that the inspection cannot identify all of the potential defects or shortcomings of the buildings.
- No intrusive investigation was undertaken within the survey. The findings of this report are based on the visual inspection only.
- No testing of material samples was carried out. Similarly, comments on specialist services not included in our areas of expertise have been excluded.
- No geotechnical or sub-surface investigations were carried out.
- No engineering measurement or calculations have been performed.
- This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in connection with briefing from the Client. No liability or responsibility is accepted in respect of any use or reliance upon this report by any third party.
- The report will specifically exclude the following aspects:
  - Geotechnical issues and environmental considerations.
  - Hazardous substances.
  - Acoustics.
  - Occupational Health and Safety Considerations.
  - Conformance with Disability Discrimination Act.
  - BCA compliance issues outside of the services inspected.
  - Landscape Reticulation.

  The client should consider the need to engage specialist consultants to report on the above.

2.3 Available Documents

The following documents were available at the time of inspection:

- Evaluation for the Department of Conservation and Land Management – John Pidgeon Architect, 1990s.
- Old Aerial Photograph – date unknown.
- Conservation Management Strategy (Worker's Accommodation) – SCA, 25 October 2022.
- Routine Inspection Report – Harcourts Bridgetown, 5 October 2022.

The following documents were available subsequent to inspection:

- Municipal Heritage Inventory entry – Shire of Donnybrook-Balingup, date unknown (2001 earliest).
- Golden Valley Restoration Proposal – Balingup Progress Association & Hocking Planning & Architecture, September 1991.
- Golden Valley Homestead Drawing Set – John Pidgeon Architect, undated (anticip. 1990s).
- Golden Valley Homestead Floor Plan – John Pidgeon Architect, undated (anticip. 1990s).
- 2 No. Site Photographs – photographer unknown, 1990s.

3. Observations & Recommendations

3.1 Existing Structure

3.1.1 General

Place Name	Golden Valley Homestead
Place Listings	HCWA State Registered Place No. 707 Municipal Inventory Place No. 34
Address	Lot 11, 164 Old Padbury Road, Balingup WA
Date of Inspection	11 November, 2022

The building structure and its development is described in the assessment documentation for both state heritage place registration and in municipal heritage inventory entry. SCA's Conservation Management Strategy of 2022 for the nearby Worker's Accommodation also gives some background to the Homestead. Reference should be made to this source as the reader requires.

Key historical events relating to the site and building structure as far as can be discerned are ;

1880s	Construction of the Worker's Accommodation as the original homestead (80m south of present Homestead)
1895	Construction of present brick Homestead.
1900	Addition of Organ Room.
1945-1963	Kitchen space created (conversion of existing space).
1945-1963	Former kitchen (present Dining Room) converted to smoking room.
1945-1963	WC added adjacent to Bathroom.
1945-1963	Organ removed from Organ Room and bellows removed from Store (now Bed 3).
1979	Place assessed by National Trust (WA). Organ Room reported in 'dangerous state' – no further detail available.
1981	Reported 'renovations to maintain historical and architectural values'. No available detail.
1990	National Trust (WA) and Architect John Pidgeon draw up schedule of proposed restoration works for CALM with view to future use as public information centre or conservation project base. Proposed works included timber ceiling replacement, door replacement, window re-glazing, rendering and bagging of walls where required, general painting.
1991	Restoration Proposal by Balingup Progress Association & Hocking Planning & Architecture (September)
1991	Most of 1990 proposed restoration works carried out, including Organ Room re-construction and remodelling. Documentation used for works not clear, builder unknown, project manager not known (suspected Hocking Planning & Architecture). Organ Room reported by NT(WA) to have been removed and replaced in 'an unsympathetic manner'.
2001	Register of Heritage Places Assessment Documentation notes extensive cracking in the homestead, most likely due to reactive clay soil, and evidence of damp penetration. Fair condition overall.

The Homestead is a single storey rendered mud brick domestic house with corrugated steel roof. The render is ruled with ashlar lines. The main homestead and later Organ Room are constructed similarly, the homestead uses mud mortar in its brickwork, the Organ Room is suspected to use lime mortar in the brickwork of both original and in rebuilt construction. The external render is expected to be a later treatment across the building, the original wall finish expected to be fair-faced brickwork.

The main house roof is gabled with a lean-to roof over the rear rooms. The Organ Room was originally gabled, with the gables at the east and west ends. The roof was removed and the walls halved in height, then the gables reconstructed to the north and south. This change had taken place by the time of Pidgeon's 1990 proposals, possibly in the 1945-63 period or in the 1981 works.

Physical evidence indicates that the homestead developed in stages, with the Hall, Store, Bedroom 2 and Living Room appearing to be earlier than other rooms. The Study and Bedroom 1 are similar to the rest of the house but not identical. The Kitchen and Dining Room appear to have been a single room, the pine clad partition between them being a later feature. Bedroom 3 would appear to be a further addition with the Bathroom, WC and Shed following later.

All floors are timber framed other than in Bedroom 3 which has been replaced in concrete, and the Bathroom which is also concrete. The Shed floor, WC floor and all verandah floors are granolithic.

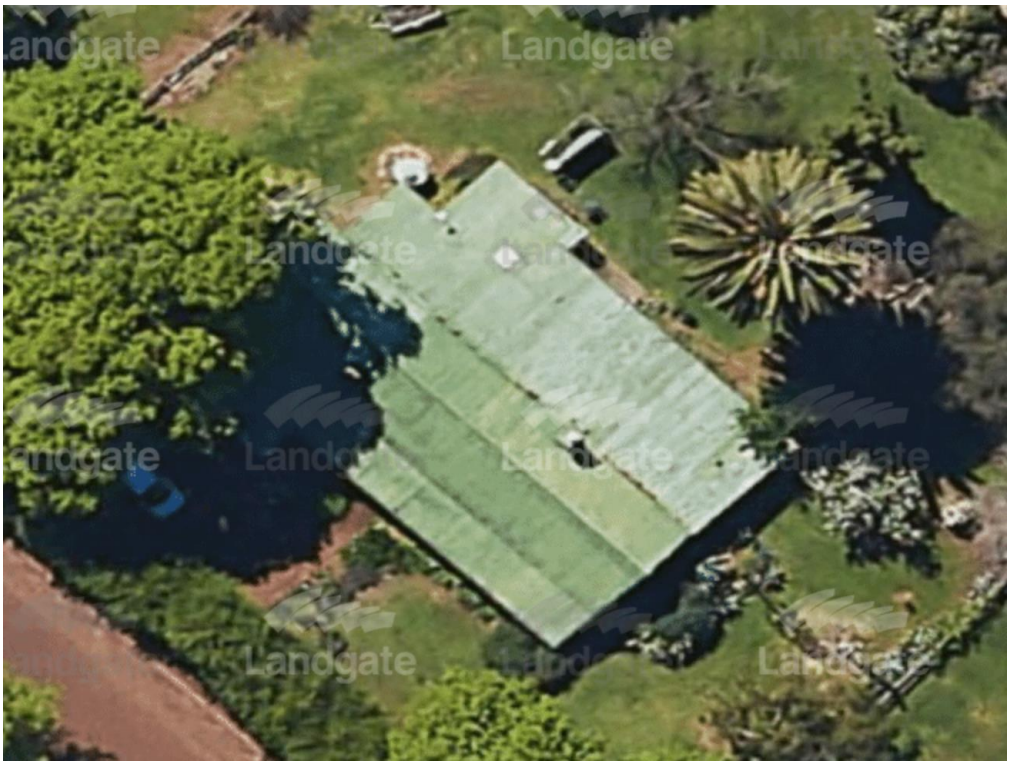
The Organ Room retains original plan form and windows bur reported as otherwise quite different to prior to the 1990s changes. It has deep pine clad roof beams and a pine clad soffit. The former apse at the east end of the room has been demolished and the area occupied by the Side Verandah. A former dais at this end of the room had also been removed.

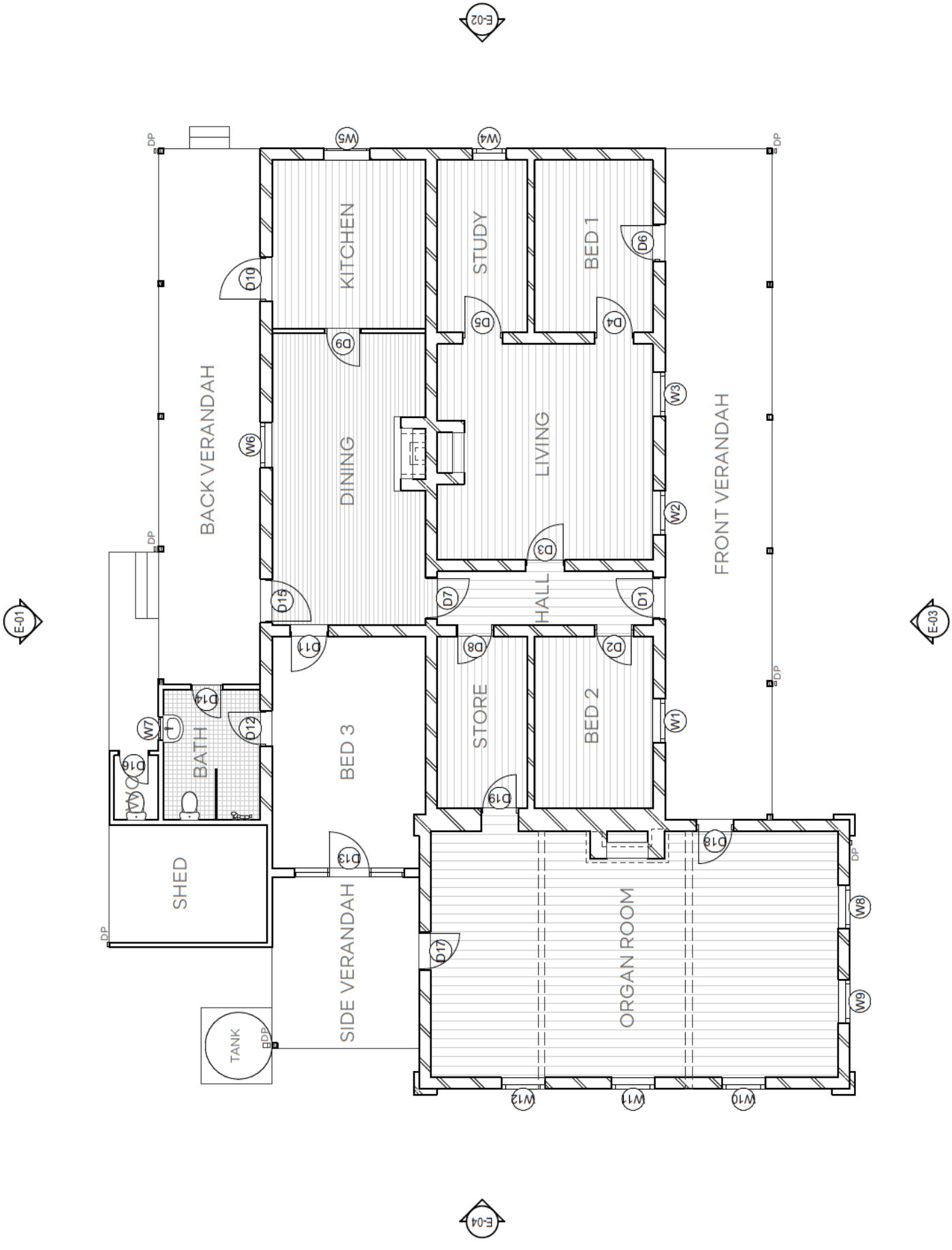
3.1.2 Zones of Heritage Significance

The levels of heritage significance across the building components will attributed by SCA in the forthcoming CMS. It is anticipated, for the purpose of this report, that most of the building structure will be attributed high significance but with some elements such as the replacement roof of the Organ Room attracting lesser significance.

3.1.3 Ground Floor Plan

SCA's ground floor plan from the forthcoming CMS is provided overleaf for ease of reference. References to rooms, elements and elevations are maintained in this report for sake of continuity. The **north** elevation is the short side of the building labelled **E-04** on the plan. A Landgate aerial view of the site is provided below.




E-02
E-01
E-03
E-04
KITCHEN
STUDY
BED 1
DINING
LIVING
HALL
BACK VERANDAH
FRONT VERANDAH
BED 3
STORE
BED 2
BATH
WC
SHED
SIDE VERANDAH
ORGAN ROOM
TANK
DP

3.2 Assessment Rating Codes

The condition and priority ranking codes used in this report are as follows:

Condition Rating Codes		
Rating	**Status**	**Definition**
A	Excellent	• No defects. • As new condition and appearance.
B	Good	• Minor deterioration. • Superficial wear and tear. • Major maintenance not required.
C	Fair	• Damaged. • Worn finishes require maintenance. • Services are functional but need Attention.
D	Poor	• Failed but retrievable. • Badly deteriorated. • Potential structural problems.
E	Very Poor	• Failed and not retrievable. • Not operational. • Unfit for occupancy or normal use.

Priority Ranking Scale		
Rating	**Status**	**Definition**
1	Immediate attention	Works required to prevent serious disruption of activities and/or may incur higher costs if not addressed within 1 year.
2	Urgent	Works that need to be addressed between 1-2 years to prevent serious deterioration.
3	Medium term	Works likely to require rectification within 3 years.
4	Long term	Works that can be safely and economically deferred beyond 3 years.
M		Part of an on-going maintenance regime.

Structural elements not mentioned in the following schedules (Section 3.3), may be assumed to have a condition rating of A or B.

3.3 Observations – Site General

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Greater site	N/A	• Approx 5-10 degree sloping site, west to east towards Golden Valley Creek (50 m to east). Pond 30 m to east. Good natural surface drainage.	• All site surface drainage to be encouraged away from building perimeter to lower levels or remote collection points by speediest means	M
		• Loamy site soil with expected high clay content, known to be reactive. Various structural masonry elements have been impacted by behaviour to some level.	• All practical means available to promote consistency of soil moisture levels around building footprint.	M
		• Reticulated garden beds against front verandah, back verandah and south elevation. Further garden beds against west wall of Organ Room and north wall of Shed.	• Delete all garden beds, remove all vegetation, and return all areas to gravel, paving or other vegetation free surface. Use edging set 1m off the building where required to manage grass encroachment. Transplant all vegetation to be saved from beds to locations remote from house perimeter.	2
		• Building set in spacious garden featuring various introduced trees on all sides, including Heritage English Oak approximately 5m from NW corner of Organ Room.	• Oak expected to be fully mature. Seasonal impact on shrink-swell of soil below Organ Room not expected to increase sizably.	Note
Below ground stormwater drainage services	Unknown	• Seven down pipes serve the roof areas, four to the rear (east) and three to the front (west). The down pipe at the NE corner of the Side Verandah empties into a rain water tank. One down pipe to the rear empties into the garden bed fronting of the Back Verandah. The down pipe at the north end of the Shed is in poor condition. Remaining down pipes extend into the ground, the nature and condition of any below ground disposal system is unclear. There are no gullies serving any down pipe.	• Undertake comprehensive check by drainage expert of condition, function, sufficiency and water tightness. Incorporate gullies to down pipes.	2
			• Rectify all deficiencies arising from check.	2

3.4 Observations – External – Roof Areas

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Gutters and rainwater goods.	C	• Gutters generally in reasonable condition. A long term leak occurs at both ends of the west eaves of the Organ Room, this has impacted on wall movement. A short length of eaves on the east side of the Organ Room is without gutter. • Downpipes of various condition and without gullies – see 3.3.	• Rectify outstanding gutter issues. Provide additional down pipe(s) as drainage expert may advise. • Replace down pipes to suit rectified below ground storm water drainage services – see 3.3. Reconsider down pipe provision and locations to suit new disposal system and modern code compliance.	2 2
General roof sheeting.	C	• . Fixings becoming loose and/or corroded in areas.	• Re-fix sheeting and cappings where required. Check and make any repairs to chimney flashings • Re-roof, including renewal of all tie-down path fixings through roof framing to receiving walls. Include repair and/or upgrade of any roof members as required.	1 4

3.5 Observations – External – West Elevation

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Organ Room wall	D	• This wall, despite reconstruction and remodelling works in 1991, has shown new movement. The wall has adopted a lean to the west and wall piers at each end have also rotations outwards to the north and south respectively. Associated vertical cracking up to 8mm in width occurs externally and internally. 	• The movement is associated with the reactive behaviour of the supporting clay soil. Some of the movement may be historic depending on the extent of 1991 reconstruction work, the panel is nevertheless still active. The appropriate action is to implement the actions on drainage and vegetation, recommended in 3.3 and 3.4 to aid soil stabilisation. No redecoration work is worthwhile until walls can be suitably stabilised. • Monitor crack for 12 months thereafter to gain confidence of wall stability. There no danger to building users through this time. There may already be serviceability problems with windows and doors however which may continue. Engage heritage engineer to set up monitor regime. • Repair wall damage using standard crack stitching methods such as those by Helifix Pty Ltd prior to redecoration work. Stitching work may expand in scale for wider tying action depending on monitoring results. Works best undertaken ahead of re-decoration works.	2 3 4
Front Verandah	C	• Continuous crack centrally in granolithic floor slab. Historic settlement of the western side rotation has occurred here due to shrinkage effects in the supporting ground.	• It is important to first implement the actions on drainage and vegetation recommended in 3.3 and 3.4 to aid soil stabilisation. Removal of the garden bed in front of the slab included.	2

		 • The steel stirrups with concrete pedestals to verandah posts have served reasonable well to date. The stirrups now have corrosion issues however to varying levels.	 • Undertake re-protection work to stirrup steel and replace bolts to prolong life of post bases. Replace stirrups where corrosion is advanced.	M
Bedroom 2, Hall, Living and Bedroom 1 external wall	C	• Render cracking over all openings to varying degrees, most strongly over the Hall door (4mm wide). Lighter cracks occur below Bedroom 1 window (hairline) and the southern window of the Living room. Many areas have seen previous patching and re-opening. Damage is symptomatic of behaviour on reactive soil. • The render is hard compared to the mid brick substrate but is not delaminating in any quantity. The presentation of wall movement in such render may be heightened. The balance in materials is uneasy but render is allowing some breathability to the substrate.	• Implementing the actions on drainage and vegetation, included removal of the garden bed on this side of the house, recommended in 3.3 and 3.4 will aid these movements. • It is advisable to provide some mechanical stitching across these cracks at the time of next decoration to resist re-opening and safeguard the new finishes being applied.  	2 M

3.6 Observations – External – North Elevation

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Organ Room wall	C	• This wall was partially reconstruction and remodelled in 1991. It has also seen some shallow concrete apron/underpinning work in the past. The west end has shown new movement associated with movement in the room's west wall but also has horizontal cracking which reflects the probable interfaces of old and reconstructed brickwork. Higher level diagonal cracking above windows is likely to reflect reactive soil conditions but early corrosion in steel angle lintels (expected 1991 fabric) has begun to impact. 	• As for the west wall, the appropriate action is to implement the actions on drainage and vegetation, recommended in 3.3 and 3.4 to aid soil stabilisation. No redecoration work is worthwhile until walls can be suitably stabilised. • Monitor crack for 12 months thereafter to gain confidence of wall stability. There no danger to building users through this time. There may already be serviceability problems with windows and doors however which may continue. Engage heritage engineer to set up monitor regime. • Repair wall damage using standard crack stitching methods such as those by Helifix Pty Ltd prior to redecoration work. Stitching work may expand in scale for wider tying action depending on monitoring results. • Re-protect steel angle lintel experiencing corrosion.	2 3 4 M

Side Verandah	C	• 15 mm wide north-south crack in floor slab. This has developed through excessive net desiccation of the soil on the open eastern side of the slab since its laying. Slab remains serviceable however. • Some decay taking place in foot of verandah post due to contact with slab and exposure to falling damp.	• Implement the actions for drainage and vegetation recommended in 3.3 and 3.4 to aid soil stabilisation. The crack then be repaired with some confidence of it not re-opening. • Provide new steel stirrup to post, or adapt existing, to raise timber off slab.	2-3 2-3

3.7 Observations – External – East Elevation

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Organ Room wall	C	• This wall shows more stability that the other walls of the Organ Room. I t also has been partially reconstruction and remodelled in 1991. Fine vertical cracks exist at the interface of infill brickwork to the former opening of the original apse here. Appearance is not visually impactful externally but notable internally. •	• Repair wall damage internal using standard crack stitching methods such as those by Helifix Pty Ltd prior to redecoration work. Implement actions for drainage and vegetation recommended in 3.3 and 3.4, plus a 12 months settling in period before any stitching work.	3
Shed	C	• Multiple cracks to granolithic floor slab. This has developed primarily through excessive movement in the reactive supporting soil. Slab remains serviceable however. • Some decay taking place in foot of the former verandah post at the end of the north wall due to prolonged falling damp from attached down pipe.	• Implement the actions for drainage and vegetation recommended in 3.3 and 3.4 to aid soil stabilisation. The cracks then be repaired with some confidence of it not re-opening. Alternatively, replace slab to appropriate design for soil nature. • Provide new steel stirrup to post.	2-3 2-3

WC	C	• Weatherboard cladding at base of eastern wall deteriorated due to falling damp from roof and subsequent termite attack. Supporting timber wall frame sound however.	• Replace weatherboards where required.	M
Back Verandah	C	• Continuous wide crack in granolithic floor slab, 300-400mm back from eastern edge. Historic eastward rotation of the shallow retaining edge has occurred here due to shrinkage effects in the supporting ground. The tear in the slab back from the edge has resulted. • The steel stirrups and shallow concrete pedestals to verandah posts have served reasonable well to date. The stirrups now have corrosion issues however to varying levels. 	• It is important to first implement the actions on drainage and vegetation recommended in 3.3 and 3.4 to aid soil stabilisation. Removal of the garden bed included. • Undertake re-protection work to stirrup steel and replace bolts to prolong life of post bases. • Replace south corner post stirrup where corrosion is advance due to falling damp from down pipe.	2 M M

Dining and Kitchen external wall	C	• Light render cracking over the Dining door and below Dining window. These areas have seen previous patching and re-opening. Damage is symptomatic of behaviour on reactive soil.	• Implementing the actions on drainage and vegetation, included removal of the garden bed on this side of the house, recommended in 3.3 and 3.4 will aid these movements. • It is advisable to provide some mechanical stitching across these cracks at the time of next decoration to resist re-opening and safeguard the new finishes being applied.	2 M

3.8 Observations – External – South Elevation

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Organ Room wall	C	• The west end has shown movement associated with movement in the room's west wall. The panel between corner pier and door opening has rotated in plane producing two tears in the brickworks above the door. The panel also has developed a lean to the south, most progressed at the corner pier. 	• As for the west wall, the appropriate action is to implement the actions on drainage and vegetation, recommended in 3.3 and 3.4 to aid soil stabilisation. No redecoration work is worthwhile until walls can be suitably stabilised. • Monitor crack for 12 months thereafter to gain confidence of wall stability. There no danger to building users through this time. There may already be serviceability problems with the door however which may continue. Engage heritage engineer to set up monitor regime. • Repair wall damage using standard crack stitching methods such as those by Helifix Pty Ltd prior to redecoration work. Stitching work here to be applied internally above picture rail and extended to corner of room from side of chimney breast.	2 3 4

Bedroom 1, Study & Kitchen wall	C/D	• The kitchen wall section has clearly seen historic in-plane rotational settlement to the east with a number of associated cracks. Evidence in the back verandah floor slab shows settlement in this area also. An attempt has been made to stabilise the wall with an introduced concrete plinth. The cracks, including the likely straight join in construction between Kitchen and Study panels, have re-opened since last painting (1991 or earlier).  • There are other historic actions that have affected the early brickwork of this elevation – some differential settlement and some historic lintel steel corrosion action. Past repairs have taken place and some re-opening of crack has occurred. The step in the wall face between lower brickwork and triangular loft gable panels is not a wall movement, it reflects a change in construction from 9” to 4.5” brick.	• The primary action needed to bring about soil stabilisation in this area is as elsewhere – the recommendations made drainage and vegetation in sections 3.3 and 3.4. There is a lot of vegetation on this side of the house in close proximity to the elevation. Its impact on year round soil moisture fluctuation is significant. • After monitoring the damage for 12 months thereafter to gain confidence of wall stability, crack repair can take. This will involve crack stitching methods such as those by Helifix Pty Ltd. This work should include an elevation long tying stitch at high level as an effective action in resisting new ground movement that may occur. 	2 3

3.9 Observations – Internal – Roof Spaces

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Over Store, Bedroom 2, Hall, Living, Study and Bedroom 1	C	• All roof framing generally in good condition. 	• N/A 	N/A
		• Old termite damage to wall plate over western wall of Bedroom 2.	• Whilst damage is not insignificant, close inspection and any action can be delay until time of re-roofing works.	4
		• 1895 gable northern gable wall (with window) still extant, 1900 Organ Room wall standing behind. Mud render noted on inside faces of north and south gable walls probably last areas of original plaster/render.		Note
		• Condition of brickwork to Living/Dining chimney stack good.	• N/A	N/A
Elsewhere	Unknown	• Not accessible or lined cathedral roofs.	• N/A	N/A

3.10 Observations – Internal – Ground Floor

Room/Area Reference	Condition Rating	Defect Location and Description	Work to Rectify Defect	Priority Ranking
Organ Room	D	• Wall cracking reflecting movements seen externally.	• Refer to actions for ground stabilisation and follow up actions under 'Observations – Site General' and 'Observations – External'.	2-4
Older 'Core' Rooms	C	• Various high level hairline or light cracking above door openings and above and below window openings or at wall junctions, typically vertical or diagonal and up to 1.0 mm width. One crack up to 2.0 mm, another in the Hall up to 3.0mm. • These patterns were found by Pidgeon in 1990 prior to the 1991 works. Some cracks have re-opened, some not, and some fresh cracks have arisen.	• Internal cracking, like external reflects the reactive behaviour of the site soil primarily. Other factors such as quality of masonry jointing are secondary. It is important to follow the actions for ground stabilisation and follow up actions under 'Observations – Site General' and 'Observations – External'. Like external re-decoration, internal re-decoration will benefit from mechanical of cracks once drainage and vegetation issues are under control.	2-4
Remaining Rooms	C	• Cracking similar to the core rooms is exhibited at the north end of the Dining Room and south wall of the Kitchen. In Bedroom 3, vertical cracking in the east wall reflects the interfaces of brick and timber-frame wall construction.	• Same actions as for 'core' rooms.	2-4
Floor structures	B	• Timber floor generally appear sound, albeit little access to sub-floors is available. A hatch in the Hall suggests a high level of reconstruction, probably in the 1991 works. The Dining room floor slight fall to the east which reflects either an earlier function as a verandah or past historic wall settlement as noted externally.	• No action here other than to promote sub-floor maintenance (termite inspection, debris build ups, etc) by the introduction of additional floor hatches.	M