**Observation**

Inspection was undertaken at the subject property to which the following was noted:

## Assessment of Foundation Reactivity & General Building Movement

1. In prefacing the assessment of the observed damage, we refer to *AS 2870:2011 – Residential Slabs and Footings* which acknowledges that foundation movement and reactivity naturally occurs on nearly all sites and that it is impracticable to design a footing system that will protect the building from movement under all circumstances.
2. We refer to the *CSIRO publication, BTF 18 – Foundation Maintenance and Footing Performance: A Homeowner’s Guide*, which clearly indicates that buildings can and often move as a result of one or more issues in the foundation soil, namely relating to differential settlement, erosion, saturation, seasonal wetting and drying.
3. A copy of this CSIRO publication is attached as ***Appendix A*** of this report.
4. In saying this, general foundation reactivity and ground movement occurs as a result of the moisture content alteration within the foundation material, which shrinks upon drying and swells upon wetting over multiple courses of rainfall, causing heaving and shifting within the footings gradually and progressively over an extended period of time.
5. On the basis of the above, given the age and construction of the property, on-going and cyclic foundation reactivity and ground movement is always expected to occur, to which building movement and cracking is ultimately expected over time.

## Assessment of Observed Damage

### Location 1 – Movement to External Pavers

1. Along the northern external pathway, we noted localised areas of movement to the floor pavers, to which localised foundation subsidence was evident. **Images 2 – 4**
2. In our opinion, if such movement had occurred as a result of the claimed storm event, a more widespread and consistent area of movement would have been observed.
3. In ascertaining the cause of damage, we note that the pavers are laid directly on natural ground.
4. In saying this, the pavers are inherently susceptible to differential movement as a result of inadequate compaction at the time of construction, in combination with cyclic foot traffic over an extended period of time.
5. We further noted evidence of vegetation growth between paver gaps which is indicative of such movement being a long-term issue.
6. To this end, in our opinion, the observed movement to the pavers is attributable to inherent construction issues and deterioration over an extended period of time and is unrelated to the claimed storm or any other single insurable event.

### Location 2A – Cracking to Northern External Wall

1. We noted vertical cracking to the northern external masonry wall, propagating from the Main Bedroom window opening. **Images 5 & 6**
2. From our inspection, we noted no evidence of vertical articulation joint provisions throughout the external walls of the property.
3. In accordance with *NCC BCA 2019* and *AS 4773.2:2015 – Masonry in small buildings - Construction*, articulation joints are to be used in masonry construction to reduce cracking or distress of masonry caused by contraction or expansion of the masonry units, or by footing movement or other structural movement.
4. In particular, vertical articulation joints must be provided in straight, continuous walls with openings more than 900 x 900 mm — at not more than 5 m centres and located so that they are not more than 1.2 m away from openings.
5. An excerpt taken from *AS 3700:2018*, highlighting the full articulation joint requirements has been provided in ***Appendix B***.
6. Given that the window opening measures approximately 2.4m x 1.3m, the pattern and mechanism of the observed cracks appear to be consistent with the omission of vertical articulation joints, in accordance with the above requirements, in accommodating long-term building and foundation movement.
7. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 2B – Cracking to Floor Tiles within Rear Porch

1. Adjacent to the abovementioned damage, we noted hairline cracking across the floor tiles within the Rear Porch. **Images 7 & 8**
2. We noted no differential movement of the slab on either side of the crack, which would be expected in the case of foundation subsidence.
3. In view of the above, in our opinion, such cracking is consistent with the shrinkage of the concrete slab substrate which occurs within concrete as a result of an uncontrolled and inadequate curing process after pouring.
4. In saying this, the plastic shrinkage of the substrate has induced cracking within the overlying floor tiles.
5. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 3 – Cracking to Southern External Wall

1. Along the southern external masonry wall, we noted cracking which appeared mostly vertical in nature. **Images 9 & 10**
2. On the opposing internal side of the wall, we noted no evidence of corresponding cracking to suggest that foundation subsidence has occurred.
3. As previously discussed, we noted no evidence of vertical articulation joint provisions throughout the property, which are to be used in masonry construction to reduce cracking or distress of masonry caused by contraction or expansion of the masonry units, or by footing movement or other structural movement.
4. In particular, vertical articulation joints must be provided in unreinforced masonry walls greater than 5m in length.
5. Given that the southern wall alignment spans approximately 7.5m, the pattern and mechanism of the observed cracks appear to be consistent with the omission of vertical articulation joints, in accordance with the above requirements, in accommodating long-term building and foundation movement.
6. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 4 – Cracking at South-Eastern External Wall Junction

1. Further along the Southern Wall, we noted vertical cracking at the south-eastern corner junction with the abutting blade wall. **Images 11 & 12**
2. As previously discussed, in our opinion, the cracking appears to be consistent with the omission of necessary vertical articulation joint requirements within masonry veneer construction.
3. In particular, in accordance with *AS 4773.2:2015*, articulation joints are required where walls change in thickness.
4. In this case, in our opinion, the inherent perpendicular thermal movement of the abutting walls has induced cracking along the wall junction, in absence of articulation joint provisions.
5. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 5 – Water Damage within Laundry

1. Within the Laundry, we noted blistering paint on the ceiling, adjacent cornices and top of the wall, about the south-western corner. **Image 13**
2. In ascertaining the cause of damage, we undertook an aerial drone inspection of the roof directly above.
3. From our observations, we noted evidence of gaps within the mortar bedding of the western gable end ridge tiles. **Images 14 & 15**
4. Given that the location of damage is directly at the downslope end of the gable, in our opinion, such damage is consistent with rainwater seeping into the mortar bedding gaps and tracking down the roof slope over time.
5. In our opinion, given the considerable age of the property, such gaps are consistent with long-term deterioration of the bedding in absence of any maintenance, rather than being storm-created openings.
6. To this end, in our opinion, the observed water damage is attributable to long-term deterioration and is unrelated to the claimed storm or any other single insurable event.

### Location 6 – Cracking at Wall Corner within Main Bedroom

1. Within the Main Bedroom, we noted hairline vertical cracking at the south-eastern wall corner. **Image 16**
2. We noted the crack to be aged in appearance, with evidence of debris build-up within, which suggests that it is pre-existing in origin. **Image 17**
3. Notwithstanding the above, in our opinion, the vertical pattern of cracking is consistent with inherent long-term thermal movement within the abutting plasterboard wall linings, which is an area of high stress concentration.
4. To this end, in our opinion, the observed cracking is attributable to long-term general building movement and is unrelated to the claimed storm or any other single insurable event.

### Location 7 – Cracking at Wall Corner within Main Bathroom

1. Within the Main Bathroom, we noted hairline vertical cracking at the south-eastern wall corner. **Images 18 & 19**
2. Similar to the above, in or opinion, such damage is attributable to inherent long-term thermal movement within the abutting plasterboard wall linings, which is an area of high stress concentration.
3. To this end, in our opinion, the observed cracking is attributable to long-term general building movement and is unrelated to the claimed storm or any other single insurable event.

### Location 8 – Cracking along Slab Edge at Garage Door Threshold

1. We noted cracking and spalling within the concrete threshold at the Garage door opening. **Images 20 & 21**
2. However, we noted no evidence of cracking, distress or movement to the adjacent masonry wall to suggest that any foundation subsidence has occurred from the claimed storm event.
3. At the location of damage, we noted differing colours within the concrete on each side of the crack, which is indicative of a previous patch repair.
4. In saying this, in our opinion, a cementitious repair mortar had been retrospectively applied at the slab edge in facilitating a smooth finish, and has delaminated from the original slab over time.
5. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 9 – Cracking along Slab Edge at Entry Door Threshold

1. We noted cracking within the tiled threshold at the Entry door opening. **Images 22 & 23**
2. However, we noted no evidence of cracking, distress or movement to the adjacent masonry wall to suggest that any foundation subsidence has occurred from the claimed storm event.
3. In our opinion, such damage is consistent with the delamination of the cementitious repair mortar at the slab edge, which has induced cracking within the overlying tiles.
4. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 10 – Cracking along Perimeter Mortar Joints at Entry Porch

1. Within the Entry Porch, we noted cracking along the mortar joints between the floor tiles and abutting external masonry walls. **Images 24 & 25**
2. We noted the floor tiles had been installed directly against the masonry walls with no movement joint provisions.
3. In accordance with *AS 3958.1:2007 – Ceramic tiles - Guide to the installation of ceramic tiles*, where floor tiles abut restraining surfaces such as perimeter walls, movement joints must be provided.
4. An excerpt from the abovementioned Australian Standard has been provided within ***Appendix C***.
5. In absence of such requirements, in our opinion, cracking has been induced along the perimeter mortar joints as a result of the inherent differential thermal movement between the differing building materials.
6. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 11 – Cracking to Ceiling within Lounge/Dining

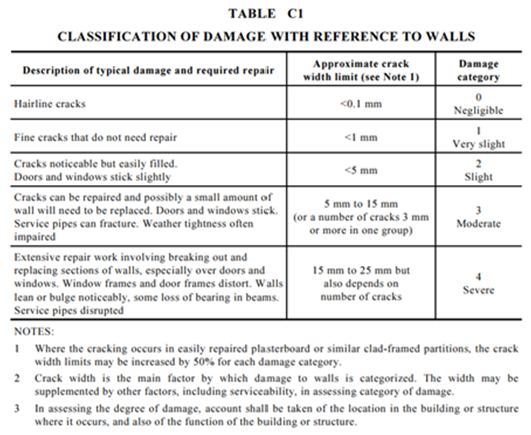
1. Within the Loung/Dining room, we noted cracking to the plasterboard ceiling lining, propagating along the butt joint of two adjacent sheets about the internal wall corner. **Image 26**
2. With reference to the *USG Boral Plasterboard Installation Manual 2016*, expansion (control) joints should be installed at changes in direction within the plasterboard sheet layout to accommodate for movement or alterations in ambient conditions. (Refer to ***Appendix D***).
3. In absence of such control joint provisions, differential thermal movement between the plasterboard sheets has induced cracking along the weak planes over time.
4. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

### Location 12 – Cracking on Eastern External Blade Wall

1. Along the eastern external masonry blade wall, we noted hairline horizontal cracking, propagating from the edge. **Image 27**
2. We further noted vertical cracking about the top of the wall on each side. **Images 28 & 29**
3. In close proximity to the observed damage, we noted the presence of a large timber pitching beam supported on the wall which has exhibited lateral movement, evidenced by visible paint lines. **Image 30**
4. In saying this, in our opinion, the cracking to the masonry wall is attributable to the long-term inherent differential thermal movement between the adjoining timber and masonry elements, which has induced stress onto the brittle brickwork and has ultimately resulted in cracking.
5. To this end, in our opinion, the observed cracking is attributable to inherent construction issues and is unrelated to the claimed storm or any other single insurable event.

## Assessment of Damage Category

1. In categorising the observed cracking damage, we refer to *AS 2870:2011 – Residential Slabs and Footings - Table C1*, which outlines the classification of damage to walls. **Table 1**



***Table 1 – Classification of Damage with Reference to Walls, taken from AS 2870***

1. On the basis of the above, from our inspection, we noted no evidence of cracking greater than Damage Category 2, which describes cracks as noticeable but easily filled.
2. In saying this, in our opinion, the observed cracking damage is superficial in nature and is not demeaning to the structural integrity of the property.

**Discussion**

NA

**Conclusion**

## Assessment of Foundation Reactivity & General Building Movement

In prefacing the assessment of the observed damage, we refer to *AS 2870 – Residential Slabs and Footings* which acknowledges that foundation movement and reactivity naturally occurs on nearly all sites and that it is impracticable to design a footing system that will protect the building from movement under all circumstances.

In accordance with *CSIRO publication, BTF 18 – Foundation Maintenance and Footing Performance: A Homeowner’s Guide*, buildings can and often move as a result of one or more issues in the foundation soil, namely relating to differential settlement, erosion, saturation, seasonal wetting and drying.

On the basis of the above, **given the age and construction of the property, on-going and cyclic foundation reactivity and ground movement is always expected to occur, to which building movement and cracking is ultimately expected over time.**

## Assessment of Observed Damage

From our inspection and assessment, we provide the following table which outlines the observed damage throughout the property and their proximate causation.

| ***Location No.*** | ***Claimed Damage*** | ***Proximate Causation*** | ***Related to the Claimed Storm or Any Other Single Insurable Event?*** |
| --- | --- | --- | --- |
| 1 | Movement to External Pavers | The pavers are laid directly on natural ground, to which they are inherently susceptible to differential movement as a result of inadequate compaction at the time of construction, in combination with cyclic foot traffic over an extended period of time. | No |
| 2A | Cracking to Northern External Wall | Omission of vertical articulation joint provisions along the wall alignment to accommodate for cracking or distress of masonry caused by contraction or expansion of the masonry units, or by footing movement or other structural movement. | No |
| 2B | Hairline Cracking to Floor Tiles | Shrinkage of the concrete slab substrate which occurs within concrete as a result of an uncontrolled and inadequate curing process after pouring, which has induced cracking within the overlying floor tiles. | No |
| 3 | Cracking to Southern External Wall | Omission of vertical articulation joint provisions along the wall alignment to accommodate for cracking or distress of masonry caused by contraction or expansion of the masonry units, or by footing movement or other structural movement. | No |
| 4 | Cracking at South-Eastern External Wall Junction | Omission of vertical articulation joint provisions along the wall alignment to accommodate for cracking or distress of masonry caused by contraction or expansion of the masonry units, or by footing movement or other structural movement. | No |
| 5 | Water Damage within Laundry | Gaps along the mortar bedding of the western gable end ridge tiles has enabled rainwater to seep into the mortar bedding gaps and track down the roof slope over time, resulting in the blistering paint to the internal linings within the Laundry. | No |
| 6 | Cracking at Wall Corner within Main Bedroom | Long-term inherent building movement which has induced cracking to the brittle plasterboard wall lining at areas of high stress concentrations. | No |
| 7 | Cracking at Wall Corner within Main Bathroom | Long-term inherent building movement which has induced cracking to the brittle plasterboard wall lining at areas of high stress concentrations. | No |
| 8 | Cracking along Slab Edge at Garage Door Threshold | Long-term delamination of cementitious mortar which had been retrospectively applied at the slab edge. | No |
| 9 | Cracking along Slab Edge at Entry Door Threshold | Long-term delamination of cementitious mortar which had been retrospectively applied at the slab edge. | No |
| 10 | Cracking along Perimeter Mortar Joints at Entry Porch | Omission of movement joint provisions between floor tiles and abutting masonry walls, to which cracking has been induced along the perimeter mortar joints as a result of the inherent differential thermal movement between the differing building materials. | No |
| 11 | Cracking to Ceiling within Lounge/Dining | Omission of control joint provisions at the change of direction between adjacent plasterboard sheets to accommodate for long-term differential thermal movement. | No |
| 12 | Cracking on Eastern External Blade Wall | Inherent differential thermal movement between the adjoining timber pitching beam and supporting masonry wall, which has induced stress onto the brittle brickwork and has ultimately resulted in cracking. | No |

To this end, in our opinion, **the observed damage throughout the property is attributable to a combination of inherent construction issues and long-term deterioration, and is unrelated to the claimed storm or any other single insurable event**.

Notwithstanding the above, in our opinion, the observed cracking damage is **superficial in nature and is not demeaning to the structural integrity of the property**.