**Observation**

Inspection was undertaken at the subject property in the presence of the Insured to which the following were noted.

## Observed Damages

1. From our observations about the fibreglass swimming pool, we noted cracking and deformation about the corners of the pool, indicating the pool shell has experienced significant applied forces and movement beyond its design intent. **Images 3 & 4**
2. We noted inward bulging of the pool shell walls about the pool, indicating the pool shell had experienced inward horizontal pressures beyond its design intent. **Images 4-7**
3. From our observations about the backyard, we noted the brick pavers about the pool were permeable, facilitating ingress of surface water into the soil below which forms the backfill around the pool.
4. We further noted that the pavers about the backyard were uneven, indicating subsidence of the below soil had occurred due to inundation with surface water. **Images 8-10**
5. We noted the adjacent grass area had provisions for subsoil drainage, however the drainage pipes evidently discharged directly onto the paved area below rather that into the stormwater system. **Image 11**
6. We advise that this arrangement would result in excess surface water runoff onto the paved area which would subsequently permeate through the pavers and into the backfill soil around the pool.
7. Overall, we did not note any effective provisions for drainage of surface stormwater about the backyard.

## Review of Historical Nearmap Imagery

1. In seeking to determine the recent condition of the pool to the present, we have reviewed historic satellite imagery taken from Nearmap.
2. From the aforementioned review, we have identified maintenance issues within the pool spanning across a period of approximately one (1) year.
3. In summarising our observations, we provide **Table 1** below, which references the relevant satellite images in **Appendix A**.

Table 1 – Observations from review of Nearmap historic satellite imagery

| **Nearmap Image Date** | **Observations and Comments** | **Appendix A Image Reference** |
| --- | --- | --- |
| *March 2019* | From satellite imagery, it is evident that the pool has been well maintained to this point, as evidenced by consistently clear blue water visible back to the earliest available Nearmap satellite imagery taken in 2010. | A |
| *May 2019* | A light-blue pool cover has been put in place across the pool water. | B |
| *July 2019* | The pool cover has come loose, exposing the pool water. The pool water appears dark and murky indicating it has not been maintained. | C |
| *October 2019* | The pool cover has further dislodged, exposing the majority of the pool water which was still murky. | D |
| *November 2019* | The pool cover has been removed. The pool water was still murky and contained debris. | E |
| *March 2020* | Several of the steps within the pool are visible through the murky water indicating the water level has dropped significantly through evaporation. | F |
| *June 2020* | The pool has been covered again, although the cover is loose and most of the water surface remains exposed. The pool water remained murky. | G |
| *September 2020* | The pool has been uncovered and the water appears clean and fresh, indicating pool maintenance has been recently carried out for the first time since May 2019. | H |
| *December 2020* | The pool water remains uncovered and the water relatively clean, although debris has begun to accumulate. | I |

1. On the basis of the above, it is evident that the pool has not been maintained over the period between May 2019 and June 2020, evidenced by consistently unclean water and a drop in the level of the pool water.

## Cause of Observed Bulging

1. Based on our observations of inadequate surface drainage provisions, permeable pavers and soil subsidence outlined above, it is evident that the soil about the pool has been inundated with water during rainfalls.
2. We advise that this would result in the water table rising around the pool backfill, applying inward horizontal hydrostatic pressure to the pool walls in addition to the pre-existing inward lateral earth pressures.
3. We advise that fibreglass pools require a subsoil drainage layer around the pool shell to discharge ground water and prevent excess hydrostatic pressure build up which can deform and damage the pool shell.
4. We confirm that, although a hydrostatic valve was observed within the pool, this is not sufficient to relieve external hydrostatic pressure build-up in the absence of an appropriate drainage layer.
5. We reference *AS 1838 – 1994 Swimming pools – Premoulded fibre-reinforced plastics – Design and Fabrication* (**Appendix B**)which states *“Pools may be subject to external hydrostatic pressures, even though a hydrostatic valve is incorporated in the pool floor. Build-up of this pressure may be avoided by the incorporation of sub-surface drainage”*
6. We further reference *AS 1839 – 1994 Swimming pools – Premoulded fibre-reinforced plastics – Installation* (**Appendix C**) which requires that subsoil drainage be provided to ensure that hydrostatic pressure does not damage the pool.
7. Based on our observations, in our opinion, subsoil drainage about the pool has been omitted during the original construction, allowing the surrounding soil to be inundated with stormwater leading to hydrostatic pressure to build up against the pool walls.
8. Further to the above, we advise that the water level in fibreglass pools must be maintained at all times to ensure a consistent outwards pressure which resists the inwards pressure applied by soil and water around the pool, and prevents excessive deformation and damage to the pool shell.
9. To the above point, it is evident that that pool level has dropped significantly between May 2019 and June 2020, as discussed above, exposing the pool shell to the risk of damage caused by external soil and water pressure.
10. As discussed, the pool was unmaintained and substantially uncovered for approximately one (1) year, to which we advise that evaporation from an uncovered pool is typically between 3mm and 7mm per day equating to a drop in water level between 500mm up to 1.2m over a six (6) month period.
11. Based on the above, and pending inspection and reporting by a qualified plumber, in our opinion the drop in water level within the pool has been caused by lack of maintenance rather than any alleged leak from the pool.
12. In schematically illustrating the above points, we provide **Figure 2** below.

Diagram

Description automatically generated

Figure 2 - Schematic illustration of forces acting on swimming pool

1. In our opinion, the experienced pool damage has been caused by the following:
   1. Inadequate provision of surface drainage around the pool area resulting in inundation of the soil about the pool with stormwater.
   2. Omission of a sub-soil drainage layer, as required by Australian Standards, allowing build-up of external hydrostatic pressure about the pool shell.
   3. Lack of maintenance resulting in the pool level dropping over a period of approximately one (1) year, and in turn resulting in the loss of internal pressure required for equilibrium against external forces.
2. To this end, in our opinion, the experienced pool damage is due to lack of maintenance and inadequate stormwater drainage provisions and not attributable to any one-off storm event.

**Discussion**

NA

**Conclusion**

During our inspection, we noted evidence of damage to the pool shell in the form of cracking and deformation at corners and inwards bulging of pool walls, indicating the pool walls had been exposed to excessive inward lateral pressures.

We observed inadequate stormwater drainage provisions and evidence of soil subsistence about the pool, indicating the pool area had been inundated with stormwater, which in turn would have resulted in an increase of hydrostatic pressure in the soil around the pool.

From review of historic satellite imagery, we noted that the pool had not been maintained or properly covered over the period May 2019 and June 2020, resulting in the pool water level dropping significantly due to evaporation.

Pending inspection and reporting by a qualified plumber, in our opinion the drop in water level within the pool has been caused by lack of maintenance rather than any alleged leak from the pool.

We advise that drop in water level has resulted in a corresponding drop in equalizing internal pressures which counter balance the external lateral earth and hydrostatic pressures applied to the pool shell, exposing the pool shell to the risk of damage caused by external soil and hydrostatic pressure.

In our opinion, the experienced pool damage has been caused by the following:

* Inadequate surface drainage provisions about the pool area resulting in inundation of the soil about the pool with stormwater which is evidenced by exhibited subsidence within the surrounding pavers.
* Omission of sub-soil drainage layer allowing build-up of external hydrostatic pressure against the pool shell.
* Lack of maintenance resulting in the pool level dropping significantly over a period of approximately one (1) year, and in turn resulting in the loss of internal pressure required for equilibrium against external earth and hydrostatic pressures.

To this end, in our opinion, the experienced pool damage is due to lack of maintenance and inadequate stormwater drainage provisions, and not attributable to any one-off storm event.