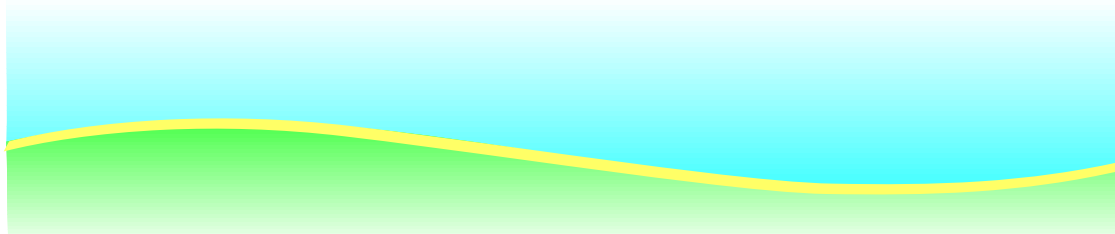


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structural engineering
civil engineering
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19th August 2015

Ballina Shire Council
c/- Jardine Lloyd Thompson Pty Ltd
2 / 140 Jonson St
BYRON BAY NSW 2481

Attn: Ross McKinnon

Dear Sir

**Re: Report on Subsidence/Tree Root Damage at 7 Castle Dr
Lennox Head**

At your request, we have undertaken an inspection at the abovementioned property. The inspection was undertaken by Dougal May of this office in the company of yourself, Phil from Ballina Shire Council, and the owner of the property, Robyn Lowry. The inspection occurred on the 18th August 2015.

We were asked to look at various defects to the building and surrounding driveway / path slabs, and comment on possible causes. We were asked to comment particularly in relation to a large Moreton Bay fig tree that is situated within close proximity of the house. The tree and the land that the tree is located on is owned by Council. We have been provided with anecdotal evidence that the tree roots have been growing and that the damage to the building has worsened recently.

Below is a list of the defective items and a discussion of our conclusions regarding each. Please see appendix for photos associated with each item.

Inspection Items

1. Blocked pipes from pool surround drains to street gutter

The owner has reported that the drains around the pool are blocked causing the area behind the house to flood during heavy rain.

Discussion:

The blocked pipes have been confirmed by a plumber and it is highly likely that tree roots have caused this damage. The pipe/s run directly through an area that has a large amount of

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tree roots at the ground surface. The owner has reported that the drains are blocked.

2. Leaning pillar at entry

There is a masonry pillar to the right of the entry that is subsiding away from the house. There is evidence that the ceiling lining has been repaired in the past, indicating this movement has been occurring for some time.

Discussion:

The front of this house is built on fill, and it is known in this office that AV Jennings (the company who built the house, now defunct) had a reputation for not adequately piercing footings through fill. While not solid evidence, we would imagine this is a likely scenario. In our opinion the pillar movement is more likely to subsidence of the fill rather than root damage, particularly when observing the direction of rotation. The type of movement is certainly what we would describe as typical of foundation subsidence. It may have been worsened by nearby tree root growth, however this is not possible to determine. In either case, the movement has pre-dated the purchase of the property.

3. Driveway Slab – risen at entry to garage / cracking in driveway surface

The driveway slab has lifted at a joint line parallel to the garage door. There is cracking in the pebblecrete surface of the driveway slab nearby.

Discussion:

The lifting of the slab almost certainly appears to be due to growth of a tree root underneath. It is very unusual to see this sort of movement from other causes in this local area. The location of the presumed tree root under the slab is in agreeance with the findings in items 4 and 5 below. A root appears to extend across the top of the driveway slab, under a masonry privacy wall, and around the corner up the western side of the house.

The driveway cracking is difficult to determine to attribute blame to – it looks very much like normal concrete slab shrinkage cracking. The surface of that slab panel appears generally flat and true with no obvious kinks.

4. Rotating masonry wall adjacent to garage

This privacy wall has a vertical joint where it joins the exterior wall of the house. The joint has opened up to around 15-20mm. Evidence from the owner indicates that this movement has worsened considerably in recent months. It appears that the wall is lifting at the joint location, at the location where a tree root is presumed to be growing underneath.

Discussion:

While this movement appears quite typical of subsidence due to settlement, given the presumed location of the tree root, the appearance that the wall is lifting at that location, and the worsening recent movement, it is very likely that this movement is caused by the tree root growing underneath the end of the wall against the house.

5. Path damage beside house, western side

On the western side of the house is a concrete path that has separated from the house by around 30-40mm. A tree root can be seen growing in the crack, filling the space. Also a section of path between this location and the driveway has also lifted, similar to the driveway slab.

Discussion:

This all seems to be attributable to the same tree root, as the damage follows a line across the top of the driveway, around the corner and up the side of the house for a few metres where the tree root is visible. Other than the separation from the wall, the western path appears generally level. If the separation was caused by subsidence, we would normally see rotation of external paving slabs.

6. Diagonal crack in brick wall (east side)

There is a diagonal crack at the south-east corner of the house, on the eastern wall. The crack follows the bedjoints of the external brick wall and is around 3mm in width. It appears to have been repaired in the past, and has opened up slightly since then.

Discussion:

This crack was present prior to the purchase of the house 3 years ago. In our opinion, it appears to be a crack associated with subsidence of the fill that this corner of the house is sitting on, and is not associated with tree roots.

Conclusion

As discussed, in our opinion some of the damage can be attributed to the fig tree. There appears to be a clear path that a single tree root is following and causing the damage (see Appendix Figure 1 for aerial image). Only a comprehensive destructive investigation would prove this, however from the current evidence, we believe this to be the case. The pre-existing damage to the house (masonry pillar rotation and eastern wall crack) does not appear to be due to the tree roots.

If you have any queries, please do not hesitate to contact the undersigned.

Yours faithfully

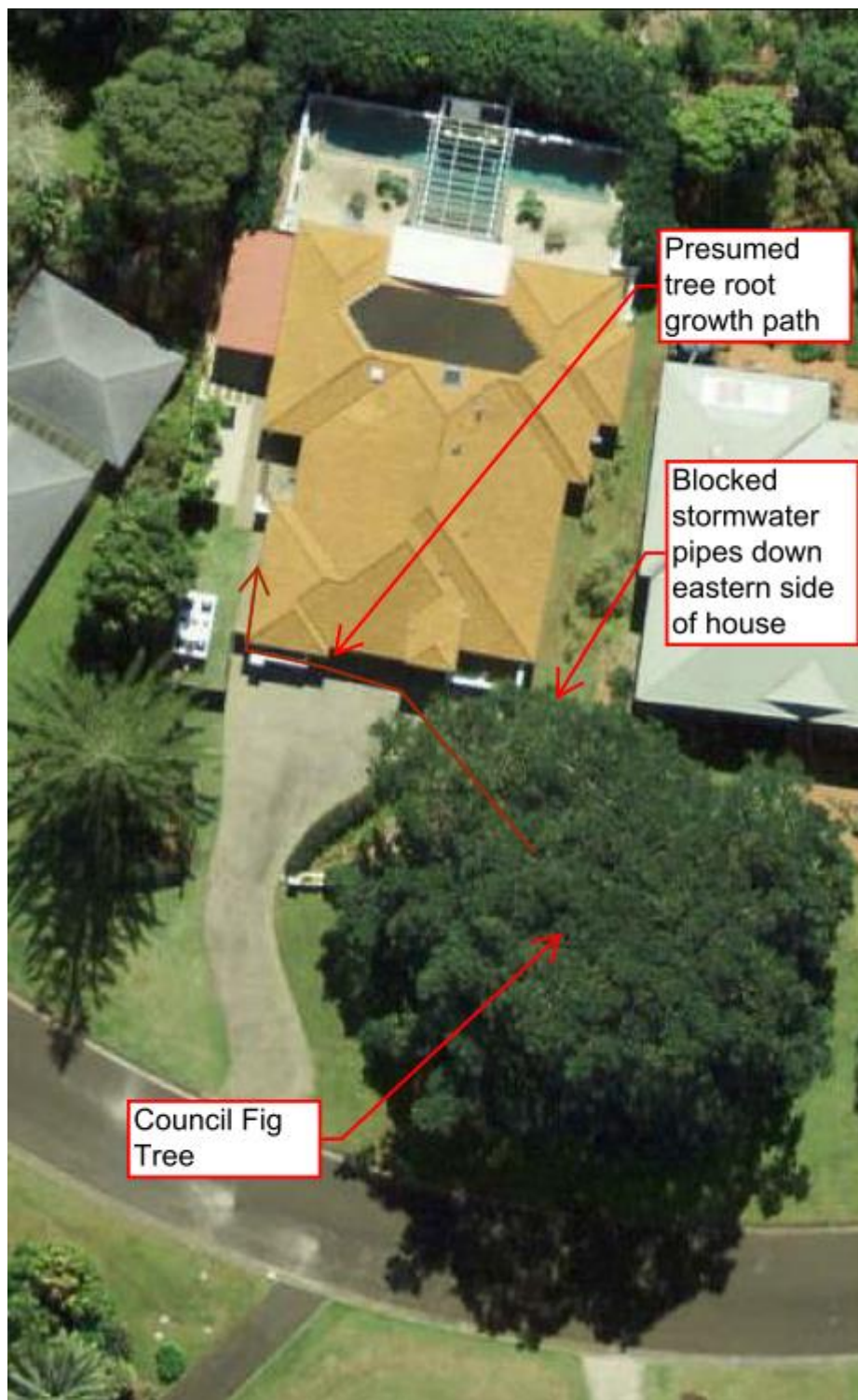


Peter Lucena

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Appendix

Figure 1: Aerial Image



Inspection Items

1. Leaning pillar at entry:



2. Driveway Slab – risen at entry to garage / cracking in driveway surface:



3. Rotating masonry wall adjacent to garage:



4. Path damage beside house, western side:





5. Diagonal crack in brick wall (east side):



Fig Tree:



