

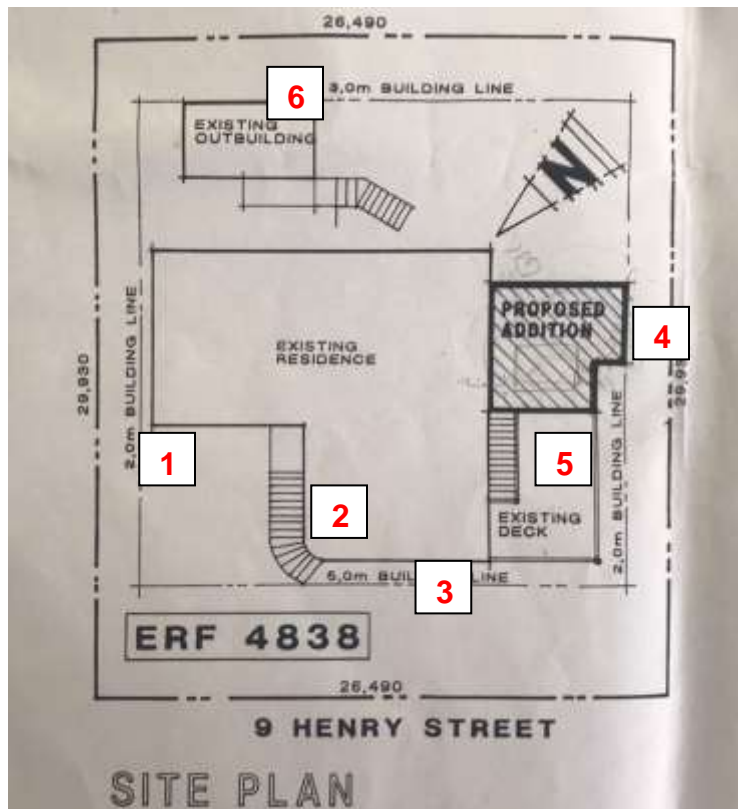
30 August 2022

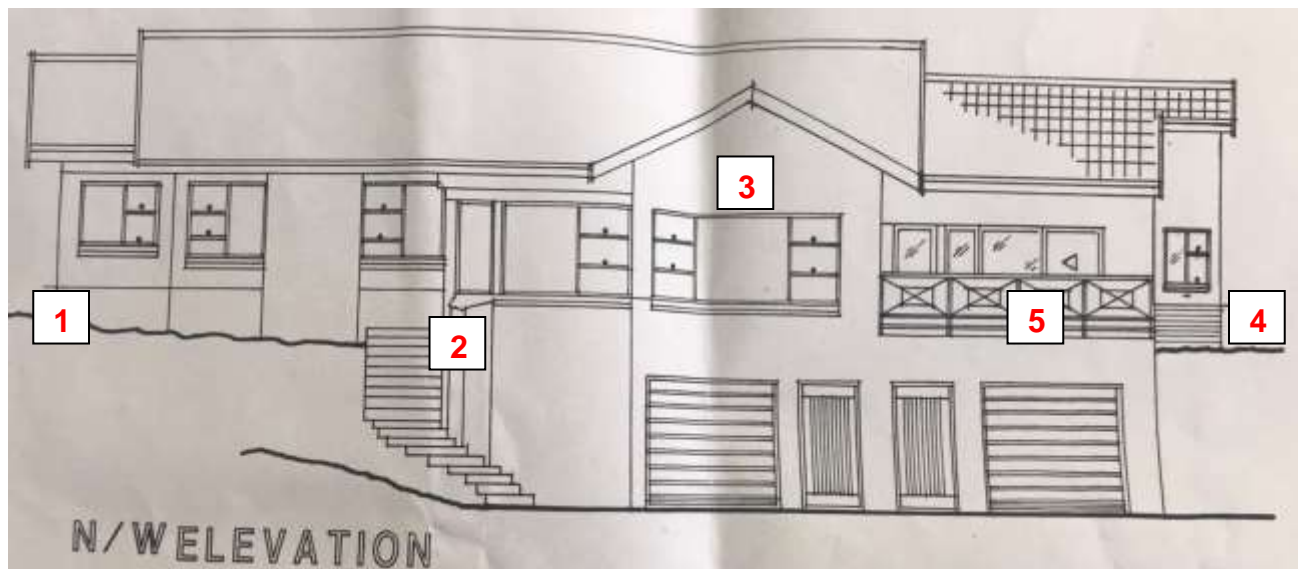
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**9 Henry Street, Erf. 4838, Port Alfred
ASSESSMENT AND STRUCTURAL REPORT**

We confirm your request to provide our services as follows :

1. Inspect and make a visual assessment of the structural condition of the above residential structure, with specific reference to cracks visible in brick walls and lintols, predominantly in the northern (1), north-western (2, 3) and southern (4) parts of the residence, as well as the guest cottage (6). Provide an assessment of the moisture ingress into the garage (5).
2. Provide a report and specify remedial action required, in order to reinstate the serviceability of the building.





Description

The building is a split level domestic dwelling, with load bearing clay brick walls founded on strip footings, on sloped clayey founding material. The basement level houses the garages and a built water tank. The upper level houses the living quarters. The roof is a tiled, pitched timber structure, supported on external brick walls.

Observations and investigation

Area 1

1. Cracks in the bedroom walls indicate subsidence of this area. The cracks are typical of those caused by subsidence of the founding material, being straight vertical cracks that widen to the top of the crack.
2. Cracks in the tiled floors correspond to the vertical cracks in the walls, also indicating subsidence of the founding material.
3. Horizontal cracks were visible along the DPC level of the exterior walls.
4. Although there are no indications of foundation failure, differential subsidence has occurred in the strip foundations in the northern corner of the structure.
5. Upon exposure of the foundations, foundations appear to be intact.
6. Founding material was saturated, clayey soil.
7. The overflow to the water tank discharges down the side of the dwelling.

See attached photos.

Area 2

1. The tiled floor in the bar area shows a straight, distinct crack and subsidence of the surface beds slab behind the built water tank. The difference in floor level is roughly up to 10mm in places.
2. The exterior wall behind the water tank shows horizontal cracking typical of subsidence of the foundations.
3. Horizontal cracks were visible along the DPC level of the exterior walls behind the water tank.
4. Although there are no indications of foundation failure, possible differential subsidence has occurred in the strip foundations behind the built water tank. It was not possible to expose the foundations due to the existing built entrance stairs.
5. The water tank appears to have no visual signs of subsidence.

See attached photos.

Area 3

1. A horizontal crack is present above the lintol of the street facing window. The window is in excess of 4m wide; a vertical crack is present at mid-span, indicating failure of the lintol.
2. A brick gable wall is constructed above the lintol over the window.

See attached photos.

Area 4

1. Staggered cracking is present in the exterior skin only of the dwelling.
2. No significant cracks are present in the internal skin.
3. No cracks are visible in the tiled floors.
4. Upon exposure of the foundations, a leaking pipe was discovered.
5. Founding material was saturated, clayey soil.
6. A horizontal crack at surface bed level is visible.

See attached photos.

Area 5

1. The basement level garage shows signs of moisture ingress through the hollow core slab above.
2. The tiling on the patio slab above the garage is cracked. Tiles have delaminated in areas.
3. It appears that the waterproofing has been damaged.

See attached photos.

Area 6

1. Cracks in the bedroom walls indicate subsidence of this area. The cracks are typical of those caused by subsidence of the founding materials, being straight vertical cracks that

widen to the top of the crack.

2. Cracks in the tiled floors are in line with the vertical cracks in the walls and also indicate subsidence of the founding material.
3. The interior is damp.
4. There is no downpipe present on the gutter, causing water from the roof to discharge on the ground at the foundations.

See attached photos.

Discussion of cause of foundation movement

The residence is situated in an area where the founding material, at normal founding depth for strip footings, can be defined as clayey material.

When clayey founding material is saturated with water it expands, which normally does not cause foundation movement since the pressure exerted by the clay is much less than the pressure caused by the weight of the structure and expansion of the founding material actually then occurs around the foundation instead of lifting the foundation.

When the saturated founding material dries out however, shrinkage of the clay occurs which causes subsidence of the founding material and foundations, causing cracks in brick walls supported by the foundations. Cracks of this nature are therefore often noted during dry spells, as experienced during 2021/2022 in this area, followed by a rainy season.

Because of the impermeability of clay, heavy rainfall is required before the founding material actually gets saturated. If, however, roof water and surface storm water is trapped and ponds next to a foundation, saturation of the founding material will occur which will cause subsidence when drying out.

Tank overflows discharging next to the dwelling, damaged downpipes, lack of downpipes and clogged gutters contribute the excessive saturation of the soil following rainy periods.

Recommendations

We recommend as follows:

1. Storm water channels along the side of the dwelling are to be cleared of all debris and checked to ensure that they are discharging water correctly.
2. All gutters to be cleaned and checked to ensure that they are not leaking, are free of debris and discharge correctly into downpipes directing water away from the dwelling or into water tanks.
3. All downpipes to be checked to ensure that they are not leaking and discharge water away from the dwelling.
4. All tank overflows to be directed away from the dwelling into the storm water channel.
5. A plumber needs to be appointed to inspect all pipes and fittings for leaks.
6. A 1m x 100mm thick concrete apron slab is to be cast all round next to external walls, where aprons are not yet present, in order to keep the moisture content of the founding material at a constant level.
7. Plants and shrubs to be trimmed away from structures to allow for sunlight to penetrate, assisting with drying the surrounding areas.

Area 1

1. Foundations are to be underpinned using the following method:
2. Excavate 1m wide x 1m deep x width of the foundation in alternating blocks under the existing foundation.
3. Cast mass concrete, Class 20/19, into blocks under the foundations.
4. Allow to cure for at least 5 days.
5. Excavate remaining alternating soil blocks and repeat the above.
6. Excavation to be for 3m along the side exterior wall and for the extent of the two front bedrooms along the street facing exterior wall.
7. Once underpinned, cracks are to be repaired using the crack repair method specified.

Area 2

1. The surface bed slab behind the built tank is to be demolished and fill under it to be removed.
2. Fill is to be re-compacted in layers not exceeding 150mm thick.
Cast a new 100 thick surface bed, reinforced using ref 193 mesh. Engineer to approve compaction prior to casting a new surface bed.
3. Form a soft-board joint between the existing tank slab and the new surface bed slab. Seal using a flexible sealant.
4. Make good floor finishes and paintwork.

Area 3

1. Repair the cracking above the existing lintol using the crack repair method specified.

Area 4

Foundations are to be underpinned using the following method:

1. Excavate 1m wide x 1m deep x width of the foundation in alternating blocks under the existing foundation.
2. Cast mass concrete, Class 20/19, into blocks under the foundations.
3. Allow to cure for at least 5 days.
4. Excavate remaining alternating soil blocks and repeat the above.
5. Excavation to be for the length of side exterior wall and for the extent of the wall along the street facing elevation.
6. Exterior skin to be removed, as per Engineer on site, and rebuilt.
7. Lugs are to be drilled into the existing interior skin and built into the new skin to offer stability to the new skin.
8. Once underpinned, cracks are to be repaired using the crack repair method specified.

Area 5

1. Remove existing tiles and debris from patio.
2. Cleaning and waterproofing by specialist.
3. Make good tiles and damage caused by moisture in garage.

Area 6

1. Repair cracks using method specified.
2. Make good finishes.
3. Install a downpipe to gutter directed away from structures to stormwater channel.

Reinstate the original strength in all cracks in brick walls by using an epoxy structural repair mortar as per the following specifications and procedure :

- a) Cut out cracks using an angle grinder, following the cracks to a depth of 40mm and to the width of the blade.
- b) Remove all dust and loose material and dampen inside of crack using a water spray.
- c) Treat the inside of cracks with a wet/dry epoxy, ensuring proper coverage by dabbing with a stiff brush.
- d) While the wet/dry is still tacky (within 1h of mixing) repair the cracks using Durarep FR from ABE. Remove excess Durarep while still wet.

Please advise if more information is required.



Annelize Lloyd Pr Techni Eng

VIAPLAN Civil and Structural Engineers

PHOTOGRAPHS

Area 1



Tank discharge saturating soil



Crack in second bedroom corresponding to crack in next picture (corner bedroom)



Crack corresponding to crack in second bedroom; View of corner bedroom indicating cracks





Excavated corner where underpinning is to occur

Area 2



Level difference in bar floor, behind tank







Area 3



Area 4







Area 5



Area 6

