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12 August 2016

The Manager,
Western Plains Regional Council
P.O. Box 81
Dubbo NSW 2830

Attention: Wes Giddings

Dear Wes,

WELLINGTON SWIMMING POOL – STRUCTURAL CONDITION ASSESSMENT. FULL REPORT.

This report follows the interim report provided on 4 August. This report contains all the information included in the interim report and is intended to replace it.

Geolyse was commissioned to inspect the Wellington Swimming Pool and surrounding facilities. On 3 August our Engineer Peter Thew inspected the facilities. This report highlights the urgent works which need to be done prior to the pool re-opening to the public at the start of the swimming season, and lists some of the less urgent works required to keep the pool facility in a workable condition.

Background

The Wellington Pool Olympic pool and kiosk was constructed in 1956-1958, the club house in 1961 and the children's pool and mid- sized pool added some years later. Over the years some facilities including play equipment and a disable changing room have been added and maintenance undertaken, but overall the pool is showing its age, with multiple serious problems and issues which need to be addressed.

Safety Issues – Immediate attention required.

During the inspection, the following three safety issues were noted. These should be treated as a priority and adequately addressed prior to re-opening the pool to the public:

1. The wall around and over the poolside entrance to the men's change room is cracked, loose and dangerous. The wall above the entry is badly broken up and in danger of collapse. We recommend the following:
   - At a minimum, the wall above the lintel level (approx. 2.3 m) needs to be removed. This should include the wall over the entrance, above the urinal and above the sinks. As an alternative, the wall could be removed just above the entrance, however both sides will need supporting through the addition of steel posts on both sides of the opening where the door frames would be (if there were a door in the space). This action will provide a short term fix to the problem and make the change room temporarily safe.

- A better, and long term, solution is to replace the entire wall of the men's changing room, together with the urinal and wash hand basins. The wall and floor in this area is badly affected by the tree roots and has multiple cracks. The movement of the urinal is to the extent that hygiene is affected and it is likely that the drainage pipes have broken or cracked.

Figure 1: The pool side entrance on the men's changing room.

The underlying cause of the movement in the men's changing room wall is the large tree nearby, visible in the background of the photograph. We recommend that consideration be given to installation of a root barrier beside the building to limit on-going damage. This will require consultation with a tree specialist to avoid damage to the tree. Removal of the tree would also be an option.

2. The deep end wall of the Olympic pool is unstable. The top metre or so of the pool wall is loose and can be moved by hand in 2 locations along the deep end wall. In its current condition, it is possible that a swimmer in the pool could unintentionally pull the side of the wall into the pool, injuring themselves or others. This is a serious safety risk.

We have detailed a temporary repair to the side of the pool. This is included in appendix B to this report. This temporary repair is cheaper and easier to complete and will be suitable for a period of 2-3 years until the more substantial works required on the pool can be determined.

A more permanent repair is as follows:

- Break off the loose parts of the wall. This can be done with a crow bar or similar. We expect that two 2-4 metre sections 300 mm to 1 m deep will be able to be broken off. A jack hammer may be required to remove the concrete from around the reinforcement.
- Clean off the break lines with a jack hammer. Cut off and remove rusted or bent reinforcing steel. If steel is rusty at connection, additional concrete may need to be removed.
- Drill and chemset in place new reinforcing steel for the swimming pool wall patch.
- Form and pour a new concrete wall.

- Tile over patch and finish.

Figure 2: The circled areas of the Olympic pool deep end are both loose.

Note: The assessment of the end wall of the pool is based on the engineer's ability to visibly move the end wall by hand during the inspection. This probably indicates the wall is weak and could break, but it is possible that the wall is still much stronger than anticipated. If a high amount of force is applied and the wall does not break or significantly move, this repair may be unnecessary. However we would recommend monitoring the edge for future deterioration.

3. The brick wall of the pump house beside the door is loose and could easily collapse if someone pushed hard on it. This part of the wall needs to be demolished and rebuilt with proper support.

Figure 3: This brick wall is loose and unstable. (entry to pump house)

The wall appears to be a stud frame construction with brick veneer. We believe the stud frame is adequate, thus just the brick section needs to be fixed. If required, the bricks could be replaced with external cladding.

Summary of Swimming Pool Facilities Condition:

Children's pool.

The children's pool is in reasonable to poor condition. The fibre glass has a new crack in the base and the gel coat is wearing out. The pool is no longer level, affecting the edge flow conditions. Around the pool, the concrete path at the southern edge has fallen substantially, suggesting leakage in that area.

Olympic pool

The Olympic pool is in poor condition. The concrete is spalling in several locations (notably alongside the gutters) and there are numerous leaks. The fibreglass coat on the base is near the end of its life. The deep end wall is structurally unsound (see safety recommendations). There are also cracks in the concrete and the expansion joints need refilling. Reports of bubbles emerging from the side of the pool after backwashes suggest voids behind the concrete.

Around the pool the concrete paths have moved and broken up, there are numerous open joints which need filling.

Medium pool

The medium pool is in reasonable condition. However at the deep end the concrete area seems to have subsided greatly, and the drainage is blocked, indicating drainage problems and possible pipe breakages.

Club room

The Club house, built in 1961 appears to be in good condition. There are minor areas of timber degradation and rot in the window frames, but overall the structure is sound.

Kiosk and Entry

The kiosk is in reasonable condition. The roof leaks in a number of places and there are minor cracks in some of the walls.

Changing rooms

The men's change room wall (pool side) has substantial cracks in it, due to ground movement and the nearby tree. This is now a safety issue. Some of the plumbing appears to be dysfunctional.

The women's change room is in reasonable condition. The concrete floor is badly cracked and several of the doors on the stalls are rotten at the bottom. The lintel over the pool side entry is rusted and has caused a crack in the wall.

The disabled change room appears to be structurally sound.

Grounds

The grounds around the pools are generally in poor condition. The concrete paths have moved and cracked. There are numerous trip hazards.

All the shade structures and light poles appear to be in good condition.

The drainage around the pool appears to be in very poor condition. A number of the channels beside the paths no longer slope the correct way and a large number of the drains were flooded or blocked.

Filtration Building and Pool Plumbing

The pool pump house is in very poor condition. The floors are badly cracked and have moved due to ground movements. The visible pipes are rusty and in poor condition. The walls of the filtration tank are badly cracked and steel fixtures are corroded.

The buried pipes servicing the pool cannot be inspected, but flooded pits, subsidence of ground over the pipes and leaks in the system suggest they are in very poor condition.

The balance tank could only be viewed through the access hatch. A crack in the side wall and substantial subsidence in the path and pump house above suggest there may be a substantial leak in the balance tank.

The Chlorine store facility is an old shipping container. It is sitting on the ground, and thus will rust quickly, and the roof already leaks. There is no containment around the Chlorine gas bottles.

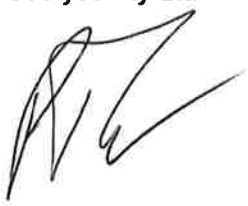
Conclusion

The Wellington Pool facility overall is generally in very poor condition. The main assets are very near the end of the functional life and well into the phase were multiple expensive repairs are required to keep them operational. The Swimming pools leak in multiple locations, the fibreglass surfaces (base of main pool and all of the children's pool) are wearing out and will soon need replacement. The pools' structural concrete is suffering from spalling (concrete cancer) and general degradation in multiple locations. At least 2 of the pools have suffered from subsidence of over 25 mm.

Planning and consideration needs to begin for either a major refurbishment of the swimming pools and facilities or full replacement of the same. On-going patch repairs will become increasingly ineffective as the entire asset approaches breakdown and substantially fails to meet its performance requirements. In particular, the on-going leaks in the pool will likely exacerbate the ground movements around, leading to additional cracks in the concrete structures including the pools themselves.

The level of facility provided has not substantially changed since the pool was opened in the 1956 and is now well below that provided by similar towns.

Yours faithfully
Geolyse Pty Ltd



PETER THEW
Senior Structural Engineer

Appendix A – List of noted defects and recommended repairs.

This list is based on the visual inspection. Not all repairs are urgent and some may be put off for a few years without excessive deterioration of the facility. However, the longer they are left undone, the faster the condition of the facility will degrade.

KIDS POOL – FIBRE GLASS LINED.

Condition

- East corner has dropped,
- Crack in the edge 2 mm
- Southern edge severely fallen suggests leak and subsidence
- Joint around pool needs replacing – pull out bitumen and insert filler
- Internal paint/liner is wearing out
- Concrete slab sunk on east side of pool (40 mm)

- 1 new crack in fibre glass near old, 0.4 mm wide.

Recommended Repairs.

Replace concrete path on south side of pool. Drain just outside the fence probably needs replacing too.

Remove old gap filler and replace with new.

OLYMPIC POOL

Condition

- A number of tiles on the walls are cracked. – especially East wall (deep end)

- Inside gutter wearing out. The concrete will spall and put gravel in gutter. Ok for a few years then will need repairs.
- Visible horizontal lines in tiles suggest leak.
- At 25 m point, south wall is bowing inwards – suggests slow failure. Monitor for future increased movement.
- Expansion joint in pool includes gutter – thus it is impossible to replace joint in gutter without breaking concrete above. Leave alone.

- At 2.0 m marker (joint) on south side – ground subsidence suggests leak. Leak could be from balance tank or pool. Subsidence has damaged corner of pump house (out of picture to the left). From the other side of the pool, the dip in the fence line shows the degree of subsidence.
- crack at mid deep end wall (vertical)
- Pool attendant reports bubbles emerge from filling holes in side of back wall during back wash operations, suggesting a void behind the deep end pool wall.

- Bottom gel and fibre glass near end of life.
- Shade structure at deep end is in good condition.

Recommended Repairs

- Expansion joints need replacing. Remove old filler and rubber and insert new expandable gap filler. Deep end joint – replace filler as per shallow end.

- Fill joints in paths around pool

- deep end top wall – re-seal gap behind tiles
    - Wall of pool is weak and in danger near old diving board. – URGENT REPAIR See appendix B

- big crack in concrete – patch and repair

MEDIUM POOL

Condition

The medium pool is in reasonable condition.

- There is a gap at the base of the pool where the floor joins the walls.
- The ground and paths surrounding the pool are in poor condition, with excessive movement of the concrete paths and likely failure of the storm water drainage. The concrete slabs have sunk and broken up.
- At deep end path seems to have dropped a lot especially on drain
- Drain at NE corner is blocked
- Concrete over drain has sunk – now trip hazard
- Drains probably blocked

Recommended Repairs

- Fill in end gap at base of walls with expandable filler

- Remove and replace joint sealant

CLUB ROOM (1961)

Condition

Overall the club room is reasonably good condition. With proper maintenance it should last a long time into the future.

- Window frame rotting (damp)
- Previous termite damage
- Some aging of timber and glass frames

- Some water staining on window frame indicate windows leak

Recommended repairs

- Remove vegetation from against wall on north side.

GROUNDS

Condition

The Wellington pool grounds consists mainly of grassed areas, concrete paths with additional facilities including children's playground, BBQ facilities and seating.

- At eastern end of grounds some saturated ground over water pipe suggests leak in pipe. (note this is not definitive, as the inspection took place after some substantial rain)
- Drain between 2 small pools not draining – probably blocked.
- Outside near the bike rack the concrete foot path has broken up.
- Electrical point was built over joint in slab– thus badly cracked
- The children's playground appeared to be in good condition.
- Paths have moved forming some trip hazards
- Tree roots have lifted the nearby paths and building

The storm water drainage system could not be checked as it is all underground. However movement of the paths above and standing water suggest multiple failures in the system. After this inspection, a camera inspection of the inside of the pipes was done by others. The results of that inspection do not form part of this report.

Repairs

Multiple paths and concrete slabs have moved. Trip hazards need to be ground off, gaps filled and broken corners patched and replaced.

This electrical box was built over an expansion joint and thus has cracked. It needs to be move or demolished.

- This tree near the entrance has affected the concrete paths around and the mens change room. For long term repairs, or for a new change room, consider a root barrier between the tree and the building. Please consult a tree specialist to avoid damage to the tree.

PUMP HOUSE AND FILTRATION BUILDING

Condition

The pump house is in poor condition. The corner of the building near the balance tank has subsided and the floor has cracked and moved substantially. Inside there are multiple trip hazards. The building appears to remain stable and safe (with the exception of a small piece of wall near the door mentioned earlier), but is nearing the end of its effective service life.

The filtration tanks have cracked walls, with spalling of concrete and corrosion of steel elements.

The filtration equipment (while out of the scope of this report) has substantially corroded components.

- Corner foundation damaged (over 10 years)
- Multiple concrete cracks

- Pipes rusty and near end of life. Trip hazards, etc.
- Tank is cracked, probably leaks – putty, etc. to fill
- Brick wall by door very loose and unsafe (see in front section of report for repair).

- Chlorine store room is old shipping container – leaks, sits on the dirt, will rust quickly. Fence around chlorine may not be adequate for safety.
- Valve pit often full of water.

Recommended Repairs

- Suggest inspection of balance tank and repair leaks.
- Repair wall as per other instructions

KIOSK

Condition

The Kiosk and entry are structurally in reasonable condition. The roof sheeting is near the end of its life and needs to be replaced as it leaks. The kiosk shop and first aid room may not be compliant with health and safety standards, but are structurally sound.

- Roof leaks lots of places – needs replacing.
- Office - crack in wall
- Mould on ceiling outside the kiosk
- First aid room known to be non-compliant (door width)

Recommended repairs

- Replace roof sheeting

MENS CHANGE ROOM

Condition

The men's change rooms is in poor condition, with multiple cracks in the floor and walls, damaged plumbing and general degradation. The entry to the pool side is dangerous and needs urgent repair (as detailed in beginning of report)

- Floor slippery from poor drainage (regularly cleaned with pressure washer)
- Diagonal crack in wall. 6 mm wide.
- Near sinks cracks in upper wall 5 – 10 mm wide
- Multiple cracks in floor and wall especially around urinal – probably has caused plumbing leaks.
- Trip hazard by door

Recommended repairs

- Need to re-build whole wall (long term). Make safe in short term – consider remove wall above plaster line at 2.2 – 2.4 m

- The cracks around the urinal affect the drainage and sanitary conditions. This is integral with the wall which needs replacing.

LADIES CHANGE ROOM

Condition

The Ladies change room is generally in better condition than the mens, but still shows signs of degradation.

- Cracks in floor and levels now wrong leads to standing water and poor drainage.
- Lintel is rusty and crack around it (monitor)

DISABLED TOILET/CHANGEROOM

Condition

The disabled change rooms were constructed from the end of the women's change room. Being a recent construction it is in better condition than the rest. However there are minor problems:

- Roof leaks
- Taps and door handles are non-compliant with disabled standards
- Door warps with moisture

Appendix B Urgent temporary repair to swimming pool edge

Pool repair procedure:

The purpose of this repair is to secure the edge of the pool back to the ground behind so that a swimmer cannot accidently pull the wall down onto themselves. This repair is temporary repair and is safe for 3 years. After 3 years it will need reassessment to determine on going effectiveness or alternative repairs.

Procedure

1. Drill hole through yellow slab beside pool to determine thickness.
    a. If slab is 150mm or thicker, use method 1 (or method 2)
    b. If slab is less than 150mm thick, use method 2.

Method 1.

1. Drill 10mm dia horizontal holes through side of pool at approx. 100 mm below the top, 500mm spacing.
2. Blow dust/debris out of holes
3. Insert chemset Reo 502 into hole (end of hole only), use long tube to ensure chemical is at the end of the hole in the sound concrete,
4. Insert stainless steel all thread. Turn as it is inserted to spread the chemset epoxy.
5. Allow to set.
6. Load test anchors as described
7. Mark and drill holes in stainless steel plate
8. Trim protruding length of all thread to suit
9. Place stainless steel plate (see specifications on next page)

10. Place acorn (cap) nut on and tighten to suit. (other smooth fixings without sharp edges may be used instead)

Load Test

Load test at least 4 anchors to prove capacity. Load test to 100kg as follows:

1. Attach connector and hook or eye to all thread.
2. Direct pull 100kg. OR
3. Use timber blocking against pool side
4. Insert bar in hook, use 4:1 mechanical advantage and pull 25kg. (Suggested dimensions shown).
    a. Note: 25 kg is a reasonably good effort by a worker, using his foot against the side of the pool and pulling back.
    b. Approximate load (25kg) is ok, this need not be exact.
    c. Anchor passes if it remains in place or moves less than 2mm after load is removed. (Measure length before and after load test).
    d. Anchor fails if it breaks or moves more than 2mm after load is removed. Take care that a sudden break does not injure the tester.
5. If the anchor fails the test at 50kg or more, increase the spacing in the anchors to 250mm c/c. If the anchor fails the test at less than 50kg, abandon and use method 2.

Under ideal conditions, the anchors should be able to pass an 800kg load test, thus we are not expecting failure.

Method 2

1. Cut holes in concrete slab min 100 dia (recommended 150mm, but limited by ability to put a hand down and manipulate a washer and bolt)
2. Drill hole through side of pool.
3. Insert all thread into hole until the end is in the centre of the excavation
4. Place a washer and nut onto the all thread. Washer to be min 50 mm dia.
5. Pour concrete into hole and finish at the surface level surface.
6. After concrete is cured, install stainless steel plate
7. Mark and drill holes in stainless steel plate
8. Trim protruding length of all thread to suit
9. Place stainless steel plate
10. Place acorn (cap) nut on and tighten to suit. (other smooth fixings without sharp edges may be used instead)

This anchor from method 2 does not need to be load tested.

- Anchors should be 500 mm apart (unless they fail the load test as per above). Spacing can vary +-100mm provided the average is 500mm or less.
- Plates should be min 1200mm long with 3 anchors in each
- The gap between plates should be 400mm or less.
- Plates should be bolted no more than 100mm from the edge
- Plate corners and edges should be rounded to remove any sharp edges.
- Plates, nuts and all threads should be matching grade of stainless steel, Grade 304 or 316

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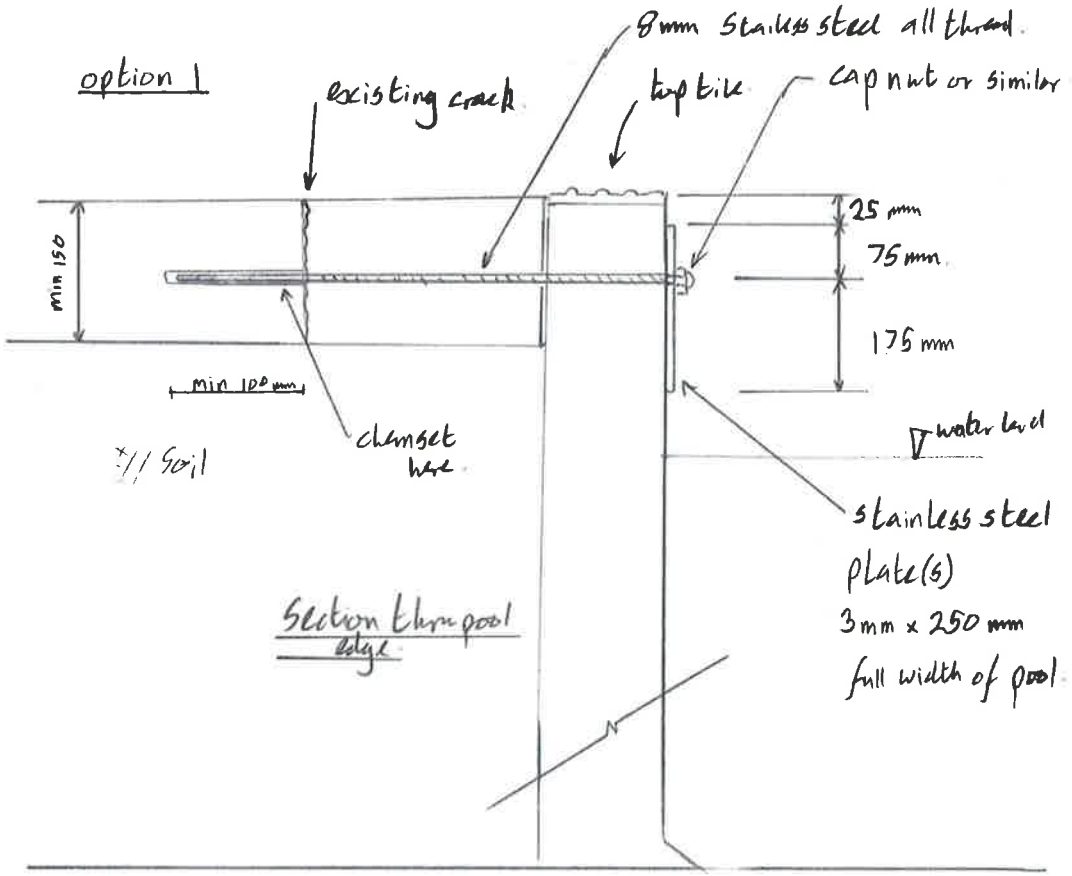
Project: Wellington Pool

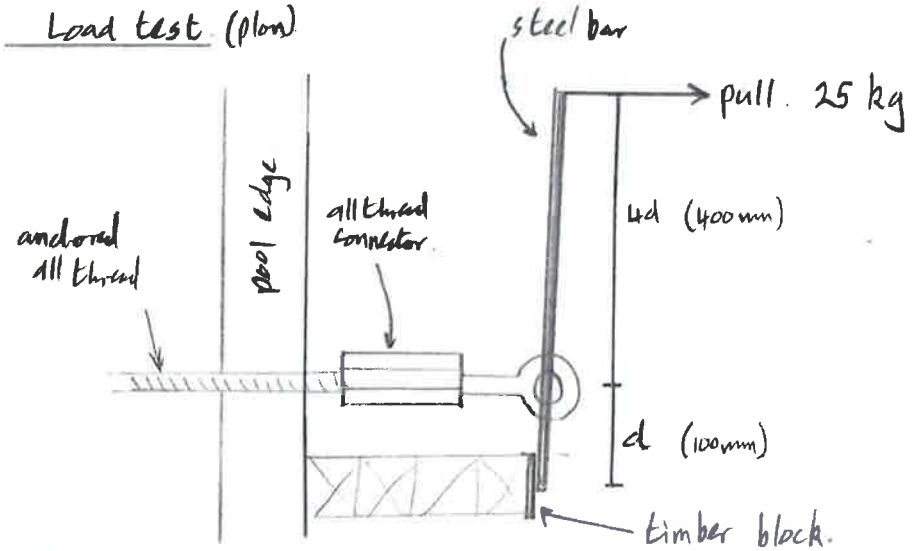
Project Number 217032

Date: 10 Aug 16

Sheet: 1 of

Subject: Temporary repairs





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Project:

Project Number 217032

Date: 10 Aug 16

Sheet: 2 of

Subject: Wellington pool temporary repairs

option 2.