Aquatic Facility Audit

AQ1-0224-DR1, Revision A

Cleveland Aquatic Centre

REDLAND CITY COUNCIL

19/14 Ashtan Place, Banyo Queensland 4014
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PROJECT DETAILS

Project:	**Cleveland Aquatic Centre**
Area:	All pools
Client:	Redland City Council
Reference:	AQ1-0224-DR1, Revision A

REVISION SCHEDULE

Revision	Date	Description	By
A	09/05/22	Issued for client review	LHB

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INTRODUCTION

Figure 1: Leisure Pools at the Cleveland Aquatic Centre

Aquatic One was commissioned by Redlands City Council to undertake a site audit of the existing aquatic elements at the Cleveland Aquatic Centre in Brisbane, Queensland. This report details the findings of the audit of the centre and provides a condition report on the swimming pools and filtration plant currently installed.

A representative from Aquatic One attended site in March 2022 and inspected the pools as well as the filtration and sanitation plant installed for the aquatic elements at site. Focus was given to equipment condition, filtration and sanitation, operation and suitability for use.

This report and associated documents are based on site visit observations and interviews with staff. Whilst all investigation and reporting works have been undertaken by experienced aquatic personnel and qualitative assessments and predictions have been made based on relevant experience, it is not possible to quantify opinionative elements such as general condition or predict with complete accuracy elements such as expected lifespan. These factors should be taken into consideration whilst reading this report.

This report references a number of standards and codes as required by the site observations. References to 'NCC' refer to the National Construction Code. Australian Standards are referred to by their standards number and year of publication, eg. AS 3780-2008.

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APPROXIMATE COST FIGURES

Any approximate cost figures provided within this report are rough approximations only, intended to provide a concept as to the magnitude of the cost expected for works described. They are not intended to be used for accurate budgeting, funding or works quoting.

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SITE DESCRIPTION

GENERAL OVERVIEW

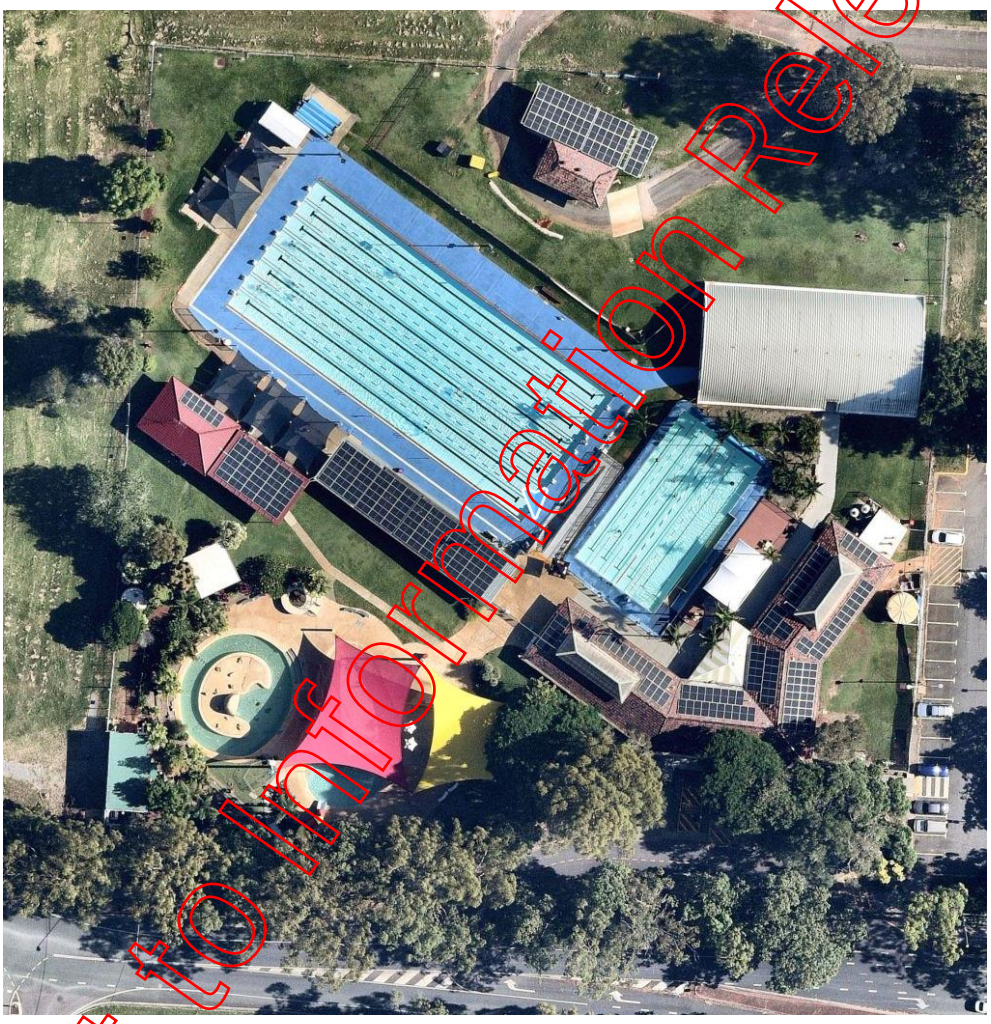

Figure 2: Aerial photo of facility

The Cleveland Aquatic Centre is a publically-accessible swimming pool hosting a mixture of aquatic facilities including:

- Outdoor 25m Lap Pool
- Outdoor 50m Lap Pool
- Indoor LTS Pool
- Outdoor Play Pool with Waterslide
- Outdoor River Pool

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The facility is understood to have originally opened in the early 1970's, with the 25m pool being added in the mid-90's. The dates for the play pool and river pool are not known but are suspected to be constructed around a similar time. Relatively little as-constructed documentation of the elements in the facility was available for viewing at the time of the inspection, primarily covering the 50m pool only.

Each aquatic element at site is serviced by a standalone filtration system, located across three equipment rooms:

- The 50m pool equipment is located in a dedicated equipment room to the north of the site.
- The 25m and LTS pool equipment is located in a combined equipment room to the east of site.
- The Play and River pool equipment is located in a combined equipment room to the west of site.

All systems are serviced by sand filtration systems, liquid chlorine and either acid or CO2 dosing. The pools are heated through either electric heat pumps or gas heating systems.

At the time of the inspection, the filtration systems were operational and the pools full of water. The facility was open to the public.

SWIMMING POOL DESCRIPTION

OUTDOOR 50M POOL

The outdoor 50m pool is an 8 lane 50m fully tiled reinforced concrete lap pool. The pool is 20.5m wide, 1m deep at each end and grades to 2m deep in the centre. Wet decks are placed to the two long sides of the pool and raised hobs to the two ends. The pool is understood to be from the original construction of the site in the 1970's.

OUTDOOR 25M POOL

The pool is a 25m long 6 lane lap pool, understood to be of concrete construction with a fiberglass internal lining. The pool is 1m deep at the shallow end, grading down to 1.2m at the deep end. An access ramp provides access to one side of the pool. The pool is a skimmer design pool. The pool is understood to have been constructed in the 1990's, replacing an existing wading pool.

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INDOOR LTS POOL

The pool is a 20m long x 6.8m wide (6m main body with 800mm wide bench) reinforced concrete pool fitted with a fiberglass internal liner. The pool is 1m deep to the full extent with a 250mm deep bench along one side. The pool is a skimmer design pool, understood to be from the original construction in the 1970's.

OUTDOOR PLAY POOL

The pool is a freeform play pool, approximately 25m long x 20m wide overall. The pool is varying depth throughout and is fitted with a waterslide and various water toys. The pool is a skimmer design pool, understood to be constructed in the early 2000's.

OUTDOOR RIVER POOL

The pool is an ellipse-shaped river pool, approximately 17m long and 15m wide. The pool is of reinforced construction and is a constant depth to the perimeter of the ~2.4m wide channel. The main feature for the pool is the channel flow system, where large pumps draw water from the side of the pool and inject into floor jets to circulate water around the channel. The pool is a semi-skimmer design pool, understood to be constructed in the early 2000's.

POOL WATER CIRCULATION

OUTDOOR 50M POOL

In this pool, water circulation is provided through the following means:

1. Filtered water is delivered into the pool through a center return channel running along the length of the pool, fitted with small outlet grates in the top surface.
2. Soiled water overflows wet deck gutters to the two long sides of the pool. It collects in underground pipework and flows to the drawoff tank adjacent the north-eastern corner of the pool.
3. Balance lines appear to connect the pool to the balance tank through the wall to prevent the tank running dry.

OUTDOOR 25M POOL

In this pool, water circulation is provided through the following means:

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1. Filtered water is delivered into the pool through a series of wall return fittings along both sides of the pool. The returns are currently open pipes and not provided with fittings.
2. Soiled water is drawn into 10 skimmer boxes located along the two long sides of the pool. Pipework joins these skimmer boxes back to the equipment room.

INDOOR LTS POOL

In this pool, water circulation is provided through the following means:

1. Filtered water is delivered into the pool through six wall return fittings generally installed along the bench but with one fitting installed in the corner of the pool.
2. Soiled water is drawn into three skimmer boxes located along the long side of the pool opposite the bench. Pipework joins these skimmer boxes back to the equipment room.

OURDOOR PLAY POOL

In this pool, water circulation is provided through the following means:

1. Filtered water is delivered into the pool through three rows of floor returns installed across the pool.
2. Soiled water is drawn into a series of skimmer boxes placed around the walls of the pool. Pipework joins these skimmer boxes back to the equipment room.
3. Wall suctions are present in the pool. Whilst as-constructed documentation is not available and the pipework pathways could not be confirmed, it's assumed that some of these wall suctions connect to the skimmers as relief lines whilst others connect to the feature suction pump.

OUTDOOR RIVER POOL

In this pool, water circulation is provided through the following means:

1. A large grated overflow sump is located in the wall of the pool adjacent the stairs. Water overflows into this sump. A large single suction fitting in this sump connects through pipework up to the plant room.
2. The pipe splits at the plant room into two suction lines which appear in the pump well. The two main river circulation pumps connect to these pipes then tee together into a single line above these pipes before flowing back out to the

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pool. The pipework splits at the pool into series of river flow jets located in the floor of the pool.

3. The filtration pumps draws water from the river pump outlets, and pumps through the filtration system in the plant room. The return water is then delivered back into the river pump outlet line downstream of a check valve. It appears as though previously this system was directly connected to the pool, as cut-off pipework is present nearby in the plant room.

FILTRATION PLANT

OUTDOOR 50M POOL

This pool is serviced by a pressure sand filtration plant. A single end-suction centrifugal circulation pump located in the equipment room draws soiled water from the drawoff tank through a hair and lint strainer and pumps the water through four fiberglass high-rate pressure sand filters. After passing through the filters, the water collects into a single underground pipe which flows back to the pool.

The filter is cleaned by backwashing; pumping water through the filter chamber beds in a reverse direction, with the waste water flowing to a sewer discharge pit in the equipment room.

Primary sanitation is provided through liquid sodium hypochlorite. A bulk storage tank is located in the equipment room. An automatic water chemistry controller measures the ORP level and pH level of the pool water and automatically controls a chlorine dosing pump. pH is regulated using CO2, which is stored in a bulk tank outside the equipment room and injected into the filtration stream when the chemical controller measures the pH level as being too high.

Pool heating is provided through direct-fired gas pool heaters. Pool water is drawn from the filtration stream downstream of the filters and passed through a pair of commercial pool gas heaters before being returned to the filtration stream.

OUTDOOR 25M POOL

This pool is serviced by a pressure sand filtration plant. A single end-suction centrifugal circulation pump located in the equipment room draws soiled water from the skimmers through a hair and lint strainer and pumps the water through three fiberglass high-rate pressure sand filters. The skimmers are connected to the plant room through a pair of 80mm pipes, suspected to be one pipe to each side of

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the pool. After passing through the filters, the water collects into three 80mm underground pipes which flows back to the pool.

The filter is cleaned by backwashing; pumping water through the filter chamber beds in a reverse direction, with the wastewater flowing to a drain in the floor of the plant room.

Primary sanitation is provided through liquid sodium hypochlorite. A bulk storage tank is located in the equipment room. An automatic water chemistry controller measures the ORP level and pH level of the pool water and automatically controls a chlorine dosing pump. pH is regulated using CO2, which is stored in a bulk tank outside the equipment room and injected into the filtration stream when the chemical controller measures the pH level as being too high.

Pool heating is provided through a direct-fired gas pool heater. Pool water is drawn from the filtration stream downstream of the filters and passed through a single commercial pool gas heater before being returned to the filtration stream.

INDOOR LTS POOL

This pool is serviced by a pressure sand filtration plant. A single end-suction centrifugal circulation pump located in the equipment room draws soiled water from the skimmers through a hair and lint strainer and pumps the water through two fiberglass high-rate pressure sand filters. The skimmers are connected to the plant room through a single 150mm pipe. After passing through the filters, the water collects into a single DN100 underground pipe which flows back to the pool.

The filter is cleaned by backwashing; pumping water through the filter chamber beds in a reverse direction, with the wastewater flowing to a backwash holding tank outside the equipment room.

Primary sanitation is provided through liquid sodium hypochlorite. A bulk storage tank is located in the equipment room. An automatic water chemistry controller measures the ORP level and pH level of the pool water and automatically controls a chlorine dosing pump. pH is regulated using CO2, which is stored in a bulk tank outside the equipment room and injected into the filtration stream when the chemical controller measures the pH level as being too high. A UV secondary sanitizer is installed on the return to pool pipework to assist with bacterial control.

Pool heating is provided through a direct-fired gas pool heater. Pool water is drawn from the filtration stream downstream of the filters and passed through a single commercial pool gas heater before being returned to the filtration stream.

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OUTDOOR PLAY POOL

This pool is serviced by a pressure sand filtration plant. A single end-suction centrifugal circulation pump located in the equipment room draws soiled water from the skimmers through a hair and lint strainer and pumps the water through three fiberglass high-rate pressure sand filters. The skimmers are connected to the plant room through a single suction pipe of an unknown configuration. After passing through the filters, the water collects into a single underground return pipe feeding into the rows of filtered water returns.

The filter is cleaned by backwashing; pumping water through the filter chamber beds in a reverse direction, with the wastewater flowing to a backwash holding tank located outside the equipment room.

Primary sanitation is provided through liquid sodium hypochlorite. A bulk storage tank is located in the equipment room. An automatic water chemistry controller measures the ORP level and pH level of the pool water and automatically controls a chlorine dosing pump. pH is regulated using acid, which is stored in a small bulk tank in the corner of the equipment room and injected into the filtration stream when the chemical controller measures the pH level as being too high.

Pool heating is provided through a multiple electric heat pumps located in an enclosure outside the equipment room. Pool water is drawn from the filtration stream downstream of the filters and passed through the heat pumps before being returned to the filtration stream.

Feature pumping is provided by a circulation pump located in a cabinet outside the equipment room on the downhill side. The feature pump draws water from an unknown source and pumps the water through an actuated valve manifold. The actuated valves then connect to the various features.

OUTDOOR RIVER POOL

This pool is serviced by a pressure sand filtration plant. A single end-suction centrifugal circulation pump located in the equipment room draws soiled water from the outlet of the river circulation pumps through a hair and lint strainer and pumps the water through three fiberglass high-rate pressure sand filters. Two of the filters are the original filters whilst the third is a repurposed filter from a disused spa onsite. After passing through the filters, the water is returned into the river circulation stream.

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The filter is cleaned by backwashing; pumping water through the filter chamber beds in a reverse direction, with the wastewater flowing to a backwash holding tank located outside the equipment room.

Primary sanitation is provided through liquid sodium hypochlorite. A bulk storage tank is located in the equipment room. An automatic water chemistry controller measures the ORP level and pH level of the pool water and automatically controls a chlorine dosing pump. pH is regulated using acid, which is stored in a small bulk tank in the corner of the equipment room and injected into the filtration stream when the chemical controller measures the pH level as being too high.

Pool heating is provided through a multiple electric heat pumps located in an enclosure outside the equipment room. Pool water is drawn from the filtration stream downstream of the filters and passed through the heat pumps before being returned to the filtration stream.

Feature pumping is provided by a pair of large river circulation pumps located in the recessed pump well. The feature pumps draw water from the drawoff sump in the side of the pool and return it to a series of angled floor river boost jets.

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SITE OBSERVATIONS

This section details observations from the inspection.

AQUATIC FACILITIES

50M POOL GENERAL ITEMS

Figure 3: 50m Pool

Applicable To:

- 50m Pool

Observations

- The pool appears to be slightly out of level. More water was evident flowing over the northern wet deck compared to the southern. This may be a result of structural movement or may simply be poor construction tolerance at the time of the initial build. The level is not such that it causes immediate reason for concern however should be monitored.
- The balance tank lids are concrete infilled lids, which are heavy and present a risk for operational staff.

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- Tiling in the wet deck gutters is failing in places.
- The tiling in the floor of the pool is not slip-resistant. Activities in the pool that require friction to the floor (such as aqua-aerobics, LTS and the like) have an increased risk of injury if slip resistant finishes are not utilized.
- The gutter on the northern side appears almost flooded at one end. This is indicative that the flow capacity of the soiled water gravity system is at its peak, coupled with a bias of water over one side of the pool.
- The gutter design is outdated, presenting as an open channel to the full length with pool access over this channel. This presents a risk of ankle injury and falls/trips.
- The filtered water return system is a single row of returns along the centre of the pool. This is likely to be resulting in poor circulation and mixing of the pool water as this style of return has a very low impact beyond the return itself.

Recommendations

- Undertake a survey of the pool wall levels and repeat in 12 months to determine if there is any movement.
- Replace the tank lids with lighter lockable items such as Terra Firma lids.
- Rectify failed tiling. Undertake a detailed grout inspection on the pool and repair / replace as necessary.
- Consult with operational staff regarding floor tiling slip level and identification of any operational issues experienced.
- Consider providing grated covers to the open channel wet decks.
- Undertake circulation dye testing in accordance with the Model Aquatic Health Code. If dead spots are identified, improvements may be required to the filtered water return system.

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Additional Photographs

Figure 4: Failed tiling in gutter floor

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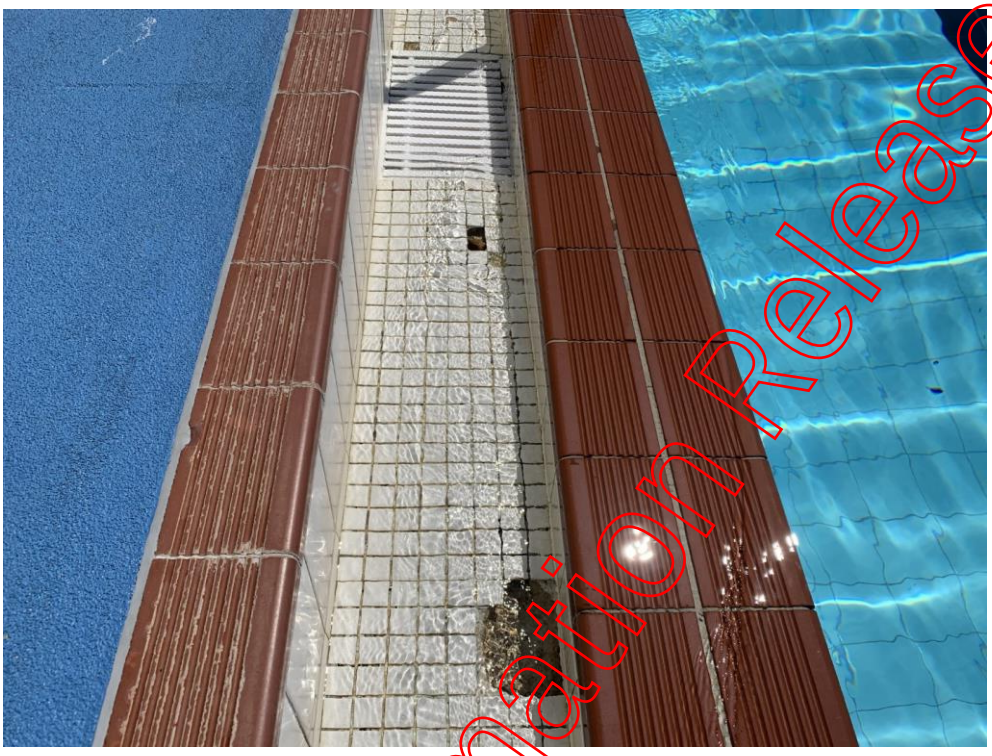

Figure 5: Damaged tiling in open gutter

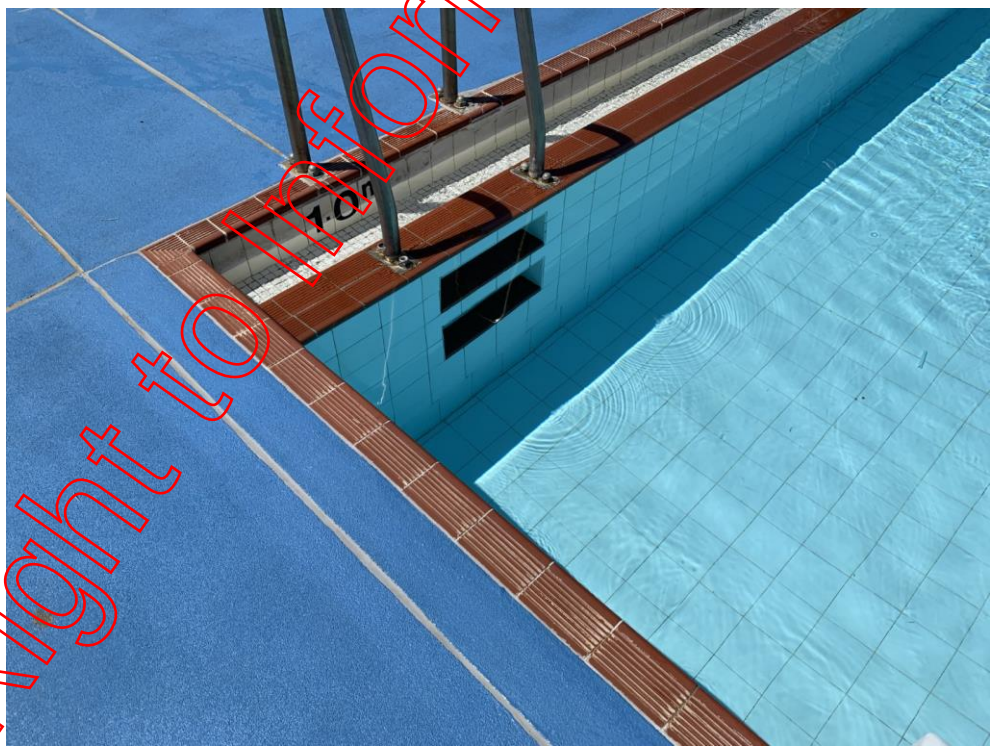

Figure 6: Steps into pool over gutter presenting injury risk

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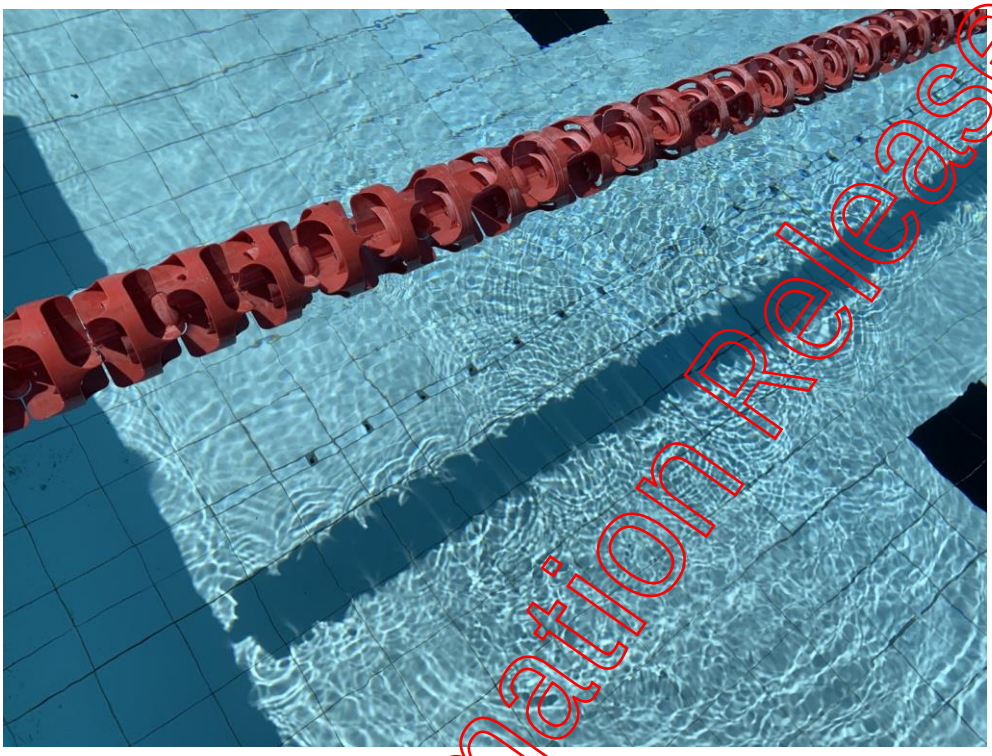

Figure 7: Filtered water returns to pool floor

Figure 8: Heavy balance tank lid

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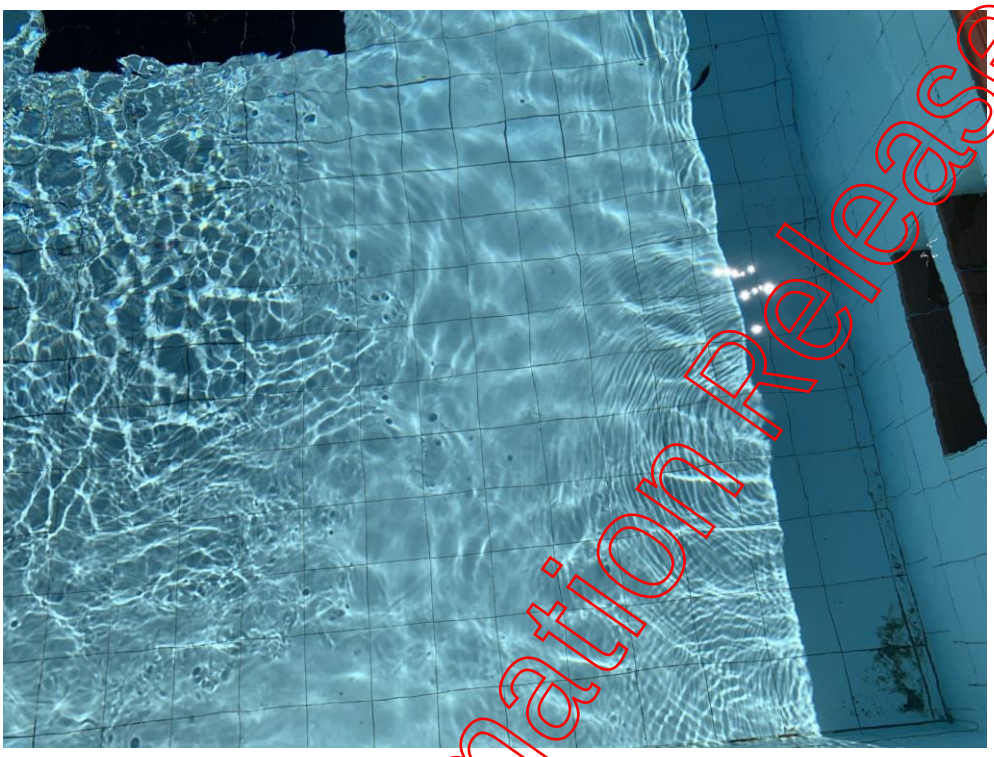

Figure 9: Non-slip resistant tiling on pool floor

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25M POOL GENERAL ITEMS

Figure 10: 25m Pool

Applicable To:

- 25m Pool

Observations

- At the time of the inspection, the pool was very cloudy. This is a reported problem by the operators, with indications that the painted internal finish is failing. This paint failure is observed in particular areas of the pool, where the finish has severely degraded and the underlying structure is visible, indicating poor installation techniques in these areas.
- Flow through the pool appears to be very low. Water ebbs into the skimmers whereas it would usually have a visible flow.
- None of the skimmers are fitted with strainer baskets, which can result in pipework blockages.
- None of the filtered water returns to the pool have a fitting such as an eyeball present. Instead, open pipes are present in the pool which could become a hand entrapment.

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- Access around the pool does not comply with Royal Lifesaving Guidelines for Safe Pool Operation (min 1000mm for low traffic areas, min 3000mm for high traffic areas).
- A crack was observed in the pool wall at the upper level. This crack appears minor, however the fiberglass liner makes observation of other structural issues difficult.

Recommendations

- The painted finish in the pool is at the end of life and requires replacement, noting that also the fiberglass liner below the pool may be problematic due to its age. A higher-level approach towards the pool finish is required as discussed in the *Conclusions* section.
- The low flow through the filtration system is impacted by several factors, including the pipework, plant and pool fittings. This is discussed further in the *25m Filtration Plant* section.
- Provide strainer baskets to the skimmers.
- Provide eyeball fittings to the outlets.
- Review access in and around the pool and apply a risk assessment to mitigate movement and access risks.
- If the liner is to be removed, undertake a detailed structural assessment of the underlying structure.

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Additional Photographs

Figure 11: Cloudy water, poor access across end of pool

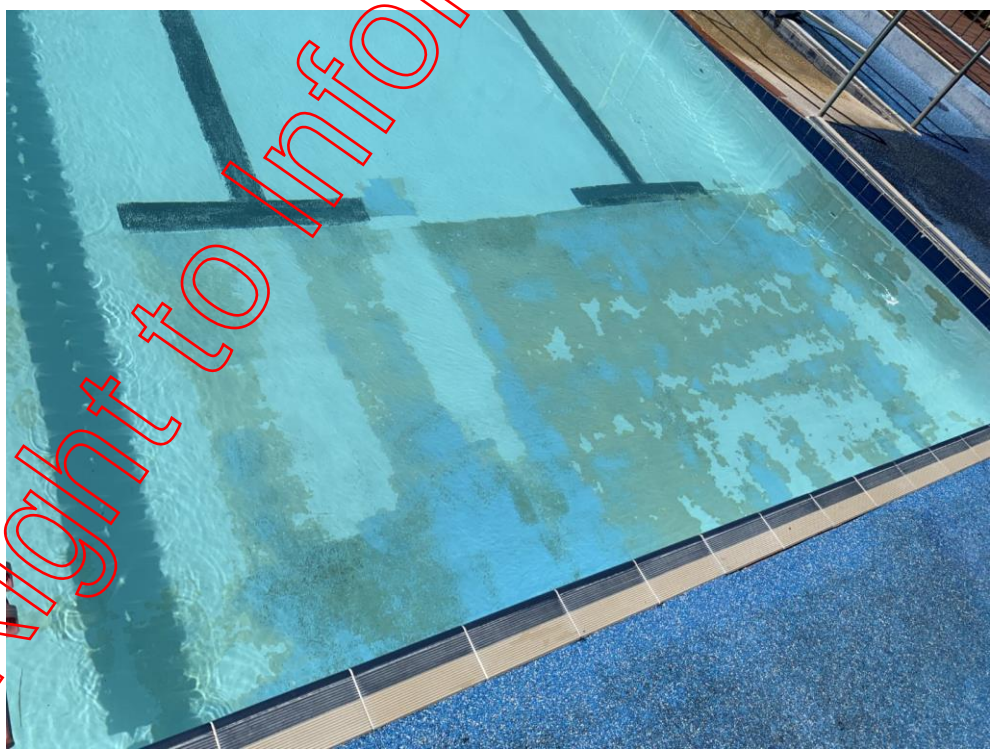

Figure 12: Region of failed finish in pool

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Figure 13: Skimmer without basket

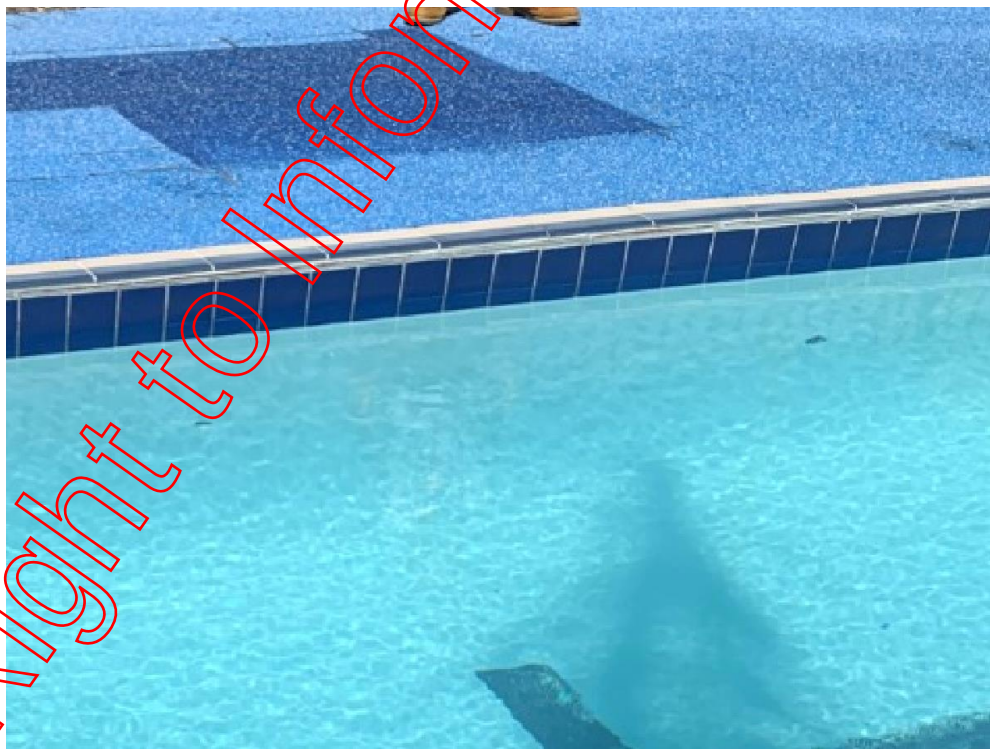

Figure 14: Uncovered filtered water returns

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Figure 15: Crack in structure

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25M POOL ACCESS RAMP

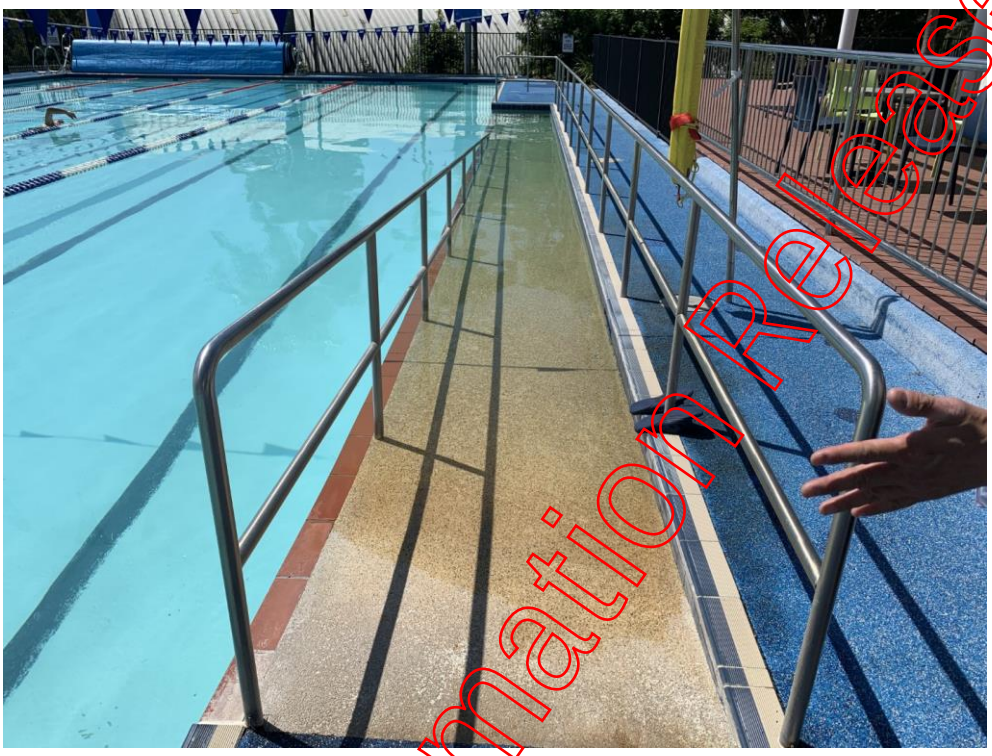

Figure 16: 25m Access Ramp

Applicable To:

- 25m Pool

Observations

- The 25m pool access ramp is not compliant with AS1428.1 *Design for Access and Mobility:*
    - There is only one handrail, whereas the standard requires two.
    - The provided handrail does not extend onto the landings at each end, nor is it provided with a kerb rail.
    - No mid-landing is present as is required under the standard.
    - The ramp delivers patrons to an area of the pool deeper than 1100mm (maximum depth as per NCC requirements)
- The entry into the ramp appears too steep and was identified as slippery.

Recommendations

- Modifying the ramp to comply involves significant reworks to the pool structure. For a long-term plan it is recommended to provide a compliant ramp, however in the short-term:

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- The slip resistance of the ramp should be investigated.
- The profile of the ramp should be confirmed (primarily the ramp gradient)
- A compliant access method (such as a platform lift) should be maintained.
- Appropriate signage should be adopted to inform patrons of the ramp compliance.

Additional Photographs

Figure 17: Bottom landing of ramp

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Figure 18: Lack of mid-landing in ramp

Figure 19: Initial transition into ramp identified as slippery

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LTS POOL GENERAL ITEMS

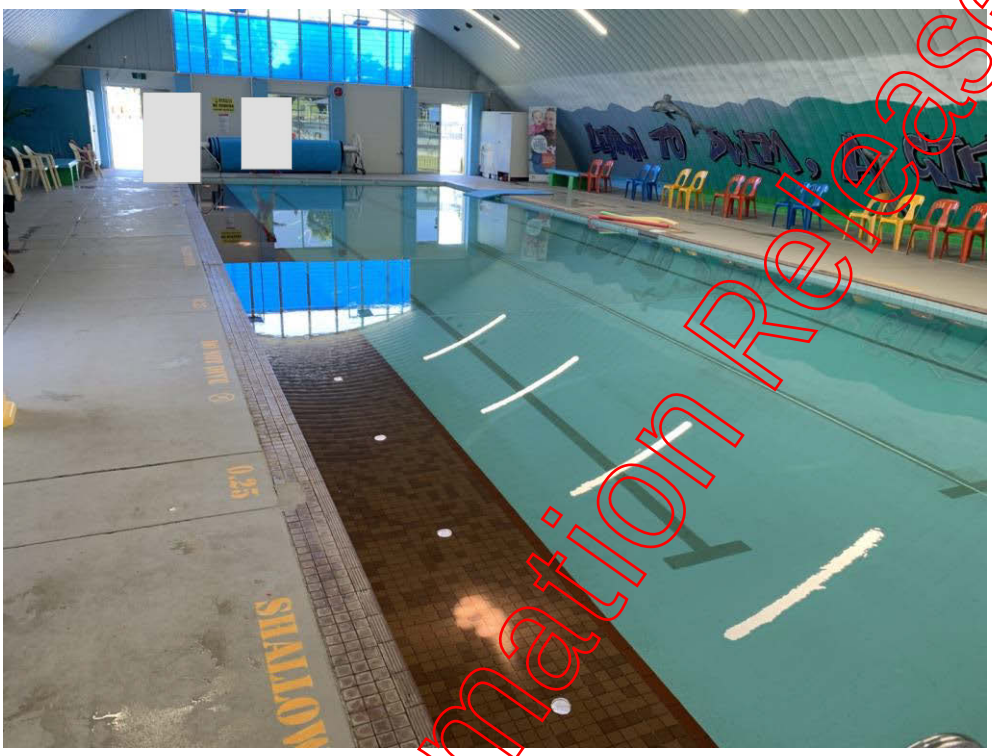

Figure 20: LTS Pool

Applicable To:

- LTS Pool

Observations

- The pool is not fitted with a compliant access point such as a ladder or steps.
- Depth markers on the vertical surface of the pool walls are half-submerged.
- The pool is not provided with slip-resistant floor finishes.
- The pool finishes are aging.
- Given the size of the pool, a maximum instantaneous bather load of 61 patrons is theoretically possible based on PWTAG requirements. A filtration system flowing at least 30 L/s would be required to support this bather load, which would not be achievable with the current hydraulic fixtures. A system flow closer to 15 L/s is more likely being achieved, limiting the bather load potential.
- Some of the lane rope anchors are not recessed, instead standing proud of the wall. These are an injury risk.

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Recommendations

- Whilst no major issues were identified with the pool structure itself, the pool is reaching end of life. Operators have advised that the patronage for the pool is now exceeding what the pool is capable of. Replacement of the pool is understood to be planned within the next 10 years. In the interim period:
    - Check slip resistance of the floor finishes
    - Rectify finishes where damage and degradation are identified
    - Remove lane rope anchors that are not flush or provide covers
    - Control bather load to maintain water quality.
    - Provide a compliant access point.

Additional Photographs

Figure 21: Skimmer in pool

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Figure 22: Failing finish on floor of pool

Figure 23: Submerged depth marker

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Figure 24: Damaged tiling, non-compliant access

Figure 25: Prominent anchor point

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Figure 26: Wearing floor finishes

Figure 27: Degraded / damaged finishes

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OUTDOOR PLAY POOL GENERAL ITEMS

Figure 28: Outdoor Play Pool

Applicable To:

- Outdoor Play Pool

Observations

- Cracks are observed in the pool structure. The majority of the cracks appear to be relatively minor cracks at the tops of the walls likely a result of under-reinforcement in the coping, however one larger crack appears to continue across the entire pool at the waterslide landing zone region.
- A set of fiberglass stairs have been added to the waterslide splash down area above a bench. These only reach the bench.
- Signage around the pool is generally lacking or incorrect. For example, a warning sign adjacent the waterslide landing area notes 'deep water' however the pool is only 900mm deep here. This may cause confusion.
- Circulation through the pool appears low in areas. A large amount of leaf material was observed in the pool and in the shallow region some of these leaves sat on the filtered water returns without moving.
- Water toys need servicing. Several blocked nozzles were observed.

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- Skimmer lids are not secure and some are cracked.
- The pool contains a mixture of old pebblecrete and new pebblecrete. The newer pebblecrete appears to be degrading, with the cement layer appearing to have been subjected to chemical attack.
- Safety suctions are provided adjacent each skimmer, assumed to be relief lines. The covers appear to be older covers and not compliant with current standards.
- The connection of the wall suctions shown in the pool and the feature system could not be confirmed. It's not sure if the system is installed in compliance with AS1926.3 *Suction Entrapment*.

Recommendations

- Undertake dye testing on the pool cracks to determine if there's leaks. Inspect the cracks closely during the dye testing to measure the width and attempt to determine if the cracking continues through the substructure or is primarily in the finishes level. Obtain specific direction following these works.
- Provide a proper ladder to the deep region of the pool.
- Undertake a signage audit as discussed later in this report.
- Undertake a circulation dye test in accordance with the Model Aquatic Health Code to identify any dead spots and rectify as required.
- Service the water toys.
- Replace all skimmer lids with secure fitting items.
- Confirm consistent water quality is being maintained in the pool, including having the pool in a slightly scale-forming state. Undertake a detailed assessment of pool finishes for condition.
- Replace all non-compliant safety suction fittings with AS1926.3 compliant covers.
- Review as-constructed documentation if located and undertake circulation and flow testing on all pool suction lines (primarily for features and skimmer balance pipes) to confirm the direct suction systems are in compliance with AS1926.3. Undertake appropriate rectifications where not.

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Additional Photographs

Figure 29: Crack across pool floor on eastern side

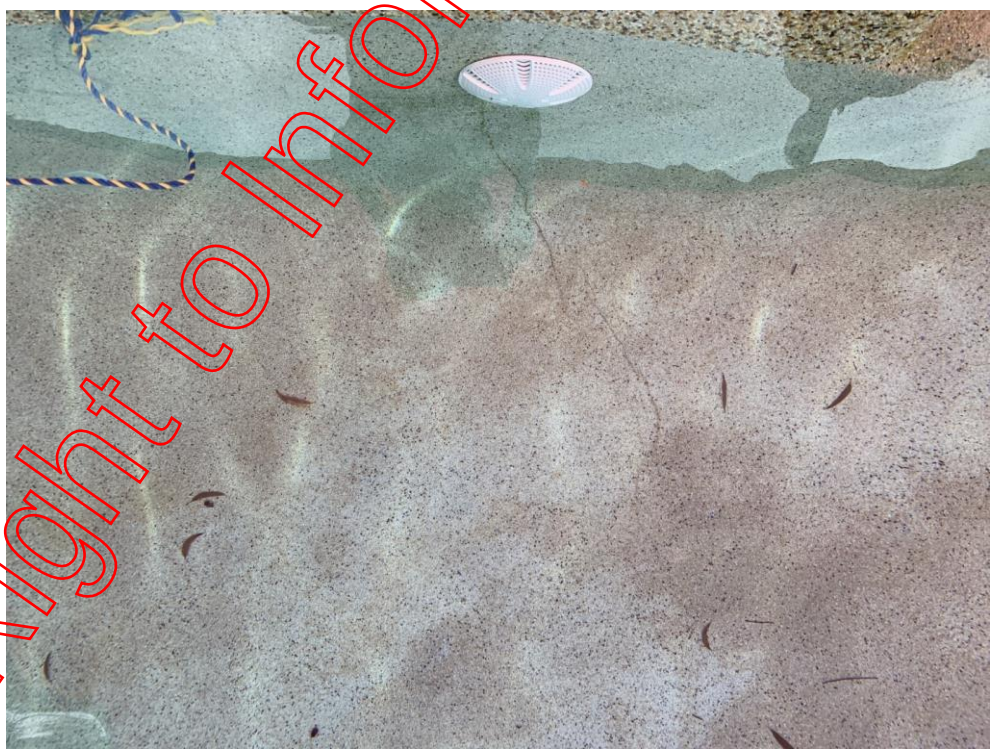

Figure 30: Crack across pool floor on western side

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Figure 31 : Cracks in coping

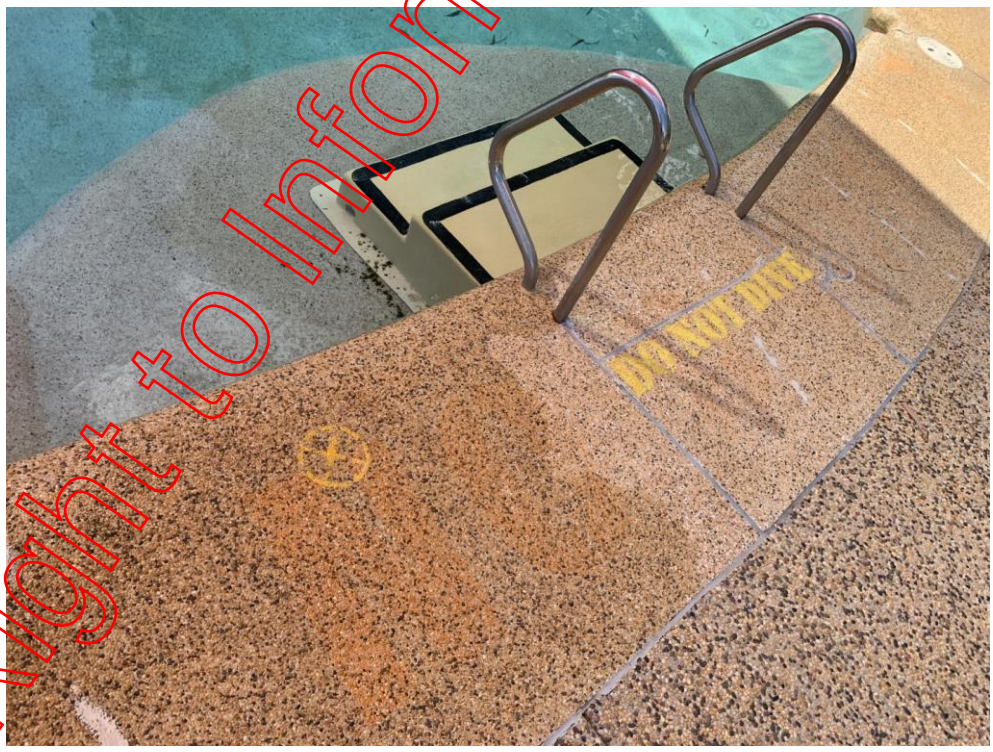

Figure 32: Cracks in coping, fibreglass stairs

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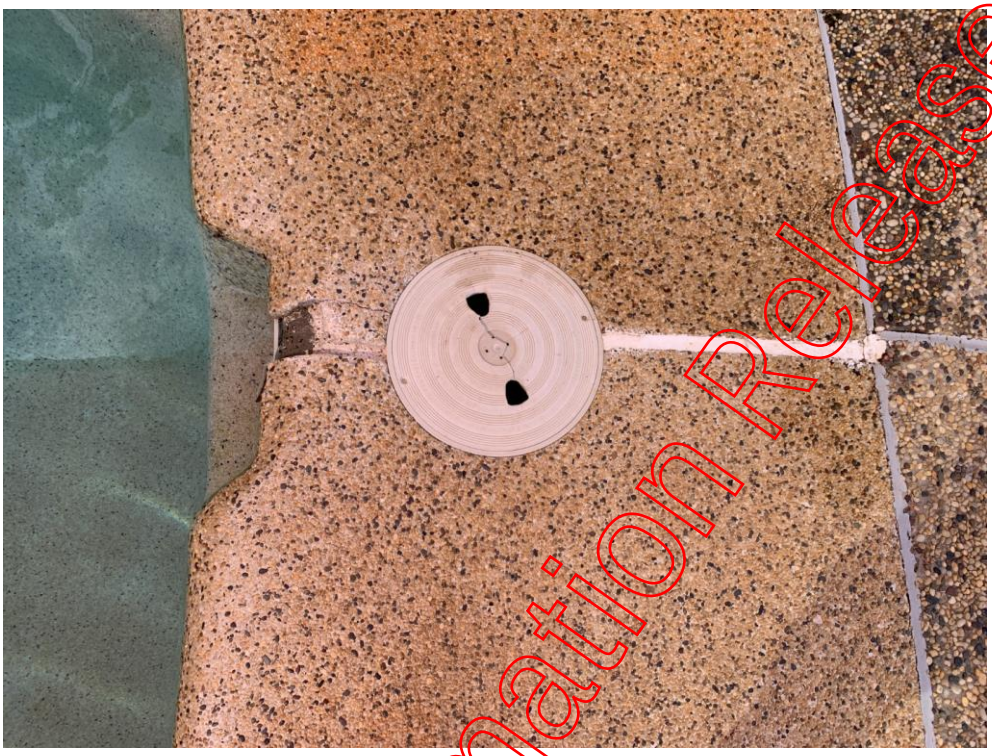

Figure 33: Broken skimmer lid

Figure 34: Leaves in deep region blown away from returns

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Figure 35: Leaves in shallow region sitting on returns

Figure 36: Deep water sign adjacent shallow water

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Figure 37: Water constantly leaking from cannon

Figure 38: Jammed bucket

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Figure 39: Older safety suction, crack in wall

Figure 40: Cracks in coping

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OUTDOOR PLAY POOL WATERSLIDE

Figure 41: Waterslide in Outdoor Play Pool

Applicable To:

- Outdoor Play Pool

Observations

- The waterslide is leaking at several of the joints.
- The access structure to the waterslide is notably rusted.
- The waterslide obstructs access around the end of the pool. People are likely to duck under the slide to get around the end of the pool, which could result in a head strike.
- The astroturf area in front of the slide access way is lumpy and a trip hazard.

Recommendations

- As a minimum, refurbish the slide and access way and undertake regular inspections of the timber support posts for rot and degradation. For long term planning, consider whether the slide is fit for purpose and the risks are considered appropriate.

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Additional Photographs

Figure 42: Leaks from slide flume

Figure 43: Rust under slide access way

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Figure 44: Rust in slide access way

Figure 45: Rust in slide access way

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OUTDOOR RIVER POOL GENERAL ITEMS

Figure 46: Outdoor River Pool

Applicable To:

- Outdoor River Pool

Observations

- A significant number of cracks are observed in the pool structure. The coping of the pool is regularly cracked with hairline cracks that appear to be relatively minor and likely a result of under-reinforcement in the coping. Several larger cracks are present in the walls of the pool which are larger than hairline that raise concern regarding the structural integrity of the pool. These cracks are vertical in the wall on the island and across the coping around the outlet grate. Additionally, a mass concrete bench is present in the pool which has large cracks at one end, indicating it is unreinforced.
- Filtered water returns in the floor of the pool have no water flow. This is likely due to the change in the filtration system, where the original filtration connections have been disconnected and the filtration system run in parallel

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with the river pumps. Resultantly, a large unmoving clump of debris is present on the floor.

- Patches of the floor finish are missing. These are typical where the pebblecrete finish has delaminated from the base concrete structure either due to age, structural movement or incorrect installation. Whilst only a couple of areas are currently present it's possible that larger regions have delaminated but have not yet cracked away. Where sharp edges are present a cut risk remains.
- The recesses in the pool floor where the jets are located are potential trip hazards.
- Signage to the pool is poor.
- No compliant access is provided into the pool. A bench is placed in front of the overflow grate assumed to be the intended access however it's too large to comply as a set of steps and is not provided with a handrail.
- The island itself is a visual obstruction to lifeguards.
- The earthing connection to the large stainless grate is broken.

Recommendations

- Undertake dye testing on the pool cracks to determine if there's leaks. Inspect the cracks closely during the dye testing to measure the width and attempt to determine if the cracking continues through the substructure or is primarily in the finishes level. Obtain specific direction following these works.
- Provide a proper access ladder to the pool, ensuring that it does not form an obstruction to patrons utilizing the river. This may be better off provided as a set of stairs constructed into the bench region with a handrail.
- Repair the failed floor finishes sections as a short-term rectification and consider full finishes replacement as a long term. For the repairs, it's recommended to drain the pool, remove any additional loose areas, make good the remaining and inspect the finishes for any other drummy sections.
- Undertake a signage audit as discussed later in this report.
- Undertake a circulation dye test in accordance with the Model Aquatic Health Code to identify any dead spots and rectify as required. This may involve reconnecting the original filtered water return lines.
- Repair the broken earthing connection
- Provide a cover system to the floor jets

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Additional Photographs

Figure 47: Numerous cracks in pool coping

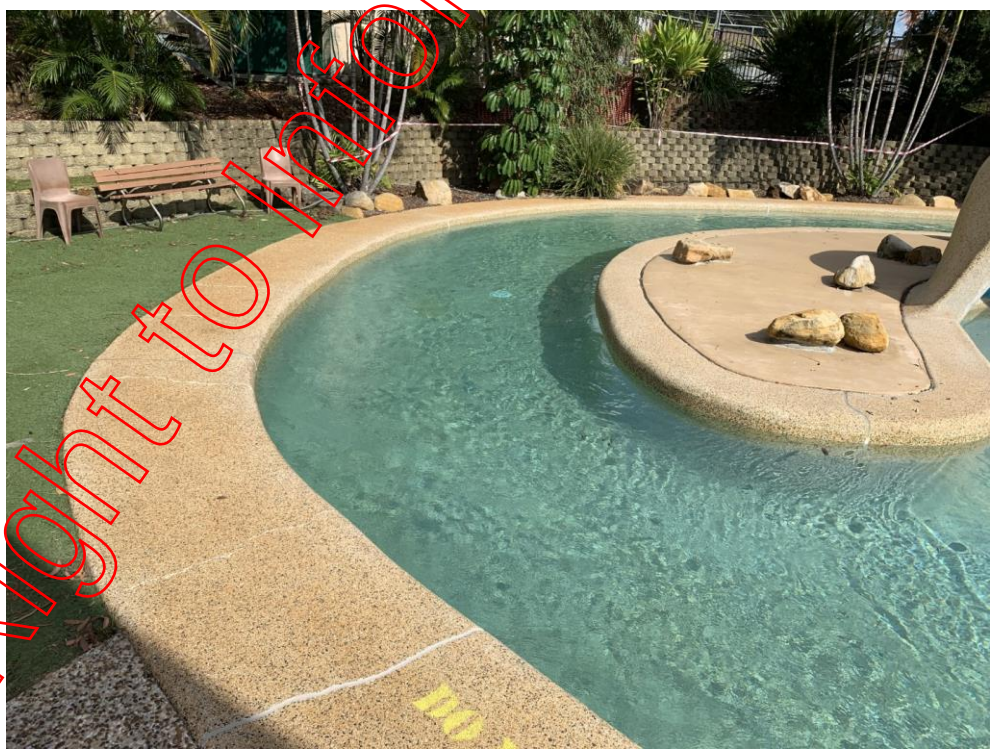

Figure 48: Cracks in coping

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Figure 49: Cracks in coping, missing floor finish

Figure 50: Overflow grate with bench in front

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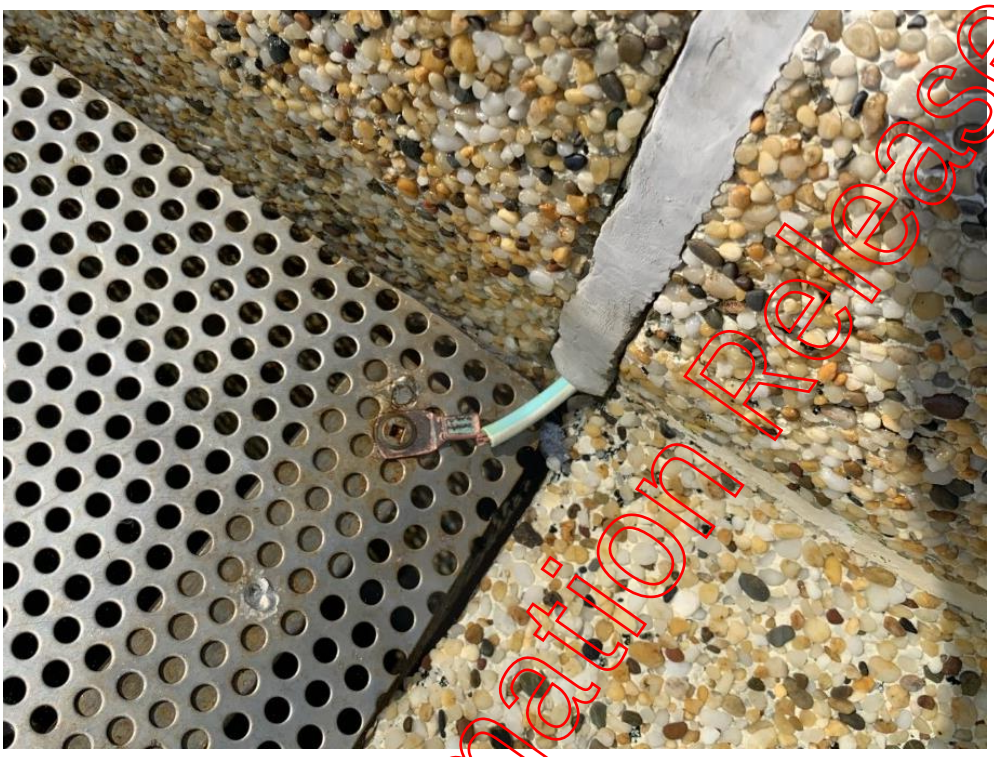

Figure 51: Broken earth connection to overflow grate

Figure 52: Cracks in pool wall

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Figure 53: Cracked bench

Figure 54: Sealed cracks at overflow chamber

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Figure 55: Missing floor finish

Figure 56: Debris accumulation in pool

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Figure 57: Jets in pool floor

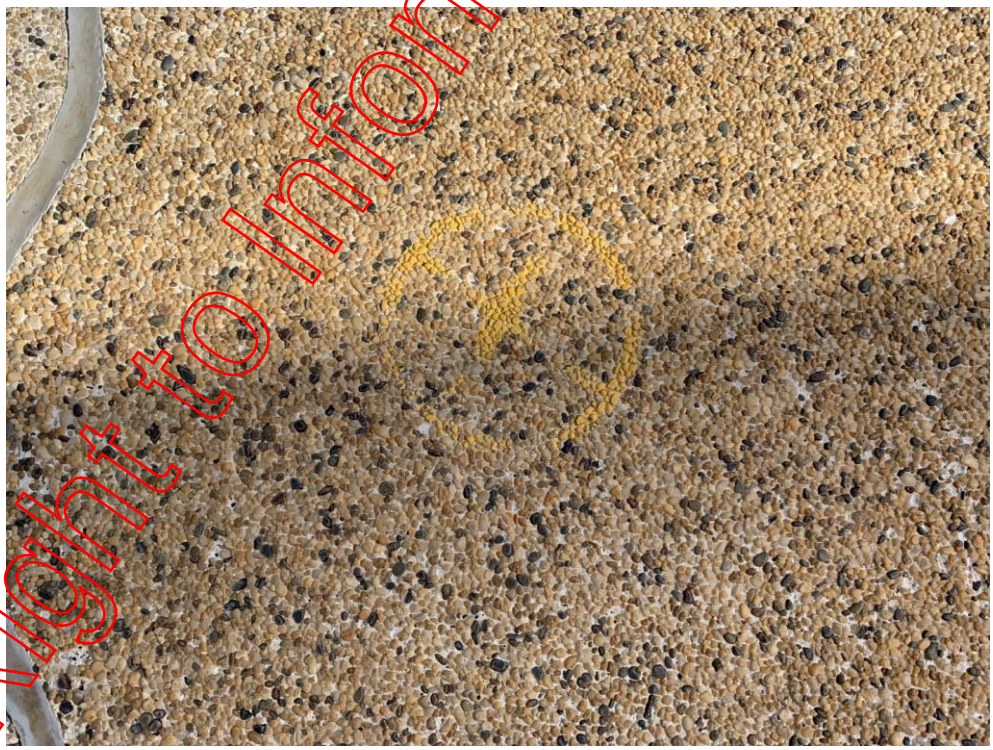

Figure 58: Faded signage

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POOL SIGNAGE

Figure 59: Signage at 25m Pool

Applicable To:

- All Pools

Observations

- Whilst warning and depth signage is present around the pools, it is not consistent and does not comply with the Royal Lifesaving Guidelines for Safe Pool Operation.

Recommendations

- Engage Royal Lifesaving (generally undertaken through Pool Star) to provide a signage audit and report. Update the signage as recommended.

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EQUIPOTENTIAL BONDING (EARTHING)

Applicable To:

- All Pools

Observations

Under AS3000 *Wiring Rules*, generally speaking all fixed conductive items that are greater than 100mm in any dimension and lie within the prescribed pool zones are to be equipotentially bonded. This means running an electrical conductor between all the items, and connecting it to the earthing system. The pool zones generally include the pool body itself as well as an area extending to a height 2.5m above the water level and a perimeter 3.5m beyond the pool waterline, however under the standards the requirement extends to the reinforcement in the pool and concourse as well.

Some indications of earth connections was observed during the inspection, however some of these were identified as degrading of broken.

Recommendations

- Engage an electrician to inspect the installation and test the conductive items to confirm firstly if earthing has been provided at all, and if so whether it passes the requirements.
- If no earthing system is present or failures are present, engage the electrician to supply and install one, taking note of the requirements under the standards as well as the issues associated with installing electrical conductors in a chlorinated environment. Stainless links to the items back to a main copper conductor system may be required.

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POOL WATER TREATMENT PLANT

NORTHERN EQUIPMENT ROOM GENERAL ITEMS

Figure 60: 50m Pool Equipment Room

Applicable To:

- 50m Pool

Observations

- The area where the chlorine truck parks for unloading bulk liquid chlorine is not a sealed surface. Should a spillage occur, it can escape to the surrounding environment.
- Labelling of pipework and valves, whilst sometimes present, is not clear, obvious and consistent. For example, heating circulation lines are unlabeled, whilst valves are just numbered without any reference diagrams provided for their use.
- The pipework to the heater circulation pumps is poorly constructed and supported.

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- Chemical storage signage is generally present, however some chemical stores for minor storage is unlabeled. Minor storage in the respective room is messy with pathway obstructions.
- The latch on the distribution board in the pump room has failed and has been replaced with a conduit clip to hold the door closed.
- The electrical installation is poor in general, with inadequate signage, disused equipment and aged components.

Recommendations

- Consider converting from bulk liquid chlorine (discussed in the *Conclusions* section) or provide a bunded truck unloading area in accordance with AS3780 *The Storage and Handling of Corrosive Substances*.
- Provide adequate signage to all chemical storage areas including the equipment room exterior and chemical dosing areas. Ensure MSDS's are located adjacent relevant chemical stores and that clear access is available to all chemics.
- Label all pipes with their flow direction and contents and label all valves clearly.
- Re-run the heater circulation pipework to be neater, correctly supported and functional.
- Engage an electrical contractor to provide a full internal condition and compliance audit on the boards and electrical installation.

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Additional Photographs

Figure 61: Chlorine unloading area

Figure 62: Crowded chemical storage, poorly labelled

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Figure 63: Unlabeled poorly configured heater pipework

Figure 64: Conduit clip to hold door closed

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Figure 65: Poorly labelled control panel

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50M POOL FILTRATION PLANT

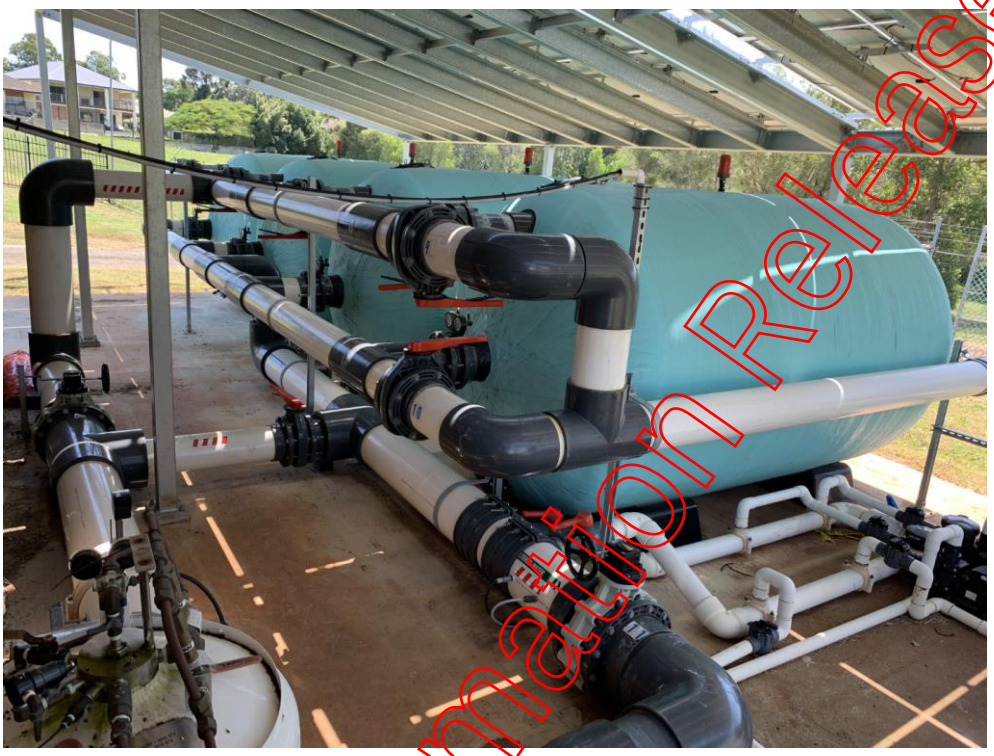

Figure 66: 50m Pool Filters

Applicable To:

- 50m Pool

Observations

- Access through the equipment area is poor, with the filtration manifold being constructed with low level trip hazards and high-level head obstructions. These items have been marked with reflective tape however still require operators to step over them.
- The filtration manifold is poorly constructed. The system main pipework is sized as DN300 whilst the filter header manifolds are sized as DN200. The pipework drops in size to the DN200 prior to the split at the manifold, needlessly increasing the system velocity and resultant friction loss. As the system flow meter is not functional verification of the actual system flow is not possible, however assuming a nominal system flow of 85 L/s (based on a 5 hour turnover for the pool) this reduction in pipework is potentially adding an additional 1.5m of friction loss to the pool filtration system.

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- The hair and lint strainer is a large unit, with the basket being difficult to remove.
- The chemical controller on the system is an obsolete Prominent brand unit. The system has limited chemical measurements, error reporting and spare parts.
- The pool heating is currently provided through Raypak direct-fired gas pool boilers. Whilst these boilers have a relatively low capital cost, they have relatively short lifespans and large ongoing operating costs.
- Pressure gauges on the filtration pumps have failed.
- The flow meter appears to have jammed and displays no flow.
- Chemical injectors are not labelled. Dosing lines are not run in conduits.

Recommendations

- Rebuild the filtration system manifold to be correctly sized and to avoid trip and head strike issues in areas through walkways.
- Review the operational procedure for removing the hair and lint basket for cleaning and consider the addition of a lifting davit.
- Provide a new chemical controller.
- Consider replacement of the gas heating system with electric heat-pumps.
- Replace failed pressure and flow measurement equipment.
- Label chemical injectors.
- Run all chemical dosing lines in sealed conduits from dosing controllers/pumps to injection points.

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Additional Photographs

Figure 67: Premature step-down of pipe size, head strike

Figure 68: Late increase in pipe size

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Figure 69: large hair and lint pot

Figure 70: Obsolete chemical controller

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Figure 71: Inefficient gas boilers

Figure 72: Unlabeled chemical injectors

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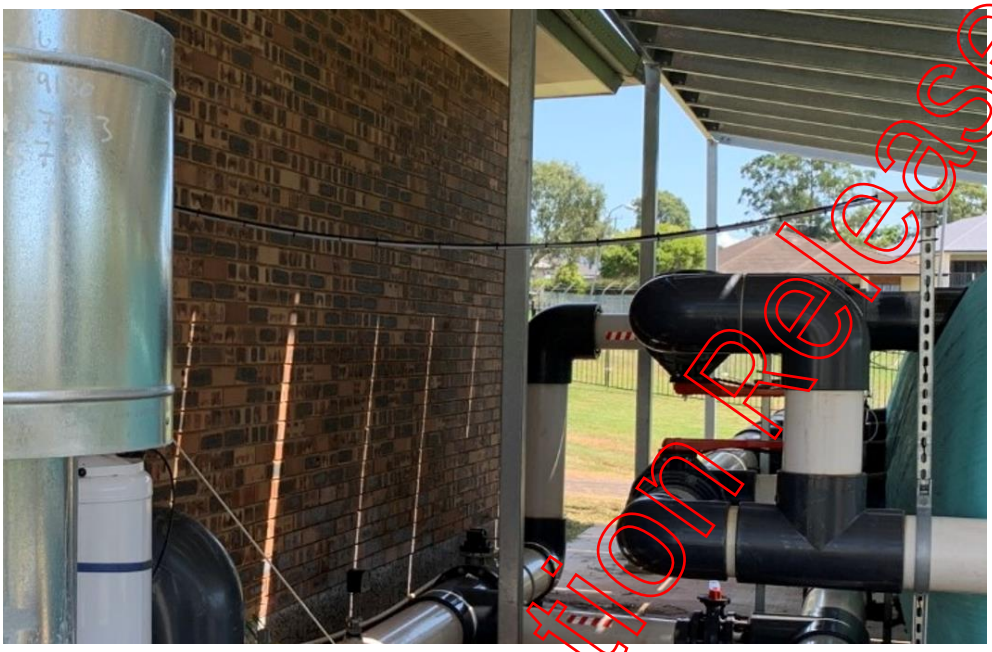

Figure 73: Unprotected dosing line suspended between wall and bracket

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EASTERN EQUIPMENT ROOM GENERAL ITEMS

Figure 74: Eastern Equipment Room

Applicable To:

- 25m Pool
- LTS Pool

Observations

- As a general summary, the eastern equipment room is a poor installation that required significant reworks. Access is poor, building structures are degrading and the equipment within is poorly installed. Pipework is poorly installed and poorly supported. Numerous safety and condition issues exist, requiring significant works to overcome. The equipment areas appear to have been tacked on and grown over the life of the facility without an overall consideration to the facility use and maintenance.
- The area where the chlorine truck parks for unloading bulk liquid chlorine is in a publically accessible carpark without any spill retention measures. This creates a notable risk to health and safety should a spillage occur.
- Labelling of pipework and valves, whilst sometimes present, is not clear, obvious and consistent. For example, heating circulation lines are

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unlabeled, whilst valves are just numbered without any reference diagrams provided for their use.

- The latch on the UV control panel in the pump area has failed with tape holding the door shut. Electrical equipment is exposed behind the door.
- The electrical installation is poor in general, with inadequate signage, disused equipment and aged components.
- The chlorine storage tank produces several compliance and condition issues:
    - No tank vent or overflow are provided as per AS3780
    - No labelling is provided on the tank as per AS3780 such as volume indicators
    - The bund is in poor condition, unlikely to be sealed in the event of a spill.
    - The fill point for the tank is poorly supported and may break during a tank fill.

Recommendations

- Consider replacement of the entire equipment room with a properly designed room considering actual equipment size requirements (to suit correct equipment for 25m and LTS), access pathways, chemical storage, chemical unloading and the like.
- Consider converting from bulk liquid chlorine (discussed in the *Conclusions* section) or provide a full refurbishment to the chlorine storage including new tank and bund as well as a bunded truck unloading area in accordance with AS3780 *The Storage and Handling of Corrosive Substances*.
- Provide adequate signage to all chemical storage areas including the equipment room exterior and chemical dosing areas. Ensure MSDS's are located adjacent relevant chemical stores and that clear access is available to all chemics.
- Label all pipes with their flow direction and contents.
- Engage an electrical contractor to provide a full internal condition and compliance audit on the boards and electrical installation.

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Additional Photographs

Figure 75: Poor access through equipment room

Figure 76: Poor condition external equipment, unsafe access to manifold

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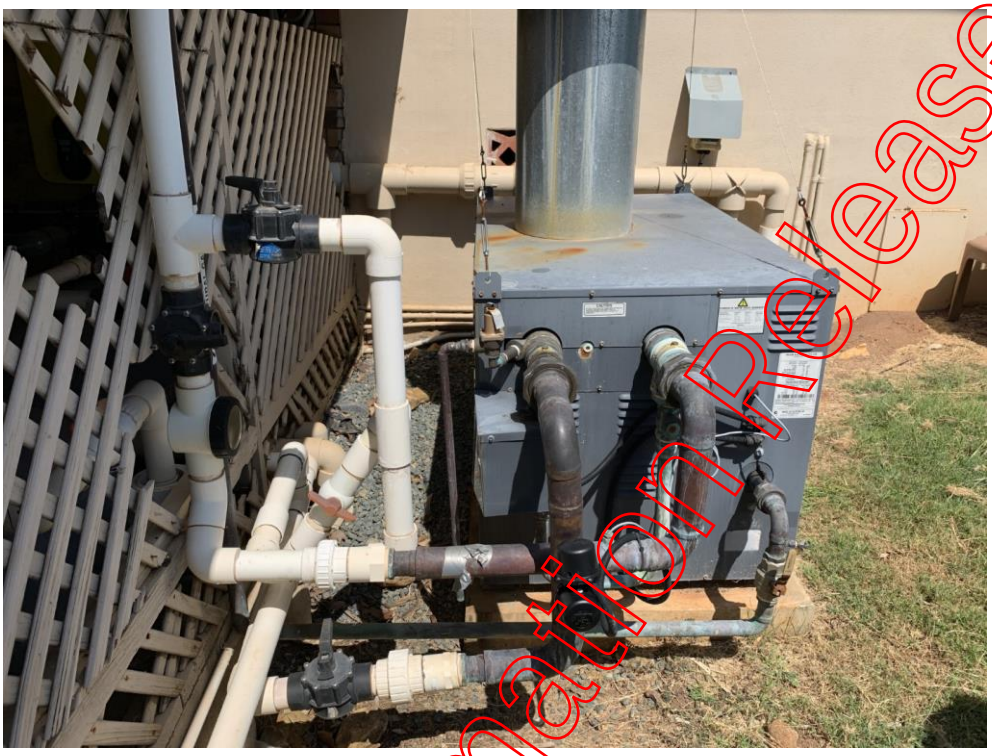

Figure 77: Poorly installed and supported pipe

Figure 78: Poorly installed and supported pipe

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Figure 79: Poorly installed pipework, inaccessible multiport valve

Figure 80: Rusted pipe supports, unsupported pipework

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Figure 81: UV Degraded external equipment

Figure 82: Failed door hinge, poor building condition

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Figure 83: Public carpark where chlorine truck unloads

Figure 84: Unlabeled equipment in equipment room, loose extension cord

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Figure 85: Unsafe working surface between plant and truck unloading area

Figure 86: Obstructed main distribution board

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Figure 87: Open UV control panel with broken latches

Figure 88: Poor condition bund wall

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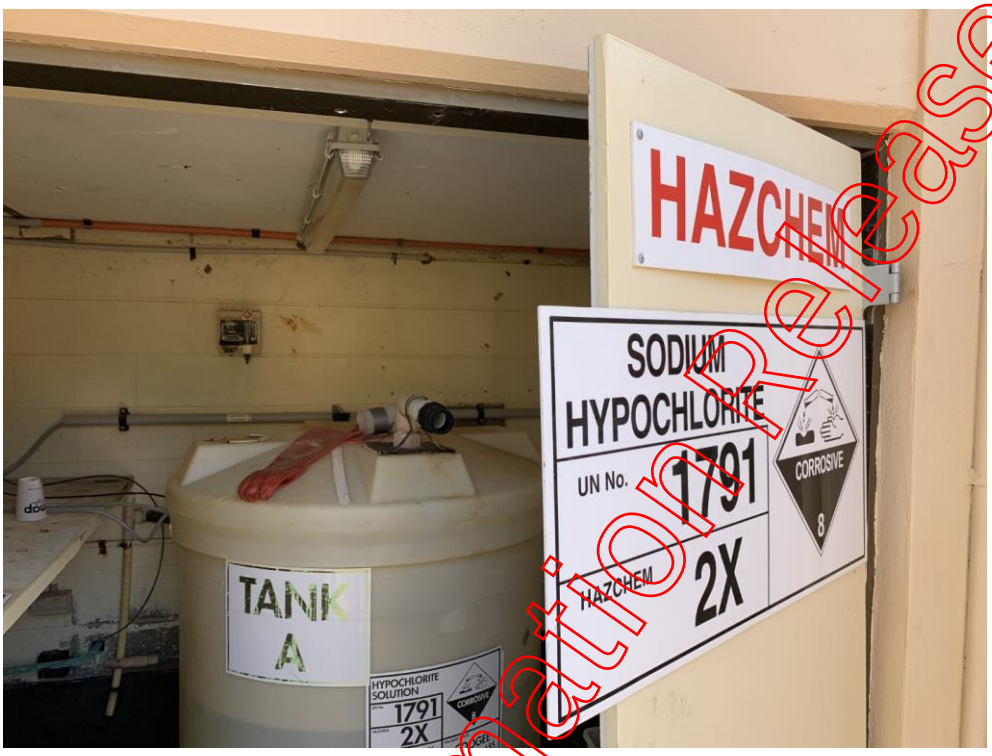

Figure 89: Poorly installed signage on broken door

Figure 90: Tank with no level markings or solid plumbing connections

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Figure 91: Poor condition bund with debris

Figure 92: Disused equipment, open inlet to tank

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25M POOL FILTRATION PLANT

Figure 93: 25m Pool Pump and Filters

Applicable To:

- 25m Pool

Observations

- Whilst flow measurement equipment on the pool was not functional at the time of the inspection (reading 2,100 L/m which is far from achievable given the current installation), the system flow is expected to be significantly lower than what is required for this pool.
    - The pool is approximately 25m x 13m, with a nominal volume of or around 370 m³. Applying a four-hour maximum turnover for the pool, a minimum system flow of 25.7 L/s should be provided.
    - The two DN80 suction pipes flowing from the skimmers are limited to around 10 L/s each. The pipes then tee together into a single DN80 before entering the pump, further limiting the system flow.

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- The system is provided with 3 x 1200mm filters, which have a maximum flow of 11.4 L/s each. Whilst this flow rate is acceptable for the required flow, the 50mm multiport valves on each filters severely limit the system flow. Additionally, access to the multiport valves for maintenance is very poor and has the potential to break poorly installed pipework as people climb over the pipework to reach the valves.

- The filtration pump baseplate is rusty. The pump is not provided with no-flow protection, which may result in a pump burnout.
- The backwash lines from the filters discharge to a floor waste in the equipment room instead of the backwash holding tank. It's not known where this floor waste drains to.
- The chlorine dosing pump is not labelled, has an inaccessible injector and has an overpressure line that discharges to the room adjacent the pump. If the injector becomes blocked, chlorine will be discharged into the room.

Recommendations

- Provide reliable flow monitoring equipment and confirm the system flow.
- As part of the equipment room replacement, provide a new correctly designed filtration system, rated to suit the required flow for the pool. Pipework upgrades to the pool may be required for this. Due to the numerous issues with access, pipework configuration and the like, minor refurbishment works are difficult to provide.
- Divert the backwash to the holding tank.
- Rectify the chlorine dosing pump situation.

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Additional Photographs

Figure 94: Restriction in filtration pump inlet

Figure 95: Filtration pump installed direct to slab, rusty baseplate

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Figure 96: Backwash to floor drain, trip hazards

Figure 97: Chlorine dosing pump, overpressure line discharging to room

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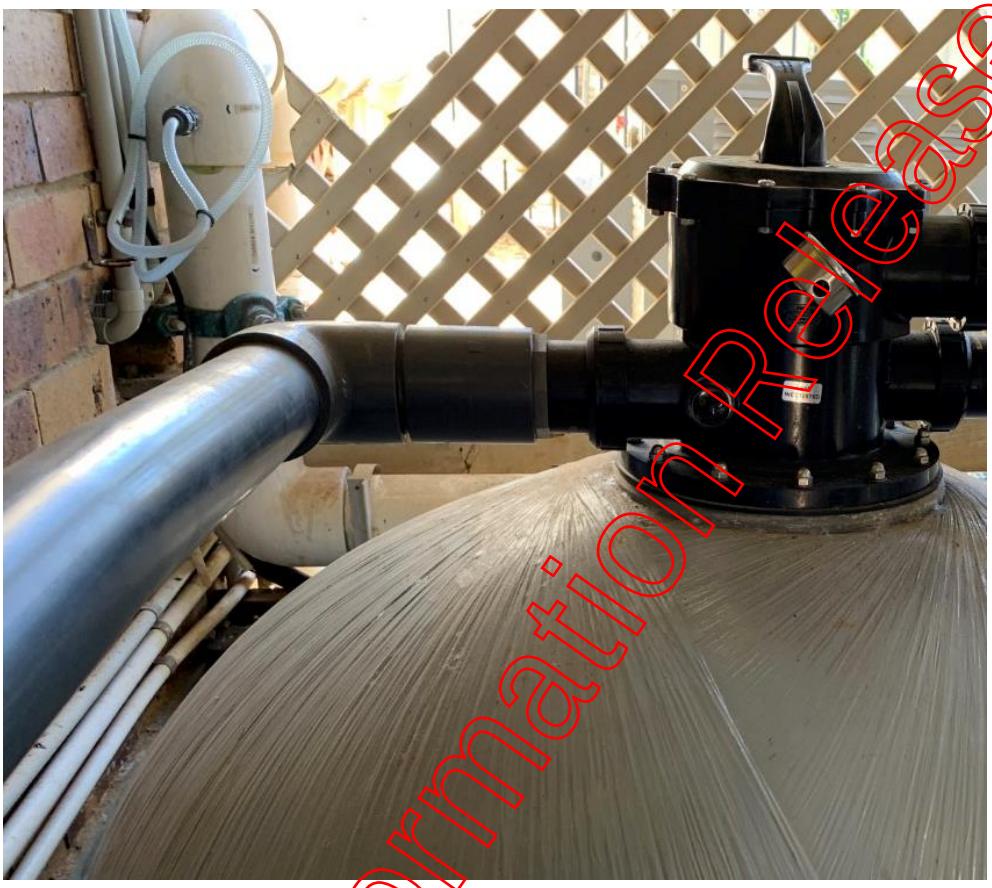

Figure 98: Inaccessible chlorine injector

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LTS POOL FILTRATION PLANT

Figure 99: LTS Pool Pump and UV Unit

Applicable To:

- LTS Pool

Observations

- Flow measurement equipment on the pool was reading approximately 900 L/min at the time of the inspection. Whilst calibration of the flow meter is not confirmed, this flow is a reasonable flow to expect for the system. Regarding required flow for this pool:
    - The pool is approximately 20m x 6.8m, with a nominal volume of or around 124 m³. For a learn to swim pool, a turnover of between 1 to 2 hours should be provided depending on bather loads for the pool. This requires a filtration system flowing between 17 to 34 L/s.
    - If the current system is flowing around 15 L/s, whilst this is longer than the Queensland Health maximum recommended turnover time, it is only marginally longer. This flow would be

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considered appropriate for a maximum bather load of 31 patrons and an average hourly bather load of around 8 patrons.
    - The primary limitation in the pool appears to be the pool skimmers, which are nominally rated to 5 L/s each. Increasing the system flow to support higher bather loads would require major replacement of the hydraulic plumbing components.
- The filtration strainer has a solid lid. Operators must remove the lid to inspect the strainer internals.
- Access to the filters is poor. The filters are degrading from UV exposure. A leak is present in the manifold.
- The filtration pump is rusty and is not provided with inlet or outlet valves. The pump is not provided with no-flow protection, which may result in a pump burnout.
- The chlorine dosing pump is not labelled, has an inaccessible injector and is not fitted with a multifunction valve (overpressure relief / anti-siphon).

Recommendations

- Provide reliable flow monitoring equipment and confirm the system flow.
- As part of the equipment room replacement and LTS pool replacement, provide a new correctly designed filtration system, rated to suit the required flow for the pool. Due to the numerous issues with access, pipework configuration and the like, minor refurbishment works are difficult to provide.
- Rectify the chlorine dosing pump situation.

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Additional Photographs

Figure 100: Pool filters with unsafe access, UV degradation to filters

Figure 101: Poor condition pump motor

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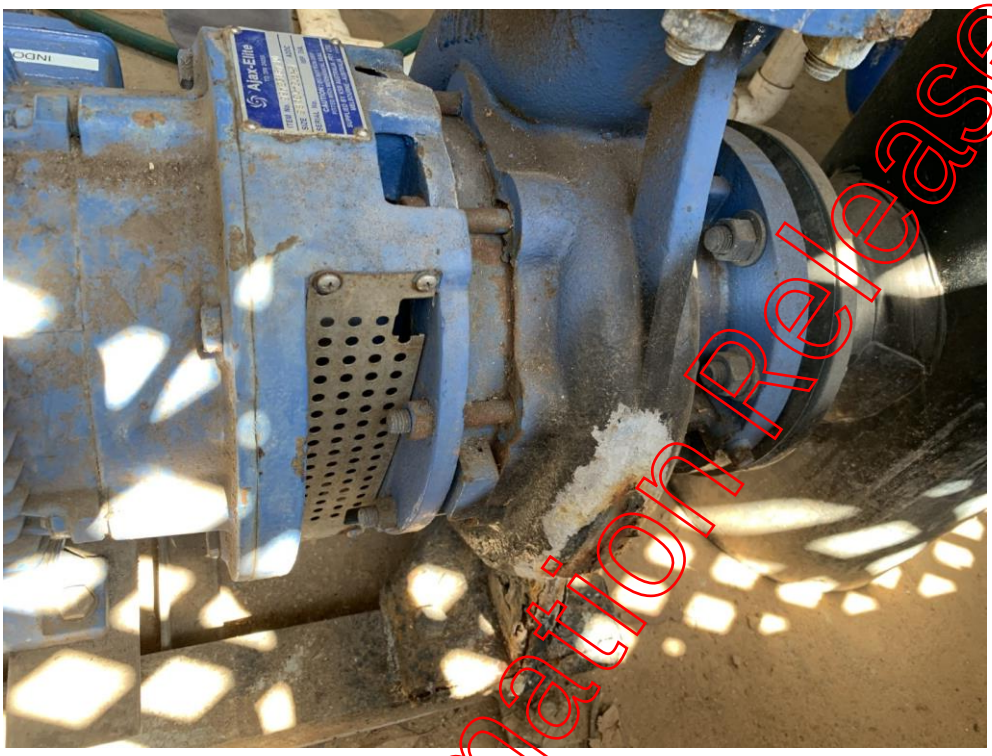

Figure 102: Poor condition pump housing

Figure 103: Leak in pipework

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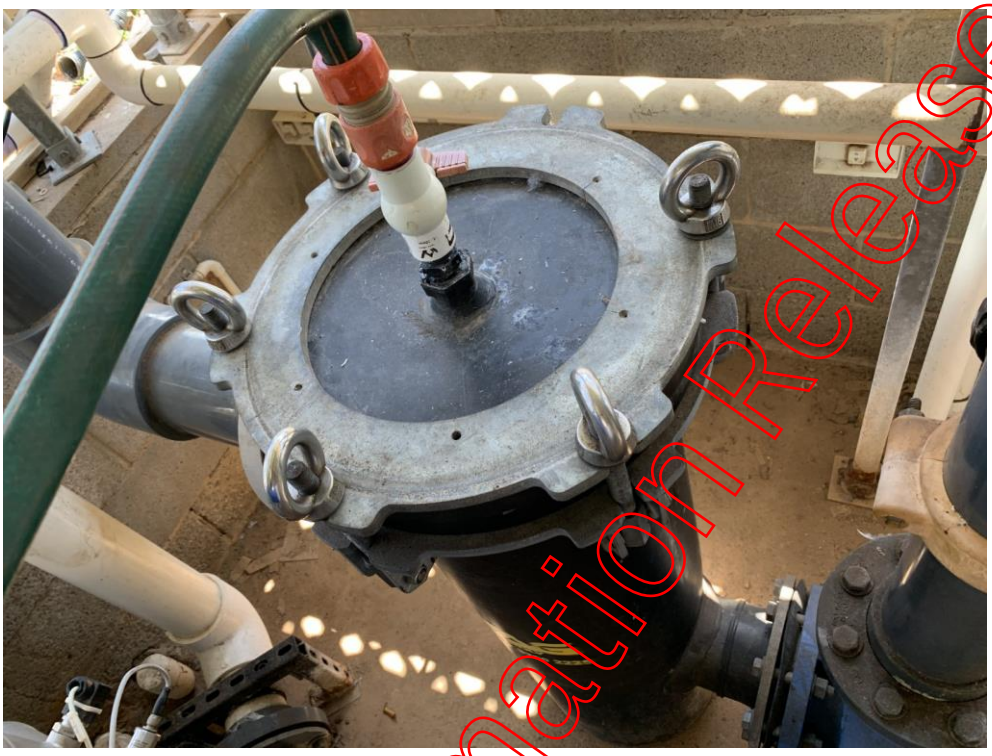

Figure 104: Solid lid on strainer

Figure 105: Chlorine injection point

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Figure 106: Chlorine dosing pump with no multifunction valve

Figure 107: UV degraded filter

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WESTERN EQUIPMENT ROOM GENERAL ITEMS

Figure 108: Western Equipment Room

Applicable To:

- Play Pool
- River Pool

Observations

- The area where the chlorine truck parks for unloading bulk liquid chlorine is not a sealed surface. Should a spillage occur, it can escape to the surrounding environment.
- Labelling of pipework and valves, whilst sometimes present, is not clear, obvious and consistent. For example, heating circulation lines are unlabeled, whilst valves are just numbered without any reference diagrams provided for their use.
- The pipework to the heater circulation pumps is poorly constructed and supported.
- Chemical storage in the room is poor.

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- The electrical installation is poor in general, with inadequate signage, disused equipment and aged components. Cable trays are rusting and the switchboard contains obsolete equipment.
- A drip tray is provided below the chemical measurement and dosing area. Both chlorine and acid injectors are present, meaning that if a leak occurs in both and acid and chlorine line the incompatible substances can mix and cause a dangerous environment.
- The acid storage is poor in general.
- The main river pumps and play pool filtration pump are located in a submerged pump well, accessible via a ladder. Access around the pumps does not comply with workplace health and safety requirements.
- Obsolete equipment is present in the room.
- There's a concrete pad outside the equipment room however the ground has subsided around it. This generates a trip hazard.
- Flow meters are installed on the systems between filters 2 and 3. Resultantly, the meters are not reading the full flows of the systems. The operators have reported that the flow meters are unreliable.
- Pipework support is inadequate, with filter manifolds practically unsupported.
- No positive ventilation system is present to the plant room. Many items inside are corroded.
- Chemical injection points are not labelled.
- The chlorine storage tank produces several compliance and condition issues:
    - The tank vent discharges to the room instead of the plant room exterior.
    - No dedicated overflow is provided.
    - No camlock coupler is provided on the tank fill point. Instead, the operator holds the hose in through the tank lid for filling which is highly dangerous.
    - No labelling is provided on the tank as per AS3780 such as volume indicators

Recommendations

- The access issues around the pumping area are difficult to resolve due to the elevated location of the equipment room. Raising the pumps up to floor

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level would be ideal however may introduce cavitation and priming issues. As an ideal solution, the pumps would be relocated to a new equipment enclosure down at the deck level of the pool, with good access provided around all equipment.

- Consider converting from bulk liquid chlorine (discussed in the *Conclusions* section) or provide a bunded truck unloading area in accordance with AS3780 *The Storage and Handling of Corrosive Substances*.
- Provide adequate signage to all chemical storage areas including the equipment room exterior and chemical dosing areas. Ensure MSDS's are located adjacent relevant chemical stores and that clear access is available to all chemics.
- Label all pipes with their flow direction and contents.
- Engage an electrical contractor to provide a full internal condition and compliance audit on the boards and electrical installation.
- Update the chlorine storage tank to comply with relevant codes.
- Relocate the acid dosing systems to the opposite end of the plant room to remove the risk of cross contamination. Improve the acid storage.
- Remove all obsolete equipment.
- Fill around the concrete step.
- Replace the flow meters and provide in the correct locations to measure full flow of the systems.
- Provide pipework supports in accordance with pipe supplier instructions so that no load is placed on equipment from pipework.
- Provide a mechanical ventilation system.
- Label all chemical injection points.

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Additional Photographs

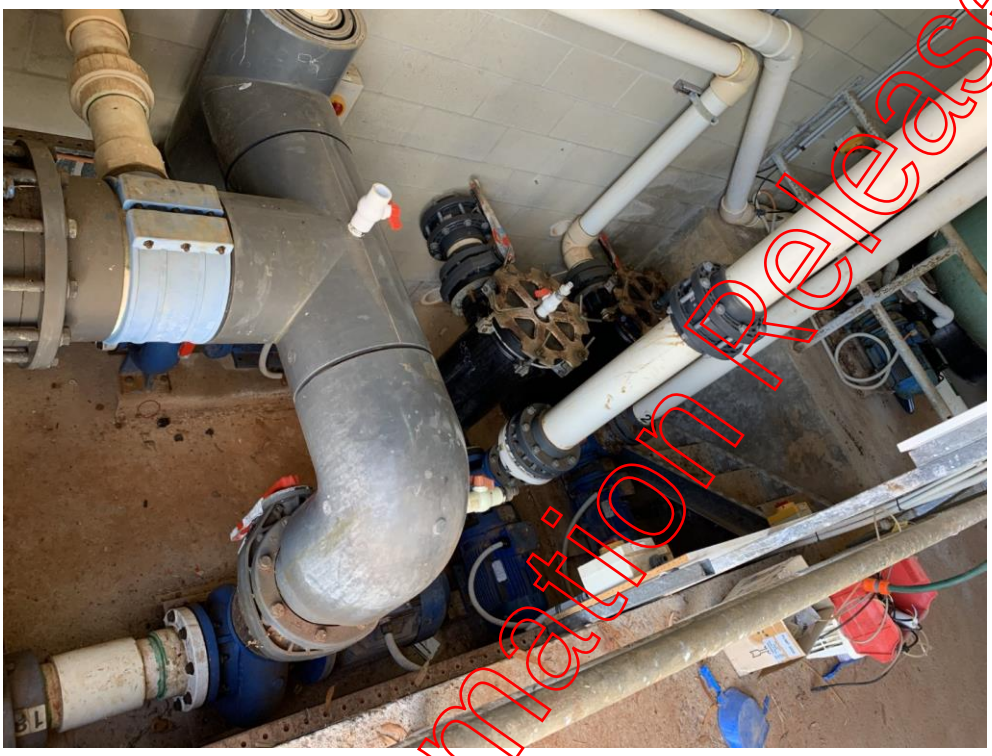

Figure 109: Submerged pump well, poor access

Figure 110: Chlorine tank with no fill point, overflow or level markings

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Figure 111: Chemical control and dosing area with disused equipment

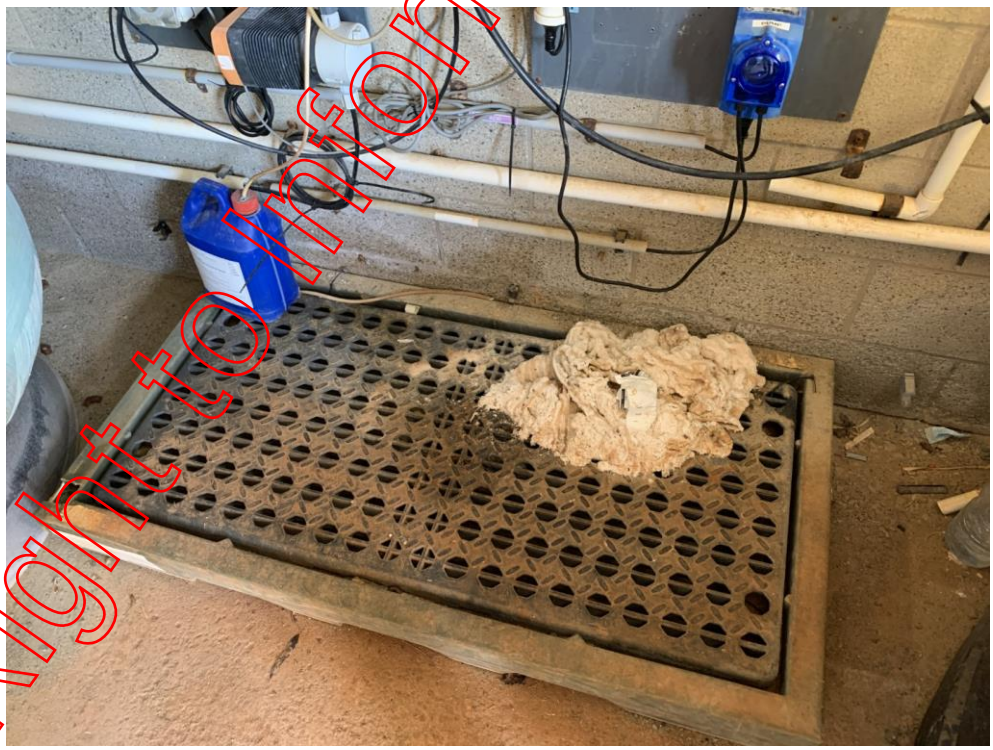

Figure 112: Chemical tub below dosing area

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Figure 113: Stairway into pump well with no access at bottom

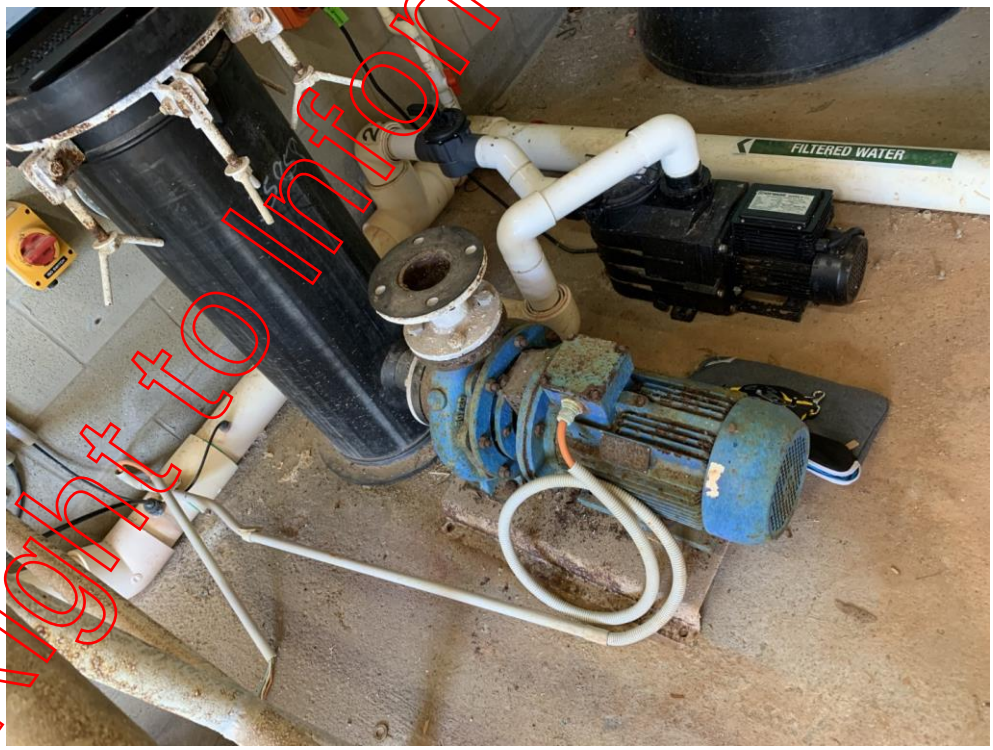

Figure 114: Disused equipment in room

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Figure 115: Obsolete equipment, poorly labelled pipework, disconnected heater pipework

Figure 116: Poorly managed acid storage

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Figure 117: Flow meter installed in wrong location

Figure 118: Inadequate pipe supports in filter manifold

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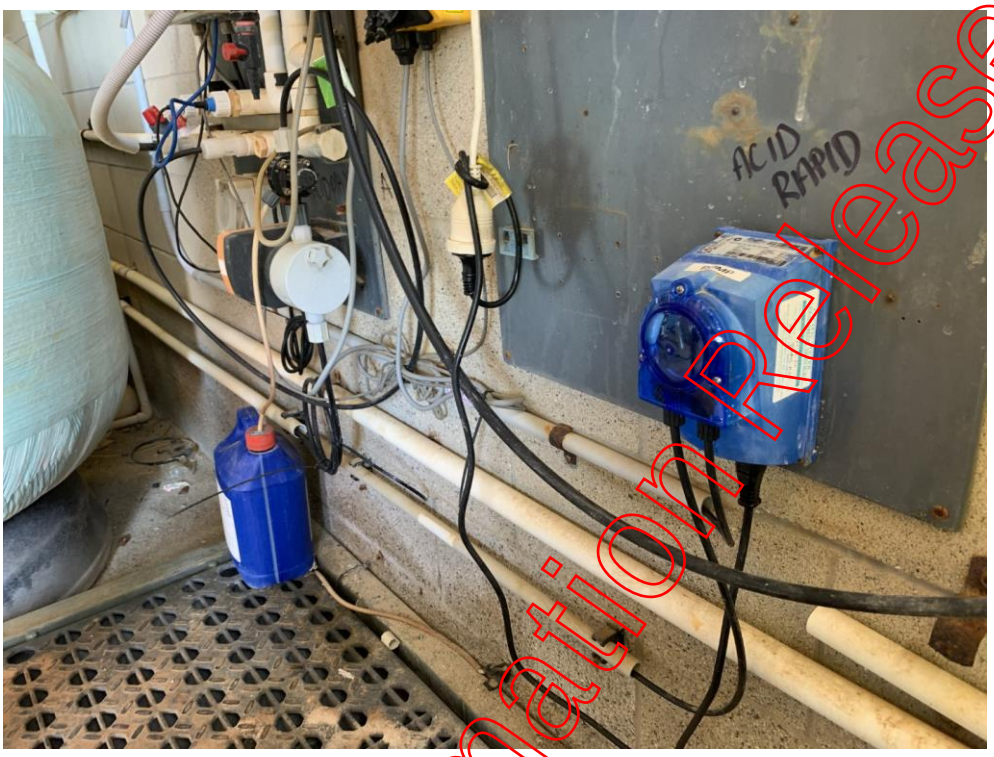

Figure 119: Poorly labelled and installed equipment

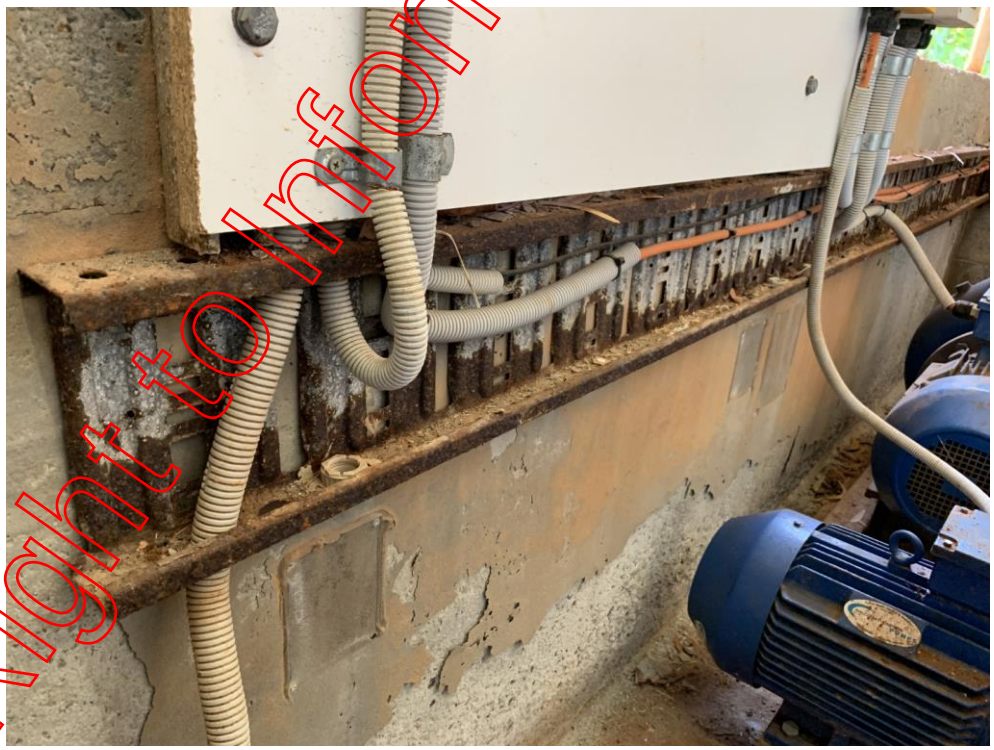

Figure 120: Rusty cable tray

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Figure 121: Obsolete switchgear for spa in board

Figure 122: Electrical Cabling

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PLAY POOL FILTRATION PLANT

Figure 123: Play Pool Filters

Applicable To:

- Play Pool

Observations

- Flow measurement equipment on the pool was reading approximately 1000 L/min at the time of the inspection. Given the flow meter location this would be approximately 2/3 of the filtration flow, so a total of 1500 L/min. Whilst calibration of the flow meter is not confirmed, this flow is a reasonable flow to expect for the system. As the pool volume is not currently known due to the freeform nature of the pool and the lack of as-constructed drawings, it is not possible to comment regarding the suitability of this flow.
- The filtration pump is rusty and is not provided with inlet or outlet valves. The pump is not provided with no-flow protection, which may result in a pump burnout. Access to the pump and strainer is very poor.
- Heating for the pool is currently shut down, with the heaters in poor condition. It's not known as to why.
- At the time of the inspection the chemical controller was not operational. It's understood that since then a replacement has been ordered.
- The acid dosing pump injects into a local dosing loop, with the overpressure line discharging to a local 5L drum. This is a poor configuration.

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Recommendations

- Provide reliable flow monitoring equipment and confirm the system flow.
- Consider relocation of the pump to a more appropriate location as discussed above.
- Relocate acid dosing pumps, lines and storage to the opposite end of the equipment room and neaten up overall.

Additional Photographs

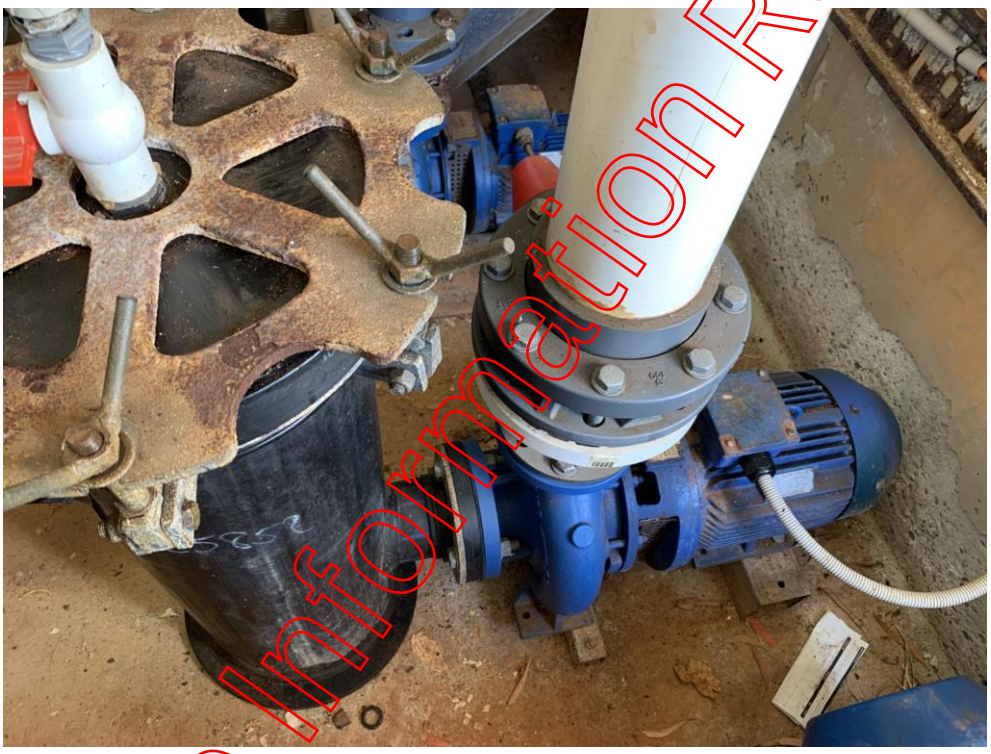

Figure 124: Filtration pump

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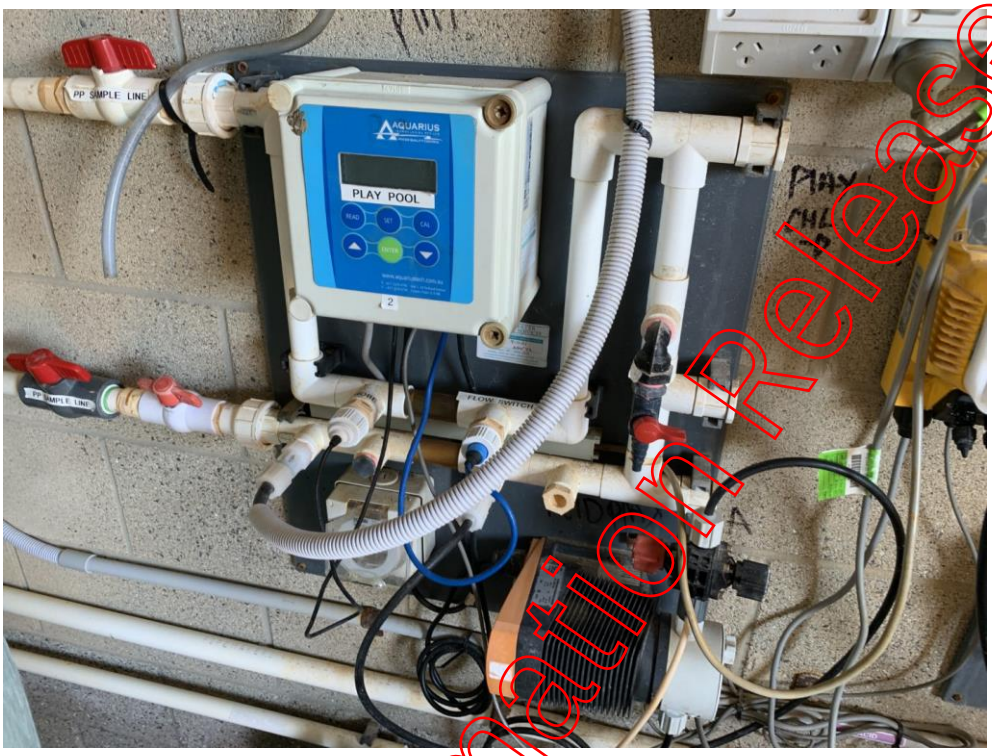

Figure 125: Play pool acid pump and chemical controller

Figure 126: Play pool heaters

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RIVER POOL FILTRATION PLANT

Figure 127: River Pool Filters

Applicable To:

- River Pool

Observations

- Flow measurement equipment on the pool was reading approximately 1500 L/min at the time of the inspection. Given the flow meter location this would be approximately 2/3 of the filtration flow, so a total of 2250 L/min. Whilst calibration of the flow meter is not confirmed, this flow is a reasonable flow to expect for the system. As the pool volume is not currently known due to the freeform nature of the pool and the lack of as-constructed drawings, it is not possible to comment regarding the suitability of this flow.
- The filtration pump is rusty. The pump is not provided with no-flow protection, which may result in a pump burnout. Access to the pump and strainer is very poor.
- The features pumps are also rusty, with poor access and not provided with no-flow protection. The operators have reported difficulties in obtaining prime.

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- Heating for the pool is currently shut down, with the heaters in poor condition. It's not known as to why.
- Some obsolete pipework is present, mainly due to the heating disconnection and the integration of the spa filter into the system.
- The chlorine dosing pump is located overhead which increases the risk of chlorine contact with maintenance personnel.

Recommendations

- Provide reliable flow monitoring equipment and confirm the system flow.
- Consider relocation of the pumps to a more appropriate location as discussed above.
- Relocate the chlorine dosing pump.
- Relocate acid dosing pumps, lines and storage to the opposite end of the equipment room and neaten up overall.

Additional Photographs

Figure 128: Filtration pump and strainer, poor condition, poor access, disused pipe

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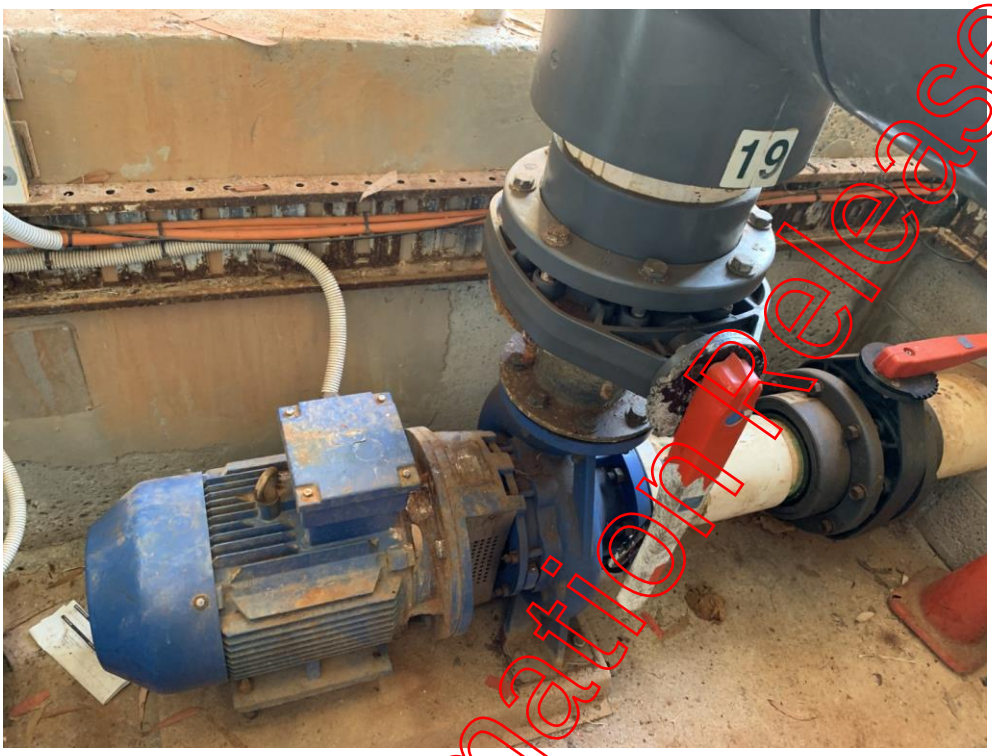

Figure 129: River pump 1, poor access

Figure 130: Filtration suction and return connections from river pump

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Figure 131: Spa filter incorporated into main manifold

Figure 132: Disused heating

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Figure 133: Flow meter installed upstream of filter

Figure 134: Chlorine pump installed at high level

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Figure 135: Disused boost pump, possibly for waterfall

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CONCLUSION

Overall, the facility is aged and presents several non-compliances with current standards, codes and practices. Issues requiring immediate attention have been identified, however as a whole the balance must be weighed between bringing individual components of the existing system up to standard versus replacing the entire system. There are several factors that must be considered.

50M POOL

Whilst dated, the 50m pool appears to be generally fit for purpose. The operators report the ability to maintain water quality in the pool, and whilst the circulation through the pool is suspected to be poor the heavy use the pool receives may be aiding in providing a natural form or circulation.

Improvements are required to the chemical storage and handling systems to overcome relatively small issues identified. Rectifying the gutter issue additionally is recommended to reduce the potential for ankle injuries.

The cost of heating of the pool is suspected to be high, as discussed later in this section. It's understood that electrical supply costs to site are relatively cheap, favouring heat pumps as a solid long term option for heating of the pool.

The liquid chlorine system onsite does present some minor non-conformances, with the cost to rectify being notable. For example, provision of a concrete hardstand for unloading bulk chlorine could be in the order of $70,000 to $100,000. Large public lap pools often adopt salt electrochlorination as the primary form of sanitation as whilst there is a capital cost in the order of $150,000 to $200,000, the operating costs are typically lower and the intrinsic safety through removing bulk quantities of a corrosive substance onsite is an important consideration.

OUTDOOR 25M POOL

The outdoor 25m pool is a heavily utilized pool for the centre, and resultantly this pool should be one of the higher quality installations. Unfortunately the current offering is poor in condition and water quality, with notable improvement recommended.

The filtration plant provided is limited in performance. Conservatively estimating a filtration flow or around 15 L/s based on pipework limitations, the resultant turnover in the pool may be in the order of 6 to 7 hours. This turnover is too long for

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a pool of this nature, with Queensland Health guidelines requiring a 4 hour turnover as a maximum and possibly a shorter turnover again depending on required bather loads for the pool. Poor filtration performance is evidenced by the cloudy water.

The filtered water return pipework can support the required flow however the soiled water suction pipework is potentially limiting. Regardless of this, inefficiencies in the plumbing within the pool plant room can be relatively easily rectified to maximise the potential of the system however the current poor configuration of the plumbing and equipment requires addressing to overcome the safety issues detected. Ultimately, demolishing the current equipment room and reconstructing a new room with better layouts and configurations of equipment is likely the most practical solution to overcome a large portion of issues experienced with the plant.

Regarding the pool interior finish, the current finish is a relatively low-cost system, with the history of the installation being unknown. The results of such a system are being experienced such as short lifespans. Given this pool is a heavily utilized elements, though should be given towards a major refurbishment of the pool. Access provisions around the pool are difficult to rectify as well due to current restrictions on space, but are important to consider as part of an overall refurbishment to remove safety concerns.

INDOOR LTS POOL

Despite being aged, the indoor LTS pool structure does not present any major areas of concern. Hydraulically, the filtration system is limited for how LTS pools are typically operated in current times and presents several safety and compliance issues. It's understood that a new LTS pool is proposed for construction in the next 10 years. Resultantly, the existing installation requires safety rectifications to overcome identified issues but generally can be placed into a 'limp-home' approach towards maintenance and repairs. Ensuring a solid risk management strategy is adopted is key in providing safe water for patrons in the interim period.

As with the other pools, it's recommended to improve online system flow and chemical monitoring to identify poor water quality.

Regarding the plant installation, the selection of equipment and pipework sizing is of a higher grade than the 25m pool sharing the same room, however access around the equipment is limited and degradation of the room structure applies as well. In the recommended replacement of the room structure itself for the eastern equipment room, a reorganization of the LTS pool equipment into a new room could

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possibly be provided to overcome the compliance issues, factoring in the proposed replacement of the LTS pool overall.

OUTDOOR PLAY POOL

The outdoor play pool is a relatively unusual pool for a public aquatic centre however provides functionality and a reasonable use. Public waterslides always contain intrinsic risk due to the uncontrolled movement during the slide, but provided these risks are managed and operation is supervised then slides can be a great attractor.

The structural condition of the pool raises some concerns. The numerous cracks in the coping appear to generally be hairline cracks and likely a result of under-reinforcement in the original construction of the pool. The same cracking is observed in the river pool which was constructed at the same time. Generally hairline cracking is not a major concern provided that leaks aren't present and the reinforcement isn't subjected to chlorinated water. Of larger concern is the larger crack that runs across with width of pool, as this is likely to be structural. It may be a location where reinforcement laps were present and insufficient in length or it may be indicative of foundation issues with the deeper section of the pool. Measuring and monitoring the crack is the primary method of inspecting for the interim period.

The equipment room's location elevated above the pools is less than ideal, however the systems appear to operate. The primary issue associated with this elevation is pump priming and suction issues, however with correct pump selection and installation these can be managed as they appear to have been. An overall refurbishment of the plant is recommended to overcome the numerous smaller issues that add up to an overall higher risk of installation than what is typically required for such an installation.

OUTDOOR RIVER POOL

The outdoor river pool contains a large amount of structural cracking as well as intrinsic risks associated with high energy water movements, poor access and trip hazards in the river pathway. These items can be rectified, however the long-term viability of the pool requires a high-level review. The circulation pumps are significant in size requiring a reasonable quantity of energy to operate.

The filtration plant presents similar issues and concerns to that of the outdoor play pool.

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ADDITIONAL ITEMS

Not currently covered but to be addressed in the following revision of this report:

1. Discussion on replacement of chemical controllers
2. Discussion on system parameter monitoring
3. Discussion on converting gas heaters on 50m pool to heat pump
4. Identification of key performance parameters
5. Asset registers of existing equipment

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