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1 Filtration Design Report -Example

I have prepared this report based on a real one prepared for a client. This is an example of the sort of report that is available for your pool and it's supporting system.

Field information is required for this type of service for an existing pool and I can work either with the home owner providing some information or your preferred local contractor doing some tests under my direction to get the required information.

For new pools no field information is usually required.

This report is for a pool in Australia so everything is in metric. I convert the results to the unit measurements appropriate for the client country.

2 **Inspection report**

The pool is approximately 6 – 10 years old and was originally piped in a fashion which appears haphazard. There are some 22 pipes coming through the ground with no distinct pattern or indicators as to what the pipes connected to in the pool.

The presence of sand leaching from the western waterfall could suggest a water leak from the pipe feeding this waterfall however we do not think this is happening a pressure test is required to prove this.

A previous contractor has disabled a skimmer box to assist in providing sufficient flow to the automatic cleaner. This is not the best idea. The skimmer box is now full of leaves and other organic debris and as it is not subject to any flow is identified as a potential health hazard.

3 Proposal

3.1 Issues

Upon completion of the pressure test and any works arising we can offer several solutions to your issues.

The issues as we understand them are:

- Spa empties when running independently of the pool and empties when the large jet starts up
- Automatic cleaner runs intermittently
- Heater does not run
- Possible leak in pipe work
- Sand leak in western waterfall
- Each waterfall should operate independent of the other
- The flow rates over the waterfalls are too high making them noisy
- Pool lights aren't working

In addition there was some mention of the pool render needing resurfacing.

Currently the pool and spa operations are manually controlled. That is when the spa is to be used some valves are relocated and the heater temperature increased for about 5 minutes before use. All of these functions are manual.

3.2 Solutions Proposed

3.2.1 Spa Empties

The jet location and turbulence of the system is most likely causing the spa to overflow into the pool. If 4 people entered the spa their displacement volume is about 240 litres added to this the turbulence from the spa jet and the relative height of the overflow it is likely 500-1000 litres is being pushed over the waterfall to the pool.

There is no simple solution to this other than to not run the jet in question.

A more complex solution is to fit a pool level controller to the spa skimmer box. These devices are not 100% reliable as leaves caught across the probes can cause them to misread, however given the current control is non-existent it is the recommended solution.

Alternative solutions which are 100% accurate are considerably more expensive and would require major modification works which are in our opinion unjustified.

3.2.2 Automatic Cleaner Runs Intermittently

As currently configured the system uses a diatomaceous earth filter. Over time these filters build a layer of body fat and oils on the septum's which degrades the flow rate. In addition the ultra fine filtration whilst offering theoretically clearer filtrate does negatively impact the flow.

I understand you are using a Maxi-Vac, or Questa when I was involved in designing these I recall a minimum flow rate of around 270 litres per minute for these to operate correctly. It is some time so my memory may be inaccurate however, I am reasonably certain this was the minimum flow rate design point.

In all likelihood the cleaner will be operating well after a backwash and recharge and may operate from time to time just after the filter system starts up but does not continuously run.

By changing the filtration system to sand based system most of the issues surrounding this problem will be dealt with. Please see Heater Does Not Run for other issues.

3.2.3 Heater Does Not Run

This is related to the automatic cleaner issue above.

As currently piped the flow rate to the heater is restricted by pipe work alone, add to this the issues with diatomaceous earth filters and the restrictions inside the heater itself and it is unlikely either the heater or automatic cleaner could run at all.

3.2.4 Possible Leak in Pipes

We are proposing a pressure test to isolate any leaks.

3.2.5 Sand Leak in Waterfall

We do not at this stage believe this is a pipe leak, although this will be verified with the pressure test. Provided the pipe work passes the pressure test, a grout repair should eliminate this concern.

3.2.6 Each Waterfall Independent

The existing pipe works allow this feature to be piped and controlled this way.

3.2.7 Noisy Waterfall

The angle of the rocks and the drop from the rocks to the pool makes the waterfall noise. I have invited a pool contractor to look at these and see if we make the entry to the pool quieter.

In addition with water falls it is very difficult to get the flow rate right. We are proposing installing a separate pump with control valves so the water falls can be run independently of the pool plant with a calculated flow rate.

3.2.8 Pool Lights

Pool lights commonly fail. If the pool is to be rendered we suggest changing the lights to a more recent Xenon design light with a 10000 hour globe.

3.2.9 Control

Manual control of the pool and spa system is possible however we would think an automatic system with remote would be better and are investigating some options.

3.2.10 Heating Cost

Subject to an inspection we would think your gas heater is better utilized as the spa heater providing boosting heat to the spa on demand enabling rapid heating. However, we are seeking proposals from heat pump suppliers complete with heat tables to maintain the pool system at 28 degrees. Due to the way heat pumps work this temperature will fluctuate between 26 and 30 degrees depending on ambient conditions.

There is a substantial energy cost reduction using heat pumps and they typically have a five year pay back against gas heating.

3.2.11 Filtration

There have been several proposals put forward from others including separate systems and other ideas. Having considered the overall design and the intent combined with what I understand of your desires I am inclined toward a single plant with automatic control. In the interim I have attached the pool Filtration Engineering below.

4 Filtration Engineering

Key: m2 square metres
m3 cubic metre or 1000 litres
lps litres per second

Pool Area: 31.25 m2 approx

Pool Volume: 46.8 m3 approx

Spa Volume: 4.3 approx

Minimum Pool T/O Rate: 3 hours

Minimum Spa T/O Rate: Proprietary information

Minimum Flow Rate: Proprietary information

Of the two flow rates calculated the spa is the higher flow rate so this sets the system flow.

Maximum Filter Flow Rate Required: Proprietary Information

Calculated Filter Area: Proprietary Information

Filter Selection: Proprietary Information

Selected Filter Flow Rate: Proprietary Information

Backwash Flow Rate: Proprietary Information

Selected Pump Duty Point: 10 metres

Selected Pump: T.B.A

Estimated Backwash Volume: 1700 litres

Spa Jet Flow Rate: Proprietary Information

Spa Jet Count: 9

Spa Jet Total Flow: Proprietary Information

Given the system flow rate it is expected spa jet performance would be adequate for satisfactory functioning.