2018 lighting upgrade at Lake Cave, Margaret River, Western Australia

Mark Delane

The need to upgrade the lighting in Lake Cave was identified by Peter Bell in 2016 (when we were still lucky enough to have him working with us). The existing lighting was nearing the end of its fifteenth year; there were a few elements that had started to diminish; and the hardware was becoming harder to source. We needed to improve the lighting, not because the existing design and program were inadequate - no! - in fact, they were excellent and well-suited to the cave and the tour … but the technology had progressed. Halogen lights were both harder to get and too energy hungry, not to mention the lifespan and maintenance costs when compared to the new LEDs.

So where to start? That was the first question, followed closely by 'what do we want?' After some thinking, research and discussions, Peter was clear that the best option was to redo the entire lighting. This would give us a clean start and the chance to give the cave a fresh look. To do this we needed to go fully LED. Having looked at options, other examples and talking to David Head at Weidmuller, we had started to focus on Weidmuller's lighting as our best option.

Could we dim the lights to match the programming? That was the big unknown for us. We knew the "Rock-Stars" could not dim and that was fine, but could the "Enviros" - for our plan to work they needed to do so! Peter spent many hours thinking, e-mailing, and thinking some more about the options. We were optimistic that they could do what we wanted.

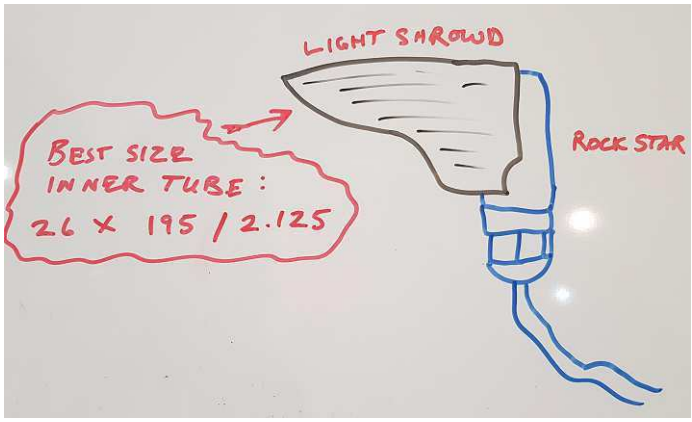
So what better way to find out than to go on a road trip to Jenolan to meet with David Head and Dave Rowling and see the lights in the field - by field, I mean cave of course! So after a day well-spent with Dave and David, we were happy to see the lights in action and being dimmed (ramped up and down, being the more technical term I have been told). Peter was happy, and so was I as this was all still very new to me but I was learning fast and loving it.

Once we arrived back in Western Australia, the pace quickened and we were set! We knew that the lights could do and what we wanted. We had received a sample from David; and, after Peter built a little test kit/model, we were sold on this being the best option for the cave and for us.

Next came the design, so the team was in and out of the cave, measuring this-and-that, double-checking, and then measuring again. Luckily, Lake Cave is not that big - you can easily measure from one end to the other!

With the measurements done and confirmation that the lights could meet our needs, then the next step was to work out how much of everything we needed, how many Rock-Stars, how many Enviros, how much cable and how many brackets etc.

Then came the Distribution Boards (DB) - how big, what they would control etc. From all this information, we had our budget for materials, extras, electricians etc. This was then submitted for approval and we were given the go ahead!



Doing the planning (Mark Delane)

Thankfully, for me, Peter knew exactly what he was doing! He had it all worked out in his head and, like Santa, he had a list and was checking it twice! He drew the electrical plans out in CAD and then had them checked and signed off by an electrical engineer. They were all good and ticked off on the list.

Next was the design and layout of the DBs - again Mr Bell! These were a piece of art - everything in order and in a system that was easy to follow. This was great for me as the first-timer trying to learn and provide some value in the process. Alex Lyovin and David at Weidmuller were both helpful. With a few minor tweaks and suggestions, the DBs were perfect, and they too were marked off on our list.

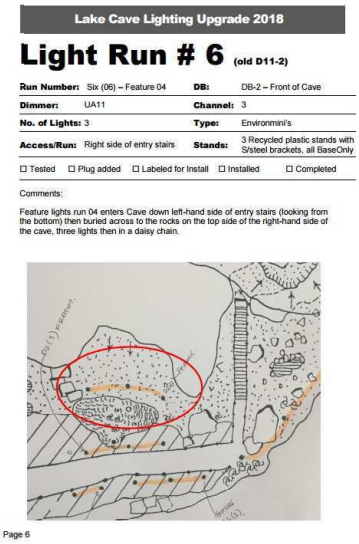
So we took the leap of faith, so to speak, and placed the orders, one for the construction and delivery of the DBs, and the other for the lights, cable, brackets etc, plus some contingencies for each. Next, we waited - there was not much we could do until the items arrived.

Then came the day they arrived. It was like Christmas, except during this time Peter had retired to greener pastures in Tassie … so this meant a long-distance relationship … they say they never work! Well, thankfully, ours did … otherwise who knows what would have happened!

So it had all arrived, what next! We were going to install the new system ourselves! But, would we do this during operations, or outside of hours? Would we close the cave to do the works or not? So many questions! And what better way to answer these questions than by doing nothing … well not quite. I needed some time to work out the logistics and the program for us to build the new system and then install it, while still operating and still using the old system. We needed to get it right and we needed to walk ourselves through each of the elements as a group, discussing options and ideas for how to do the installation. This was an invaluable process - the whole team was involved. In the end it paid dividends.

The production line

After several cave walk-throughs and some round table discussions, we had a plan. This was mapped out and documented so that we could progress from day-to-day in an order ensuring that the next person, or people, could transition seamlessly from those on the previous day. After a few YouTube videos and some soldering practice, we got started. We had a great system for measuring the cable runs: checking them twice; then cutting; then terminating and soldering the lights; testing them at each and every stage, one cable run at a time. Each was stored safely in its own crate or cardboard box, complete with its allocation of brackets, stands or clamps and an info sheet for each one. We had daily task records and run sheets which provided invaluable handover notes to the team - as every day seemed to have a different combination of staff on.



Lake Cave Lighting Upgrade 2018

Light Run # 6 (old D11-2)

Run Number:	Six (06) – Feature 04	**DB:**	DB-2 – Front of Cave
Dimmer:	UA11	**Channel:**	3
No. of Lights:	3	**Type:**	Environmin's
Access/Run:	Right side of entry stairs	**Stands:**	3 Recycled plastic stands with S/steel brackets, all BaseOnly

☐ Tested ☐ Plug added ☐ Labeled for Install ☐ Installed ☐ Completed

Comments:

Feature lights run 04 enters Cave down left-hand side of entry stairs (looking from the bottom) then buried across to the rocks on the top side of the right-hand side of the cave, three lights then in a daisy chain.

An example of a detailed planning sheet (Mark Delane)

After each cable run was created and the stands, clamps or brackets were created and put into their own crate or box, the team moved on to create the next one, fine-tuning their soldering and heat-wrap skills.

After a couple of weeks, we had created, tested and completed all the individual cable runs, along with their stands, brackets and fixings. Then came the joyful task of carrying each section down to the cave - down the 280-odd steps to the brick platform just outside the cave entrance where we made a staging post. From here, we then started to work out the order and process to install each run, whilst still having the cave operational and still using the existing system.

The day of our first install came - we took a deep breath and started. We started with the track lights, run No 1. After some final discussion about the pathway of the cable; the process to fix the lights to the handrail; and the exit plan for the soon-to-be-redundant lighting, we were off. First run in, a perfect outcome - smooth install - no unforeseen problems - and it went like a dream! A true testament to the team … their workmanship, collaborative approach and open discussions meant it all went without a hitch.

With one under our belt, we proceeded with the next, and then the next, and then, finally, at the end of our second day of installing around tours, we had all the track lighting in; we had connected them up to the new DBs we had also installed and they worked a treat! It was like turning on the Christmas lights on the tree … a great sense of joy and, more so, the chance to see, first-hand, the powerful impact these new lights had on the cave and, for the handrails, the improvement for the visitors.

Without delay (and on the back of the success from the track lights), we then started at the back of the cave running out all the off-track feature lights. This presented some opportunities and challenges, but mostly opportunities. We could tweak and adjust the new features to show off the cave best and truly highlight features with such crisp and constant light that these Enviros now provided us.

Over the next week, we ran out all the feature lighting; positioned and tested each - again in between tours and without any dramas. Luck was on our side for sure, but the prep work of the staff and their focus on sticking to the process was certainly paying dividends.

The most difficult section was still ahead of us - running the new cable and feature lights along the boardwalk alongside the existing lights, then to place the new lights to pick up the key areas to highlight. This was more challenging. Again, after some more discussion within the team, a solution was found that allowed us to run the new cable separated from the existing cable, and in a much neater, cleaner and accessible manner than the system being replaced.

The option was a simple one, to use “downie” fittings attached to our handrails and create a loom that stood off the handrails, out of the water and still accessible to the staff if any maintenance was to be carried out. The benefits were twofold! A clean, neat and appropriate new install and with no impact on the old. This meant the old could be removed without impact on the new when the time came.

So, with new plan in hand, we set about to install the final runs; connect and test them all. Again, within a matter of a few days, this was all done. We were all in, no issues, no hurdles or setbacks, no interference to trade and no silly long hours! All done in-house with a team that added to their skill set and delivered a fantastic job to date.

The next stage was to test the programming and tweak the scenes and logic in the software and then to adjust and set the lights, trialling different gels, shrouds, angles etc. At this point, Peter felt like a holiday so we flew him over to lead the charge in the commissioning of the new system. Over two days pre- and post the day’s tours, we were in and out of the cave, up and down the stairs like a yo-yo fine-tuning the PICED programming … another crash course in fast learning! The results though … WOW! It was like a new cave, being able to have the lights back in step with the tour guide, to be able to set the scene, create a reveal and then to complement the tour guides in their job was the outcome. The cave looks crisper; the lighting is amazing and consistent; the fixtures are so well-highlighted; and the lighting is again such a pivotal part of the experience visitors enjoy on their tour.

The smiles, awe and renewed pride of the guides was also clearly on display. We had a few weeks of operating the new lights where we asked for feedback from the guides and made some slight adjustments to the programming as a result. The new lights were a success!

We left the old lighting system in parallel for six weeks to ensure that the new system was without any gremlins. We then removed all the old system in a matter of days, again around tours and with the help of some of the guides; carrying up is harder than carrying down! We salvaged all that could be used at the other sites or as spares, and recycled what we could also, meaning that not a lot was then thrown away.

The new system has not only provided such an amazing quality of light, it pays homage to the cave. It requires less maintenance; has a longer lifespan; and uses significantly less power. The old system, with all lights on, was 12.5 amps … the new system, with all lights on, is 3.0 amps.

In the end, the months of planning, checking, thinking, measuring, research and consideration simply meant that the production and installation was almost seamless and fast. It was delivered in-house without any loss of tours and looks first class. Credit must go to Peter Bell for his efforts in developing the plan; creating the design; and inspiring us to deliver the project. Equally, to the team that delivered the project - to Rusty Rouse, Alan Meyburgh, Gabriel Magyar, Tim Brown, Patricia MacShane and Alex Kingston - thank you and well done! A fantastic team effort in delivering such a first class, best practice result. To the guides that assisted in carrying items up and down, for your patience and input, thank you.

Now we move forward to the next cave's lighting system to upgrade!

Some of what came out! (Mark Delane)

Editor's note: Rock-Star and Enviro are types of light fitting appropriate for use in cave environments and supplied by Weidmüller Interface GmbH & Co. PICED is a Lighting program for use with CBus lighting systems