

UPGRADE OF CRITICAL ELECTRICAL INFRASTRUCTURE IN A LOCAL GOVERNMENT ENVIRONMENT

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ABSTRACT

Albury City Council (ACC) owns and operates the Waterview Wastewater Treatment Plant (WWTP) which was commissioned in 1999. It is a Biological and Nutrient (BnR) removal plant. And processes 7.5 M/L per day. Which is approximately half of the flows from the 56,598 people living in the Albury local government area.

The inlet works consist of 2 band screens, a grit classifier and foul air blowers that make up the Waterview preliminary screening process.

A maintenance check in January 2019 identified that corrosion had begun to damage the electrical bus and control components within the inlet works switch board. This triggered a capital works project that concluded in January 2023. The result saw the renewal and relocation of the electrical switch board into an electrical switch room and replacement of field cables. This project procurement process navigated through –

- the introduction of a new council project management procedure.
- a significant organisational, top to bottom, service delivery restructure.
- Significant procurement challenges and learnings

The procurement and acquisition processes can feel over-whelming, it is a great deal of responsibility. However, leaning on the gurus in the procurement/accounts team is a very important step, particularly for any new challenges that pop up. Through this project, there were many lessons learnt to guide future purchasing activities within a local government environment.

1.0 INTRODUCTION

In 2019 the ACC electrical department identified corrosion had begun to compromise the integrity of the electrical control equipment, within the electrical switchboard, operating the critical preliminary treatment systems of plant. A capital project initiative was started to replace this critical process item and the journey across 3 years provided significant learning, for a technical based trades team, procuring large infrastructure within the local government environment.

As part of the project plan phase, a site visit was conducted to identify the best approach as well as identify why this specific switch board had deteriorated so much faster than the switch boards throughout the rest of the plant.

Several options were considered and the benefits and challenges of each were compared and considered.



Image 1 - Existing installation with tarps to protect the weary switch board from the weather.

2.0 DISCUSSION – OPTIONS ASSESSMENT

Option 1 was to replace the switch board in-situ as a like for like replacement.

Benefits

- The field wiring would remain largely reusable.
- The existing controls are known by the operations and maintenance teams.
- The existing design has a proven history of servicing the plants processes.

However, it was identified that the position of this existing switch board was immediately down wind of the inflow channel and the hydrogen sulphide that came along with it. Historically the closed aluminium channel lids had been replaced with fibre reinforced plastic (FRP) tread mesh covers, as the hydrogen sulphide from the process was destroying the concrete walls of the inflow channel. By removing the sealed lids to protect the concrete, the flow of the hydrogen sulphide had been redirected to flow up and out and over the electrical switch board instead.



Image 2 - Aerial view of the inlet plant showing old and new locations with respect to the process flow. As such, the primary problem was identified.

After considering -

- Constructing the switch board with alternate corrosion resistant materials and
- Building a corrosion resistant switch room around the switch board

It was decided that option 1 was not a viable option due to

- Increase costs of less common materials.
- No guarantee that any replacement would achieve a full-service life.
- A deeper inspection identified existing cabling was perishing as well and would need replacing.

Option 2 looked at relocating the switch board to a fresh location that was not down wind of the process. The location that was chosen was north of the inlet process, alongside the inlet flow channel.

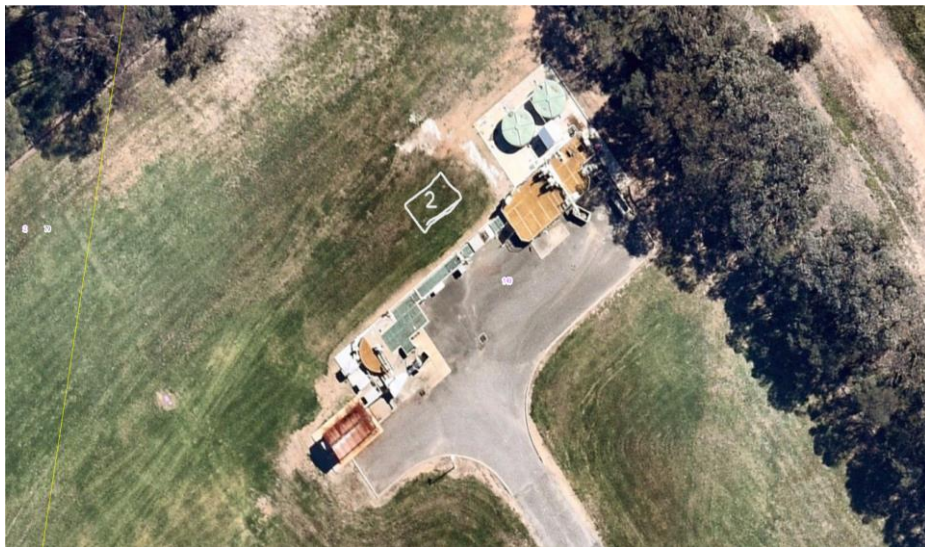


Image 3 – Aerial view of the option 2 switch board location

Benefits

- Common manufacturing materials will minimise the capital procurement costs.
- The new location could reuse the existing field cabling that is in good condition.
- The small section of underground conduits would be eliminated. This is great as the cables will become easy to inspect for damage caused by rats. Additional footpaths will make the inlet screening equipment more accessible.
- The cutover becomes a green field site, which improves commissioning processes by reducing the plants downtime.

2.1 Procurement process

This entire project included a new switch board, a new switch room, electrical connection, and cabling works plus process and program engineering labour. As with all government organisations ACC has a Procurement Manual that guides how council officers engage contractors and suppliers to acquire products and services. The manual covers the following –

PROCUREMENT PRINCIPLES

Honesty and Fairness, Legal Obligations, Policy Frameworks and Guideline Documents, Value for Money, Probity, Accountability and Transparency, Consistency, Conflicts of Interest, Improper Advantage, Risk Management and Open to Scrutiny, to name a few.

The Manual also provides a PROCUREMENT PLANNING guide.

Business Case, Alternative Procurement Options, Specification Development Preparation, Contractor Safety, Registration Contractor Assessment & Registration.

Additional considerations for this procurement activity include -

Benefit to the local region, Establishing the potential Market, Estimating the expenditure value, Procurement authority, Budget, Procurement risk, Legal Advice, Terms and conditions, Procurement Groups which includes considerations of Goods and General Services, Professional Services, Construction and Civil Services.

PROCUREMENT METHODS

The manual provides clear description and recommendations to assist a council officer to determine the appropriate procurement method.

Procurement Level	Range	Minimum requirement
Retail on demand	(\$0 – \$9,999.99 INC. GST)	Industry knowledge, regular sanitary check in with alternate suppliers
Request for quotation – written	(\$10,000.00 – \$149,999 INC. GST)	3 quotes
Request for quotation – formal	(\$10,000.00 – \$249,999.99 INC. GST).	3 quotes
Request for tender	(\$250,000 INC GST OR ABOVE)	Public tender and Council report

- Retail on demand (\$0 – \$9,999.99 INC. GST)
- Request for quotation – written (\$10,000.00 – \$149,999 INC. GST)
- Request for quotation – formal (\$10,000.00 – \$249,999.99 INC. GST).
- Request for tender (\$250,000 INC GST OR ABOVE)

Despite all these guidelines and methods to consider, as a heroic and pragmatic ‘Let’s just get on with it,’ attitude (PS. Turns out it wasn’t a great attitude), these are the 3 things that guided this activity.

1. The project, based on recent (pre-covid) costings would be approx. \$180k.
2. Good professional relationships with capable contractors.
3. This is a straightforward project; it will be smooth sailing.

As such, a Formal RFQ (\$10,000.00 – \$249,999.99 INC. GST) document was compiled and sent via email directly to 3 electrical contracting companies, each organised a site visit prior to submitting their proposal, they asked the right questions and they all looked forward to working with Council. Perfect start.

2.2 The first curve ball

On the day the request for quotation closed, only two out of three quotes were received with one party withdrawing and the other two submissions being dangerously close to the RFT limit.



Image 4 - GIF from Electrical Teams Microsoft Teams Chat. Everything is fine.

Despite the set-back, the submission assessment was undertaken and the memo with recommendations was sent to management for approval. It quickly came back with many questions, particularly requesting how overall value for money has been proven considering the high project value and limited proposals received. As expected, and predicted, the person trying to take the simplest route didn't have satisfactory answers (me). The recommendation was to source a 3rd quote to satisfy the procurements manuals RFQ requirements.

Four weeks later the 3rd proposal had been received and the memo updated. Following a 5-month memo assessment (the length of time, definitely, certainly didn't have anything to do with the poor procurement planning by the Project Lead 🧑) the recommendation was accepted, and the project was awarded. The final decision simply came down to the base reason for the project. A critical assets reliability was compromised.

Once the contract (purchase order) had been exchanged, the first steps were to peg the location of the switch room and undertake a geo-technical assessment.

2.3 The second curve ball

During the Inlet Switch Board memo and recommendation assessment, Council had topped up the water and wastewater clusters human resources with some very clever and motivated people who were sinking their teeth into the future sewer strategy. This included the duplication of our Waterview Wastewater treatment plant. It was only luck, but the strategy team happen to visit Waterview WWTP to visualise how the construction of an inlet process duplication would fit on site. This is when the pegs outlining the proposed switch room were observed. This location just happened to be in the same likely location of the future inlet flume and plant upgrades.

Ultimately, the benefit (or the curse) of a project taking 24 months to get off the ground meant we could avoid having to knock down and relocate a new switch room to make way for another project.

This is when option 3 was developed.

Option 3. It was proposed to relocate the switch room to the northeast side of the plant. This

offered the following benefits-

- The new switch board would be upwind of the process.
- Clear of any sewer main and future plant upgrade infrastructure.
- Increase of potential real estate for expanding the size of the building.

However, the following variations would be required-

- Upsize and extension of existing sub-main electricity supply cable.
- Increase in switch room size to accommodate future switch board for duplicated inlet works for the plant upgrade.
- Full replacement of every field cable as they are all too short.
- Subsequent increase in installation time.

These variations placed the final project cost well above the tender threshold and consequently took another 4 months of consideration and deliberation before the variation was accepted, the key justifications were the project had already been awarded and design works had been completed and the variation was triggered by the principle.

Saved by another fortunate (but significant technicality)

2.4 The project – executed (finally)

As with most projects across the dreaded 2020 to 2022 period, parts and materials were challenging to source, for us the Omron PLC hardware was the trickiest. However, once these items had been secured, the contractor was able to proceed smoothly through the project.

Like all good projects, the key stakeholders (Project Lead, site Supervisor and contractors) were all the best of friends for the 3 months the project was in the construction phase. All installation phases were very smooth. The building was constructed from brick, the field cables that were ran along new stainless-steel cable ladder and the switch board was installed and connected to the mains cables.

While working closely with the plant supervisor, a comprehensive cutover plan was developed and executed, with the biggest challenge coming for the engineers who were connecting the new modern PLC to the existing 30-year-old PLC software.

3.0 CONCLUSION

In 2019 the ACC electrical department identified corrosion had begun to compromise the integrity and reliability of the electrical control equipment operating the critical preliminary treatment processes. A capital project initiative was started to replace this critical infrastructure and the journey across 3 years provided a significant learning opportunity for a technical based trades team procuring large infrastructure within a local government environment.

Operating within a government environment is the land of opportunity, however every opportunity has a defined and specific process to navigate. Being a subject matter expert is only part of the process and additional key procurement principles must be taken into consideration such as value for money, probity, accountability, and transparency. These factors and guidelines are provided to protect both the sponsor (rate/tax paying community resident) and the council officer. Probity and transparency remove any potential fraud, theft, or corruption perceptions.

The Waterview Inlet project procurement was initially planned to aim to minimise the steps

involved to get to the final product. However, the reality proved that many more steps are required when trying to navigate through a procurement ‘bush track’ compared a nice straight town road (with only two or three traffic lights)

4.0 ACKNOWLEDGEMENTS

I would like to thank the Managers, Operators, Contractors, and sub-contractors for their optimistic and up-beat support through this project’s lifecycle, it was a long and unnecessarily complicated one and you all stuck with it anyway. But we all learnt a lot along the way 😊

5.0 REFERENCES

Albury City Council Procurement and Contract Management Team, *Procurement Manual*, Version 4.0 November.