

New irrigation solutions for Spotswood farming community



WaterForce

Project Description:

To provide a community and on-farm irrigation system that resulted in an economic, practical and easy-to-operate scheme.

Project Summary:

WaterForce was ultimately engaged to design and supply a pumping system and pipeline capable of delivering 550lps to five farms with the capacity to irrigate up to 790ha.

The water consenting process was already underway with Bowden Environmental, Kaiapoi to abstract water via a gallery from the Waiau River.

Irrigation Solutions:

Centre pivots on the PPL farm

Centre pivots were a natural selection due to large expanses of flat land. One of the lower cost options considered included a 950m half circle pivot. Ultimately three 460m Valley pivots were supplied with corner arms, two full circle and one half circle.

This system would offer PPL the following benefits:

- Higher application rates towards the end of the 950m pivot exceeded that of the soil infiltration capacity.
- A greater redundancy with three irrigators particularly being equal in size. If the 950m pivot has a breakdown, then 100% of the irrigation is lost. With three pivots and one failing, only 33% of the irrigation is lost.
- There will always be more alignment issues with a very long pivot.
- Whilst the property appeared to be flat, there is a 28m elevation difference across PPL. With a large pivot there was always the potential to have some

wastage in pumping power. Each of the three pivots have a dedicated booster pump to optimise the power consumption.

One farm in the Phoebe Road community where centre pivots were not an option due to land contours and undulations, WaterForce was able to design and supply a solid set sprinkler system with 20mm brass impact sprinklers spaced on a 24.5 x 24.5m spacing, covering some 80ha.

Main Pumping Station:

Water for irrigation was to be drawn from a bed-mounted gallery in the Waiau river. This would connect into a manifold with four 350mm steel pipe risers from which are connected the suction pipes to four end suction centrifugal pumps. Currently only three pumps are installed.

The basis of the design was to distribute flow at the most economical rate to each farm. This decision was based around the pipe size and pressure rating versus the pump energy consumption and the resulting booster pump sizes on each farm.

The four pumps are identical, being Goulds 250 x 200-400 pumps running at 1400rpm, delivering 137lps at 40m head and pumps powered with 90kw motors. Typical of the conservative design approach is the fact that if there is a pump failure, three pumps can nearly achieve the full duty.

Phoebe Irrigation System



Some of the features of this system design are:

- Automatic priming system to ensure positive prime at all times.
- With pumps being the same, servicing, replacement and even the option of having a spare pump available is very beneficial.
- Two of the pumps are driven by a Variable Speed Drive (VSD), two being on soft start. This ensures full automation (and redundancy should one of the VSDs fail).
- Dialling system, so should there be a fault then the operators will be advised by text messaging.
- The mainline to the two booster pump shed locations is 630mm Marley medium density pipe with a 6 bar pressure rating. The pipeline was delivered in 12m lengths and joints welded onsite.

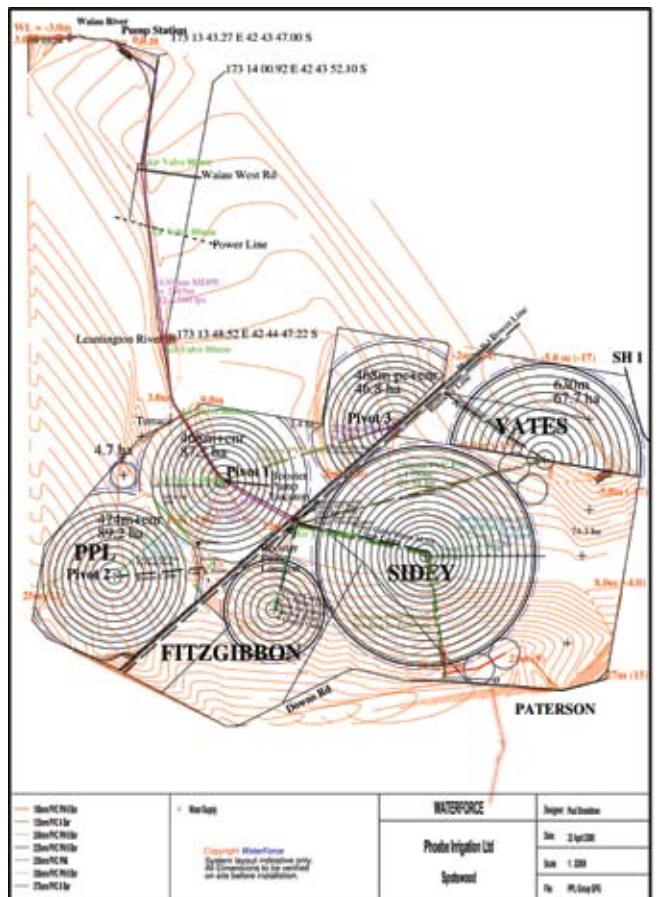
In terms of allocating costs across each property in the Phoebe Road community that uses the water supply, there is an ultrasonic water meter at the main pumping station and similar meters at each farm, so rates can be tallied and confirmed.

There is a long-term plan in place to enhance the delivery of the data to a central location and build up data transfer with soil moisture monitoring, weather station and possibly even pump energy monitoring.

Project Outcome:

The project has delivered an irrigation scheme that has robust redundancy and is installed to a very acceptable standard. All parties in the project (suppliers, client and consultants) worked together to ensure all factors were considered.

The system was commissioned during November 2008, with all farms operational by early February. The growth even in the later summer was phenomenal and had never been experienced before. Wading through ankle-deep grasses was a dream turned into reality. The scheme was a tremendous example of client and Waterforce working closely together to achieve a very cost-effective system.



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