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Pumps and Irrigation Systems

Minimising the energy cost

Three Components

The irrigator – what is it designed to do?

The supply pipes

The pump and motor

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How much water flow do you need?

Different irrigation methods require different pressure and flow combinations, travellers need pressure, laterals need higher flow at lower pressure

Minimise run-off water

The pump and pipe combination need to provide this end result with minimum energy loss.

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Pipes and Water Flow

- Velocity
- Elbows
- Length
- Valves (part closed)

These four things determine the overall *pressure* and *energy* losses in the system

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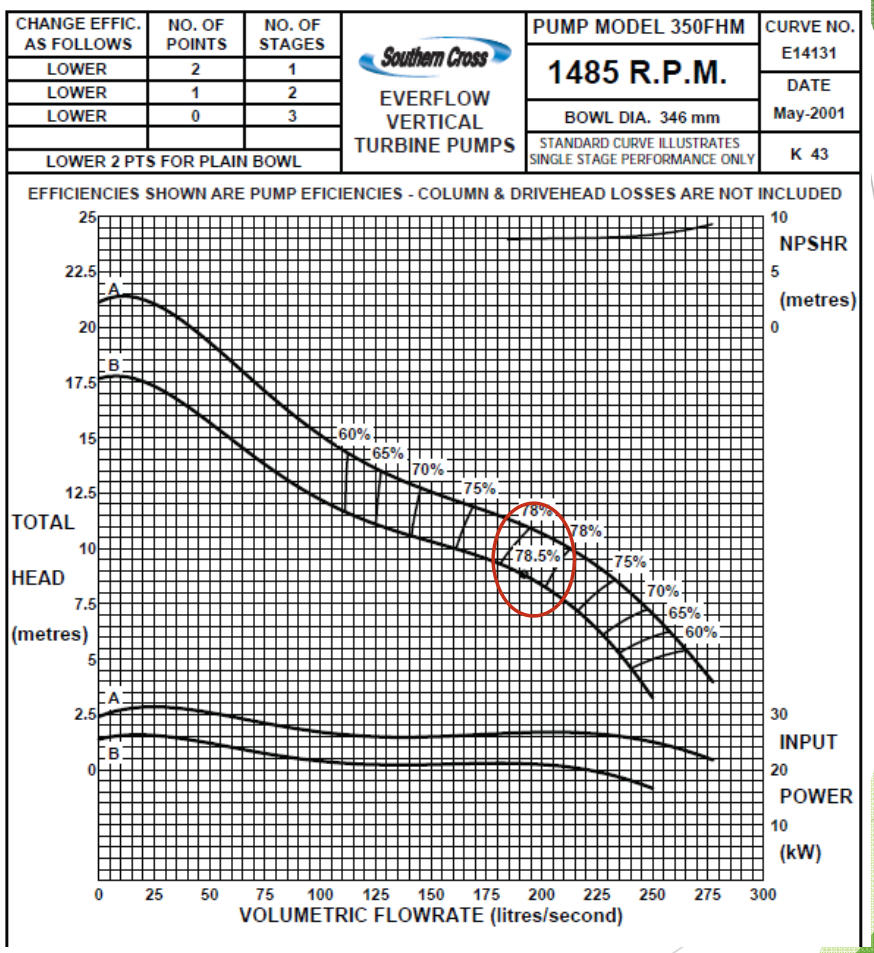
The Pump

Pumps are designed for specific pressure and flow combinations, move away from this and the efficiency will decline

Adding a stage to a turbine or axial pump will not increase the flow



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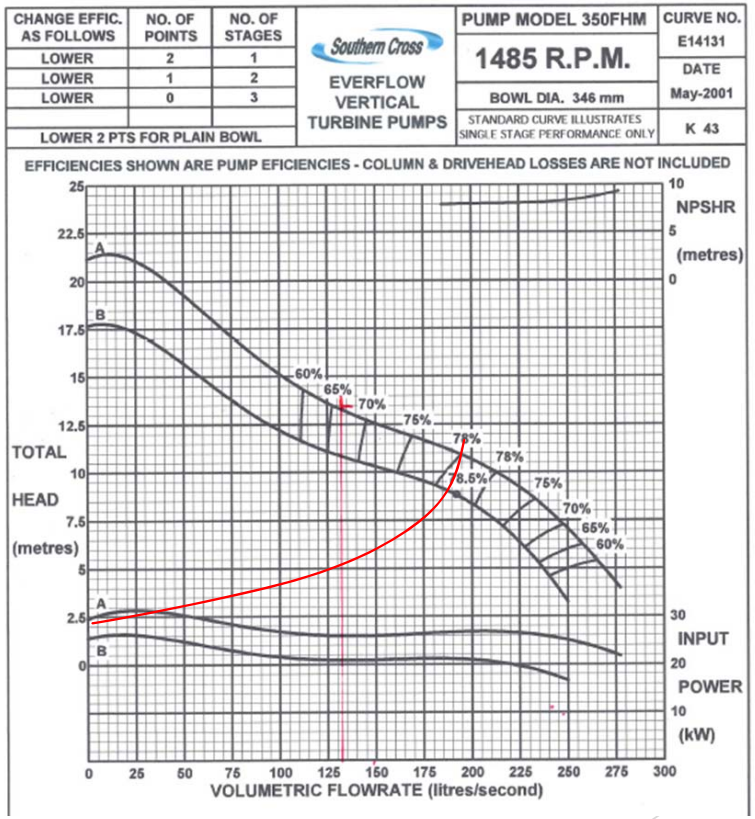
The Pump

Changing the irrigation configuration may shift the pump to a less efficient point on the curve

Varying the speed of the pump allows the pump to match the conditions



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Your Pump

Measure your current system

Flow – Pressure - Power

Calculate total dynamic head – Equivalent Length Method

- Turbine meters are notoriously inaccurate.
- Magnetic flow meters are both accurate and reliable

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The Motor

Rewound electric motors use more electricity than new motors

High efficiency motors (IE3 or IE4) use less electricity than standard (MEPS) motors (IE2)

Pre MEPS motors are less efficient

The smaller the motor, the bigger the difference on all counts

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Diesel engines

Match the pump and right angle drive to optimise the engine speed

Size the engine so that it is at an efficient point in its load curve (don't oversize it)

Turbo diesels are more efficient and worth the extra cost

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Operation and Maintenance

To get the best out of your pumping system requires attention to detail

Pay attention to changes in sound

Don’t just replace the bearings

Wear ring replacement minimises recirculation within the pump

Check for impeller wear

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Case Study – Effect of main size

System to be expanded from 1 to 2 irrigators with lengthened 4” pipe, replacement pump.

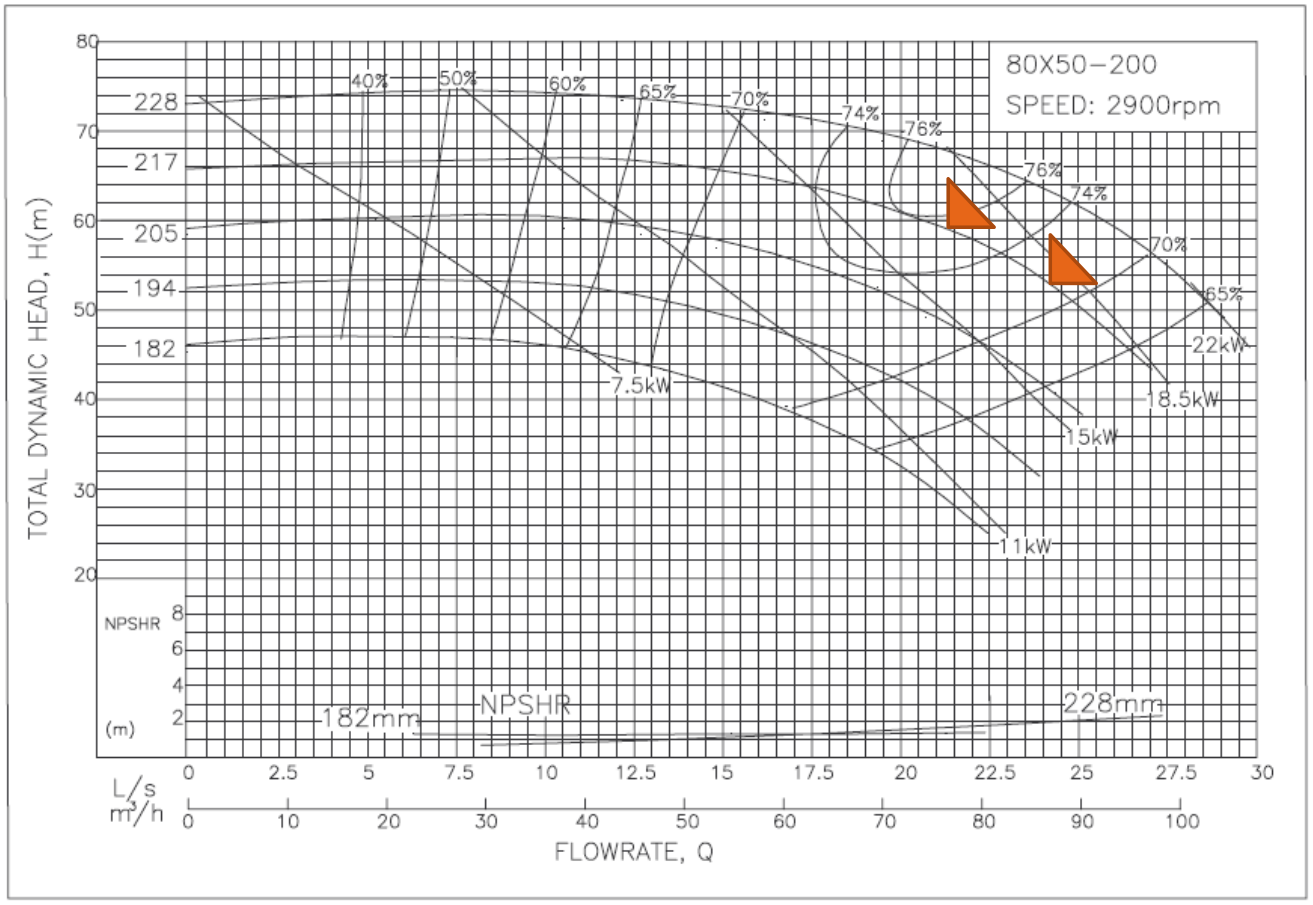
With 4” main:

21.5 l/s, 59m head

With 6” main:

24.5 l/s 53m head

Case Study – Effect of main size



Case Study – Effect of main size

With the correct main size:

- 4% increase in power draw
- 14% increase in flow
- 9% reduction in energy cost per litre of water applied.

Questions?

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