Operational savings of efficient groundwater bores

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Electricity and diesel costs for pump operation are a significant expense in obtaining groundwater supplies for irrigation. The efficiency of the whole irrigation system, including bore, pump and pipe distribution, is important. However, high priority also should be given to efficient groundwater bores because energy demands can account for up to 70 per cent of costs.

Indicative costs for pumping using an electric and diesel pump, range from $0.50 to $0.84 per ML for each metre of head respectively. For example, a CAT diesel engine driven turbine pump in the Murrumbidgee area that discharges 250 L/second of groundwater has diesel bills which add up to ~$20,000 each year. Several thousand dollars could potentially be saved by improved bore and pumping efficiency.

An efficient groundwater bore starts with good design, installation and post-drilling development practices. The aim is to minimise pressure losses due to turbulence through the bore screen, produce the highest yield with the minimum drawdown and ensure operational life of at least 25 years. There are many aspects to good groundwater design including suitable screen intake and gravel pack, and an effective annular seal.

A typical deep irrigation bore, driven by diesel turbine pump

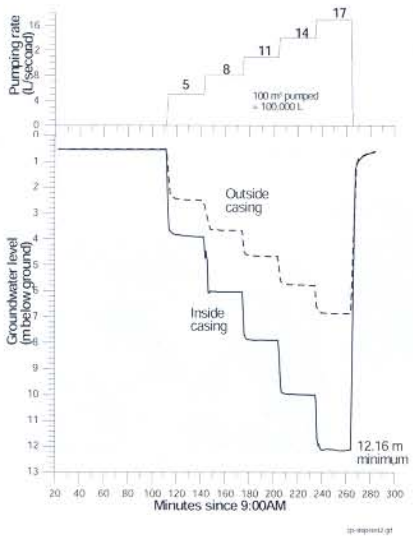

Figure: Example of a step test analysis to determine the efficiency of a bore screen

Installing a dip tube inside and outside the casing so that performance can be checked periodically is often overlooked. Operating a groundwater bore without a dip tube is like running a vehicle without a dip stick to check oil levels.

Continued performance of an existing groundwater bore can be improved by regular checks and maintenance. It is estimated that 40 per cent of boreholes worldwide suffer operational problems that cost money, time and loss of water supply. Common problems include sand and silt ingress through the screen and iron bio-fouling. Regular checks on bore performance can diagnose these problems. These checks may include, as required, measurement of borehole yield relative to drawdown, leakage detection, borehole camera inspection and water quality testing.

Maintenance is recommended when the specific capacity of the bore has fallen by 10 per cent or more. Typically, maintenance of groundwater bores in alluvial sand and gravel deposits may be required every 5-8 years. Prevention and treatment measures are available for mineral scaling, particulate fouling, encrustation and corrosion.

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