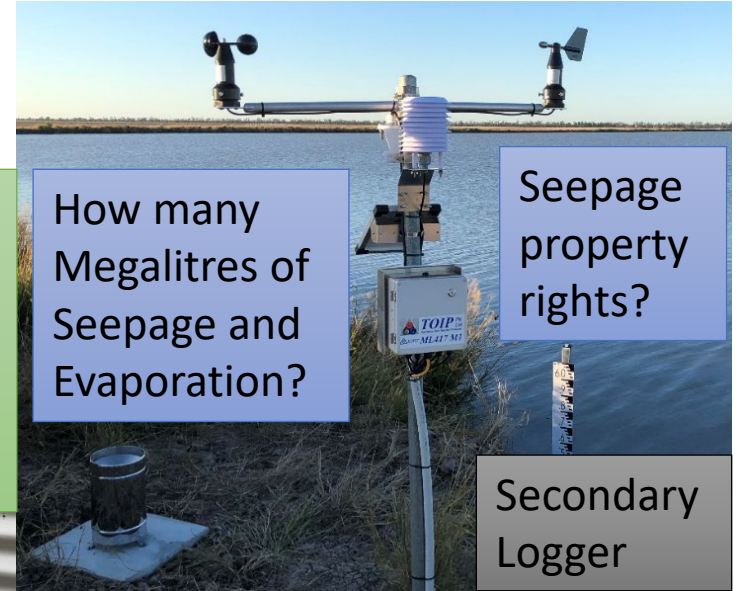


## Floodplain Harvesting Metering Options



Overlapping or staggered gauge boards

Radar sensor or Pressure sensor



How many Megalitres of Seepage and Evaporation?

Seepage property rights?

Secondary Logger

Contact:  
Dr David Allen  
0418964097

[David@groundwaterimaging.com](mailto:David@groundwaterimaging.com)

2/9 Hopkins Prd, DUBBO



Secondary logger transmission direct to your own portal – add remote moisture sensors, bore levels, weather, etc.

Antenna choices, cellular or satellite connection

### Digital readout

021-TFT 04:41:10	
distanceToWaterLe	signalStrength
1.997m	-93dB
Volume	Tamper enclosure
4682.59KL	0On/O
battery	Sensor Disconnect
12.684V	0On/O
2022/09/19	
Next >	



# FPH metering installation procedure without walkway

Initial installation is boat/barge assisted – either manned or remote control  
 Installation location is determined by sonar or plans – must be nearly flat and >5m away from inflow-outflow works and bank toe.



## Needed for Installation

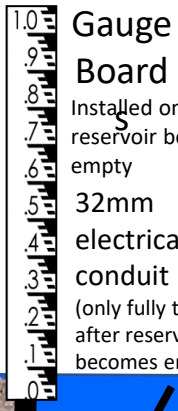
**Pressure Sensor or Bubbler Orifice**  
 (option – add EC sensor for water quality monitoring)

Open cell foam in enclosure slows ingress of slumping sediment



Logger post to >900mm or >450mm + add 2 bags of concrete

Tamper evident seal



**Gauge Board**  
 Installed only after the reservoir becomes empty  
 32mm electrical conduit (only fully trenched after reservoir becomes empty)



**Anti-tamper and thermal shield enclosure - hinged**  
 Marked – 'Water Level Sensor – Do Not Move'

**Concrete P2 pit lid**  
 Raise slightly above ground to allow for bank slump



**Cross section view**  
 Not to scale



Float allows pit to be located and pulled up and makes installation easier.

install/retract sensor rope attached at tie-off point

17kg P2 Pit Lid

Tamper evident seal

Attachment in sealed enclosure

Ropes pull around smooth shaft, the enclosure hinge.

**Anti-tamper – checks and balances**

- Compare laser levelled water level (from bench mark) to gauge boards (referenced to sensor height);
- Compare sonar depth (if obtained) to sensor depth;
- Compare evaporation and seepage losses to modelled level changes in times of no use;
- Cable severance results in an alarm sent to the server.

No equipment or parts exceed manual handling recommended weights

Gauge board posts double as conduit protectors and are driven in >1200mm by post driver and/or into pre-drilled holes. Avoid concrete as it subsides and is heavy for manual handling on steep earth banks.

**Optional Earth filled pit (install only when empty)**  
 Subsidence neutral due to equal density with surrounding earth

# Seepage Monitoring and Groundwater Banking



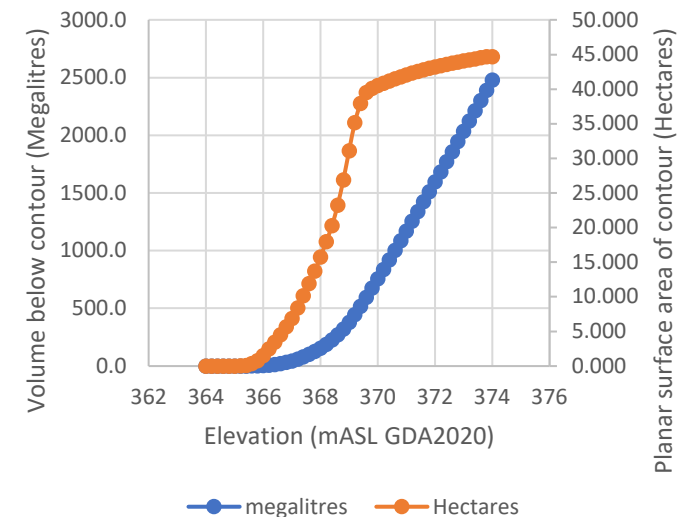
- With accurate bathymetric survey, weather and water level monitoring, it is possible to quantify seepage.
- Water 'banked' as seepage no longer suffers evaporation loss and salt concentration, and, if managed well, can alleviate problems with excessive pumping heads and water logging.
- Seeped water forms a long-term storage component of any surface water storage suitable for high security uses.
- Electromagnetic mapping reveals aquifer connections beneath potential and existing reservoirs so seepage pathways can be known and managed.
- Just as in the infiltrometer measurement below, all water storages have both an above ground and underground component – seepage prevention is not the only solution.

By Dr David Allen, 0418 964097 Feb2022  
david@GroundWaterImaging.com.au

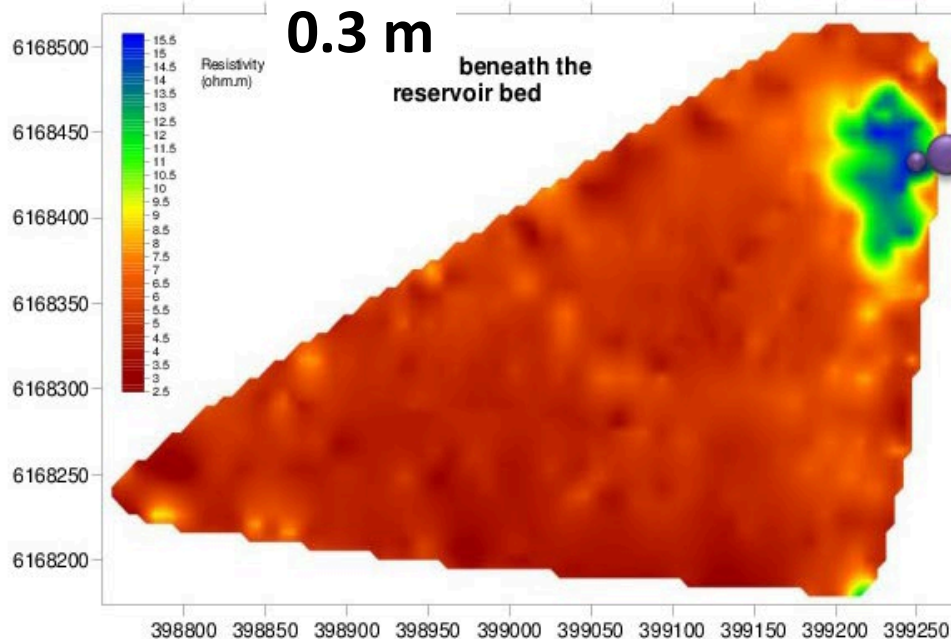
## Cylinder Infiltrator w/Lateral Correction



Water Storage Volume and Area



# Seepage investigation of a reservoir using a geo-electric streamer



Seepage into shallow clean sand

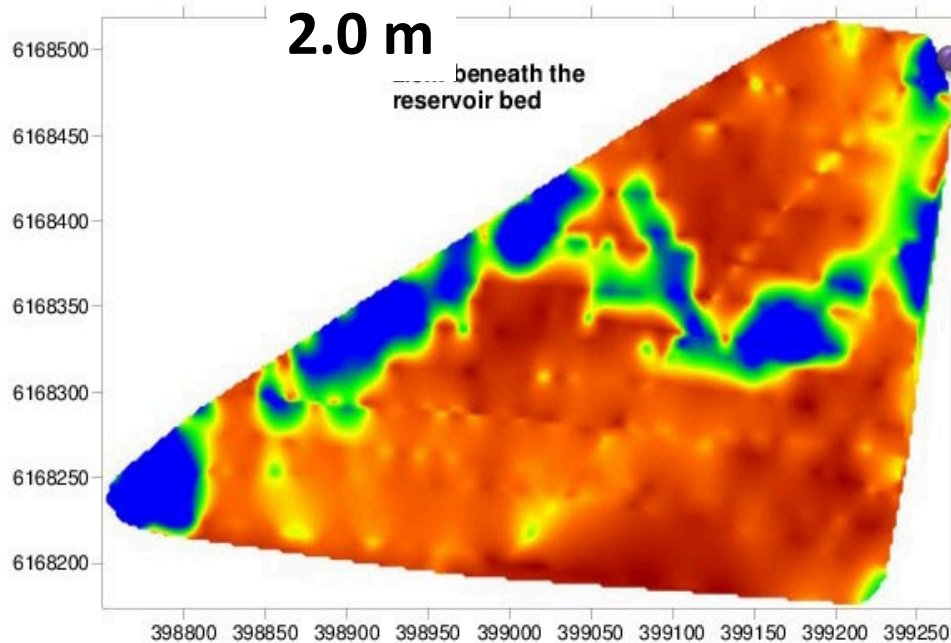
**GROUNDWATER IMAGING**

[www.GroundwaterImaging.com.au](http://www.GroundwaterImaging.com.au)

Dr David Allen

phone +61(0)418964097

Dubbo, NSW, Australia



Seepage may flow along a slightly deeper prior stream then perhaps be recovered using a shallow bore

Observe here that a real seepage problem was only evident from multiple depth imaging. Single depth imaging (eg. EM31) would not have detected the real seepage problem but rather just the prior stream beneath. Groundwater Imaging specialize in multiple depth EC imaging.



# GROUNDWATER IMAGING

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- **Floodplain Harvesting Certified Meter Installers and Validators**, Non-Urban Metering Duly Qualified Persons, Reservoir Stage Table and Benchmark surveyors.
- **Electromagnetic mapping** for dam seepage investigation, precision agriculture and groundwater investigation.
- **Telemetered monitoring** of reservoir water balance, seepage, evaporation, soil moisture and groundwater levels and recharge.

