Water Security Tours - March 2020 *- save water, save $*

Friday 6th March - Coomandook
8.00am - 1.00pm
Friday 13th March - Policemans Point 8.00am - 2.30pm

Please register by 3rd of March:
text on 0427 750 050 or
E: tstrugnell@coorong.sa.gov.au

Meeting at: Coomandook - Uniting Church Hall - Dukes Hwy
Policemans Point - Jacks Point Pelican Observatory - Princes Hwy

Lunch & morning tea provided

WHAT YOU WILL SEE?

- Airborne Logic - Drone mounted thermal camera technology for pipe leak detection
- BushLinx Controller Leak Detection and Water Shut Off Technology
- Alpha Group Leak Detection Technology & tank water level sensors
- Automated water blending technology, mixing ground & mains water
- Automated weather stations
- Lined Catchment / Water Harvesting (Policemans Point only)

COORONG DISTRICT COUNCIL

Coorong Tatiara Local Action Plan

This project is supported by the South East Natural Resources Management Board, through funding from the Australian Government's National Landcare Program

Australian Government | National Landcare Program

Government of South Australia
South East Natural Resources Management Board

Government of South Australia
Primary Industries and Regions SA

Natural Resources
SA Murray-Darling Basin

Policemans Point - Friday 13th March 2020

Stop	Item	Speaker	Organisation	Location	Time	Page n#
1	**MEETING POINT**	Tracey Strugnell	Coorong Tatiara LAP	Meet at Jacks Point Pelican Observatory Car Park	**8.00am** - *8.15am*	
2	**Lined Catchment / Water Harvesting**	Mark Scobie	Orlunda	Princes Highway, Policemans Point	**8.30am** - *9.15am*	3 - 8
3	**Alpha Group Tank Level Sensors**	Shane Oster	Alpha Group	Princes Highway, Policemans Point	**9.30am** - *10.00am*	9
4	**Alpha Group Leak Detection Unit**	Shane Oster	Alpha Group	Princes Highway, Policemans Point	**10.15am** - *10.45am*	10 - 12
5	**BushLinx Controller Leak Detection & Water Shut Off Tech**	Tim Powell	Integrated Irrigation	Princes Highway, Woods Well	**11.00am** - *11.30am*	13 - 14
6	**Building a Lined Catchment – decision making**	Adam Merry	Warreena	Princes Highway, Woods Well	**11.45am** - *12.15pm*	
7	**Lunch**		Suzanne Neumann	Warreena Shearing Shed	**12.20pm** – *1.00pm*	
8	**Automated shandying / water blending technology**	Andy Chambers	Airborne Logic	Warreena Shearing Shed	**1.00pm** - *1.20pm*	15 - 20
9	**On farm / local weather stations** Tim Powell	Graham Gates Integrated Irrigation Shane Oster	Coorong Tatiara LAP Alpha Group	Warreena Shearing Shed	**1. 20pm** - *1.45pm*	21 - 23
8	**Drone mounted thermal camera tech for leak detection**	Andy Chambers	Airborne Logic	Warreena Paddock	**1.45pm** – *2.30pm*	24 - 27
	FINISH			Jacks Point Pelican Observatory Car Park	**2.40pm**	

Coorong Tatiara

Sustainability, Agriculture & the Environment

Water Harvesting and Lined Catchments

This fact sheet covers the basic considerations & steps involved in constructing a lined catchment. Maintaining a reliable & sustainable farm water supply is a major concern for livestock producers today. Many farmers have invested in lined catchment areas across SA. A lined catchment is a poly lined catchment area that runs into a poly lined dam. A lined catchment will capture water in any rainfall or dew event, where as an earthen dam needs the soil profile to be fully wetted up for water to run off the catchment & into the dam.

The motivation for implementing a lined catchment area varies, but the most common reasons are;

- The cost of mains water.
- Low annual rainfall levels.
- Poor quality groundwater is not an option.
- Sandy soils are too porous to install earthen dams.
- Lined catchments produce high quality water suitable for use by all livestock, intensive agriculture, spraying, and domestic use.

Site selection and preparation

Some points to consider when selecting a site:

- A steep gradient is not required.
- A level area with a slight fall is ideal.
- Sitting on elevated area, or the highest point in the landscape can negate water pumping costs.
- If this is not possible the location of storage tanks needs to be considered.
- The catchment can be placed on land that is deemed otherwise unproductive.
- Can drains or roads run into the catchment area?

Poly Liners

There are a range of different quality liners including;

- High Density Polyethylene - HDPE
- Linear Low Density Polyethylene - LLDPE
- Polypropylene -PP and Poly Vinyl Chloride—PVC

High Density Polyethylene (HDPE) geomembranes, is a polyethylene thermoplastic. HDPE provide excellent durability and resistance properties due to its large strength to density ratio. This is the most common liner used in lined catchments.

Linear low-density polyethylene (LLDPE) geomembranes are very flexible, tear resistant and durable. LLDPE is very flexible, with a higher tensile break elongation than HDPE, however HDPE has an excellent ultraviolet (UV) and chemical resistance

What is the difference between HDPE and LLDPE Plastic Sheets?

- Although both materials are polyethylene, they do have different properties.
- LDPE is softer, more flexible and melts at a lower temperature than HDPE.
- HDPE is harder, has a higher chemical resistance and can withstand higher temperatures.

Poly liners come in a range of thicknesses, and qualities

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Planning and Regulation

Introduction

Regulatory requirements have been established primarily in response to issues that have arisen over the years that have created either environmental damage, over-use of resources, infrastructure damage or even conflict between land users. Often these issues were not foreseen, and as such the regulatory frameworks have been put in place to prevent or limit any such adverse impacts occurring. In regards to piping water/water harvesting the following may need to be considered as part of the overall plan (noting that this is based on use as stock water only).

Dams

Dams that do not meet certain exemption criteria will be required to be assessed as development. Depending upon the location, this might necessitate referral to the NRM Board and/ or the Department for Environment, Water and Natural Resources. Impact on water resources and ecology are important considerations.

Dams are exempt from development approval, except:

- Where a levee or mound with a finished height greater than 3 metres above the natural ground is to be formed; or ☐
- Where a retaining wall which retains a difference in ground levels exceeding 1 metre is to be used or formed; or
- Where the dam is in the Flood Zone or Flood Plain delineated by Council's Development Plan, or in any other zone or area shown as being subject to flooding or inundation in Council's Development Plan; or
- Where the dam is to have a capacity exceeding 5 megalitres.

For more information please visit :
http://www.coorong.sa.gov.au/waterplanningconsiderations

For a range of information please contact Natural Resources SA Murray Darling Basin or Natural Resources South East to check to for any 'Water Affecting Activities' regulations.

- Mount Barker P.08 8391 7500
- Mount Gambier P.08 8735 1177

Other Considerations

Shandying Water

Stock do not need rain water so there is a potential to mix water from the lined catchment and bore water.
This can significantly boost the water output from the lined catchment or reduce the area of the catchment or the size of the dam.
It just needs to be fit for purpose.

Water quality

Stock grazing green feed can tolerate higher salt concentrations than the same stock on dry feed. Stock grazing saltbush or salty feeds are less tolerant to saline water than stock grazing other types of pasture. Pregnant, lactating and young stock have a lower salt tolerance than older dry stock.

Algae

Build up of algae in dams can not only block outlets and pipes but also taint the water. Several species of algae are toxic to stock and cause deaths from poisoning. Algae can be controlled with several chemicals, including copper sulphate, calcium hypochlorite and ferric alum.

Estimation of potential water harvested

The figures below can be used as a guide in determining your total stock water requirements.
It should be noted however that the following are average figures and variations will occur depending on weather conditions, the feed available, and the breed of animal.

Area		*Rainfall*		*Volume captured*	Value of same amount of SA Water mains supply *($3.413 kl - 01/10/2019)*	Annual number of dry cows watered *(13,500 l/head)*	Annual number of cows & calves watered *20,000 l/head)*	Annual number of dry sheep watered *(2,070 l/head)*	Annual number of lactating ewes watered *(2,880 l/head)*
1 sq m	X	1mm rain	=	1 litre					
0.5ha	X	450mm rain	=	2,250,000 litres (2.25 megs)	$7,697	166	112	1,086	780
1 ha	X	450mm rain	=	4,500,000 litres (4.5 megs)	$15,358	333	225	2,173	1,560
2 ha	X	450mm rain	=	9,000,000 (9 megs)	$30,717	666	450	4,347	3,125
3 ha	X	450mm rain	=	13,500,000 (13.megs)	$46,075	1,000	675	6,520	4,685

CASE STUDY ONE

Owner	*'Orlunda Downs'*	**M & L Scobie**
Property size		**2,690ha**
Location		**Policemans Point**
Rainfall		**500mm**
Enterprises		**1,100 Cattle and 800 Sheep**
Annual water bill pre dam		**$40,000**
Annual water bill post dam		**< $1,000**
Catchment area		**2.3ha**
Catchment liner	Polydam	**1.5mm HDPE**
Dam Capacity		**11 mega litres**
Dam liner	Polydam	**1.5mm HDPE**
Shandying water		**yes**
Cost		**$250,000**
Year established		**2016**

Benefits

Mark has now switched off his water meter but has left it connected to his farm watering system as "insurance" in case of emergency.

Mark turning off his SA Water meter

Commencing the instillation of the liner and the anchor trenches are clearly visible in the foreground.

Site selection was important and there is plenty of room to extend the catchment at a later date if necessary

Excess rock was used around troughs and on roads The site must be rock free or liner damage may occur

Poly liner initially weighted down with sandbags

Mark the ability to shandy bore water to increase the capacity of the lined catchment. Water only needs to be fit for purpose and stock don't need pure rainwater to thrive.

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Project Steps

- Earthworks carried out to build the dam and shape the catchment area.
- The dam and catchment surface to be lined must be smooth and free of rocks, sharp stones, sticks, roots, sharp objects, or other debris prior to laying liner.
- Ensure the catchment site is level to minimise water pooling and evaporation.
- Placement of liner in dam and on catchment.
- Liner cannot be laid when hot or windy.
- The liner must be laid loosely as it will tighten, and move when the temperature fluctuates.
- Ensure the liner is stable, weighed down, and fully welded to stop poly liner from flapping.
- Welding of liner by contractors (if using purpose made poly liner).
- Fencing the site to prevent wildlife being trapped and damaging the liner.
- Setting up other water infrastructure as required eg. tanks, pumps, telemetry etc.

Project Components

In approximate order of costs

**May not be required at all sites*

1. Poly Liner	6. Water Pumps *
2. Earthworks	7. Remote Monitoring Telemetry*
3. Catchment Fencing	8. Pump Shed*
4. Tanks *	9. Sand Bags to weigh down liner
5. Power *	10.Tyres to weigh down liner

Site selection is very important and it is advisable to do a test dig with a backhoe so there is no nasty surprises during construction

The whole site must be free of rocks and other debris otherwise liner damage mat occur

Concrete sump and outlet

The liner needs to be weighed down to prevent lifting in the wind

The site needs 1.8m high secure fencing

WORK

CASE STUDY TWO

Owner	*'Gundooee'*	**Nick Daniel**
Location		**Field**
Property size		**1,230 ha**
Rainfall		**450mm**
Enterprises		**Cattle**
Annual water bill		**$28,000**
Catchment area		**12,200sq m**
Dam area		**3,200 sq m**
Total area		**1.54ha**
Catchment liner	Fabtech	**1mm HDPE**
Dam Capacity		**5 mega litres**
Dam liner	Fabtech	**1.5mm HDPE**
Year established		**2015**

Challenges

Have had issues with algae, but it was easily treated with copper sulphate.

Benefits

SA Water meter now switched off.
It remains connected and could be switched on in case of emergency.
The only SA Water charge is the annual connection fee.

Cost

Poly Liner 12,200 sqm + dam 3,200 sqm	$76,300
Earthworks	$28,200
2 pumps & telemetry (SMS)	$15,400
Tank and extra poly	$15,400
Pump shed	$250

Payback Period

Will capture 15,400 litres per millimetre rain all working well
450mm rain will produce 6,930kl or 6.93 megs
This would equate to $23,000 for an equivalent amount of mains water

All joints double seem welds and the gap between the welds is pressure tested for any leaks

Completed dam with floating pump

Pump shed and storage tank

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Dam evaporation losses

Evaporation losses from the dam will be between 1.5m and 2.0m and need to be allowed for in calculating catchment area.

Covers are expensive, and in the range of $5 to $8 per sq m.

The cheapest option to address losses may be to dig the dam deeper to compensate for the evaporation loss.

Floating Dam Covers - Benefits:

- Evaporation control
- Blocks sunlight preventing algae
- Protects water from bird droppings, pollens, air born and animal borne particulates
- Contain dairy effluent and other agricultural wastes
- Acts as a catchment area, water is diverted to a drainage system and stored in the dam

Catchment liners can save evaporation losses but are very expensive. It is probably better to dig the dam deeper or make the catchment larger to offset evaporation losses.

Factors to consider with dam covers:

- How stable will the cover/barrier be in high winds?
- How long will it last?
- Will it be stable when the dam is dry?
- Are there special requirements – at least one product requires 30cm or more of water in the dam at all times?
- Will it leach toxic substances into the water?
- How will it stand up to what is a corrosive environment – continual contact with water and air and some level of salinity; exposure to ultra-violet light that can degrade some plastics?
- Some products are easily and cheaply installed by the land owner, others require expensive installation by specialists.
- What warrantee is there & is the company likely to be around in five years if you need to call on the warrantee?
- Does the product need to cover only the water, or does it need to be large enough to allow for anchoring beyond the lip of your dam – making a big impact on the final price?
- Many of the products on the market are flammable. The probability of a bushfire during the life of the cover must be considerable; in some areas more than others.

Fencing the lined catchment is essential to prevent trapped wildlife and livestock tearing the liner or drowning.

Additional Resources

Water Harvesting and lined catchments
Coorong Tatiara Local Action Plan :
http://www.coorong.sa.gov.au/waterharvest

Planning information
http://www.coorong.sa.gov.au/waterplanningconsiderations

Water affecting activities regulations
Natural Resources SA Murray Darling Basin or Natural Resources South East to check to for any 'Water Affecting Activities' regulations.

- Mount Barker P.08 8391 7500
- Mount Gambier P.08 8735 1177

Catchment and dam liners:
Fabtech: https://www.fabtech.com.au/
Tel: 1300 664 776 / 08 8347 3111

Poly Dam: https://polydam.com.au/
Mobile 0411 101 468

Coorong Tatiara Local Action Plan
Tintinara Office

37 Becker Tce Tintinara
PO Box 399
Tailem Bend SA 5260
P: 1300785277
F: (08)87 572 222

www.coorong.sa.gov.au go to CTLAP
www.tatiara.sa.gov.au

'National Landcare Program: Smart Farms Program, an Australian Government initiative'.

Australian Government | National Landcare Programme

Alpha Group Tank Level Sensors

Leak Detection Technology **Shane Oster – Alpha Group**

Background

Leak detection is rapidly becoming a must have management tool for livestock producers in the Coorong/Tatiara area. The technology saw it's genesis in the early 2000's with a project instigated and funded by the Coorong Local Action Plan. The system was extremely effective at identifying water leaks that producers were not aware of, even if they were checking their meters.

This technology continues to be fine tuned, and has been primarily installed onto SA Water mains meters.

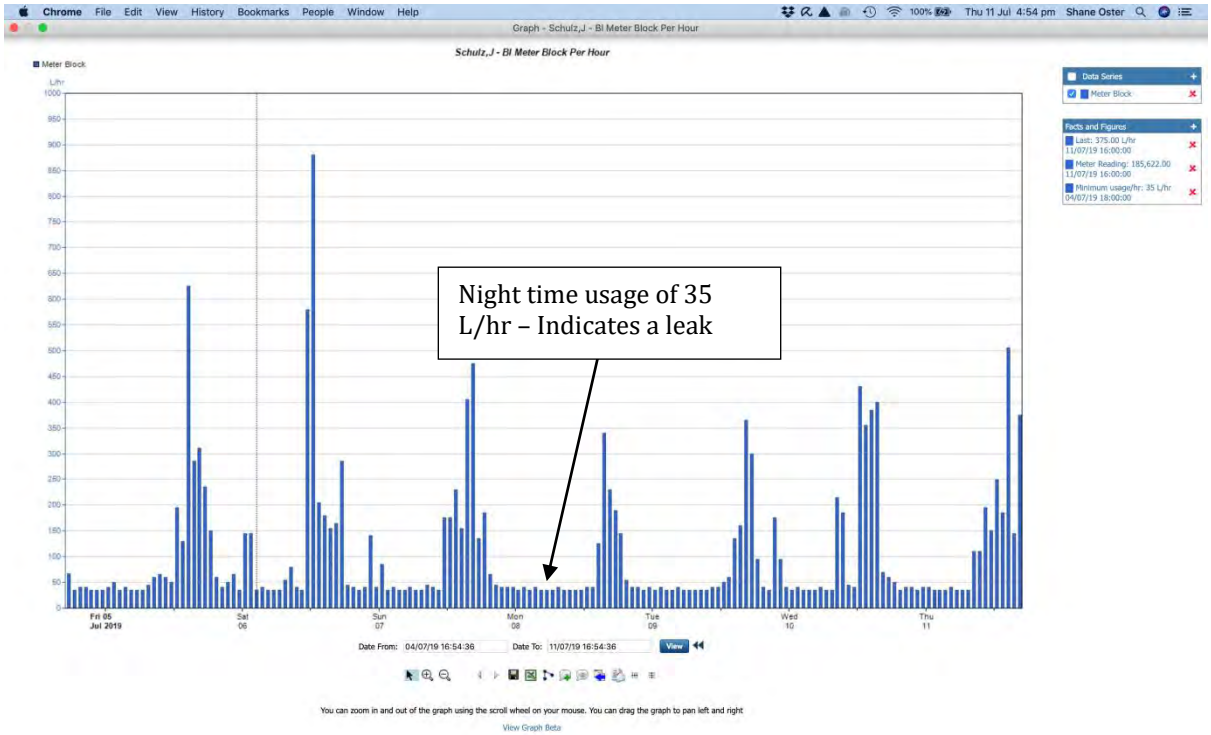
How it works

The challenge often comes in finding the leak after you have identified that you have one. Having a system which is essentially mobile with a flow meter that can also be shifted around to different sections of the pipeline network is one way of overcoming this issue. This will isolate the section of the pipeline where the leak might be occurring on.

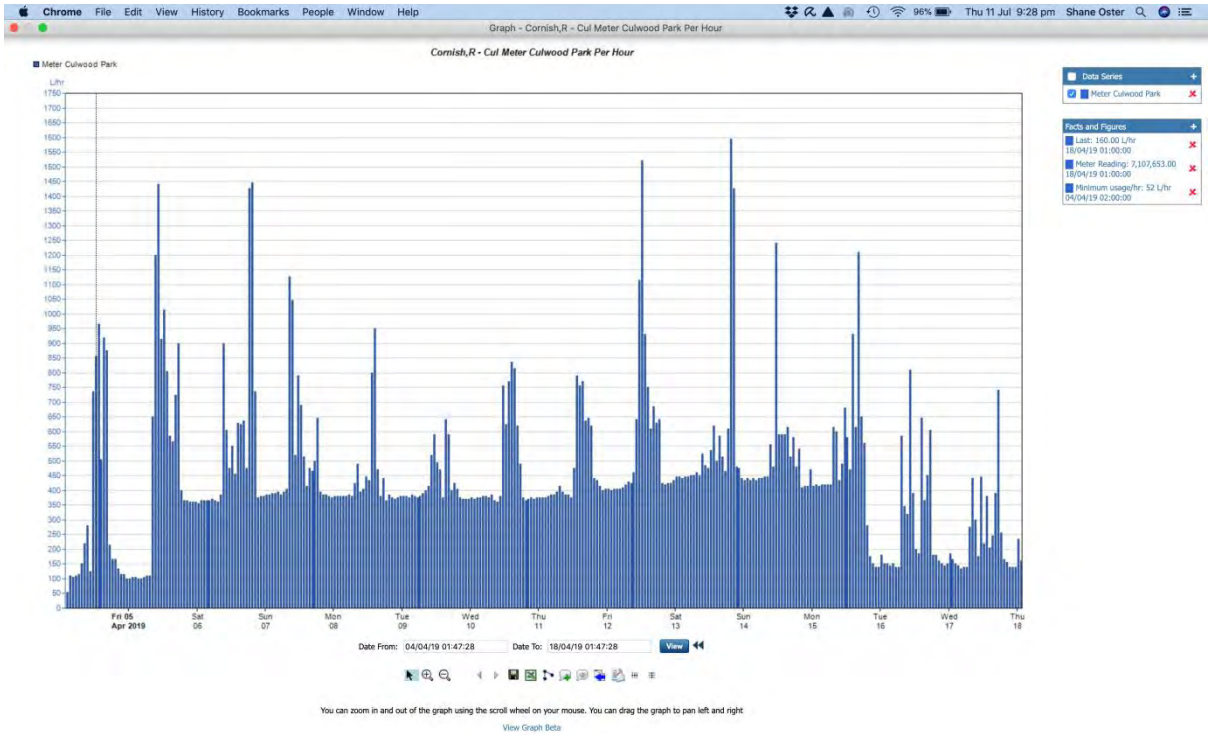
The technology works by receiving a "pulse" from the flow meter every time it registers a litre of water (the pulse rate varies depending on the type of meter). The telemetry unit will then record the "pulses" and will send the data off via a Next G connection at a scheduled interval (usually every 2 hours) to an ftp site. From there the data is processed to be put into a graphical format and alerts are sent via SMS & email if the pre-set tolerances are breeched. A typical Leak Detection unit is shown below. The telemetry unit which contains the Next G SIM card is inside the small grey box on the back of the solar panel.

The basis of the system lies in understanding what the water usage patterns are normally and identifying when they change. For example, from examining the data we know that stock typically won't drink between the hours of midnight and 6am. As such the water usage at this period should be zero litres/hour. If the minimum usage at this period is 200 L/hr we can quantify that there is a 200L/hr leak. Every morning clients will receive a text message informing them exactly how much water they have used over the previous 24 hours and what the minimum flow has been

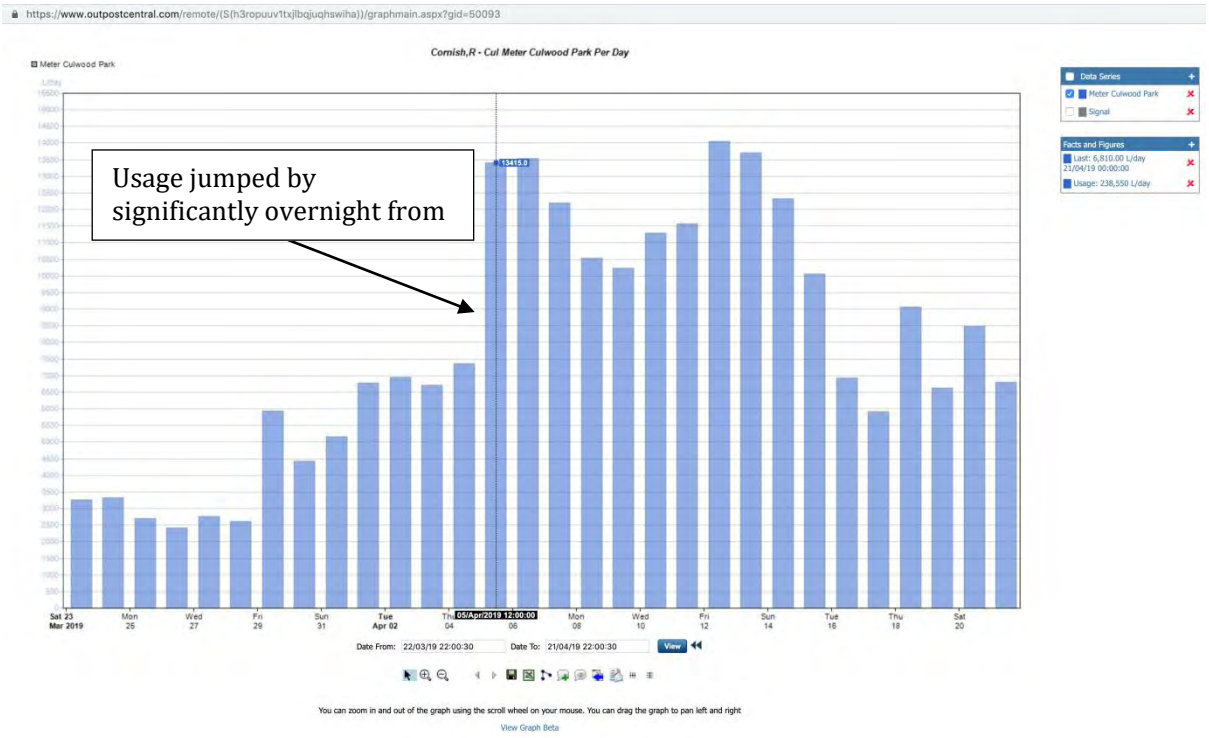
Below is an example of a “Normal” water usage graph with a minor 35 L/hr leak.



Below is an example of how major leaks often appear. Although it seems a lot, a leak of less than 100 L/hr is very hard to find. Commonly leaks like this will occur for a period of time before a split pipe really opens up. Below shows a leak event of 105 L/hr jump to 380 L/hr effectively overnight. Even at that usage rate is still took 10 days before the leak was able to be identified and repaired.



Alarms are also set on the system to alert for high usage events. The graph below illustrates how “normal” usage can double in a day with the advent of a leakage event.



The integration of technology such as leak detection units have benefits which reach across the whole business. At it’s most fundamental level is a tool for saving water but once implemented into a business it performs other functions such as water security, efficient labour utilisation and provides mental health benefits. Growers with diagnosed mental health issues have identified it as being a critical tool for them, ensuring that the stress of losing thousands of dollars or water stock losses doesn’t weigh on their minds when other pressures are keeping them down.

BushLinx Controller Leak Detection and Water Shut Off Technology
Tim Powell – Integrated Irrigation

The aim of the technology is to;

- Provide leak detection and water flow data remotely to the primary producer
- Provide a mechanism to assist the primary producer to remotely switch water lines on and off, which will be of great benefit when a water leak is detected, or to shut down water lined while not in use

The new BushLinx Controllers appear to be working well, and is a great buzz for the farmer to stand there and turn the water on and off from their phone.

BushLinx controller installed in water line

Background

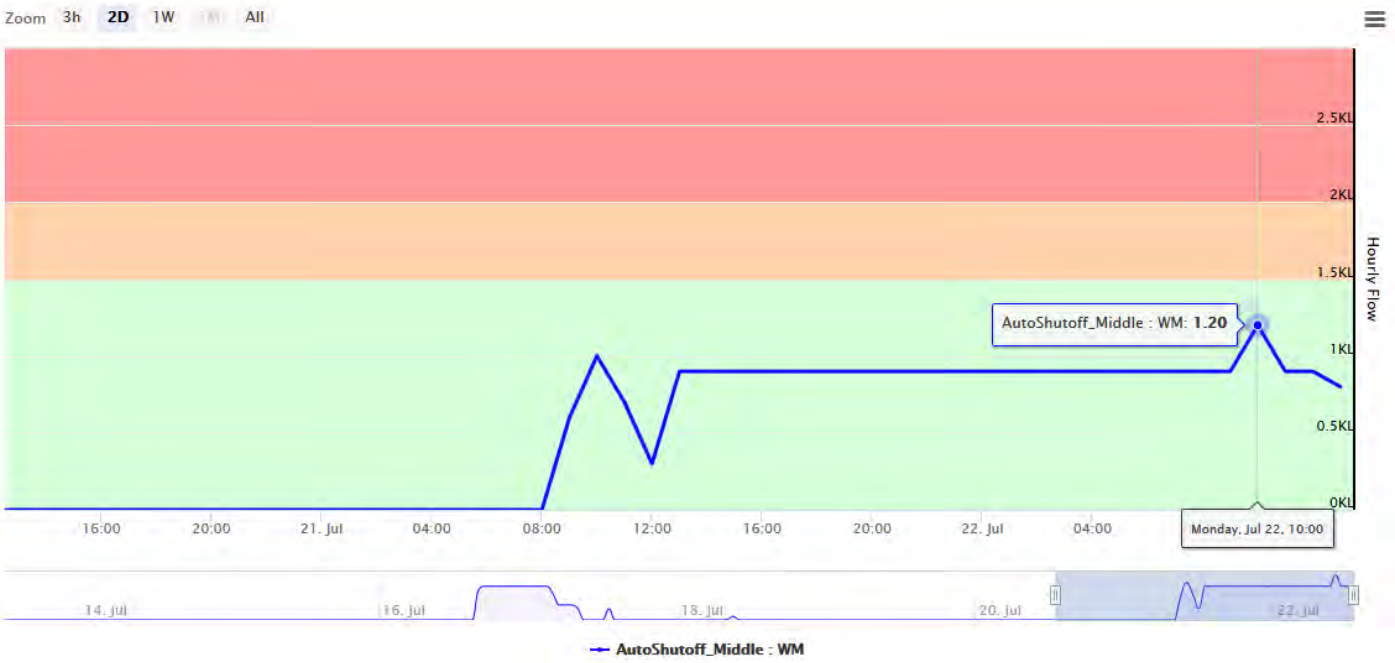
One of the biggest things to consider with remotely issuing commands to remote equipment is latency. That is, the time it takes from the user issuing a command to it being carried out in the paddock e.g. turning the water on/off. There is very little equipment available that can do this properly, and even fewer that can combine the sensor monitoring required. We have invested significant effort and resources into making this water control system simple, and robust and get the job done properly.

We have now implemented a system that has reduced latency to the time it takes a sms command to arrive at the BushLinx controller which is as fast as it can happen from a phone.

Sensor monitoring has also been enabled, and in the case of the BushLinx Controller, we use a water meter installed in a mains water supply line to measure the water volume/flow to a whole section of the property. This also provides leak detection function as any sudden increase in water flow indicates a water leak. This data is then sent to our BushLinx servers, where it is graphed and accessible by the user.

In farm water systems, other sensors that can be installed are options like tank level sensors that measure how much water is in each tank around the property to show where the water is going to when it goes through the supply line.

BushLinx controller installed in water line



Example of data produced by the BushLinx controller that can be accessed remotely

Automated shandying, water blending technology (groundwater / mains water)

Background

Seed (supported by Atnik Solutions) installed water blending equipment at Moonee Hills Pastoral, near Field (5265) on the Coorong SA. The site was selected as water from SA Water mains is delivered to a centrally located water tank (hilltop location) and blended with two saline bore water sources (wedge holes) to create a single source of water for stock watering purposes. Salinity management is an issue, as is the cost of SA Water mains.

Materials and Methods

An automated blending valve was installed at the existing blending tank (receival point for SA Water, and two groundwater supplies). The blending valve was connected to a microprocessor controller, with power supplied by a battery and solar panel.

The list of components used is as follows:

Automated blending trial
Water sources: Mains water and saline groundwater

Equipment Used		quant
Salinity (EC) probe	Conductivety sensor 4-20mA output	1
Blending valve	Electric actuated ball valve - proportional control (4-20mA)	1
PLC controller	Allen Bradley Mictologix PLC 1100	1
HMI touch screen 4"	Allen Bradley HMI PV800 4"	1
Enclosure	Steel power coated cabinet 500 x 400 x 210	1
Relays	24 VDC coils	2
Battery 24 VDC	2 x 18 Ahr	2
Solar panels 24 VDC	2 x 60 watt	2
Solar regulator	10 amp	1
9..30/24VDC power supply		1
Circuit breaker	10A	1
Pushbutton		1
2 position switch		1
Ethernet patch cables	1m	2
Terminals		15
Antenna	900 MHz dipole	1
Concrete and steel		
Float switch	10m of cable	1
Pipe fittings Butlers		
Pipe fittings Meningie		

The system was pre-configured and tested by Atnik Solutions and then constructed onsite by Nick Cumming (Atnik Solutions) and Andy Chambers (Seed). The system was connected to a 3G modem to enable remote monitoring, settings change and data download and upload.

Figure 1. Alamil Pastoral company was selected for the water blending trial due to the high cost of SA Water and existing use of simple, but uncontrolled blending technology to mix two sources of groundwater with the SA Water mains.

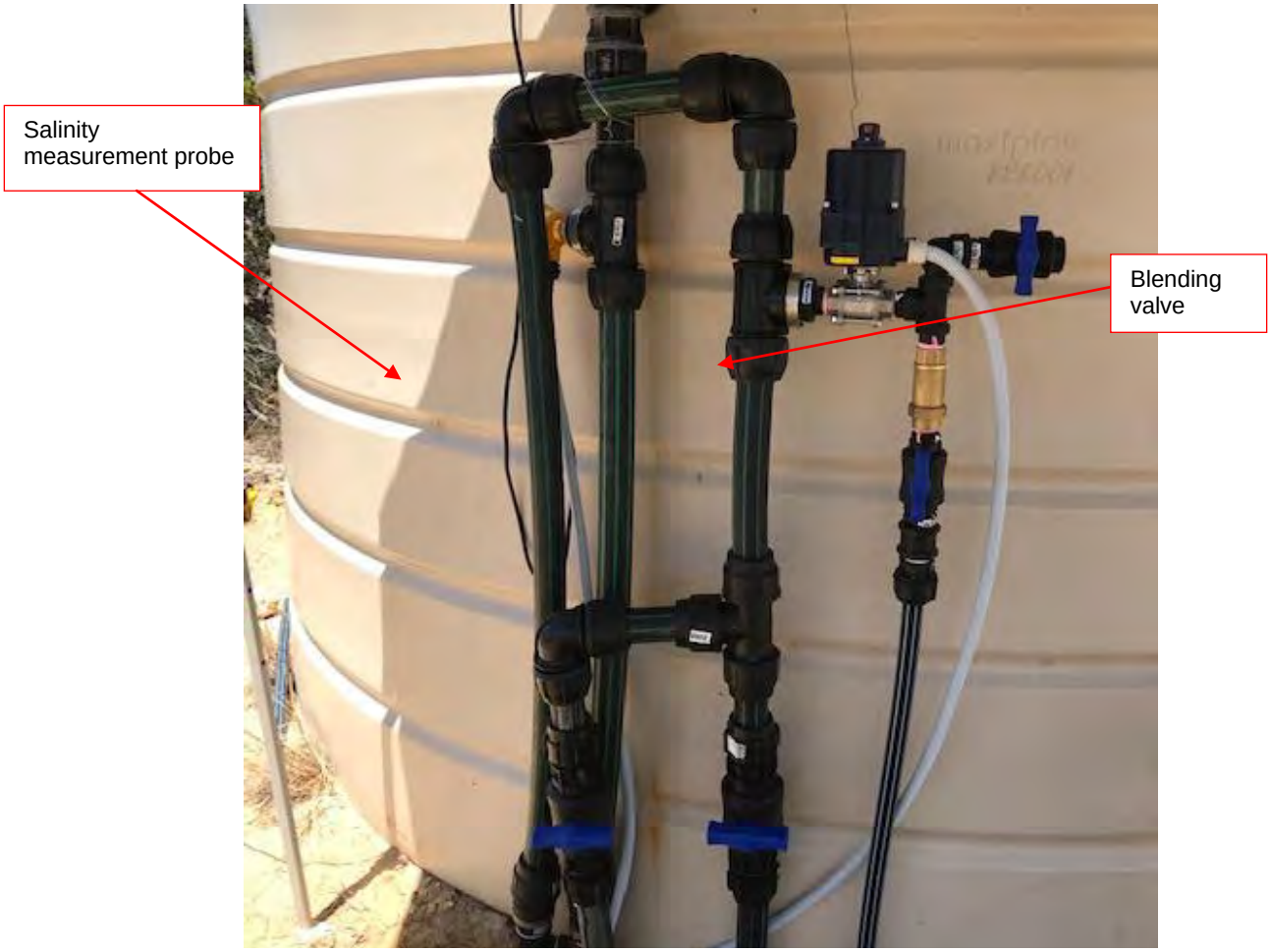


Figure 2. Existing water blending tank with three sources of water input (SA Water, smaller input pipe on the right) and two groundwater input pipes (50mm green stripe poly). The automated blending valve is marked. A salinity probe is also marked on the final input (blended) water source.

Figure 3. Control box located adjacent to the blending tank indicating the solar panels providing power to the system battery (See figure 4).

Figure 4. Control box showing the power supply battery, microprocessor control equipment and modem for remote connection.

Results

Indicative flow rates and salinities from the three sources of water and estimates for cattle water needs are as follows:

	uS	L/min	Hrs per day	L / day	
Big wedge hole	5100	25	8	12,000	
Small wedge hole	3500	31	8	14,880	
SA water	300	15	24	21,600	
			Total inflow	**48,480**	
				550	head of cattle
				100	L / head
				55,000	L / day required

Following system install, configuration, and testing the system was actively monitored for a period of 2 weeks to ensure security of water supply.

Initial data downloads are indicated in the following figures (Figure 5).

Coorong water blend

Date	Time	EC	Valve	Battery
23-Jan	13	4493	96	294
23-Jan	14	4615	101	305
23-Jan	15	4750	100	304
23-Jan	16	5116	100	311
23-Jan	17	5397	100	303
23-Jan	18	5067	100	299
23-Jan	19	4054	100	283
23-Jan	20	940	1	265
23-Jan	21	952	1	264
23-Jan	22	965	1	262
23-Jan	23	965	1	262
24-Jan	0	965	1	261
24-Jan	1	1001	1	260
24-Jan	2	1038	1	260
24-Jan	3	1050	1	259
24-Jan	4	1013	1	258
24-Jan	5	1026	1	258
24-Jan	6	1013	1	257
24-Jan	7	1038	1	257
24-Jan	8	5519	100	257
24-Jan	9	6166	100	258
24-Jan	10	5665	100	271
24-Jan	11	3651	65	279
24-Jan	12	4017	14	301
24-Jan	13	3712	6	303
24-Jan	14	4298	15	310
24-Jan	15	4054	13	316
24-Jan	16	3663	20	307
24-Jan	17	4151	23	299
24-Jan	18	4432	30	296
24-Jan	19	672	1	269
24-Jan	20	427	1	265
24-Jan	21	342	1	264
24-Jan	22	342	1	263
24-Jan	23	305	100	262
25-Jan	0	269	100	262
25-Jan	1	269	100	261
25-Jan	2	281	100	260
25-Jan	3	281	100	259
25-Jan	4	293	100	259
25-Jan	5	281	100	258
25-Jan	6	317	100	257
25-Jan	7	330	99	257
25-Jan	8	3800	58	264

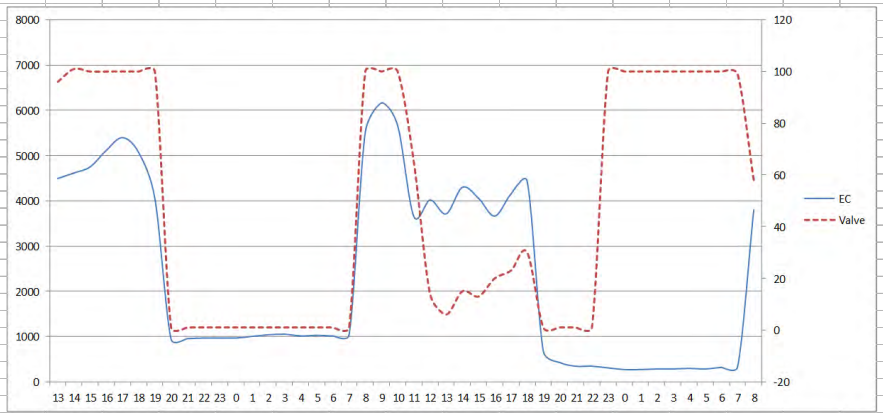


Figure 5. Indicative salinity (EC) data as the automatic valve cycled through seeking to achieve a constant salinity (to tank) of 3500 EC.

As the trial progressed it become apparent that there was limited pressure available through the SA Water supply (some 50m+ head) to the header tank located on top of the hill, to the extent that there was insufficient flow to compete against the higher flows and higher salinities of the two groundwater supplies.

As a consequence it was very difficult to maintain the desired salinity output from the blending valve to the storage tank.

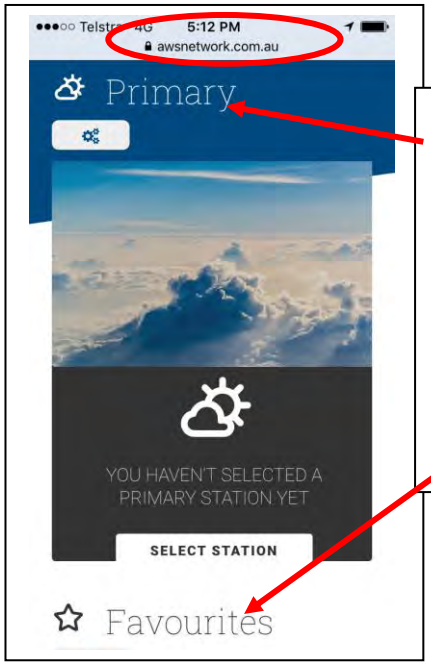
Some battery voltage and software command issues were experienced which resulted in the valves switching off for a period of time. Componentry was swapped out (replaced) but the key issue maintained to be lack of flow and pressure from the SA Water supply to achieved the desirable salinity outcome i.e. approx 3500 EC.

The equipment has now been removed and a second site is been sought to trial different flow rates. Reinstallation will occur during Spring 2019.

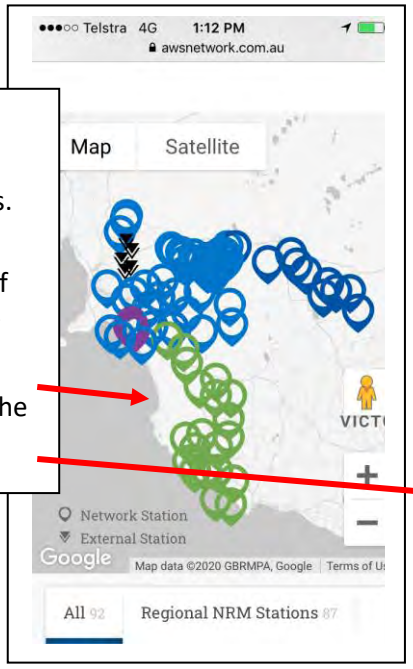
Key learning: Need to establish pressure and flow rates of all input sources prior to installation and match accordingly. Some situation will not be suitable for this type of automated water blending.

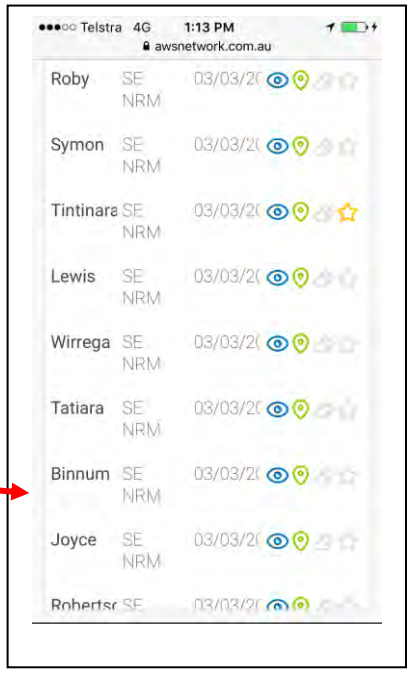
Saving easy access weather icon to a to a smart phone

Website https://www.awsnetwork.com.au/

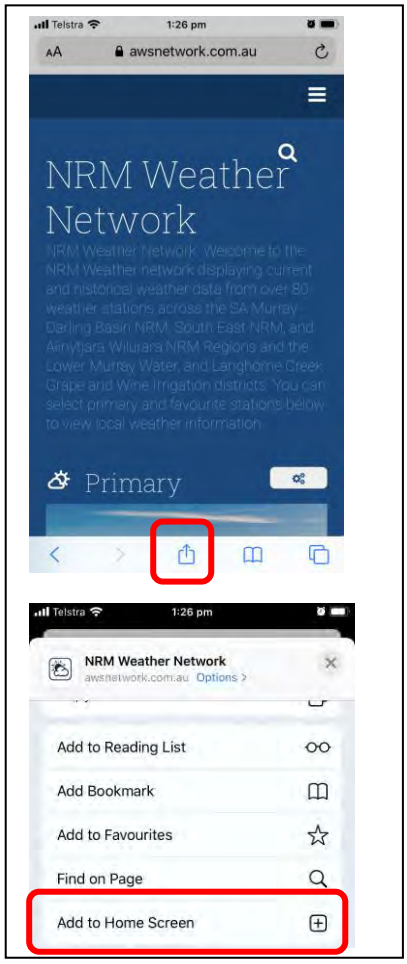


Select a primary and favourites weather stations. from either the map or the list of over 60 weather stations which is situated below the map.

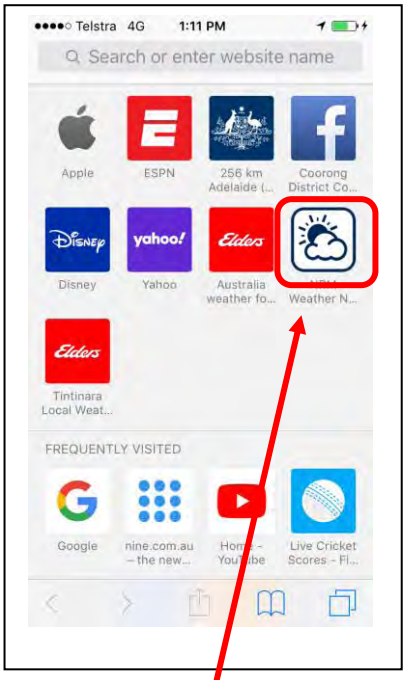




Once you have selected your Primary site, scroll down to the bottom of the page and click on the circled icon.



Click on this icon, then 'Add to Home Screen'



The circled icon above will appear on your smart phone.

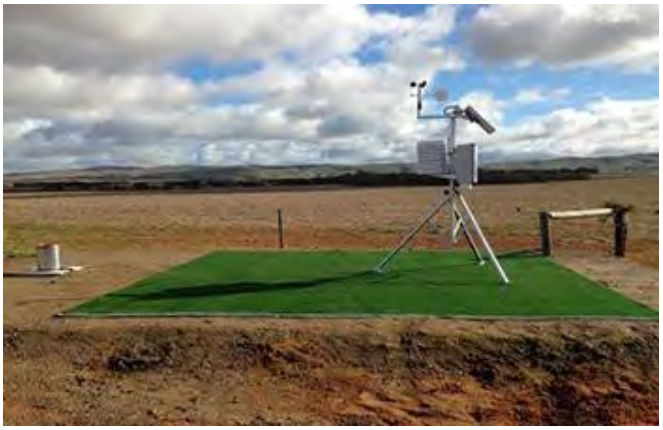
Click on this icon to take you to your primary weather station

Automatic Weather Station Network

Fact sheet August 2015

What is an automatic weather station?

Automatic Weather Stations (AWS) record various weather observations at set intervals during every 24 hour period. The South Australian Murray-Darling Basin Natural Resources Management Board has established a network of 40 automatic weather stations and seven automatic tipping bucket rain gauges across the South Australian Murray-Darling Basin region.



An automatic weather station

What data do AWS's record?

AWS's have a dual function – they record key climate data and combine some of these collected data sets to calculate important climatic indicators for agricultural and horticultural production.

Basic data collected

- Rainfall (mm)
- Temperature/Humidity (degrees Celsius and relative humidity (%).
- Global Solar Radiation (Watts per m2).
- Soil temperature (in degrees Celsius at 150 mm depth).
- Wind speed (kilometres per hour).
- Wind direction (compass degrees, pointing to direction wind is coming from).

Calculated indicators

- Dew Point – (degrees Celsius) - the likelihood of dew formation with respect to atmospheric temperature and humidity levels (usually interpreted in conjunction with likely overnight temperatures and hence frost risk).
- Apparent Temperature – (degrees Celsius) - an inferred rating of current temperature based on the combined effects of several climatic data sets to breed a 'feels like' temperature rating from a human perspective.

- Growing Degree Days – Tally of hours where temperatures above 10 degrees Celsius have been sustained divided by the time maintained.
- Chill hours (hours below 10 degrees Celsius) – an online calculator allows specific calculations of chill hours or portions respective to location.
- Frost – recorded time below 2 degrees Celsius at a given location.
- Evapo-transpiration (ET) – inferred mm of moisture transpired from a plant surface during a 24 hour period. Two ratings one for short crop (0.12 m height) and one for a tall crop (>0.50 m height).
- Delta-T – suitability of conditions for application of airborne sprays (safe operating standard is between 2 – 8 Delta –T degrees).
- In – crop canopy temperature (degrees Celsius) relative humidity (%) and leaf wetness index (0% dry to 100% fully wet). This feature is available at a handful of sites in vineyard applications.
- Calculated Minima/Averages/Maxima for most data sets.

How frequently is data collected and available on the internet?

Data from all stations is collected hourly and uploaded to the internet (see link at the bottom of this page). There are plans to increase this data collection frequency to 15 minutes to provide a greater degree of accuracy to users of the network.

Can data be viewed on a phone or tablet?

Yes, data can be viewed on these devices but it may require resizing the display to permit suitable viewing. Plans are currently underway to develop mobile and tablet friendly screen displays.

Locations of Automatic Weather Stations and rain gauges

Automatic Weather Stations are funded by the South Australian Murray-Darling Basin Natural Resources Management Board through the NRM Levy. For details of their locations, refer to related links below.

Related links

- Access the Automatic Weather Station network and locations (web page link) (http://www.naturalresources.sa.gov.au/samurraydarlingbasin/home)

Leak Detection Technology **Andy Chambers – Seed Consulting Services**

1. Drone mounted thermal camera technology for pipe leak detection

Materials and Methods

Raven Limousin "Coolaroo" – Field (5265), Coorong, South Australia. A DJI Wind 8 Octocopter was equipped with a Flir Duo Pro R thermal camera. An initial flight to ground truth the technology and set up and calibrate camera parameters was conducted on 16 May 2019 following initial delays during March and April with camera and drone communications.

Figure 1: Site planning with Raven Limousin property owner Jason Schulz

Figure 2. Preparing the drone for flight

Figure 3. Initial site launch and flight testing

Figure 4. Airborne and ready to fly

DJI Ground Station Pro flight planning software was used to program a pre-determined flight plan following the route of a major farm water supply pipeline. The property owner has experienced pipeline leaks along this route.

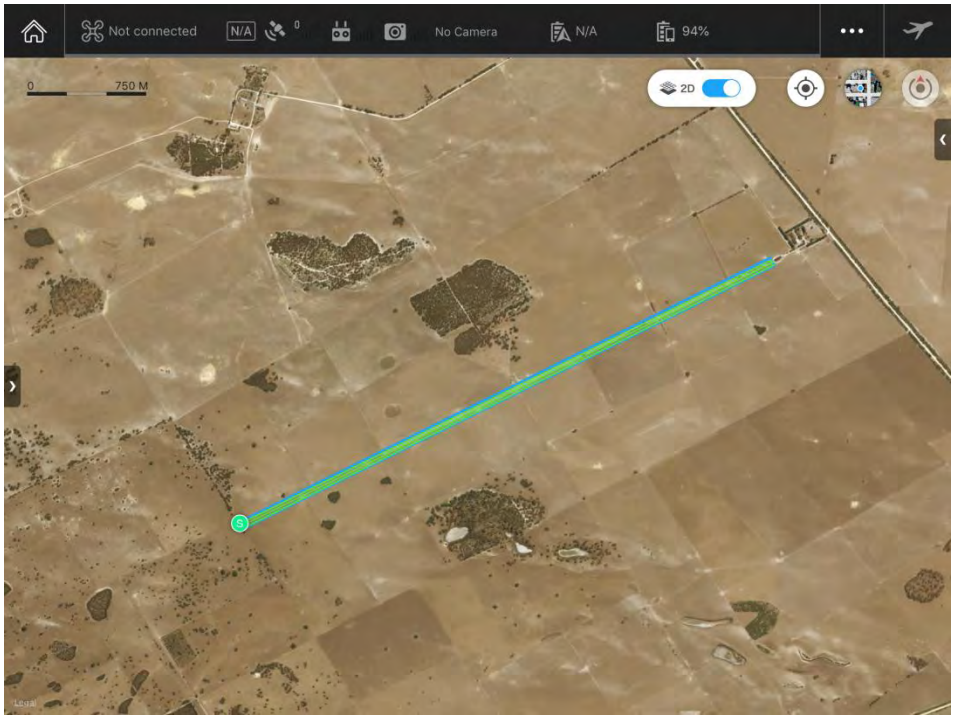


Figure 5. Property map (Google Earth image) contained within DJI ground station Pro control software contained within an app run on an Apple iPADmini 4 attached to the DJI flight controller

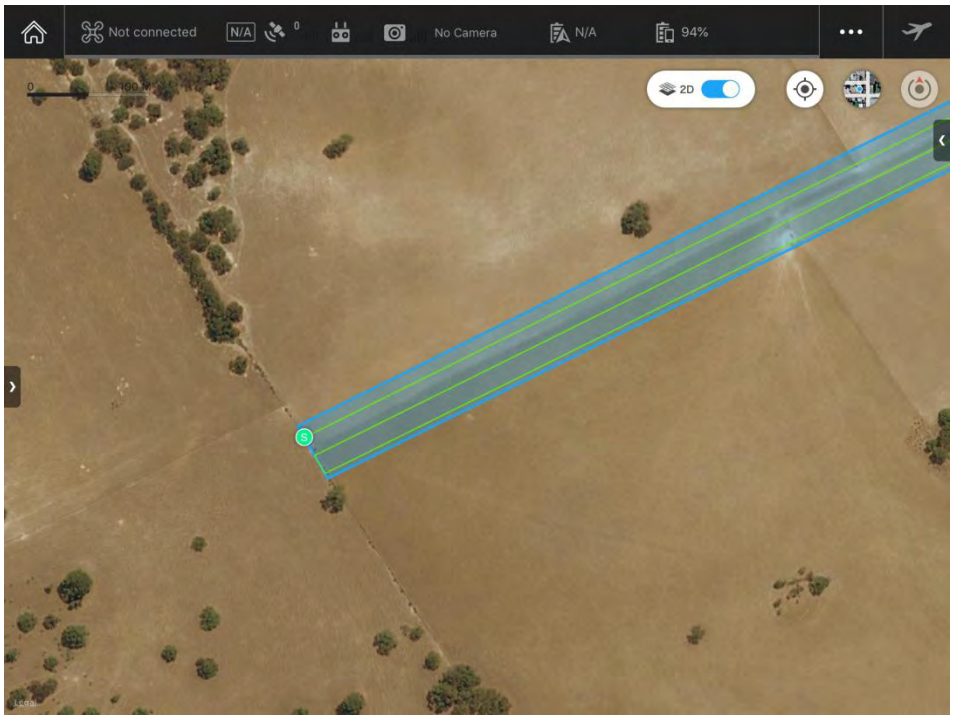


Figure 6. Three parallel transects of approximately 3.7km each were flown with overlapping imagery

Some communications issues were experienced preventing the fully overlapping final image to be post processed, however individual photos in high definition (4k RGB) and thermal imagery were captured.

Opening rains shortly after the flight prevented follow up flights being conducted as the ground was considered too wet for useful results.

Data interpretation is continuing with view to follow-up flights being conducted in Spring 2019.

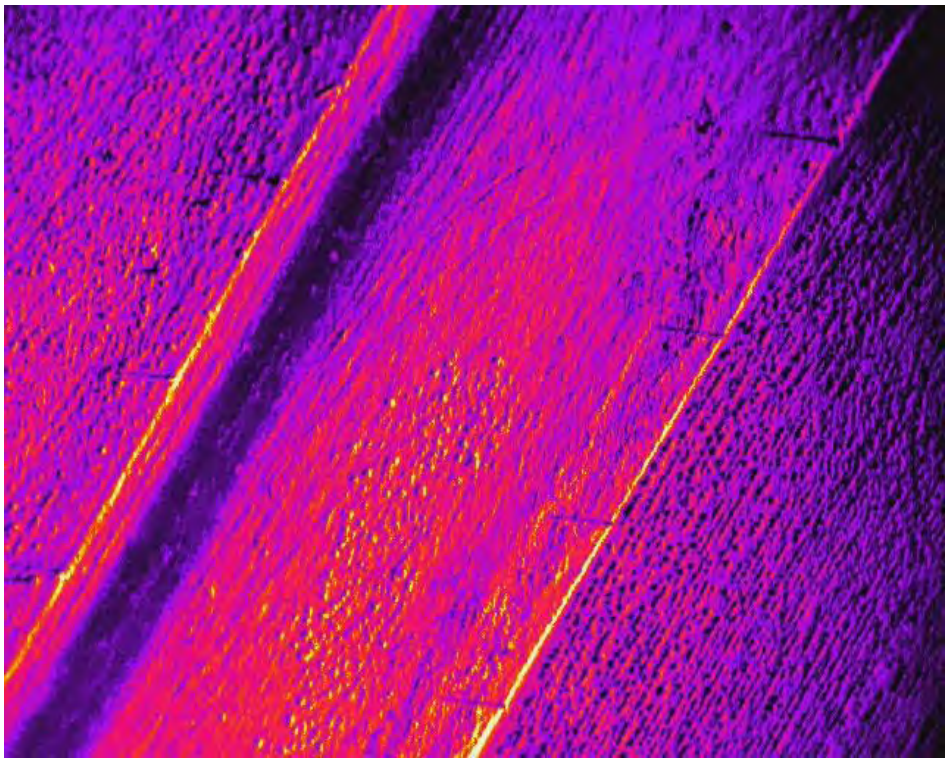


Figure 7. Example thermal image from site, prior to further analysis of temperature variations.

Coorong Tatiara

Sustainability, Agriculture & the Environment

Farm Water Infrastructure Tax Benefits

Use this document as a guide only.
Tax legislation frequently changes.
Individuals financial situation and business structure varies.

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$30,000 instant asset write-off

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- **Water facilities**
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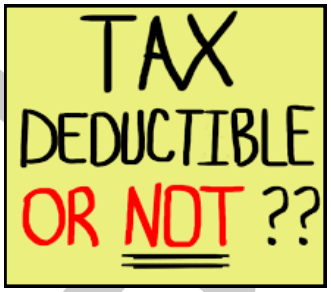
Environmental Protection Activities



Primary producer concessions

If you are a primary producer, special tax concessions may affect which amounts you include in your assessable income each year. These concessions also affect when you have to pay your income tax, as you may be able to make two pay as you go (PAYG) instalments each year, instead of four.

Primary producers also have access to primary production averaging, which may allow you to pay a lower tax rate in years where you earn above-average income.

Grants and Financial Incentives

These may be available from time to time to assist with projects.

In time of drought, tax and financial incentives may be offered as part of Government drought assistance packages.

The Coorong Tatiara Local Action Plan will include these in our e newsletter and also post them on our website.

http://www.coorong.sa.gov.au/page.aspx?u=1946

ATO 2nd October 2019

$30,000 instant asset write-off

Did you know, you may be able to claim a deduction in your 2019 tax return for assets you bought for your business in the 2018-19 financial year?

Using the instant asset write-off, you can claim a deduction for each asset that cost less than the threshold that applied when the asset was first used or installed ready for use. Different thresholds apply, so make sure you check which one applies to your asset:

- $30,000 from 7.30pm AEDT on 2 April 2019
- $25,000 from 29 January 2019 until before 7.30pm AEDT on 2 April 2019
- $20,000 before 29 January 2019.

STOP PRESS!!!
Corona Virus Economic Stimulus Package

Medium to big business will be encouraged to spend on equipment & other investments through an extention to the instant asset write off.

This is currently restricted to companies with a turn over of up to $50 million, for maximum investments of up to $30,000. But this will be significantly lifted, allowing companies with turnovers of up to $500 million to make asset write-offs of up to $150,000.

On your tax return, claim your instant asset write-off deduction under 'Small business entity simplified depreciation'.

The usual rules for claiming deductions still apply. You can only claim the business portion of the expense, and make sure you have records to prove it.

Assets that cost more than the relevant threshold can't be immediately deducted. You can deduct them over time using the small business pool.

https://www.ato.gov.au/Newsroom/smallbusiness/General/$30,000-instant-asset-write-off/

Remember, registered tax agents can help you with your tax.

PIRSA December 2019

On-Farm Emergency Water Infrastructure Rebate Scheme

Purpose The Program has been established to provide a one-off 50 per cent rebate up to $50 000 (GST exclusive) to primary producers in drought affected areas for the costs associated with the purchase and installation of On-farm water infrastructure that:

- assists primary producers to be more productive
- assists in mitigating degradation of natural watering points
- addresses animal welfare needs
- assists primary producers to be more resilient for future droughts

The On-Farm Emergency Water Infrastructure Rebate scheme can be applied to new purchases and installation of:

- water pumps, pipes and fittings
- water storage devices (such as tanks and troughs) associated with stock watering
- de-silting of existing dams, where you can demonstrate that the property does not have access to groundwater
- drilling of stock groundwater bores and associated equipment/power supply such as generators, desalinisation plants
- other materials or equipment necessary to install the above excluding purchase of machinery
- any freight component to purchase and install the equipment
- the professional installation costs to install the water infrastructure.

The availability of rebates is subject to funds being available in the Program. No rebates will be offered beyond the allocated funding of $4.75 million. The Program opened on 1 July 2018 and will close on 31 March 2021 or when the funding allocation is exhausted, whichever occurs first

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ATO Guide to depreciating assets 2019 (ATO June 2019)

Water facilities

A water facility includes plant or a structural improvement that is primarily and principally for the purpose of conserving or conveying water. It also includes an alteration, addition or extension to that plant or structural improvement. Examples of water facilities are dams, tanks, tank stands, bores, wells, irrigation channels, pipes, pumps, water towers and windmills. The meaning of water facility has been extended to include certain other expenditure incurred on or after 1 July 2004:

- a repair of a capital nature to plant or a structural improvement that is primarily and principally for the purpose of conserving or conveying water (for example, if you purchase a pump that needs substantial work done to it before it can be used in your business, the cost of repairing the pump may be treated as a water facility)
- a structural improvement, or an alteration, addition or extension to a structural improvement, that is reasonably incidental to conserving or conveying water,
- a repair of a capital nature to a structural improvement that is reasonably incidental to conserving or conveying water.

You can fully deduct capital expenditure on a water facility if you incurred the expenditure at or after 7.30pm (AEST) on 12 May 2015. You fully deduct the expenditure in the income year in which you incurred it. The total deduction cannot be more than the amount of the capital expenditure. If you incurred the expenditure before this time, the previous UCA continue to apply.

For more information

https://www.ato.gov.au/Forms/Guide-to-depreciating-assets-2019/

Fencing assets

A fencing asset is an asset or structural improvement that is a fence, or a repair of a capital nature, or an alteration, addition or extension, to a fence. The capital expenditure you incur on the construction, manufacture, installation or acquisition of the fencing asset must have been incurred primarily and principally in a primary production business that you conduct on land in Australia. You may claim the deduction even if you are only a lessee of the land.

You can fully deduct capital expenditure on a fencing asset if you incurred the expenditure at or after 7.30pm (AEST) on 12 May 2015. You fully deduct the expenditure in the income year in which you incurred it. The total deduction cannot be more than the amount of the capital expenditure.

Fodder storage assets

A fodder storage asset is an asset that is primarily and principally for the purpose of storing fodder. It is also a structural improvement, or a repair of a capital nature, or an alteration, addition or extension, to an asset or a structural improvement, that is primarily and principally for the purpose of storing fodder.

- silos
- liquid feed supplement storage tanks
- bins for storing dried grain
- hay sheds
- grain storage sheds, and above-ground bunkers for silage.

The capital expenditure you incur on the construction, manufacture, installation or acquisition of the fodder storage asset must have been incurred primarily and principally for use in a primary production business that you conduct on land in Australia. You may claim the deduction even if you are only a lessee of the land.

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Capital Works Deductions

Capital works used to produce income, including buildings and structural improvements, are written off over a longer period than other depreciating assets.
Note that the land itself can't be written off and its cost isn't deductible.

The capital works deduction is available for:

- buildings or extensions, alterations or improvements to a building
- structural improvements such as sealed driveways, fences and retaining walls
- earthworks for environmental protection, such as embankments.

If it isn't possible to determine the actual construction costs, you can get an estimate from a quantity surveyor or other independent qualified person. You can claim a deduction for the full cost of the estimate in the year it is incurred. Deduction rates of 2.5% or 4.0% apply, depending on the date on which construction began, the type of capital works, and how they're used.

https://www.ato.gov.au/business/depreciation-and-capital-expenses-and-allowances/capital-works-deductions/

Landcare operations

You can claim an immediate deduction for capital spending on a Landcare operation in Australia.
The deduction is available to the extent you use rural land for a primary production or other business (other than including mining or quarrying).
You're entitled to the deduction even if you lease the land from the owner.

Environmental protection activities

You can claim an immediate deduction for expenditure for the sole or dominant purpose of carrying on environmental protection activities (EPAs). These are activities undertaken to prevent, fight and remedy pollution, and to treat, clean up, remove and store waste from your earning activity or a site on which another entity carried on a business that you acquired and carry on substantially unchanged as your earning activity.

Earning activities are defined as those carried on for the following purposes:

- producing assessable income (other than a net capital gain)
- exploration or prospecting
- mining site rehabilitation.

You may also claim a deduction for expenditure on EPAs relating to a site if the pollution or waste is caused by another entity to which you have leased or granted a right to use the site.

Expenditure that is deductible as part of the cost of a depreciating asset is not also deductible as expenditure on an EPA.

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https://www.coorong.sa.gov.au/
https://www.tatiara.sa.gov.au/

'National Landcare Program: Smart Farms Program, an Australian Government initiative'.

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