Coorong Tatiara

Sustainability, Agriculture & the Environment

Farm Water Supply Pipelines

This fact sheet covers the basic considerations and steps involved in constructing farm water supply pipelines. Maintaining a reliable and sustainable farm water supply is a major concern for livestock producers today.

Background

The increasing mains water prices has driven some landholders to consider sourcing water for their livestock from alternate sources such as; from Lake Albert, and from bores with good quality water on other properties.

This has lead to several ambitious and successful piping projects to provide an alternate water source to mains water.

Selecting correct pipe size

To determine the best size/diameter of pipe to install for a specific water reticulation project, the whole of the proposed system must be evaluated first.

The purpose of the evaluation stage is to gather information on the physical conditions that will inform the best design of the system.

It is necessary for the 'Total Head' to be calculated which is the sum of three elements;

- Static Lift
- Static Height
- Friction Loss.

Static lift

In the case of using a pump to supply the water into the system, Static Lift is the vertical distance of the suction pipe from the ground level at the pump site to the lowest water level in the Bore, Well, Dam or Creek. If the water supply is from a Storage Tank adjacent to the pump site, there is no Static Lift factor.

Similarly, where the water supply is from a reticulated pressurised mains supply, there is no Static Lift.

Static height

This is the maximum height to which the water has to flow, and is the vertical distance from the ground level at the water source to the highest point in the proposed delivery pipeline, eg a header tank. (When flowing downhill, water acquires a Static Height equal to the height of the fall.)

Friction loss

And the same applies to pipes. If we double the quantity of water passing through a pipe, it must obviously travel at twice the speed. This then means a greatly increased friction factor, but doubling the speed of the flow doesn't mean the friction is doubled too. The increase in friction is almost 4 times.

Friction loss is the most important element in the determination of any reticulation system, because it is the only variable that can be changed. For example, friction loss can be reduced by an increase in the diameter of the delivery pipe.

Designing the system

Once all the information required to design your system has been gathered and evaluated, the next process is to use this information to select the correct pump (if required) and pipe diameter.

High ambient temperature can significantly reduce the rated pressure capability of polyethylene pipe.

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, the following may need to be considered as part of the overall plan (noting that this is based on use as stock water only).

Dial Before You Dig

The essential first step in any roadside excavation

Dial Before You Dig is a FREE national referral service designed to assist in preventing damage and disruption to Australia's vast infrastructure networks which provide essential services we use every day. Visit https://www.1100.com.au

Infrastructure for pumping water from River Murray system

Any new pumping infrastructure (including deposition of wastewater from desalination plants) in the River Murray Protection Area is classified as development. Impact on use and amenity of locality, and environmental impacts required to be assessed.

Laying pipeline on road reserve

Any alteration to a road or road reserve (including laying of infrastructure) requires the consent of the relevant Council. Impact on existing infrastructure, native vegetation etc. is assessed.

Authorisation to alter a public road

The following activities are considered to be making an alteration to a road pursuant to the Local Government Act 1999. It is an offence to undertake alterations to a road without a written Authorisation from the Council for any of the following works:

- Install Stormwater Pipe
- install Underground Pipe or Cable
- install Underground Electrical Service
- install Structure (e.g. pipes, wires, cables, fixtures, fittings or other objects)

Also

Is the Proposed Alteration

- Permanent
- Temporary (indicate period of time for which the authorisation is required):

Storage Tanks

Depending on the size, & possibly location, of water storage tanks, they may require development approval. Ensuring that the tank is structurally sound would be the primary concern.

Native Vegetation

A native vegetation clearance may be required if the pipeline goes through scrub or native vegetation on a road reserve. Contact the Native Vegetation Council: (08) 8303 9777

Alteration to a road or road reserve requires permission from Council

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Permission is required to drill under a road

A native vegetation clearance may be required

CASE STUDY ONE

Henry Angas	Meningie
Rainfall	450mm
Enterprises	Cattle
Water source	Lake Albert
Total Distance:	16 kms
Pipe size:	125mm poly PN 8
Length of rolls:	210m
Weight of rolls:	450kg
Joining method:	Butt welded
Trenching:	Rock saw, backhoe, shovels
Time taken to lay pipe	15 days
Pump:	Mono 8 hp motor
Estimated pumping time:	10 hrs/day average
Estimated yearly requirement:	50 meg
Area services	6,000ha
Construction Date	April 2013
Annual water bill	previously over $100,000
Cost recovery	1 year

Benefits from the pipeline;

* Over 80% drop in water costs
* SA Water mains remain connected as a backup
* The system has been extremely reliable

Challenges None, the project was well planned

Contractors used:

- Swans Rock saw
- Glen Jackson backhoe
- Trenchless under road boring
- Subtrax cable and pipe locating

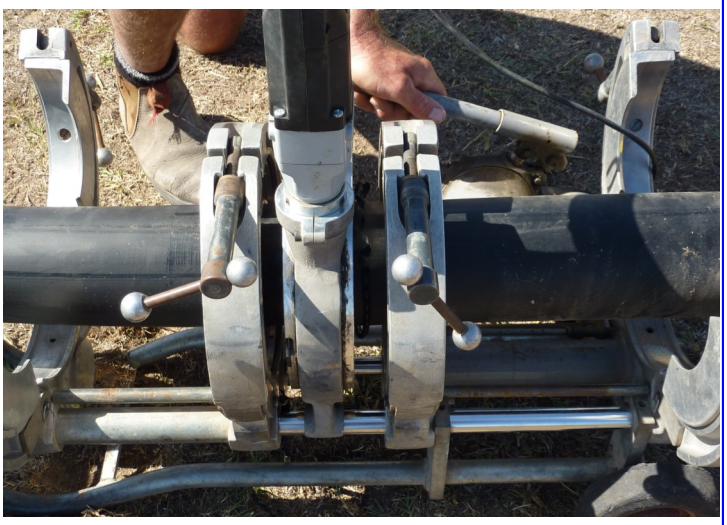
Approval requirements:

- Coorong District Council
- Crown Lands
- Department Road Transport
- Department Water, Licensing Dept

Swans Rock Saw

16 kms of 125mm PN8 poly pipe

Trench dug and ready for pipe laying



Joints were butt welded

Water sourced from Lake Albert, with a River Murray water licence

CASE STUDY TWO

Mount Boothby Pastoral Co.	**Culburra**
Property size	**4,000ha**
Rainfall	**450 mm**
Enterprises	**Cattle, Sheep & Pigs**
Annual water bill	**Over $150,000**
Length of pipeline	**12 kms**
Diameter of the pipe	**100mm**
Construction	**2013**

Project cost to date $200,000, (another bore to be drilled and equipped costing $50,000)

Annual operating costs (fuel, maintenance) **$28,000**

Pay back period **less than 2 years**

Benefits

Significant reduction in the cost of water.

Enabled the viable expansion of the Mount Boothby piggery

Below—comparative costs or 75mm vs 100mm diameter pipe

Cost with 12kms 75mm pipe

Pipe - 75mm	$ 70,000
Pump and motor	$ 20,000
Sensors	$ 5,000
Construction Labour	$ 20,000
Surveyor/Council/Legal/Accounting	$ 10,000
Shed	$ 10,000
Total Initial Outlay	**$ 135,000**
Estimated cost of Bore	$ 50,000
Total Cost including new bore	**$ 185,000**

Cost with 12kms 100mm pipe

Pipe - 100mm	$ 120,000
Pump and motor	$ 35,000
Sensors	$ 10,000
Construction Labour	$ 36,000
Surveyor/Council/Legal/Accounting	$ 20,000
Shed	$ 10,000
Total Initial Outlay	**$ 231,000**
Estimated cost of Bore	$ 50,000
Total Cost including new bore	**$ 281,000**

Mount Boothby Piggery

100mm diameter pipe ready to bury

100mm poly PN 8

Mount Boothby Storage

CASE STUDY THREE

Bob McCabe — **Tintinara**
Rainfall — **450mm**
Enterprises — **Cattle**
Area serviced — **13,000ha**

What would we do different

Use 100mm pipe instead of 75mm
Put in a larger Rhino Tank (250,000 litres)

COSTS

- 3" Poly pipe & Joiners are $4.00/m ($4,000/km)
- Storage tanks are 70 KL, $9,000 ea
- Pumps including switches, gauges, fittings etc. $4,000 – $5,000 per unit

Stage 1

9 km pipeline from 'Tanara' to 'Burrandoo' storage. Used Subtrax "Pipe Finding" trencher in difficult vegetation Cost approx $45,000

Stage 2

9 km pipeline from 'Burrandoo' storage to 'Lake Ellen' distribution. Cost approx $45,000

Payback Period

3 year estimate to recover outlay including costs of operating the system

Bore and storage tank at "Tanara"

Water is pumped from 'Tanara' to a 100,000 litre Rhino tank at 'Burrandoo' storage via a 75mm pipeline. Water is then pumped to 7 header tanks on Lake Ellen using solar power.

OTHER WATER SAVING OPTIONS

Leak Detection Units

Water leaks can be as high as 20% to 40% of total usage.
Advantages of installing a leak detection unit include;

- Monitor & record flow from SA Water meters & domestic bores
- Rapid detection of major leaks
- Identify minor system leaks
- Daily water usage alerts via SMS & email
- View graphs online 24/7
- Simple to fit on existing water meters

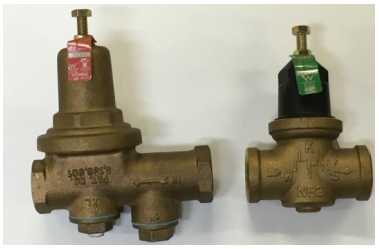
More info:
Alpha Group - https://www.thealphagroup.com.au/
Tim Powell- http://www.integratedirrigation.com.au/

Tank Level Sensors

- Saves time checking tank levels
- Saves water loss from overflowing tanks
- Prevents the risk of tanks running dry

More info: https://www.thealphagroup.com.au/

Pressure Reducers



- Pressure reducers can significantly reduce leaks in pipelines and water infrastructure.
- Particularly useful with older class B poly pipe.

Pressure Gauges

- Helps identify loss of pressure through leaks or overflowing tanks.
- Cheap & easy to install.
- Useful to check if pressure gages are set correctly.
- Best to have gauge on a riser in a spot you regularly drive past (visible without getting out of the ute or off the bike}.

Water Blending

Successful shandying of water on farm

Blending or shandying are the terms used to describe the mixing of water sources to a predetermined standard.

Water sources may include mains, dam, rain, bore or recycled.

The technique is well known in industries such as livestock production, broad acre cropping and horticulture.

The aims of blending include:

- To reduce water costs.
- To provide the best blend of water that meets your requirements, whether for livestock or other uses.
- Utilise available sources of water on your property
- To minimize the use of mains water.

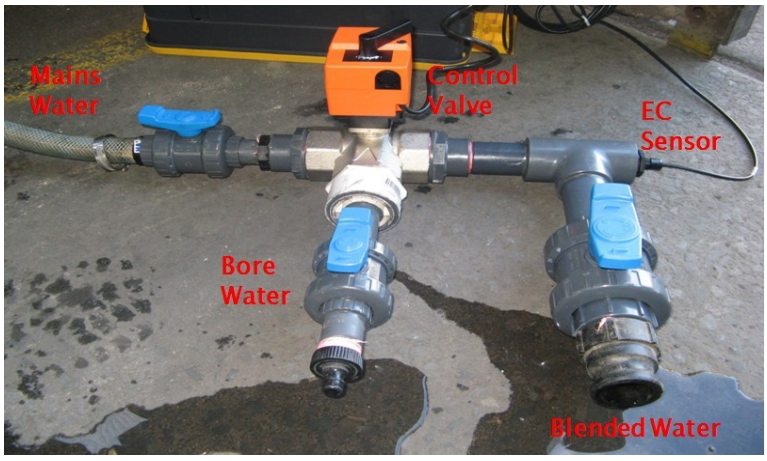
Setting up a system

Depending on your requirements the blending system can be manual to fully automatic, or combinations. The fully automatic system generally provides better control and accuracy in blending, and they have functions to shut off the system if problems arise.

Blending in tanks is possible but care will need to be taken that adequate mixing is being achieved. Saline and fresh water can stratify due to their different densities and not readily mix as would be supposed. The risk of this is livestock being exposed to highly saline water that can in extreme cases cause death.

Therefore mixing water can be added prior to a pump, or an inline static mixer will ensure a homogenous result. This is also true when adding chemicals to a tank for other farm activities.

For further information visit;
http://www.coorong.sa.gov.au/watersecuritytech



A simple method of shandying water

DIAL BEFORE YOU DIG
www.1100.com.au
The Essential First Step.

Additional Resources

On Farm Piping Projects
Coorong Tatiara Local Action Plan :
http://www.coorong.sa.gov.au/piping

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

Dial before you dig
6A, 128 Fullarton Road
Norwood SA 5067
(08) 7231 1111

Native vegetation Council
nvc@sa.gov.au
(08) 8303 9777

Other Fact Sheets in this series
http://www.coorong.sa.gov.au/watersecuritytech

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

http://www.coorong.sa.gov.au/gotolap

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

Australian Government
National Landcare Programme