

CASE STUDY

TIM CHIRGWIN – PLASTIC SHEETED CATCHMENT

With close to 100% runoff this sheeted catchment of 3 plastic runs (each run being 7x100 m) generated approx. 1 ML (in a 450mm rainfall zone)

FARM DETAILS:

- Size: 525 ha (270 ha arable + 255 ha of saltmarsh/tidal inundation).
- Rainfall: 450mm
- Soil type: light sand over clay.
- Livestock mix: crossbred and Suffolk ewes.
- Pasture mix: Ryegrass, volunteer annual grasses and clover.



BACKGROUND

Tim needed to find a water source for his livestock on his property near Western Cove. The flat salty land combined with low rainfall added to the challenge as he was unable to dig a deep dam due to saltwater table interception. He also needed to capture rainfall, as opposed to run off, as the runoff would flow across saline land. Hence the traditional graded catchment was not an option due to the salinity levels in the clay. The solution was a plastic sheeted catchment.

Plastic sheeted catchments are a good option where there is no clay, or issues with the clay i.e. salty or cracking. In addition, it enables immediate run off from minimal falls compared to a graded catchment that needs the clay base to wet up before run-off occurs. This results in a smaller area being required to generate the same run-off a larger graded catchment would provide.

Tim received funding from the Kangaroo Island Landscape Board to assist with the works and establish a water security demonstration site.

THE OPTIONS

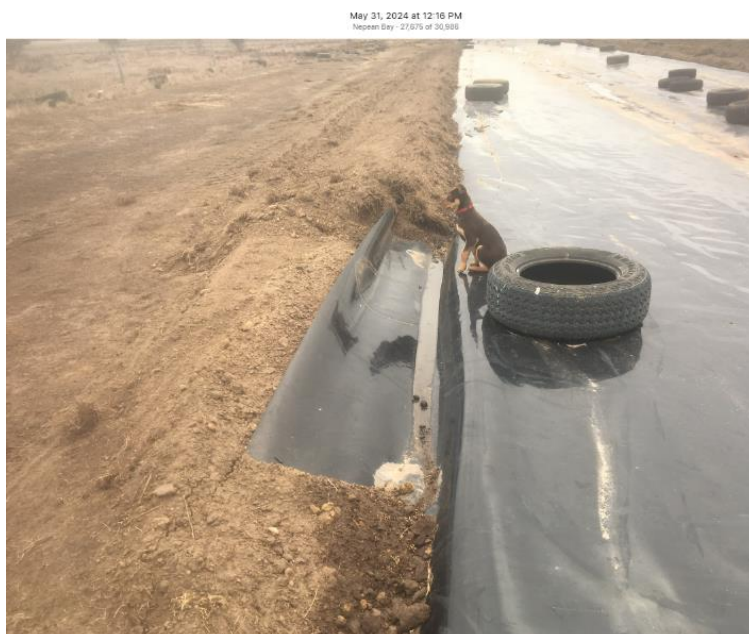
Several options for plastic sources are available. Each with their own pros and cons. All options will need fencing to keep stock off the plastic and will require some system (tyres or weights) to secure the edges and help create the middle drainage line.

Options	Cost (price as per 2024)	Lifespan	Pro's / Cons
Silo plastic	(\$1.60/m ²).	15 years + But if it comes loose, it can easily become damaged by the wind.	Susceptible to stock or wildlife damage.
Second hand silo plastic	Free from KI F Pure Grain.	15 years +	Susceptible to stock or wildlife damage. May have damage from silo handling
Heavy durable plastic	\$4.25/m ² + welding cost of approx. \$4,000 to come to KI and weld 2 x 100m runs.	Almost indestructible (although cattle could puncture the plastic).	The most expensive option.

WHAT WAS DONE?

Due to the high cost of welding the durable plastic, the decision was made to utilise the cheaper (& non-weldable) plastic and lay it out in separate runs. The overall design becoming 3 runs (each run being 8 m wide plastic with approx. 50cm each side buried – leaving 7m wide strip of effective plastic) x 100m long. With a 5-6 m gap between runs to allow for bob cat or grader access to form the runs and cover the edges of the plastic.

A grader was used to form each V shaped run with a side slope of 10%. The plastic was then placed down the runs. This can be done by hand with the silo plastic but if using the heavy plastic, it will require a tractor (or a lot of manpower!) to pull the plastic into alignment. Each run then flows into a plastic lined collector drain and then pumped into a dam.



On both sides of each run dig a trench (approx. 250mm deep by 350mm wide) to lay the plastic edge into and then backfill to ensure the edges are secured. If using silo/light plastic, place tyres in the centre of the V to hold the plastic down.

The plastic lined runs resulted in an almost perfect 100% run-off. The key issue being the ability to ensure the plastic lies flat, any ripples in the plastic will reduce runoff, especially in low rainfall events on hot days.

LESSONS LEARNT

- **Best results are gained**, by ensuring that all grass cover is removed (burn or graze heavily) during preconstruction allowing for a more even soil surface to be prepared by the grader.
- The **site was selected as it was poor/waste ground with minimal slope** – the thinking at the time was to not waste good land to harvest water. In hindsight, it would have been better to pick a sloping site above a dam, in a location that enabled gravity feed of water to the rest of the farm. Note the faster the water runs, the less loss there will be with any minor holes in the light plastic.
- **Leave a gap** between runs to enable access for machinery during construction.
- **Fence the site leaving room to plant trees** to act as windbreak to help protect the plastic.
- **As the major cost can be the plastic itself**, an effective, low-cost option is the free second hand silo plastic. If the site is designed properly, then the plastic can be easily replaced if required. The significant runoff from the small area of earthworks and replacement easily justifies the cost of replacing recycled plastic sheeting.
- In the **very low rainfall years, the plastic still yields close to 100% runoff** compared to a graded clay catchment that needs to fully wet up before generating any run-off.
- **Plan for the driest years** or be prepared to cart in water.