Wakool Tullakool Sub Surface Drainage Scheme

Murray Irrigation Limited
A.B.N. 23 067 197 933

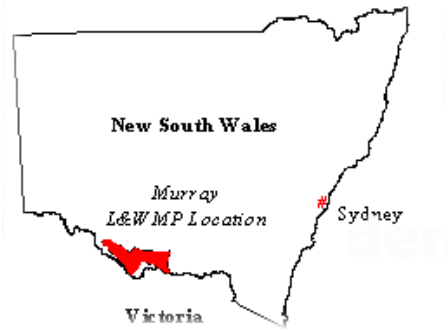
Quality Endorsed Company

OHS System Occupational Health and Safety

The Wakool Tullakool Sub Surface Drainage Scheme (WTSSDS) is a salt interception scheme that pumps saline ground water into two evaporation basins. The Scheme protects approximately 50,000 hectares of farmland in the Wakool area from high watertables and salinity.

The Scheme pumps an average of 14,600 megalitres of saline water each year, preventing its gradual movement into the Wakool, Niemur and Murray Rivers. The NSW Government acknowledges the value of the interception scheme and currently pays 30% of its annual operation and maintenance costs.

Wakool Land and Water Management Plan area



Background

The scheme lies within the Wakool Land and Water Management Plan (LWMP) area, on the riverine plain in southern NSW. The plan area is bounded by the Edward and Wakool Rivers and the Yallakool Creek. It covers 210,000 hectares and is part of the irrigation system operated by Murray Irrigation Limited.

The company supplies water to 374 farms in the Wakool region, owned by about 230 family farm businesses.

Rice, cereals, dairying, sheep and beef cattle are produced on these farms, with some areas recently being planted for stone fruit production.

Irrigation first began in Wakool in 1935 following construction of Stevens Weir on the Edward River.

Watertables in the Wakool area have been gradually rising over the years, as a result of clearing, the introduction of irrigation and flooding in the extensive creek system in some years.

There were significant increases in watertables and salinisation following major flood events in the region in 1956 and again in 1974.

By 1981 there were 19,200 hectares in the Wakool area affected by a high watertables – within 1.5 metres of the surface. The rising watertable brought salt to the plant root zone and the soil surface, dramatically reducing farm production and threatening regional biodiversity.

More than 2,000 hectares of farmland was completely barren. Landholders had been attempting to combat the rising groundwater since the 1960s, largely through the use of groundwater pumping.

However, saline groundwater could only be disposed of into surface drains when there were high flows in the rivers. The pump sites were also scattered, which limited their effectiveness.

Investigations by government in the 1970s showed there were extensive sandy seams in the subsoil suitable for groundwater pumping.

Further investigations confirmed that a regional groundwater pumping scheme for disposal of the groundwater was technically feasible.

The most suitable area for construction of the basins was identified and 2,100 hectares of farmland was set aside for the project, in order to maintain the use of the surrounding area.

Before . . .

After . . .

The evaporation basins are populated by a variety of birdlife, including Black Swans. A bird hide has been constructed at the basins in a joint project with Wakool Shire Council.

Saline groundwater is pumped into evaporation basins.

When was the Scheme built and how much did it cost?

The scheme was built in two stages between 1978 and 1988. Stage 1 started operation in 1984 and Stage II in 1988. In 1992 additional groundwater pumps were added.

The NSW Department of Water Resources and Public Works built the Scheme at a cost of $32 million.

The project was jointly funded by the Federal Water Resources Assistance Program and the NSW Government.

What does the scheme do?

The Scheme pumps saline groundwater from 54 tube-well pump sites located across area an of 25,000 hectares into two evaporation basins.

The pumps are operated to maintain groundwater levels under 50,000 hectares of farmland below 2.5 metres of the soil surface. Keeping groundwater below this level will maintain the long term agricultural productivity and biodiversity of the area.

Since 1986/87 an average of 14,600 megalitres of groundwater with an average salinity of 26,600 EC has been pumped into the evaporation basins each year.

This equates to between 150,000 and 200,000 tonnes of salt a year. Land that was previously barren and unusable for farming is now being productively farmed and eucalypt trees in the region previously thought dead,have shown signs of new life.

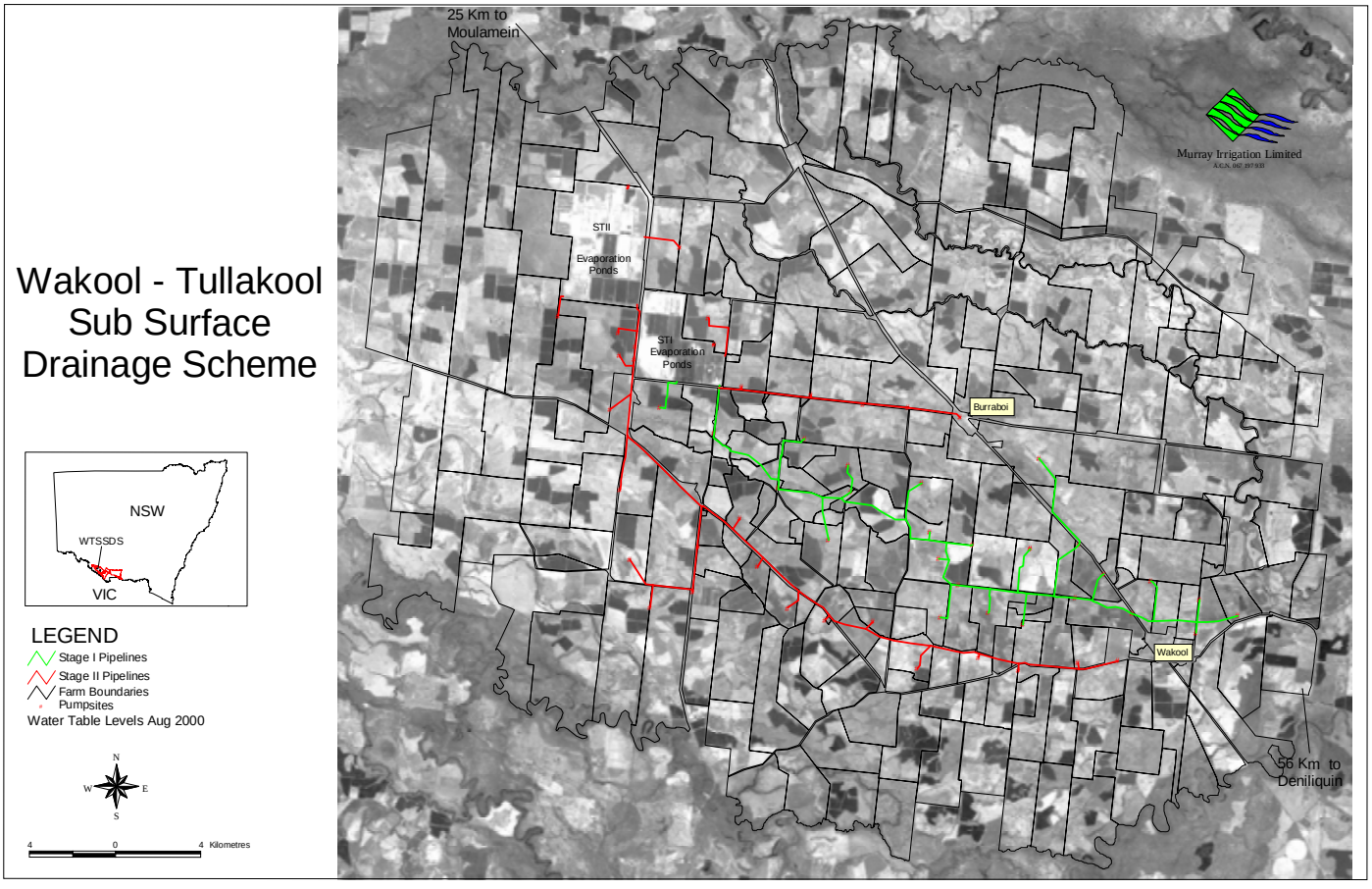
Scheme details

The Scheme involves two independent stages. Each stage has a system of tubewells, pumps, pipelines and an evaporation basin.

There are 54 pumps which pump saline groundwater from over 100 tubewells installed to a depth of about 12 metres. The tubewells are made mainly from slotted Poly Vinyl Chloride (PVC) pipe.

Pumps and pipelines

There are four main types of pump; centrifugal, self priming, submersible and airlift (for low yield sites). The pumps are usually below the ground in concrete pits, although some of the Stage II pumps are on a concrete slab above the ground.



Pipelines and pumpsites which form part of the Wakool Tullakool Subsurface Evaporation Scheme.

The average pump can pump up to 1.25 megalitres each day. A time lock system allows excellent flexibility in pumping rates, operations and power cost minimisation.

The majority of the pumps are connected by a spurline to one of two main discharge pipelines. The two main pipelines are each 26 kilometres long and the whole scheme has 115 kilometres of pipeline.

The size of the pipes ranges from 200 millimetres to 900 millimetres in diameter. They are made from a range of concrete, cement or plastic products.

Evaporation basins

There are 2,100 hectares of evaporation basins. The Stage I basin is 770 hectares and Stage II is 1,330 hectares. Only 1,600 hectares of the total area set aside is actually used. The basins represent about four per cent of the area protected.

The basins are set up into rectangular concentrating bays with areas ranging from 25 hectares to 48 hectares with a water depth of up to 1.2 metres. There are also crystallising ponds for salt production.

A three metre deep peripheral drain traps seepage from either the basins or the surrounding land. Two pumps on each basin return any water from the drains to the basins.

There is also series of airlift pumps surrounding the basins that intercept water seeping beneath the drain. Evaporation occurs naturally, powered by the energy of the sun and wind.

Utilising the basins

There are four products harvested from the evaporation basins.

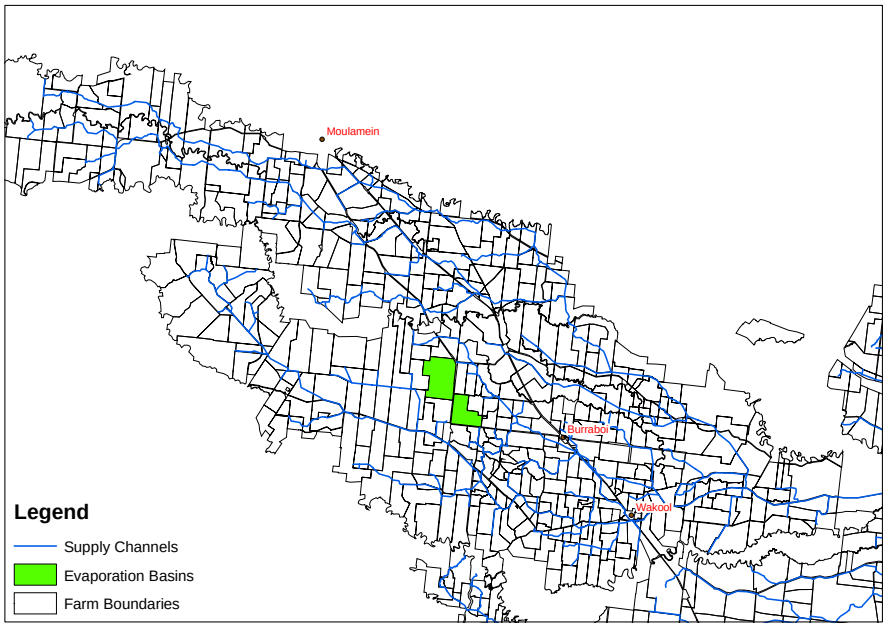
1. Salt – Common salt (NaCl) is produced as a result of evaporation. Typically the salt was used in animal feeds. Investigation are continuing to examine higher value markets for this product.

2. Bittens – MgCl is a liquid used as a dust suppressant on dirt roads and mines. The liquid is concentrated in lined ponds and pumped into a tanker, for use.

3. Gypsum – This is another by-product from the evaporation process and has applications in agriculture for soil amelioration. It is harvested as a solid product.

4. Aquaculture – An Inland Saline Aquaculture project is investigating the commercial viability of growing marine and freshwater fish and crustaceans in saline groundwater.

The research centre was officially opened in 2001, with initial research undertaken on mulloway, snapper, silver perch, trout and prawns. More recent trials are focusing on Black Tiger Prawns and Rainbow Trout.



Location of Wakool Tullakool Subsurface Drainage Scheme, within the Wakool Land and Water Management Plan area, with nearest towns identified.

When the water evaporates crystallised salt is left behind.

This water is coloured by magnesium harvested as 'bittens' which is used in road construction. It is one of several products harvested from the evaporation basins.

Mulloway are one species being trailed as part of research into the viability of commercial aquaculture using saline groundwater.

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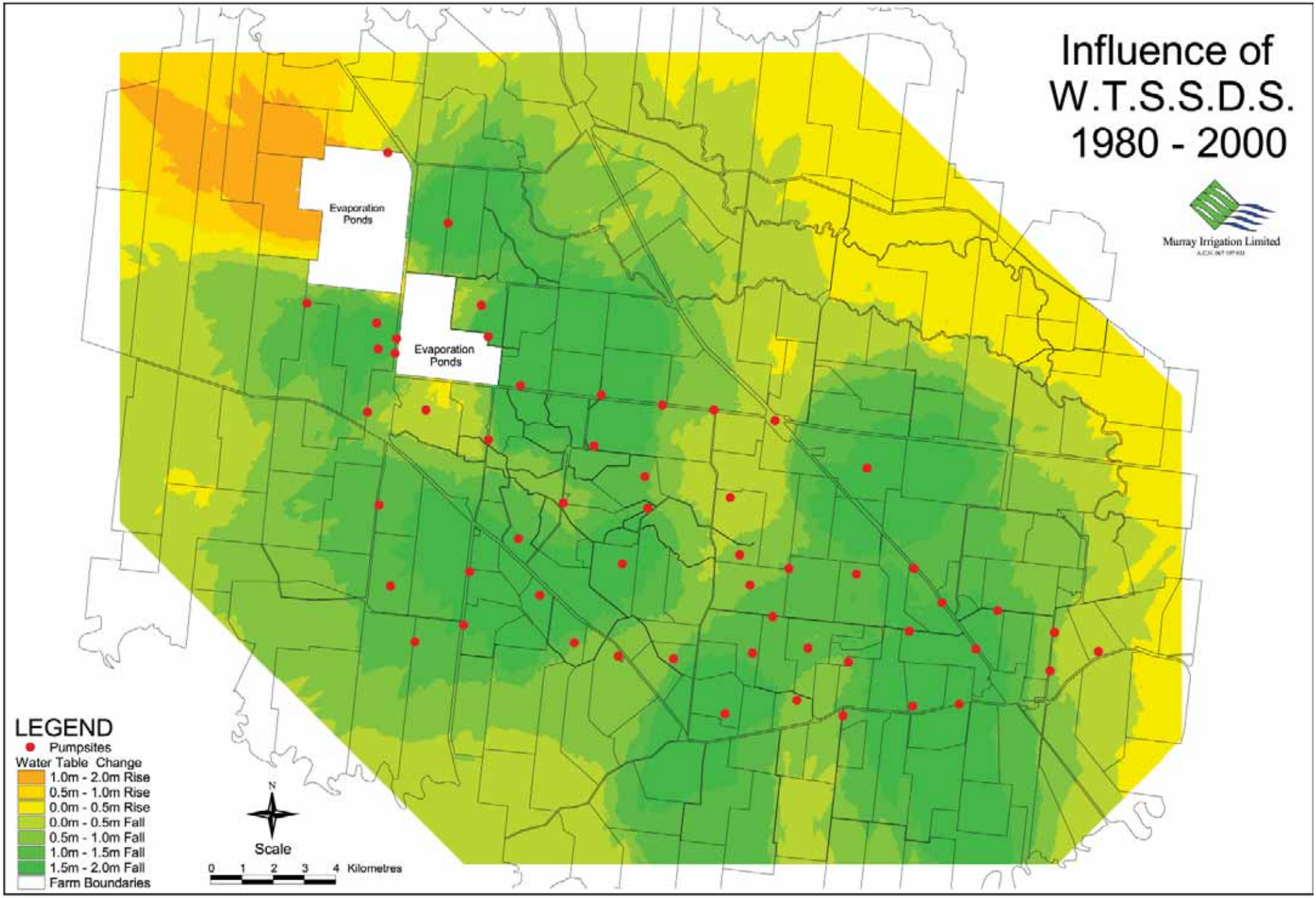
Influence of
W.T.S.S.D.S.
1980 - 2000
Murray Irrigation Limited
Evaporation Ponds
Evaporation Ponds
LEGEND
Pumpsites
Water Table Change
1.0m - 2.0m Rise
0.5m - 1.0m Rise
0.0m - 0.5m Rise
0.0m - 0.5m Fall
0.5m - 1.0m Fall
1.0m - 1.5m Fall
1.5m - 2.0m Fall
Farm Boundaries
N
Scale
0 1 2 3 4 Kilometres