TG DRAINS

SUBSURFACE DRAINAGE CONTRACTORS

"We drain your paddocks, not your wallet!"

SUMMARY

This booklet includes the following topics regarding drainage and the TG Drains' approach to assisting with it.

- ✓ THE PURPOSE OF DRAINAGE
- ✓ THE DEVELOPEMENT OF DRAINAGE PROBLEMS
- ✓ BENEFITS OF DRAINAGE
- ✓ INSTALLATION OF SUBSURFACE DRAINAGE
- ✓ SURFACE DRAINS
- ✓ MOLE DRAINAGE

TG Drains is an agricultural drainage company founded by Tim and Gea Beets in 1997.

Initially just concentrating on digging open drains the company soon expanded and in 2009 they imported a purpose built subsurface drainage machine from the UK to be able to offer the full range of drainage solutions.

All our work is completed efficiently and to a high standard to ensure that the correct results are achieved and the customer is entirely satisfied.

For further information or general enquiries please contact:

TG Drains
Tim Beets

PH: 03-5234 8240
Mob: 0409-115 474

tim@tgdrains.com.au
www.tgdrains.com.au

THE PURPOSE OF DRAINAGE

The purpose of subsurface drainage is to remove excess water from the soil in order to aerate the root zone, promoting increased soil biota, improving root development and thereby enhancing crop production. In deep, well-structured or friable soils, the natural drainage processes are adequate to allow healthy root growth and successful production of agricultural crops. However, in many shallow or more marginal soils, artificial drainage is needed to prevent water-logging of fields and orchards which causes direct loss of production and waste of chemical, energy, irrigation water and human resources. Additionally, the producer suffers indirect losses due to poor trafficability and bogged machinery, soil compaction and disease out-breaks due to the inability to apply preventative chemicals in the affected areas.

Surface drainage is the removal of water that collects on the land surface. Many fields have low spots or depressions where water ponds. Surface drainage techniques such as land levelling, constructing surface inlets to subsurface drains, and the construction of shallow ditches or waterways can allow the water to leave the field rather than causing prolonged wet areas.

Subsurface drainage removes excess water from the soil profile, through a network of perforated corrugated polydrain installed 2 to 4 feet below the soil surface. These corrugated polydrains are commonly called "tiles" because they were originally made from short lengths of clay pipes known as tiles. Water would seep into the small spaces between the tiles and drains away.

When the water table in the soil is higher than the polydrains, water flows into the holes of the corrugated polydrain. This lowers the water table to the depth of the drains over the course of several days. Subsurface drains allow excess water to leave the field, but once the water table has been lowered to the elevation of the drains, no more water flows through the drains.

DEVELOPMENT OF A....

DRAINAGE PROBLEM

Drainage problems occur where groundwater rises close to the land surface. This happens as a result of our winter rains or where underground features such as dense clay or rock prevents water from infiltrating into the subsoils. Problems may also occur where there is little or no available outfall for surface drainage, where steeper slopes flatten out, or where soil type changes from adequately drained soils on the higher terrain to more poorly drained soils on the lower, flatter land.

Elevated watertables cause the soil to become water-logged and may result in mobilisation of stored salt when the saline water comes close to the soil surface. Soil degradation will inevitably result, with detrimental effects on agricultural production.

Waterlogging causes oxygen starvation in the root zone, retarding root development and resulting in stunted root systems and low nutrient uptake from the soil.

Waterlogged soils are prone to structural damage if worked when wet or if compacted by livestock or vehicles. Waterlogging can cause increased soil erosion problems because the saturated soil cannot absorb more water.

PADDOCK DAMAGED BY PUGGING

In trail work at DemoDAIRY, DPI researcher Greame Ward found that heavy pugging of wet soils during winter reduces the total annual pasture production by more than 50 percent. In addition, clover was virtually eliminated from the pasture and the soil structure was severely degraded. These are all factors that reduce the future productivity of the pasture.

The DemoDAIRY trial showed that cows can consume five to eight kilograms of pasture dry matter in their first two to three hours on a wet paddock with good pasture cover. After this the cows tend to walk around the paddocks searching for fresh pasture and this caused long term soil and pasture damage.

The DemoDAIRY trial showed that in heavy pugged conditions, cows reduced their grazing time after the first two to three hours, and increased the time spent walking, standing or lying.

STRUCTURAL DAMAGE

To reduce the occurrence of pugging, a drainage system consisting of subsurface drains in combination with mole drains can be installed to prevent paddocks from becoming waterlogged.

TRENCH BACKFILLING

BENEFITS OF DRAINAGE

A well drained soil increases plant nutrient uptake. This is because in waterlogged soils with associated low oxygen levels, plants produce less of the energy that is required to uptake nutrients from the soil solution. Improved drainage results in a greater soil store for roots, increasing the pool of nutrients available.

Subsurface drainage systems are usually installed on high value crops which are sensitive to waterlogging and salinity, such as perennial horticulture (grapevines, citrus, fruit trees), cotton, pineapples, bananas, sugar cane and perennial pasture for dairying.

The installation of appropriate drainage systems reduces the length of time that soils remain waterlogged resulting in the following benefits:

- Increased crop yields, improved trafficability for operation of harvester and transport equipment.
- Subsurface drainage combats the problems of waterlogging, pugging and salinity associated with high watertables.
- Drainage also improves the timelines of many farming operations as waterlogging of the soil limits the time available for crop sowing and ground based weed and insect pest control.
- Subsurface drainage can also lessen the incidence of soil borne diseases such as fusarium and phytophthora root rots.

INSTALLATION OF

SUBSURFACE DRAINAGE

TG Drains installs subsurface drainage using a laser controlled purpose built drainage machine. The machine, a Mastenbroek 20/15 imported from England, can cut a trench up to 2.2 metres deep. The digging chain of the machine cuts a trench and the drainage pipe is laid with the backfill of gravel in one single operation. The machine can be altered to lay either 100mm or 160mm polydrain. The 100mm polydrain is often used for the lateral drains which feed into a main drain. The main drain is often a 160mm polydrain which discharges the water.

A tractor hauling a gravel trailer equipped with a conveyor belt is driving alongside the Mastenbroek machine to deliver a continuous flow of clean, fine gravel into the machine's hopper. This avoids slumping of the trench walls and prevents excavated material falling on the pipe and possibly blocking the drainage slots. The elevation of the gravel hopper at the back of the Mastenbroek machine can be altered hydraulically, allowing the thickness of the permeable gravel backfill to be varied according to soil type.

.

After installation, the drains are GPS mapped for future reference.

SURFACE DRAINS

Surface drainage is the removal of excess water from the surface of the land in a controlled manner and as quickly as possible. This is normally accomplished by either shallow spoon drains or open "V" shaped drains. It is important to realise that surface drains will only remove surface water.

Surface drains can also be used in conjunction with subsurface drains. The outlets of the subsurface drains discharge in the open drains.

TG Drains has 2 purpose built buckets for the 12 tonne excavator that can dig a spoondrain or a "V" shaped drain. The excavator is laser guided ensuring an even grade in the drain so water is removed quickly but doesn't cause scouring of the drain walls or bottom.

TG Drains has recently purchased a 14-tonne agricultural dumptrailer. This allows for the removal of dug up spoils. These spoils can be utilised to fill lower laying areas or cover rocky areas on the farm where traditional tip trucks often can't go. With the spoils removed, water can flow into the open drains unobstructed. The dumptrailer is equipped with flotation tyres allowing it to work on all terrains and minimising impact to the grounds it's travelling on, ensuring that the drain and the area around it stays tidy and accessible.

MOLE DRAINAGE

Mole drains are used in heavy soils, with low rates of soil-water movement. This requires a closely spaced (2-6 m apart) subsoil drainage systems to provide sufficient water movements to control the effects of salinity and waterlogging in the fields. Such close spacing using a polydrain subsurface drainage system is impractical and costly. This is where mole drainage comes in.

Mole drains are unlined channels formed in the clay subsoil by pulling a ripperleg with a cylindrical foot on the bottom and an expander through the subsoil. The expander is used to compact the channel wall.

MOLE PLOUGH

Mole drains are installed every 2 to 2,5 metres apart across a subsurface drainage system so that the expander of the mole plough is being pulled trough the permeable backfill of the polydrains. Creating the mole drains results in the formation of a series of fine fissures or cracks in the soil above the mole channel. This provides the major flow paths for the soil water to move into the mole drain. Excess water then flows through the soil fissures to and along the mole drain, then drains into the permeable backfill above the polydrains, and is quickly removed.

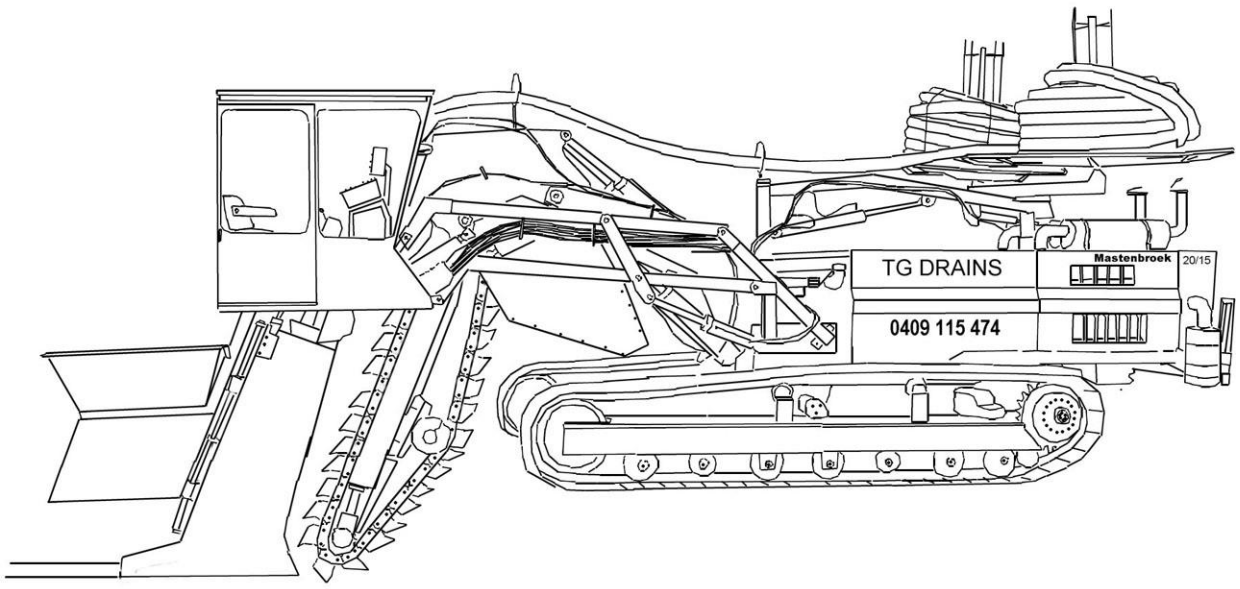
Mole channels must have an even, gentle grade, with minimal grade changes. TG Drains use a floating beam mole plough to install the mole drains. A floating beam mole plough allows the expander to maintain itself at the set depth irrespectively of small ground surface irregularities and allows the ripperleg and the expander to produce a smooth gradient to the mole channels.

MOLE PLOUGH RIPPER LEG

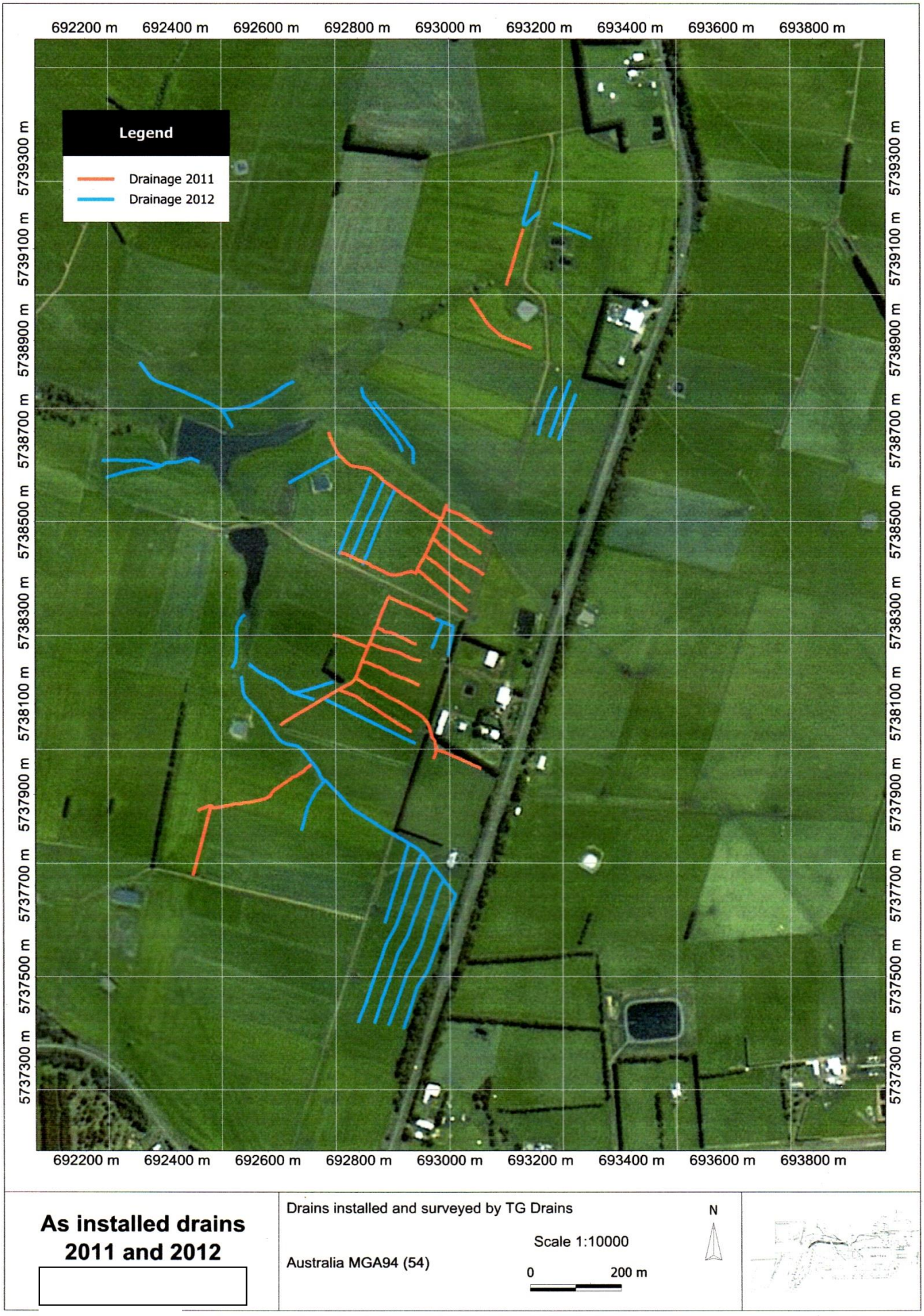
ADDITIONAL INFORMATION

The following ag-notes of the Department of Primary industries give additional information regarding the different types of drainage.

Note number: AG 1355	Managing wet soils: Determining which subsurface drainage system to use.
Note number: AG 0942	Managing wet soils: Planning farm drainage
Note number: AG 0949	Managing wet soils: Mole Drainage
Note number: AG 0946	Managing wet soils: Surface drainage



GPS MAPPING EXAMPLE:



As installed drains 2011 and 2012

Drains installed and surveyed by TG Drains

Australia MGA94 (54)

Scale 1:10000

0 200 m

N