Quick and Cost Effective Drain Laying

James Powrie and Dan Bloomer, LandWISE

Keith Nicoll and Hugh Ritchie put their heads together to produce a fast and highly accurate drain laying solution. What makes the new machine extra-special is the addition of precision technologies.

Through a chance conversation, Keith learned Hugh wanted a mole plough to lay drain-pipe. Hugh learned Keith already had one at his yard. Keith had built a prototype tine for laying pipe and shingle, which worked but lacked strength for deeper drains.

Keith and Hugh combined forces and made the machine stronger, able to lay 110mm plastic drainage pipe 1.2m deep. The tractor-drawn drain-layer's wheels are hydraulically driven to provide extra traction.

High accuracy GPS maps farm terrain in 3-D, special software determines optimum drain gradients on the fly, and guidance ensures pipe is laid to exact depth. And of course, there's a record of exactly where it is for future reference.

Wade Riley installed Trimble's *Field Level* software in the FMX console in Hugh's tractor. Designed with assistance from drainage contractors in US and UK, *Field Level* is the key to the process, Wade says. The software surveys the paddock as the tractor drives along the planned line for the next drain, the GPS measuring surface elevation to within 5cm. *Field Level* calculates the optimum design to fit the desired slope from the top end of the drain to the outlet. Guidance puts the tine foot in the right place.

Laser guided pipe-laying uses a single plane based on an average grade for the desired section. Every change in grade requires a new laser set-up. *Field Level* designs a change in grade where necessary, and no extra set-up is needed. This is very valuable when the surface grade is variable because it allows more consistent depth of pipe-laying across a paddock to give more effective drainage.

The drainlayer is able to work in poor conditions, all depth and grade controlled by GPS and software (Duke Dixon photo)

Gravel backfill is laid around drainage pipe (Duke Dixon image)

In practice, drain pipe is laid alongside the planned drain and fed into the pipe-laying shank on the machine. The depth of the shank is automatically controlled according to the design saved in the on-board computer. Pitch control allows the mole-plough tine to be angled, reducing stress on the machine.

Keith and Hugh are laying pipe at up to 1km per hour. To date this is limited by the ability to keep shingle supplied. The drain-layer has its own hopper holding enough shingle for 200 m of pipe. When a towed hopper is added to the system, shingle will be supplied faster, and the work rate is likely to improve dramatically.

The machine was used to lay new drain pipe in one of Hugh's wetter paddocks. Hugh is delighted. Water flowed strongly from the pipes, with some pipes flowing for a week after installation. "I now have a quick and cost effective solution to drainage and I know the pipe has been precisely laid to the correct depth and grade," says Hugh. "From now on, planting won't be delayed or crops affected by big puddles in those lower areas. We expect fewer stuck tractors, even crops, and more yield."

The console screen – gradient determined from GPS data and design rules