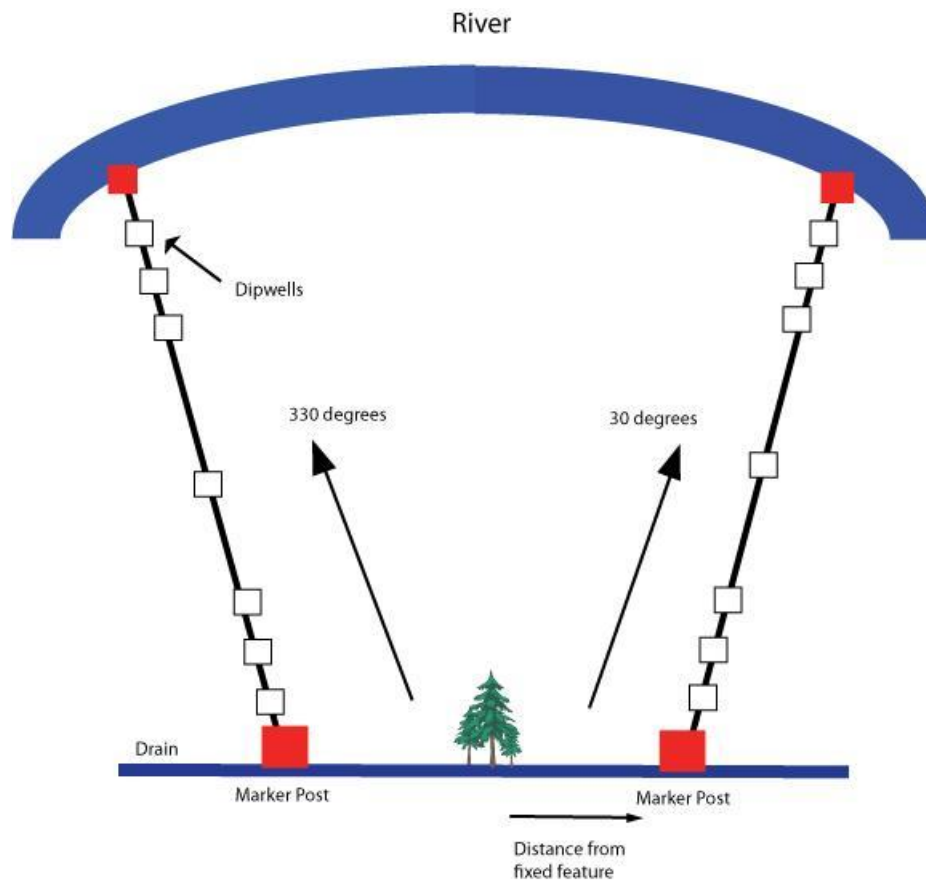


## Hydrological monitoring

Dipwells can be used to monitor the elevation of the water-table. These enable the water table to be measured routinely at fixed points within a meadow. Dipwells should be positioned along transects that generally run perpendicularly from water courses to follow the local water-table gradient. A typical pattern for locating transects is given below. If botanical transects have been set up, it is useful to place dipwells along the established transect line. Dipwells arranged at close spacing near to water courses where the water-table gradient may be steep, and widely spaced in the centre of fields where the water table is likely to be flatter can reveal further information. Hydrological and botanical data can then be linked to investigate the relationship between any changes in hydrology and plant communities.

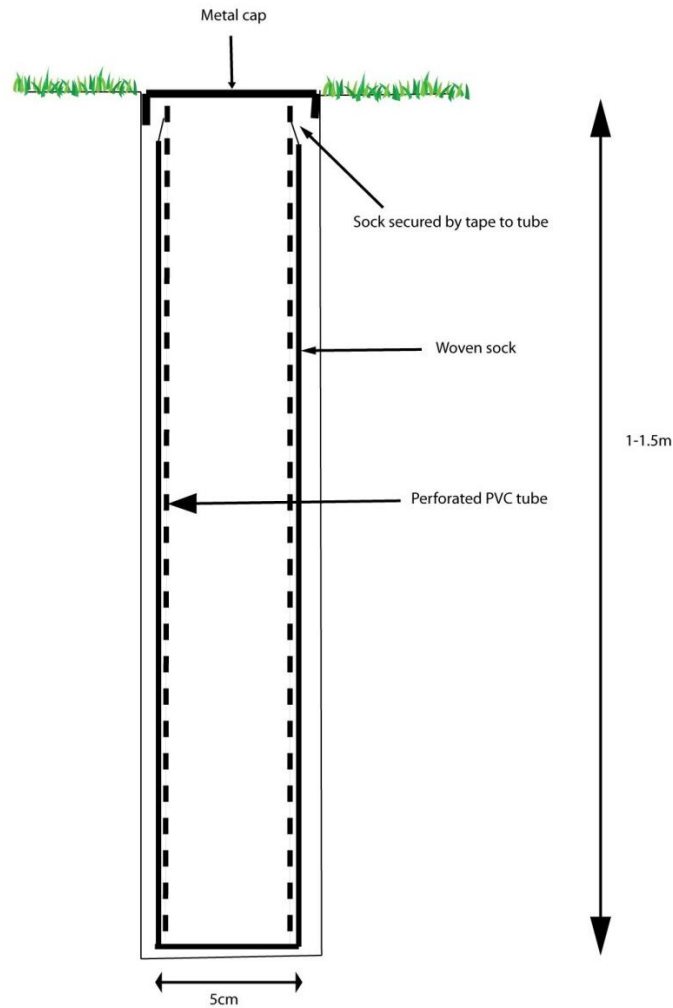


**Generic location of dipwells across a hydrological gradient positioned in a line between the river and the back drain.**

## Installing a dipwell

**This design has no impact on meadow management, machinery or livestock.**

- Buy 5 cm diameter PVC pipe (available from DIY stores as plumbing waste pipe).
- For each well, cut a 1.0 to 1.5 m length depending on the local soil profile (the tube should not penetrate a confined aquifer.)
- Perforate the tube with holes or slits of at least 5 mm diameter, along its entire length (except the top 100 mm, which should remain unperforated).
- Cover the pipe with a sleeve of woven material to prevent silt entry. Specialist geotextile “socking” can be purchased for the purpose or “socks” can be stitched from tough woven nylon material (sheer ladies stockings are less suitable, as they tend to ladder during installation!)
- The wells should be placed in hand-augered holes. In permeable soils, use a 5 cm diameter auger and place the pipe directly into the hole. In poorly structured (e.g. compacted) soils, auger a 10 cm diameter hole, place the 5 cm pipe within it and then backfill with a permeable material such as sharp sand. In this case, it will be necessary to seal the top of the hole with an impermeable clay such as “Sodium Bentonite” to avoid creating a preferential flow path for surface water. Bentonite clay can be purchased.
- Install the pipe so that its top is approximately 3 cm below the surrounding ground level.
- A metal plate (15 cm x 15 cm with downward pointing spikes to anchor it in the soil) should be placed over the pipe to prevent surface water entry, to protect the pipe from damage by hooves and wheels and to assist in its relocation with a metal detector. This can be made using a local engineering workshop. Make a sketch map of the dipwell’s location and record it with a standard GPS.
- Survey the top of the pipe against a known benchmark so that absolute water levels may be calculated. The best method would be to use a theodolite or a differential GPS, both of which can be hired for a short period if someone with surveying experience is available. A more basic technique is to use a surveyor’s level (Dumpy level,) which is cheaper to hire and can be used by non-experts after just a brief tutorial from the hire shop.



A schematic diagram of a soil-water dipwell in permeable soil. Note there should not be a gap between the sock, tube and soil.

## Measuring water levels

Once installed, the dipwells should be left for one month to equilibrate with the water table. Thereafter, readings of the distance from the top of the pipe to the water surface in the well should be taken at fortnightly intervals using a 'plover' or electronic 'buzzer' on the end of a measuring tape. These items can either be bought or constructed (see the Floodplain Meadow Partnership website<sup>1</sup>). Readings should be taken to the nearest centimetre and the date of each reading recorded.

March 2023

<sup>1</sup> <http://www.floodplainmeadows.org.uk/files/floodplain/Buzzing%20stick.pdf>