

Why

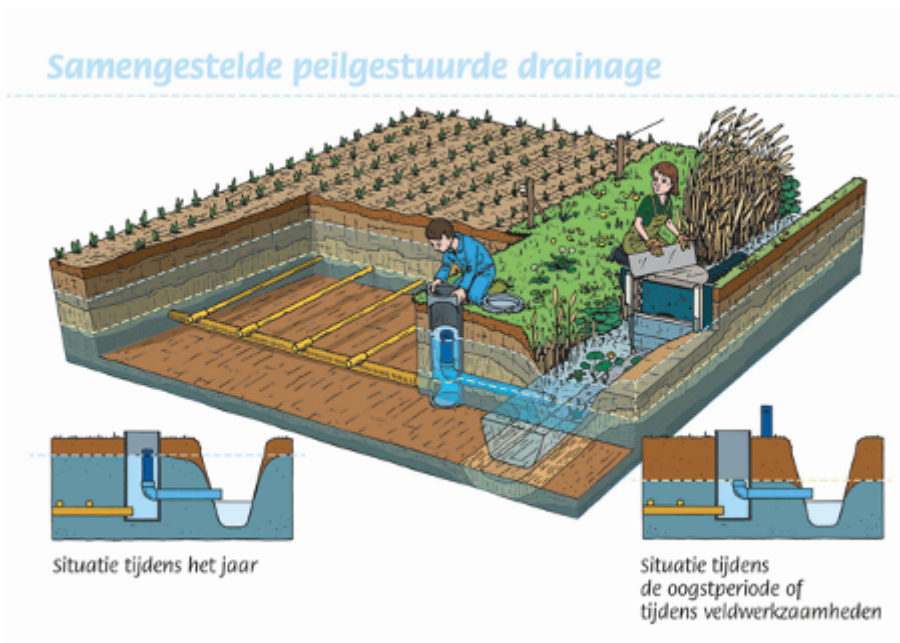
With conventional drainage, water continuously flows off the plot. During the dry season, this is undesirable because it is best to keep the water available to the crops on the plot. Level-controlled drainage can offer a solution for this. Because with this system you can regulate the water level in the soil yourself, you retain precious water when needed.

You can still drain your field during sowing and harvesting operations.

What

With level-controlled drainage, as with conventional drainage, water does drain through the drainage pipes, but it does not flow directly into neighboring ditches or watercourses. In fact, the drainage pipes are connected to a collector pipe at the edge of the plot. This collector pipe in turn is then connected to a drainage control structure, or collector. In this drainage control structure, you then simply determine the water level via a control pipe (usually an ordinary PVC pipe) with a orifice at the desired level.

Visualization (© Farmers Nature Flanders)



How

Construction

It is fairly easy to convert a conventional drainage system to a level-controlled system. You may only need to install a drainage control structure and a collector pipe (where all drainage pipes come out). However, it is important to check that the existing drains are still functioning properly.

When a new system is constructed, the drains in the field will be placed closer together (maximum 8 meters) than in a conventional drainage system. The closer the drains are together, the flatter the water table in the field.

Location

- **Slope**

The flatter the plot, the better the level-controlled drainage will work. For sloping plots, an acceptable slope can be achieved by having the drainage system arrive and manage over several drainage control structures per plot. That way you can manage higher and lower areas on your plot separately. Always review this with the drainer.

- **Soil**

Soil permeability plays an important role, it affects the response time of the plot. The level-controlled drainage system works best on well-draining sandy soils. In heavier soils (clay contents higher than 20-30%), soil permeability is not necessarily poor, but is often spatially variable, even within the same plot.

- **Groundwater pressure**

There should be sufficient groundwater pressure, groundwater should not be too low.

Layout

This technique has a negligible landscape effect since it all takes place underground. Only the drainage control structure along the moat is visible.

Maintenance

Managing a level-controlled drainage system is very simple. A few days/weeks before you need to go into the field with a machine for work, you remove the control tube from the drainage control structure. This lowers the water level back to the conventional level and the field is sufficiently drained to allow access with machines. Once the work is done, you can replace the control tube so that the rainwater stays back in the soil and is available for the growing crops. The shorter the period in which the control tube is removed from the drainage

control structure, the better the results will be. The height of the control tube determines the height that you drain. For example, if the control tube reaches 40cm below ground level, you will only drain from that level instead of, say, 80cm for a conventional drainage system (height where the drains are located).

The speed at which the system responds depends on the subsoil. A sandy soil will be much more responsive than heavier soils.

Level controlled drainage is also relevant in some regions to minimize iron precipitation, and thus ensure better maintenance of your drains. You do this by also ensuring that your drains are flooded (even if you only drain 10cm above your drains).

Cost

Target price

The price for conversion from conventional drainage to a level-controlled system is about 1000 euro/ha. To reconstruct drainage in its entirety, the price is usually between 2000 and 2300 euros/ha. Of course, these prices vary depending on the conditions on the plot.

Subsidy

Via the VLIF non-productive investment support (NPI), the conversion from conventional to level-controlled drainage can be subsidized for 75%, even if the old drainage pipes have to be replaced when converting to a level-controlled system. However, when no drainage pipes are yet present in the field, the installation of level-controlled drainage cannot be reimbursed through VLIF NPI support. Subsidies are granted up to a cost of 2,000 euro/ha (which thus represents a maximum reimbursement of 1,500 euro/ha (75%)). (excluding VAT)

Benefits

Economic

Level-controlled drainage can delay water shortage by several weeks during drought, which can still be a significant difference for most crops. It also reduces the need for irrigation during the dry season, which can also save a cost. The increased yield from level-controlled drainage obviously depends on plot, crop and rainfall pattern (wet vs. dry years):

- about 100 euros at corn
- about 150 euros at grass
- about 400 euros in water-intensive crops (e.g., potatoes and onions)

Provided proper management and site conditions, it is an investment that pays for itself through increased crop yields.

In addition, an expansion of the type of crops is also possible, e.g. because more drought-sensitive crops can now be grown. Viewed differently, it is also possible that current crops can be maintained despite increasing drought due to climate change.

Ecosystem services

The main advantage, of course, is water conservation: water is retained in plots. Figures from the Netherlands already show that in level-controlled systems about 30% less water flows away from the drains (obviously depending on the conditions of the field).

Not only is it a particularly useful system during drought conditions, but also during flooding. This is because water drains less quickly into canals/watercourses, reducing peak flows. This can also reduce downstream flooding.

Furthermore, it also has an effect on soil nutrients (especially nitrogen and phosphorus). With more upward water flow, nitrogen will also be higher in the soil, allowing plants to absorb it more. Moreover, a larger part of the soil will be saturated, so more nitrogen can be converted (denitrification) and there will be less leaching in the fall.

What to look out for

Legislation

When a conventional drainage is converted to a level-controlled system via VLIF NPI support, this does not require an environmental permit. However, technical justification advice is required.

Added value depending on : type of subsoil, distance & slope of drains, drainage along canals, fluctuation of groundwater in reference years,...

Interesting to combine with a weir (-> Apply to DIW/polder/... depending on category of watercourse)

Point of attention: install a bollard! That way you avoid damage from machines driving over it.

Useful links

- [Webinar Level-controlled drainage and subirrigation](#)
- [Animation Level-controlled Drainage](#)

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Examples

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