



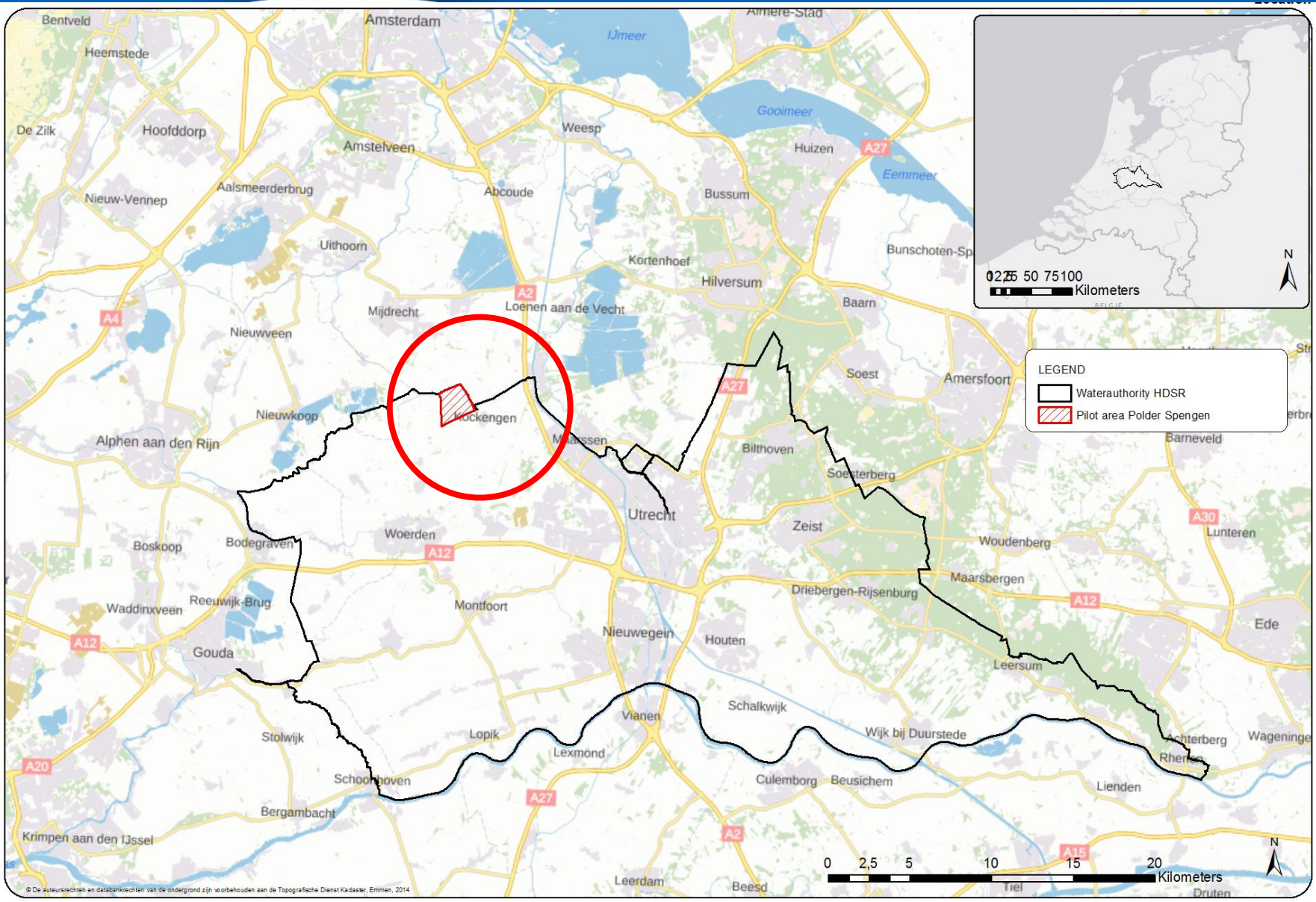
HOOGHEEMRAADSCHAP
DE STICHTSE
RIJNLANDEN

Effective soil subsidence reduction of peatlands by pressurized drainage in polder Spengen, the Netherlands



Jantine Hoekstra MSc.
19 February 2019

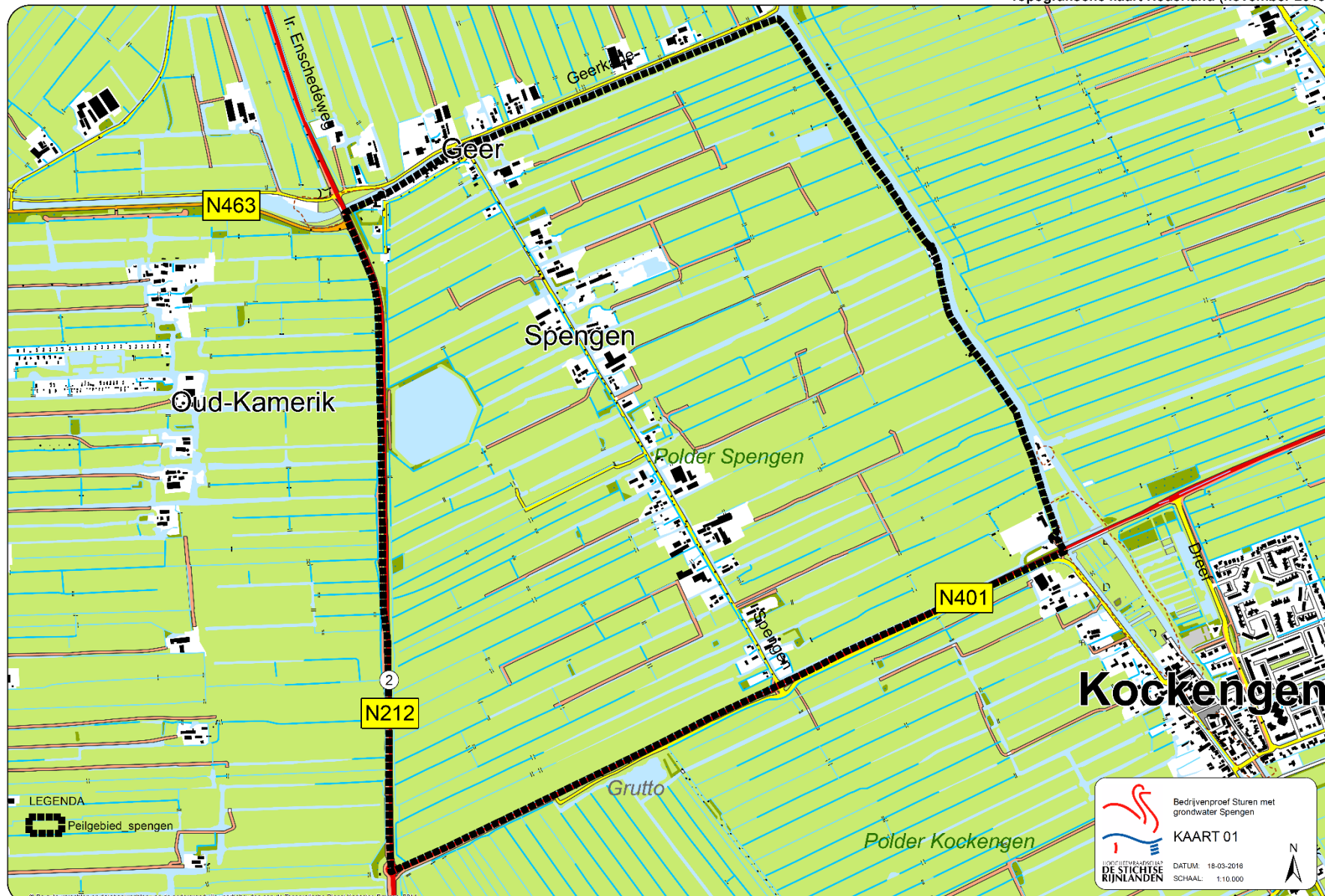
Location: polder Spengen, the Netherlands





Location: Topography

Topografische kaart Nederland (november 2015)



LEGENDA
Peilgebied Spengen

Bedrijvenproef Sturen met
grondwater Spengen

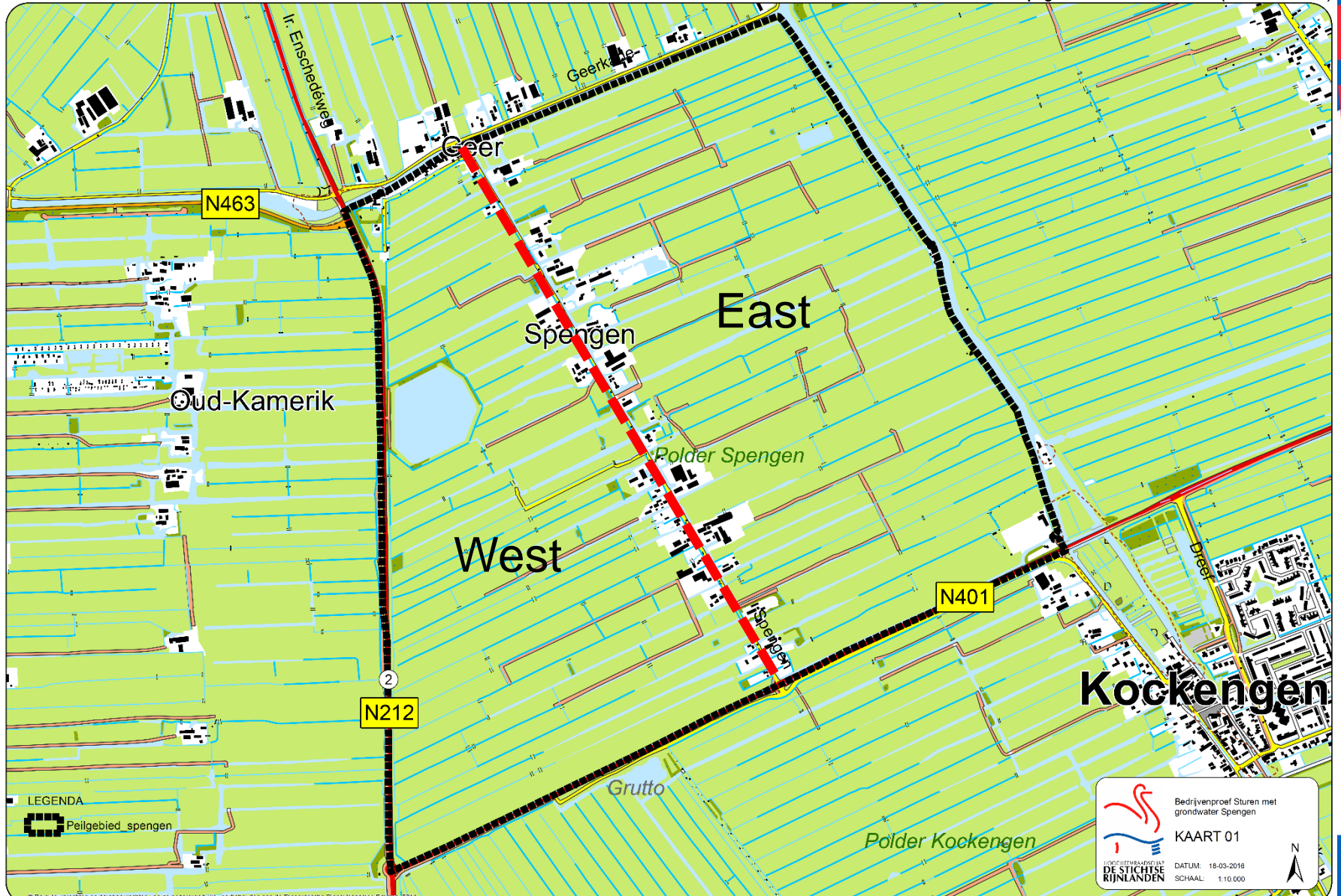
KAART 01

DATUM: 18-03-2018
SCHAAAL: 1:10.000



Location: Topography

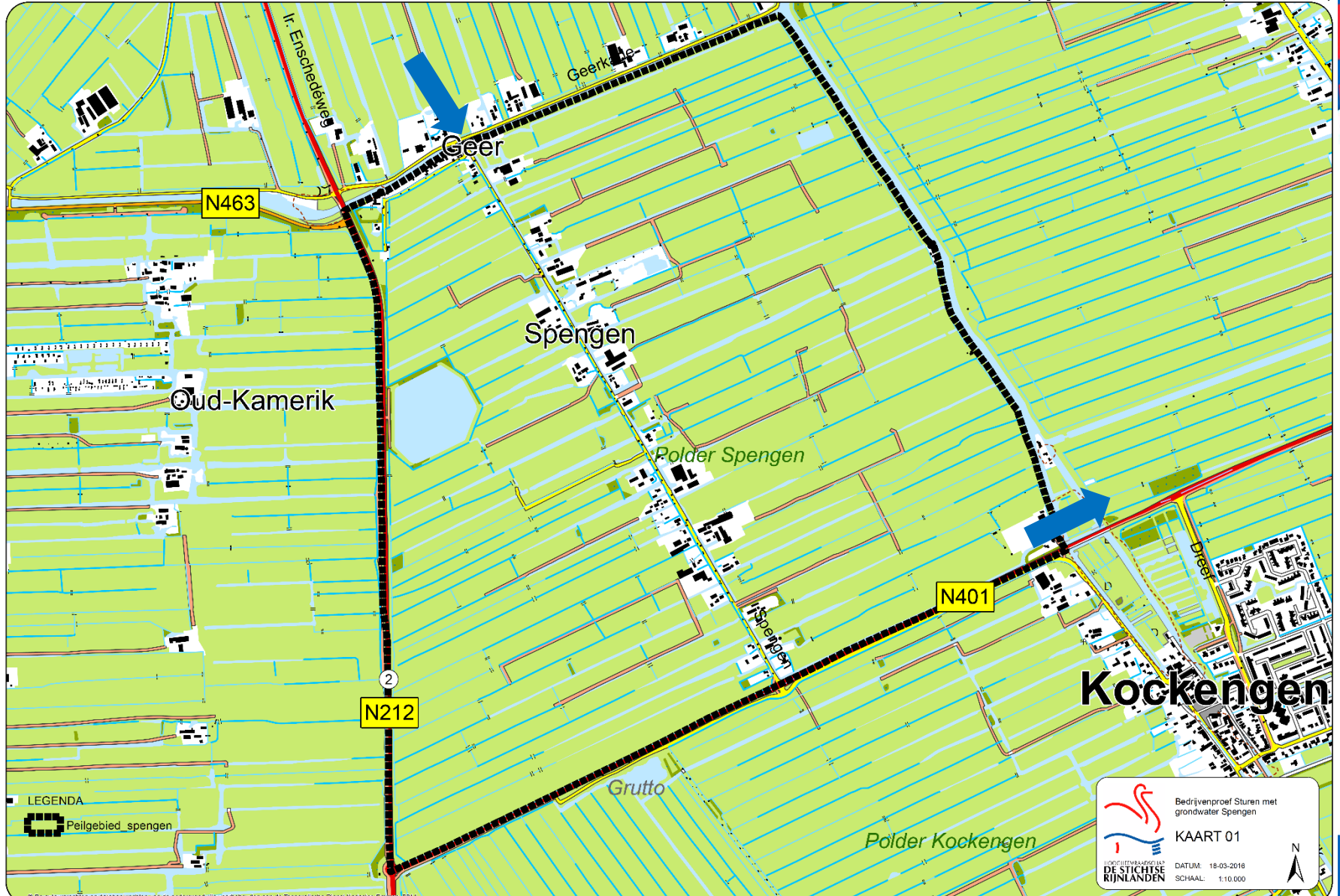
Topografische kaart Nederland (november 2015)





Location: Topography

Topografische kaart Nederland (november 2015)



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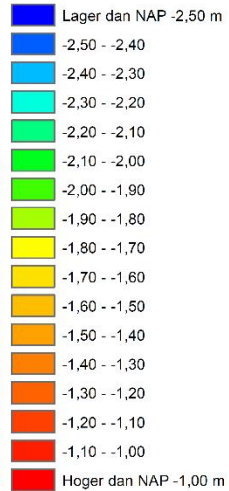


Location: Heightmap

Hoogtekaart (Actueel Hoogtebestand Nederland 3)

LEGENDA

AHN 3 (-2,5 tot -1,0m)



 Bedrijvenproef Sturen met
grondwater Spengen
KAART 03
DATUM: 18-03-2016
SCHAALE: 1:10.000



Problem definition: Water management and Soil Subsidence

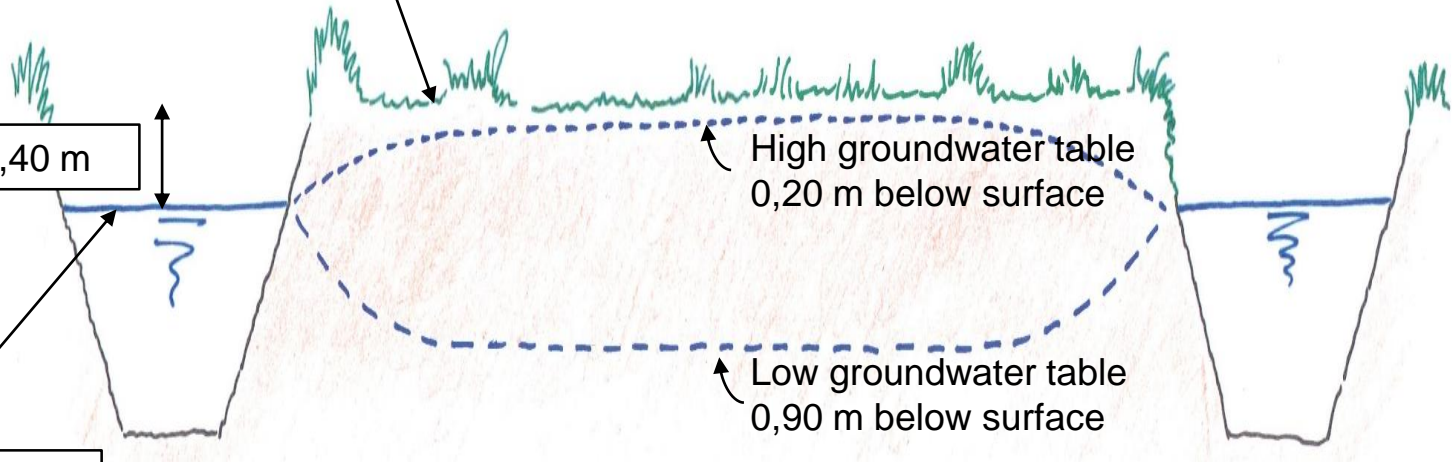
Ground surface level
NAP -1,83 m

Freeboard 0,40 m

Surface water level
NAP -2,22 m

High groundwater table
0,20 m below surface

Low groundwater table
0,90 m below surface



Goals of the pilot project

1. Apply new technique in practice
2. To quantify and qualify the effects of subsurface drainage (combined with pressurized drainage) on a broad range of environmental and agricultural aspects, such as:
 - 1 Groundwatertable
 - 1 Soil Subsidence
 - 1 Water quantity (inlet)
 - 1 Water quality
 - 1 Grass quality
 - 1 Bearing capacity field
 - 1 Meadow birds

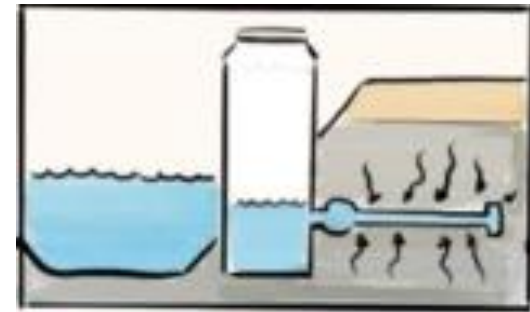
Method: Pressurized submerged drainage (infiltration)

Pressure water reservoir,
Even more constant groundwater table



WATER INFILTREREN

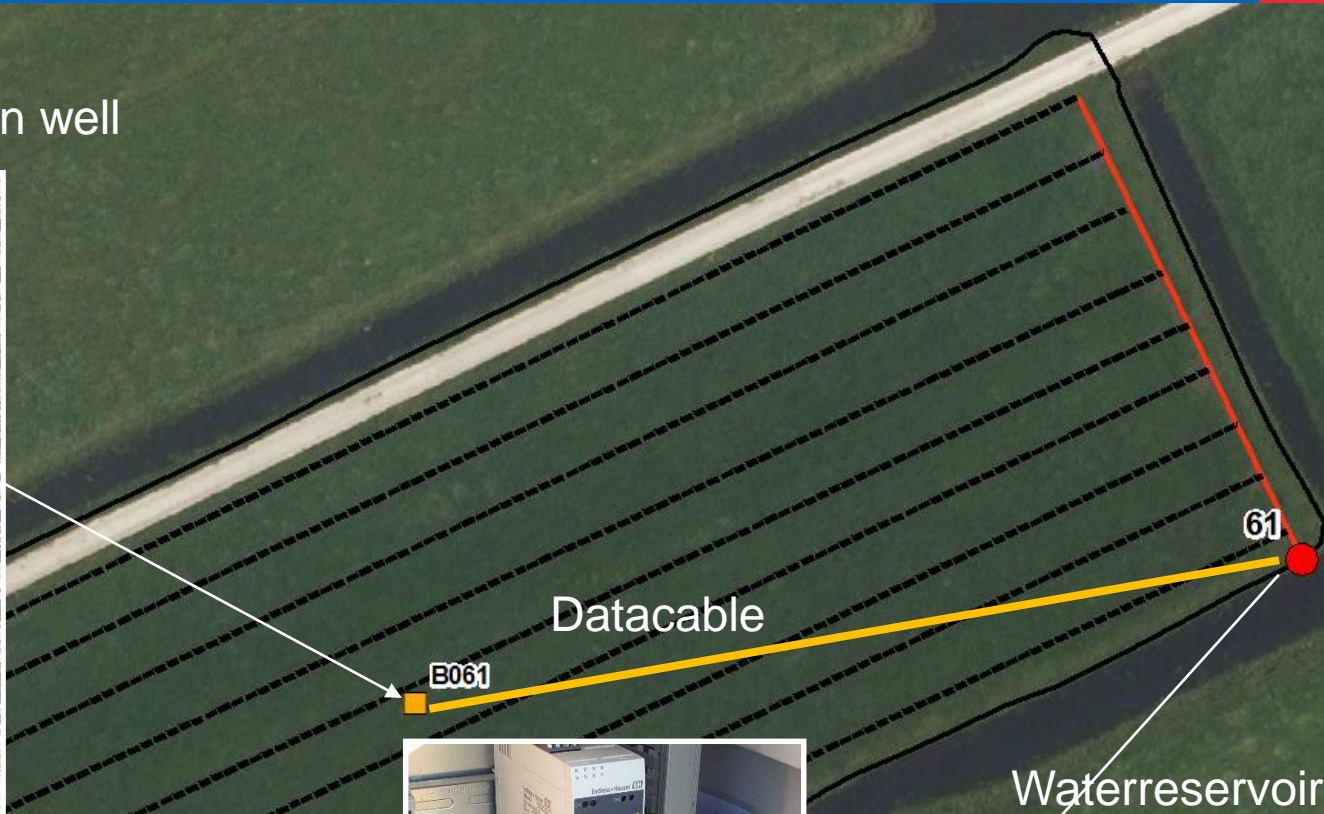
- 1 Dry period
- 1 High water pressure
- 1 Increase infiltration



WATER DRAINEREN

- 1 Wet period
- 1 Low water pressure
- 1 Increase drainage

Groundwater observation well



Datacable

61

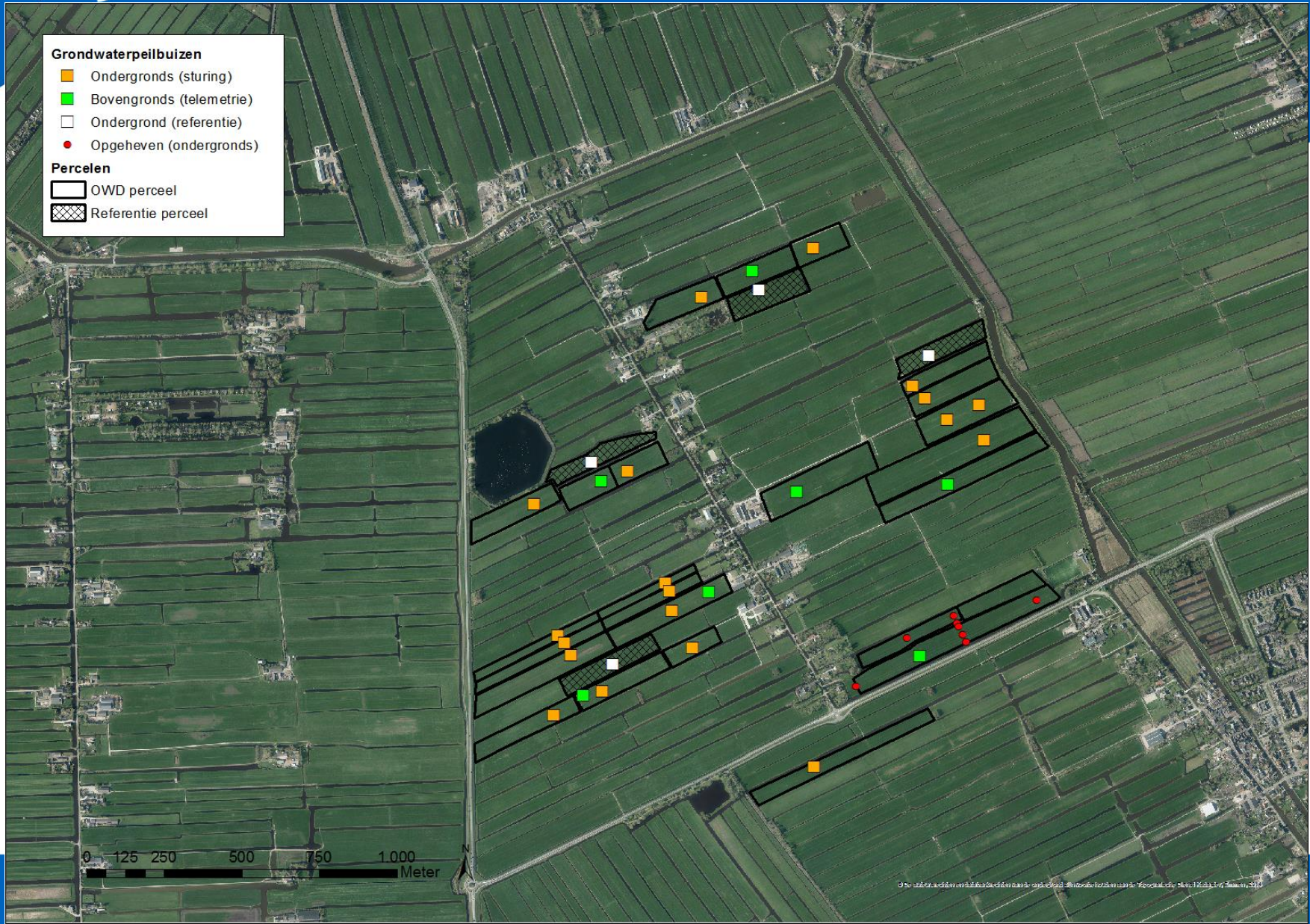
B061

Waterreservoir

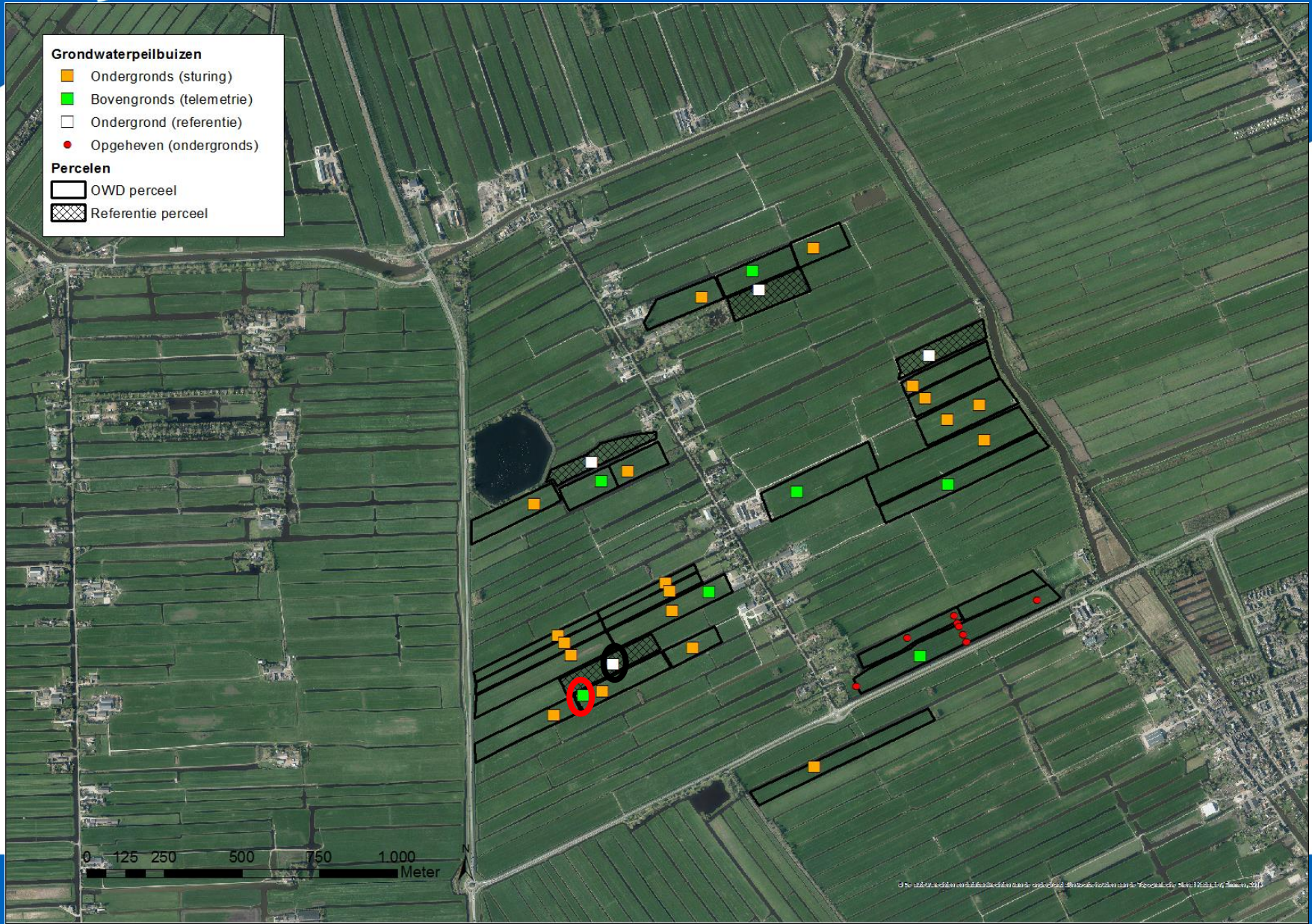
PLC/Computer



Results: Groundwatertable

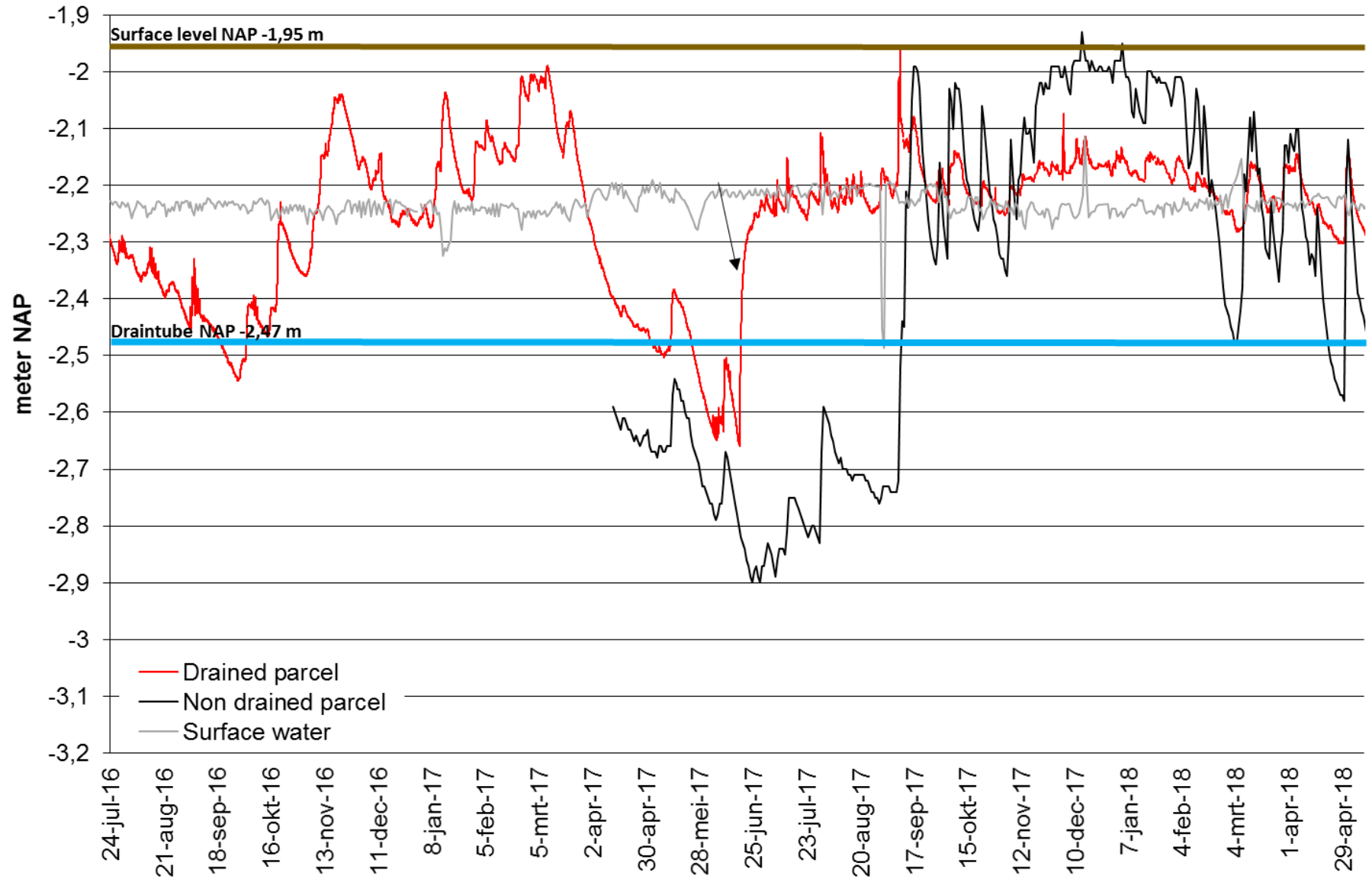


Results: Groundwatertable



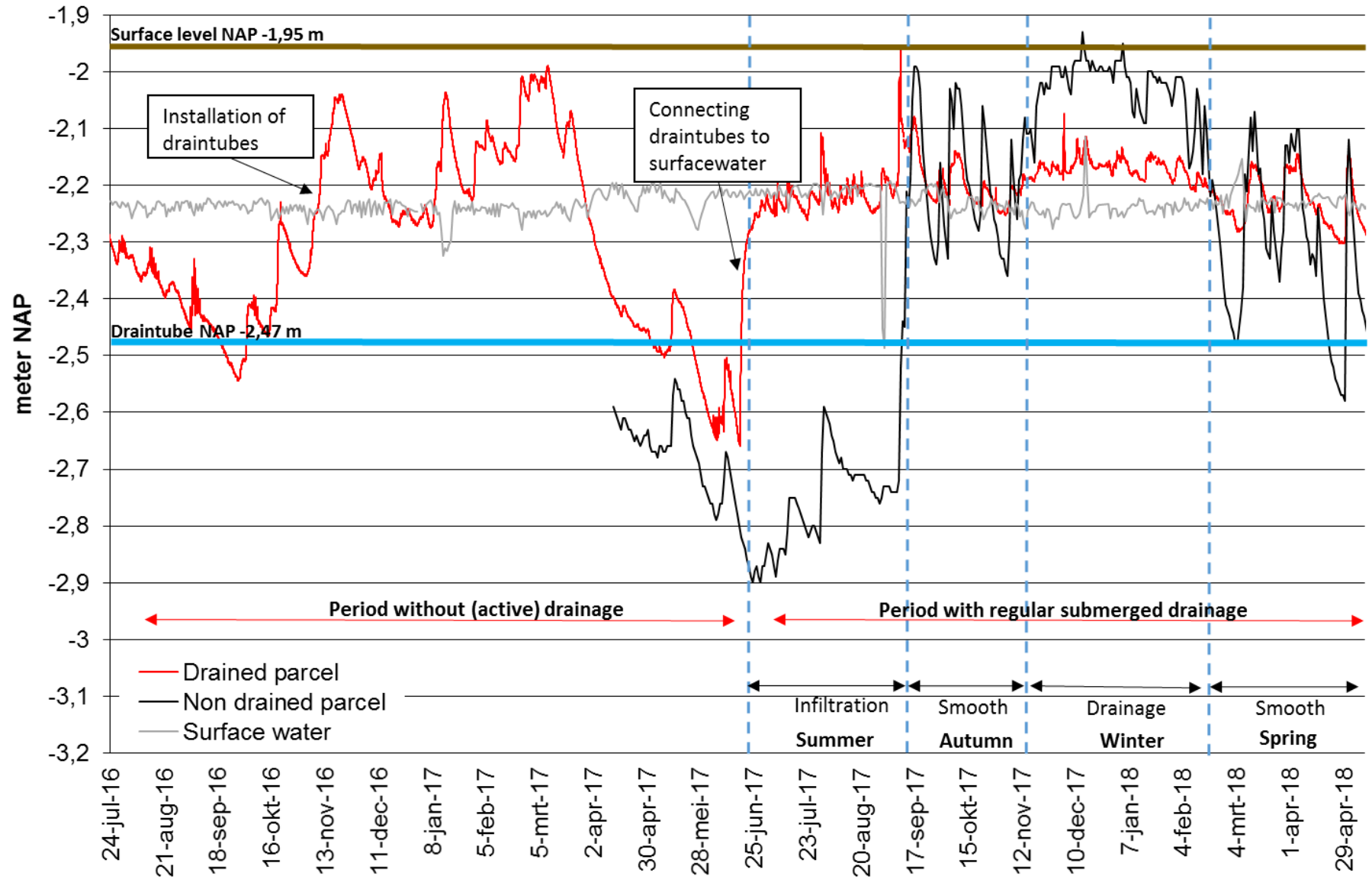
Results: Groundwatertable

Groundwatertable farmer van Herk (july 2016 - april 2018)

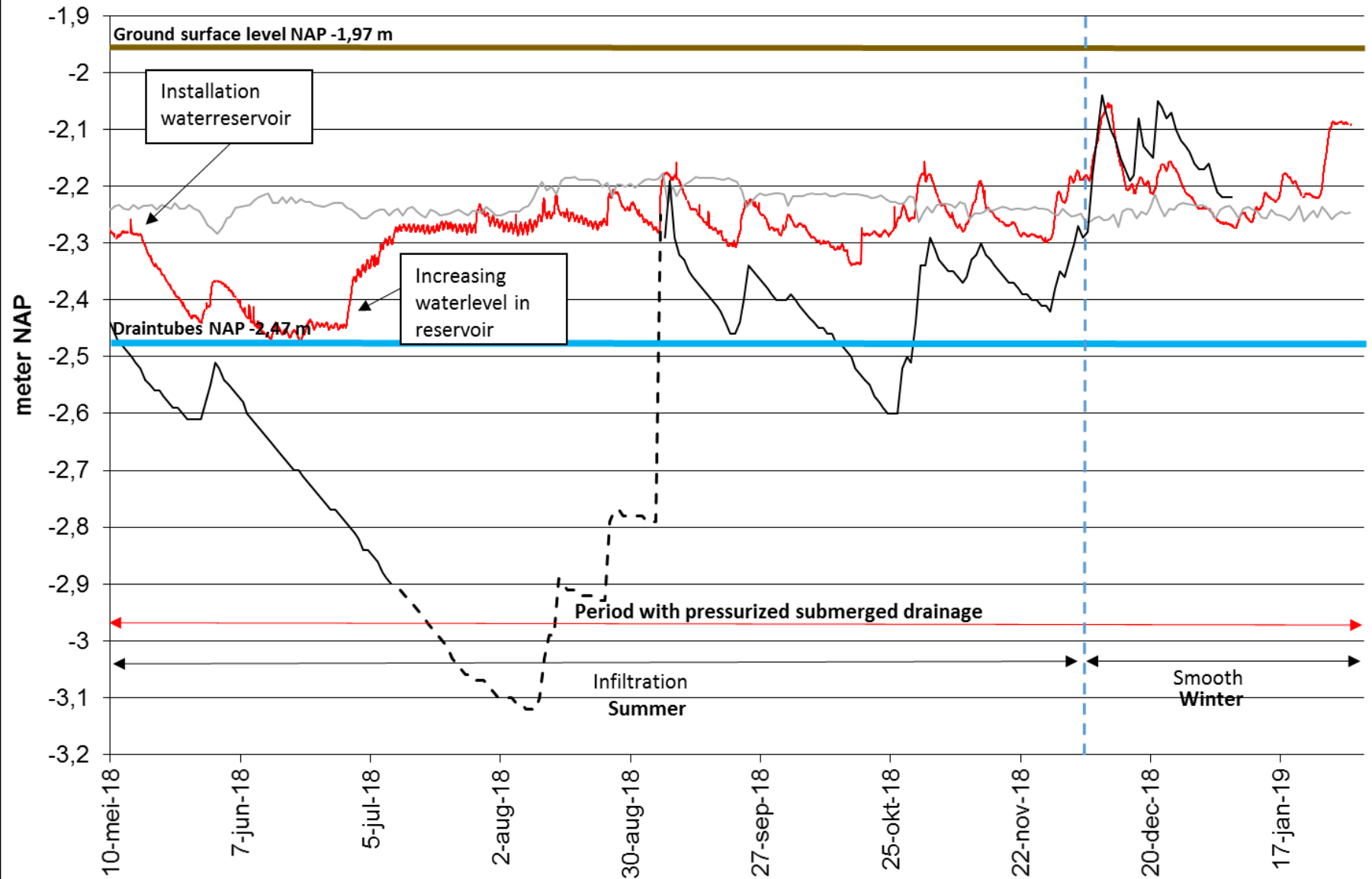


Results: Groundwatertable

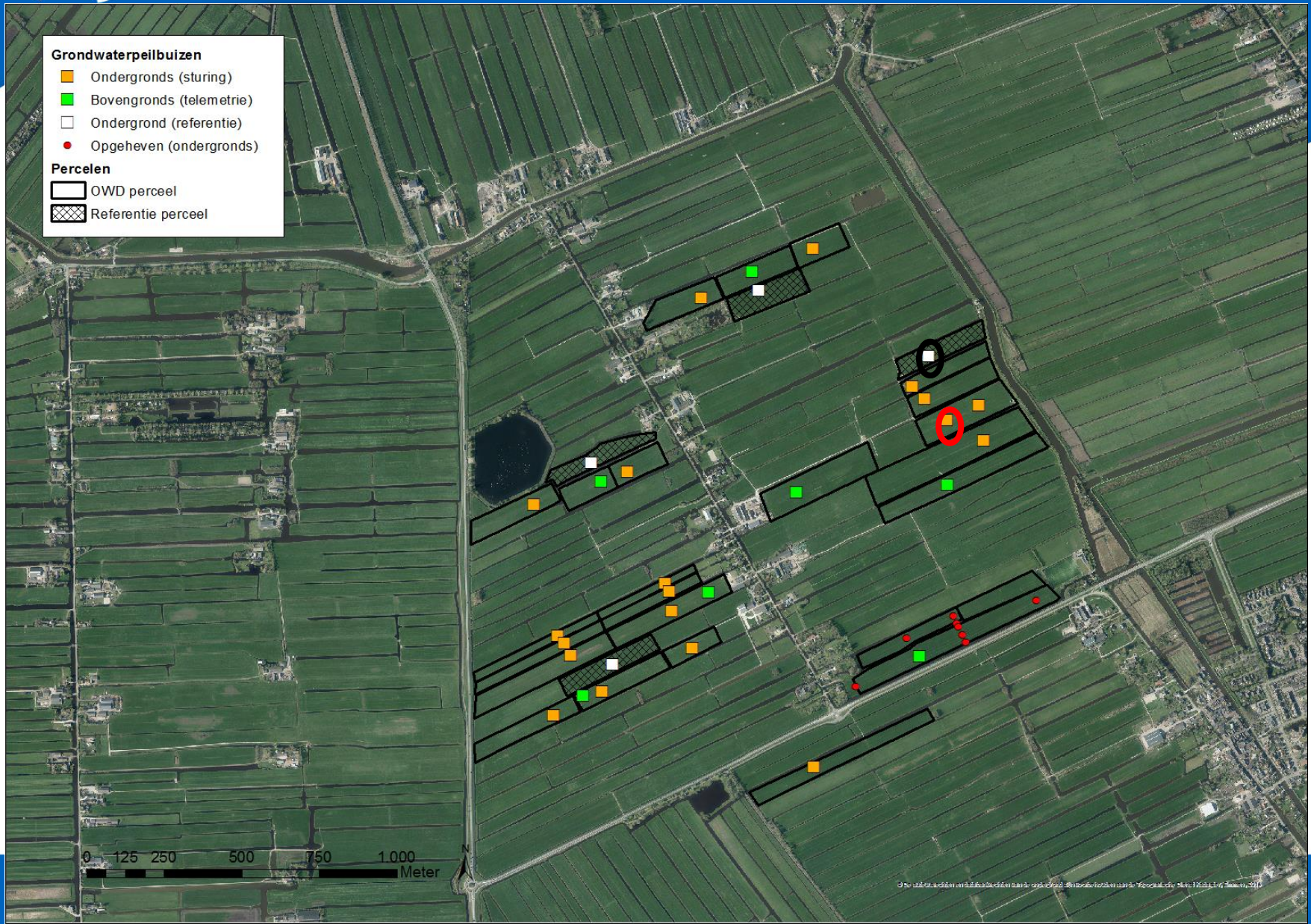
Groundwatertable farmer van Herk (july 2016 - april 2018)



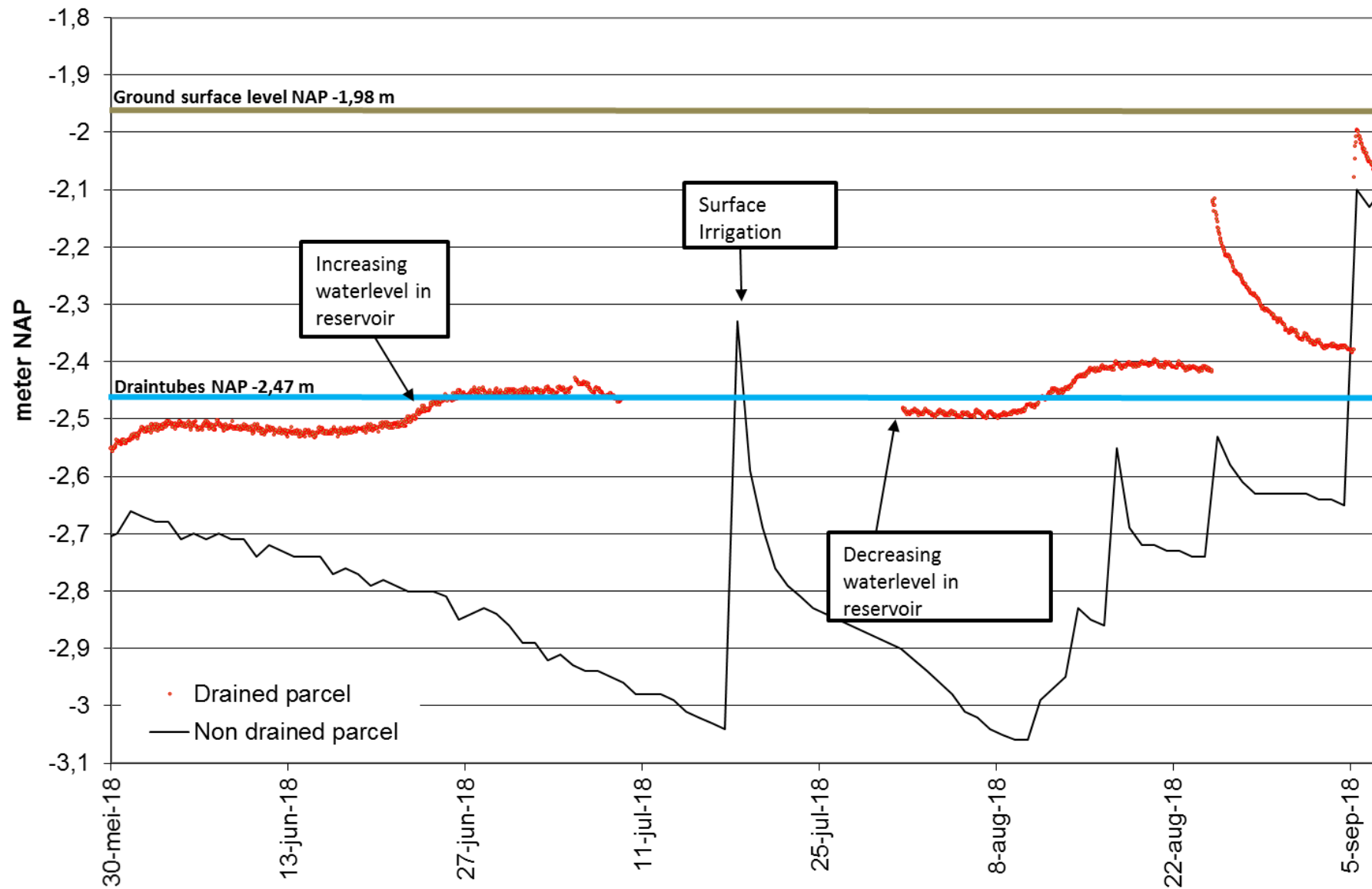
Groundwatertable farmer van Herk (periode may 2018 - january 2019)



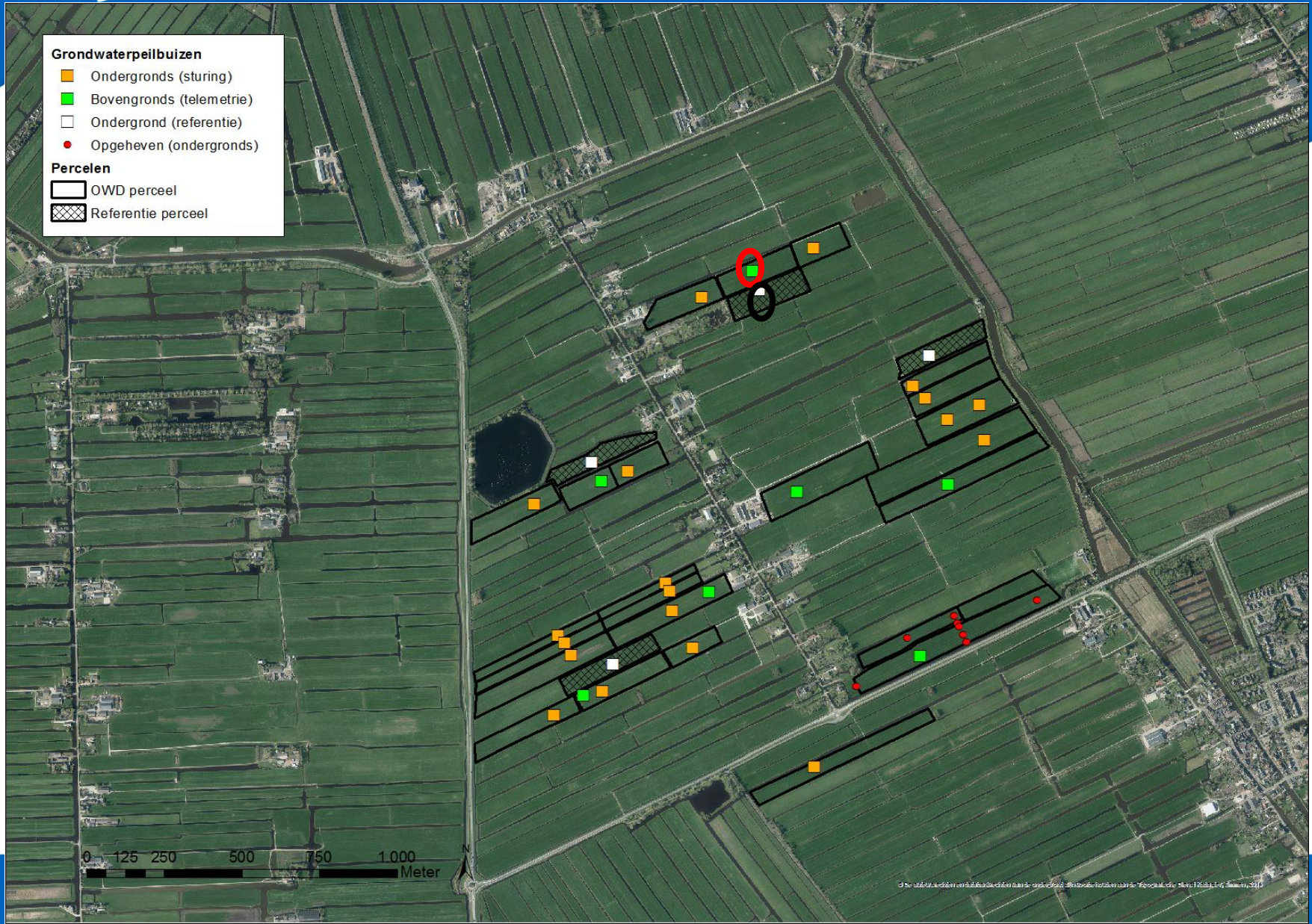
Results: Groundwatertable



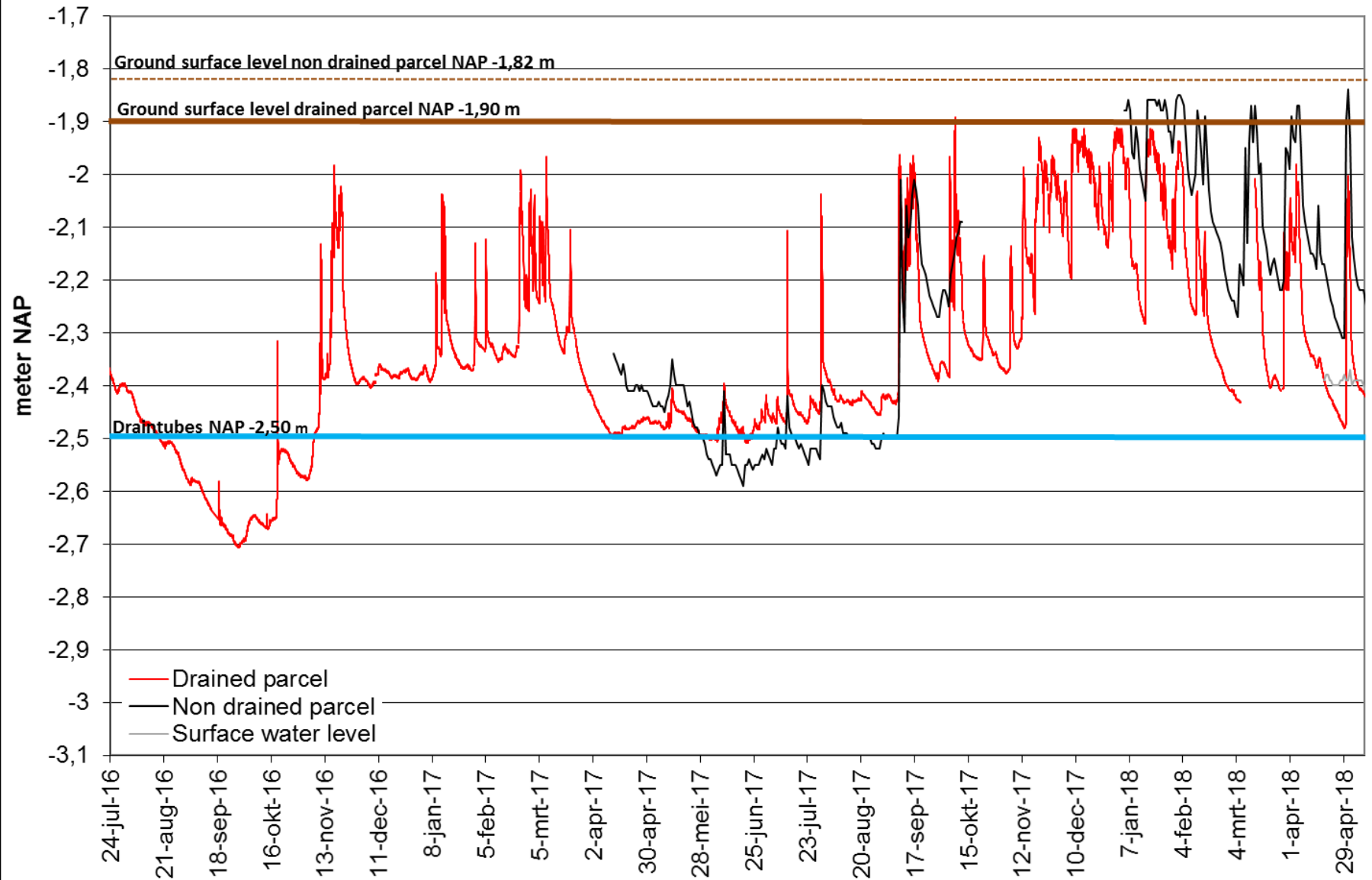
Groundwatertable farmer S. Scherpenzeel (period may 2018 - september 2018)



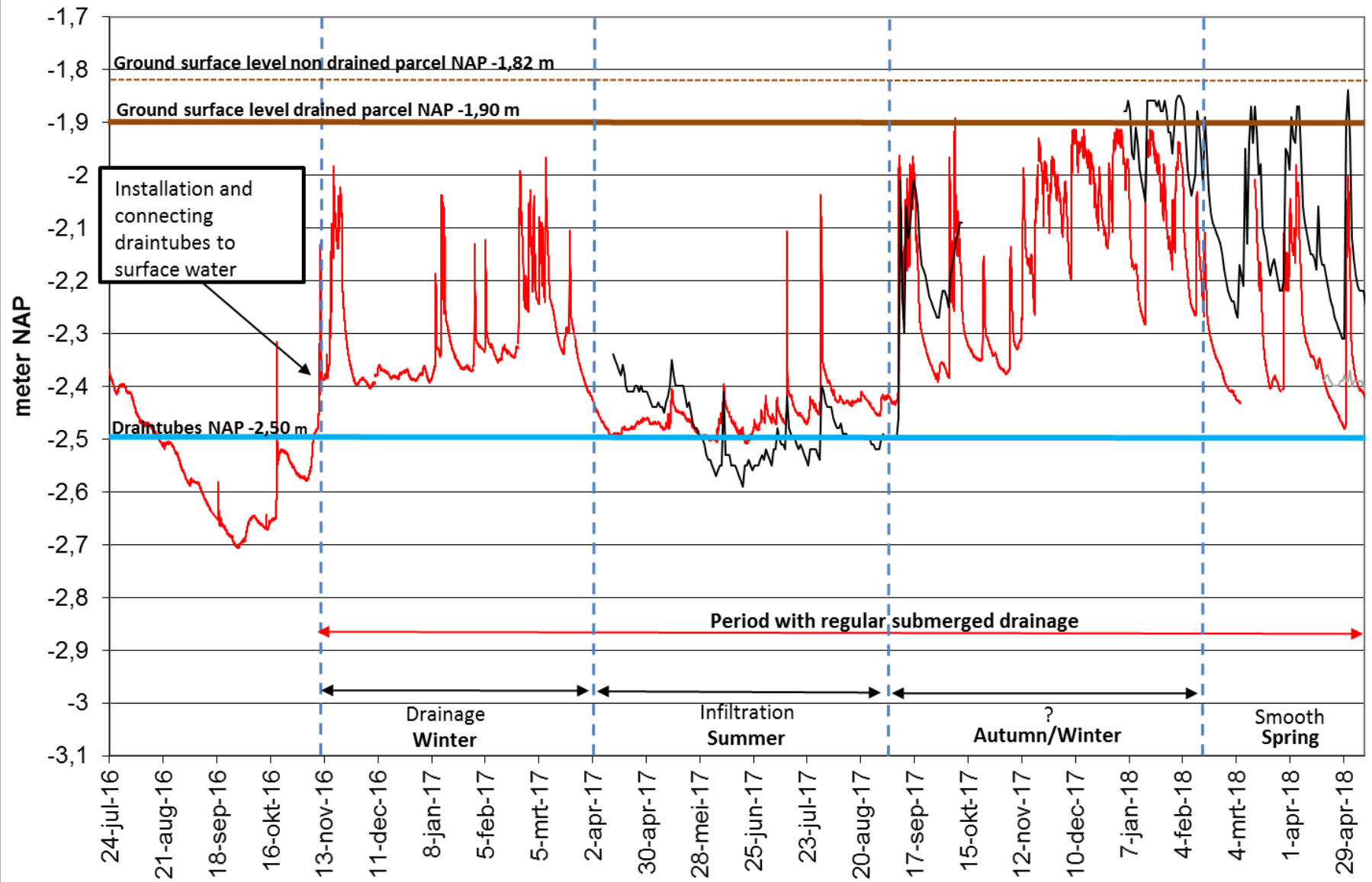
Results: Groundwatertable



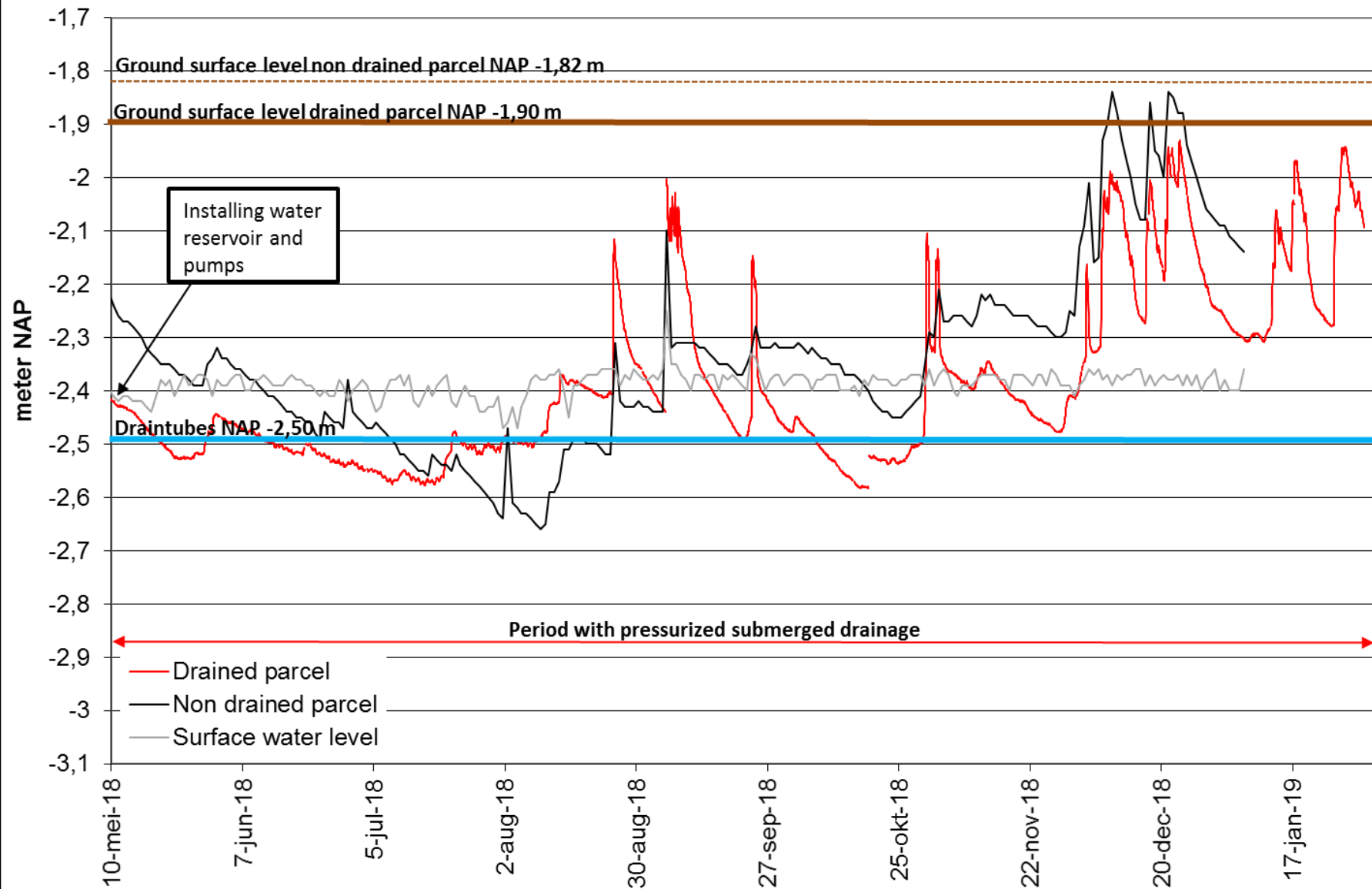
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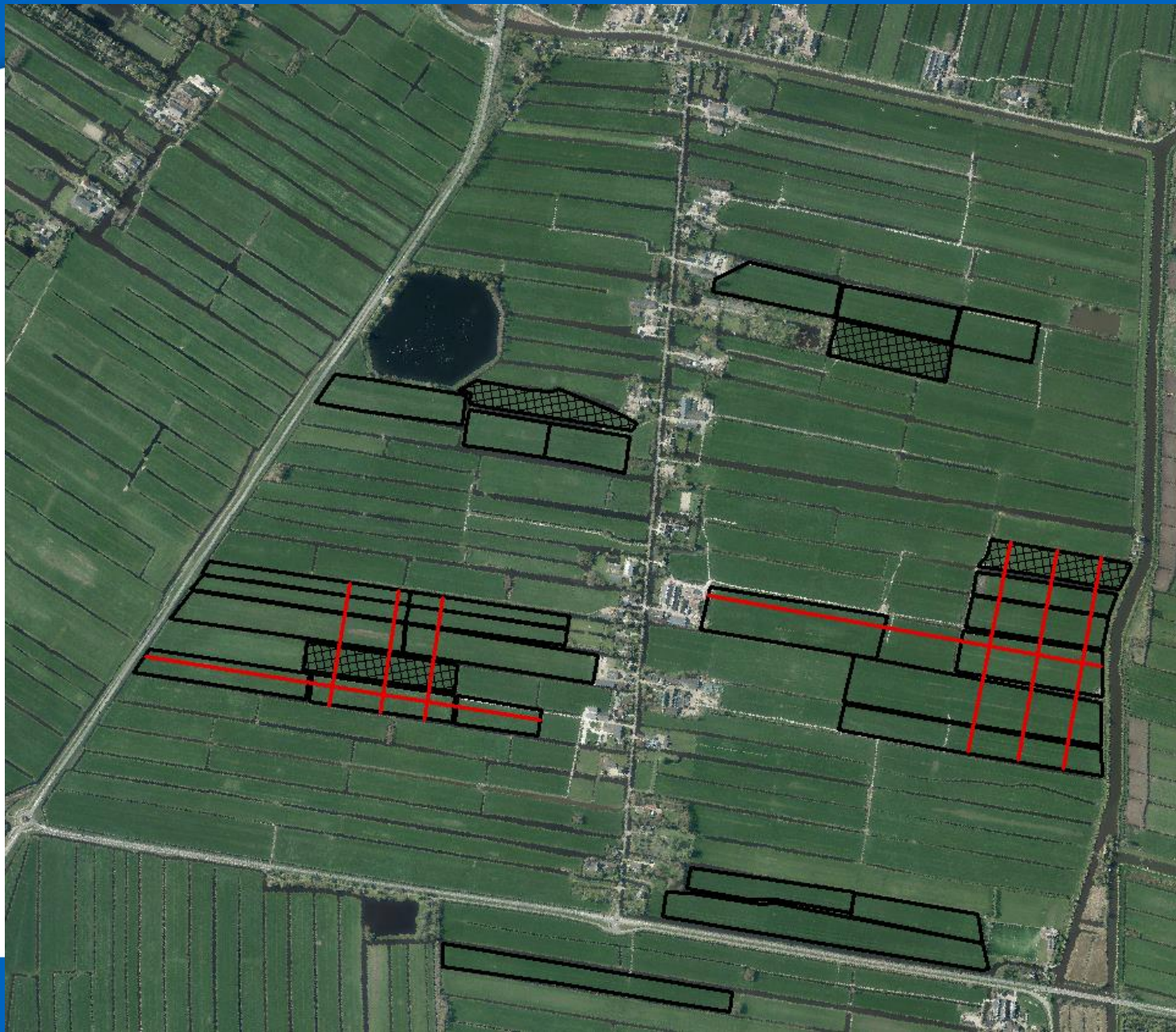


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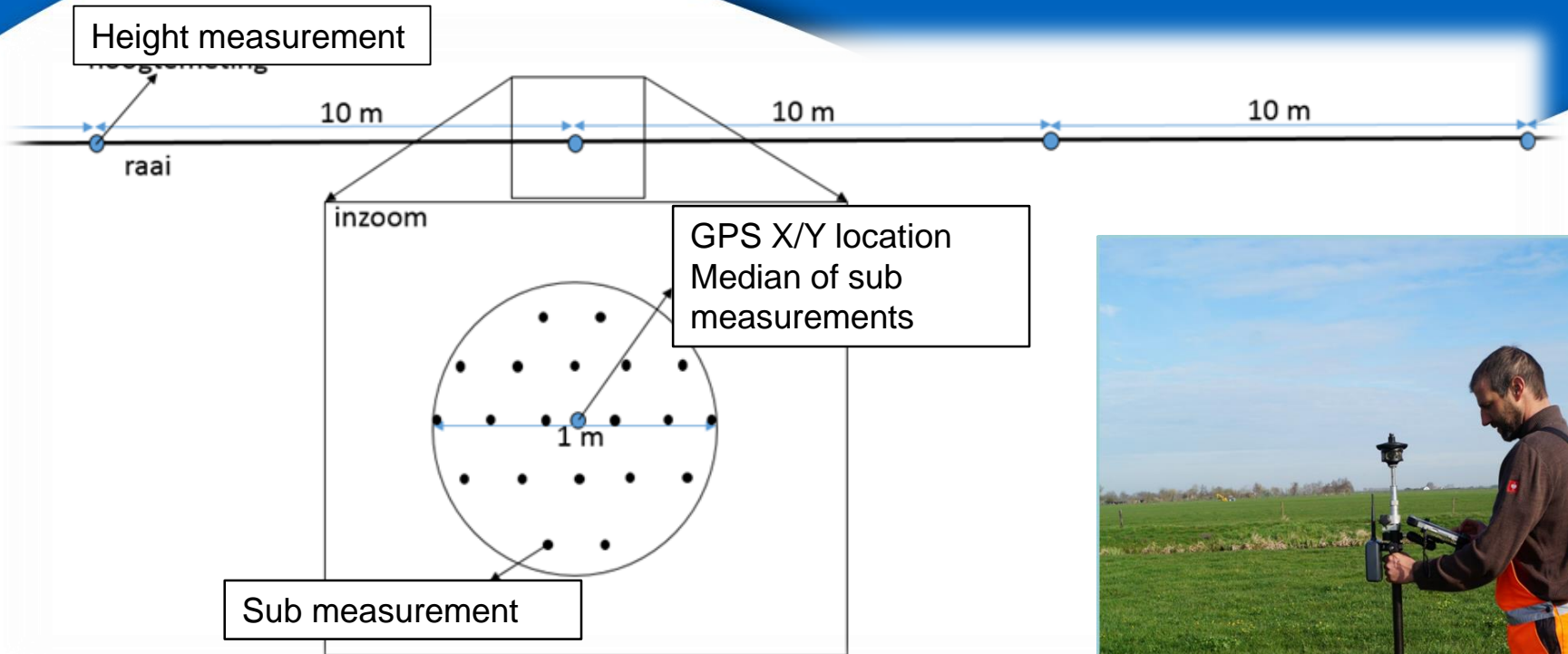




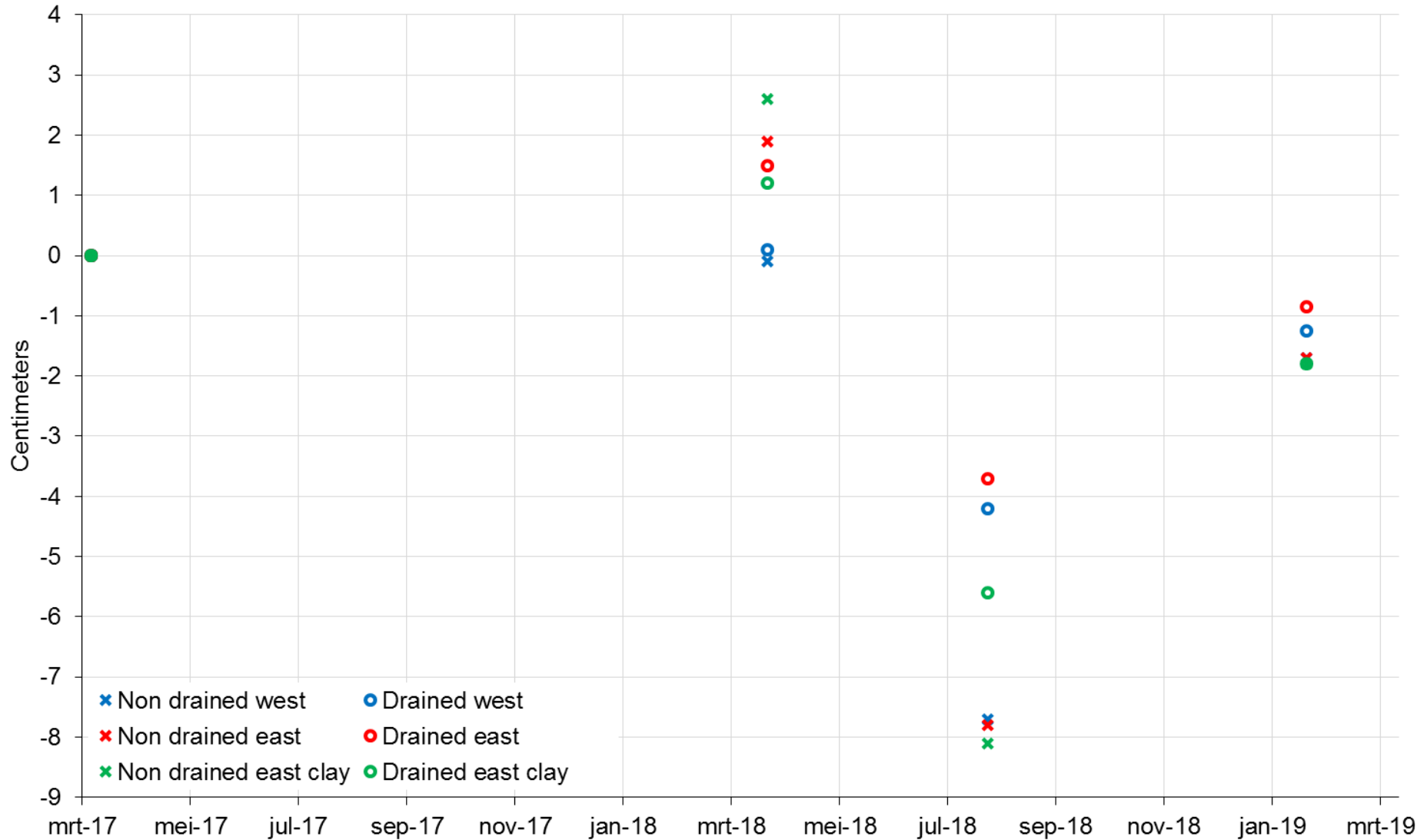
Method: Soil movement



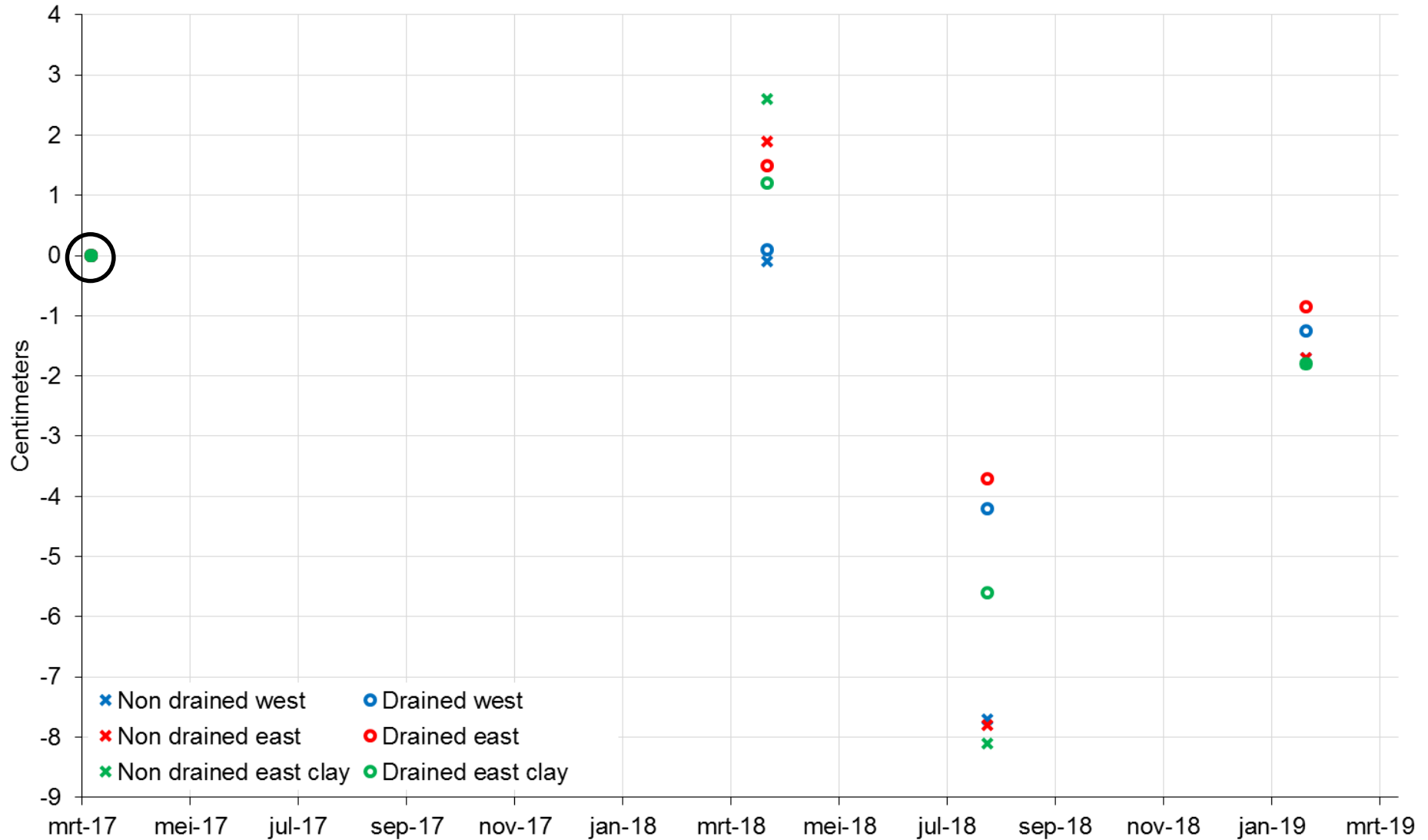
Method: Soil movement



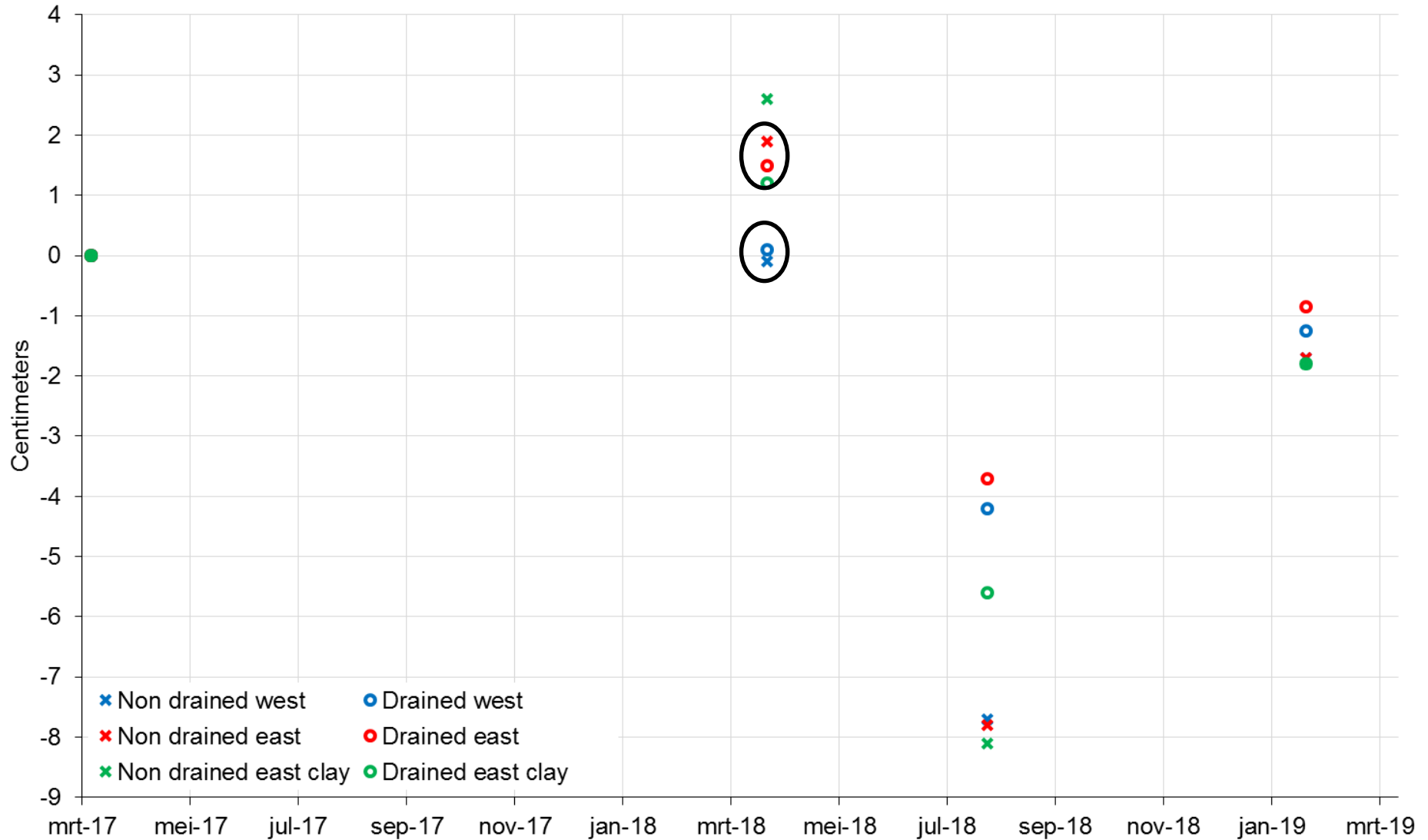
Ground surface level movement since 31 March 2017



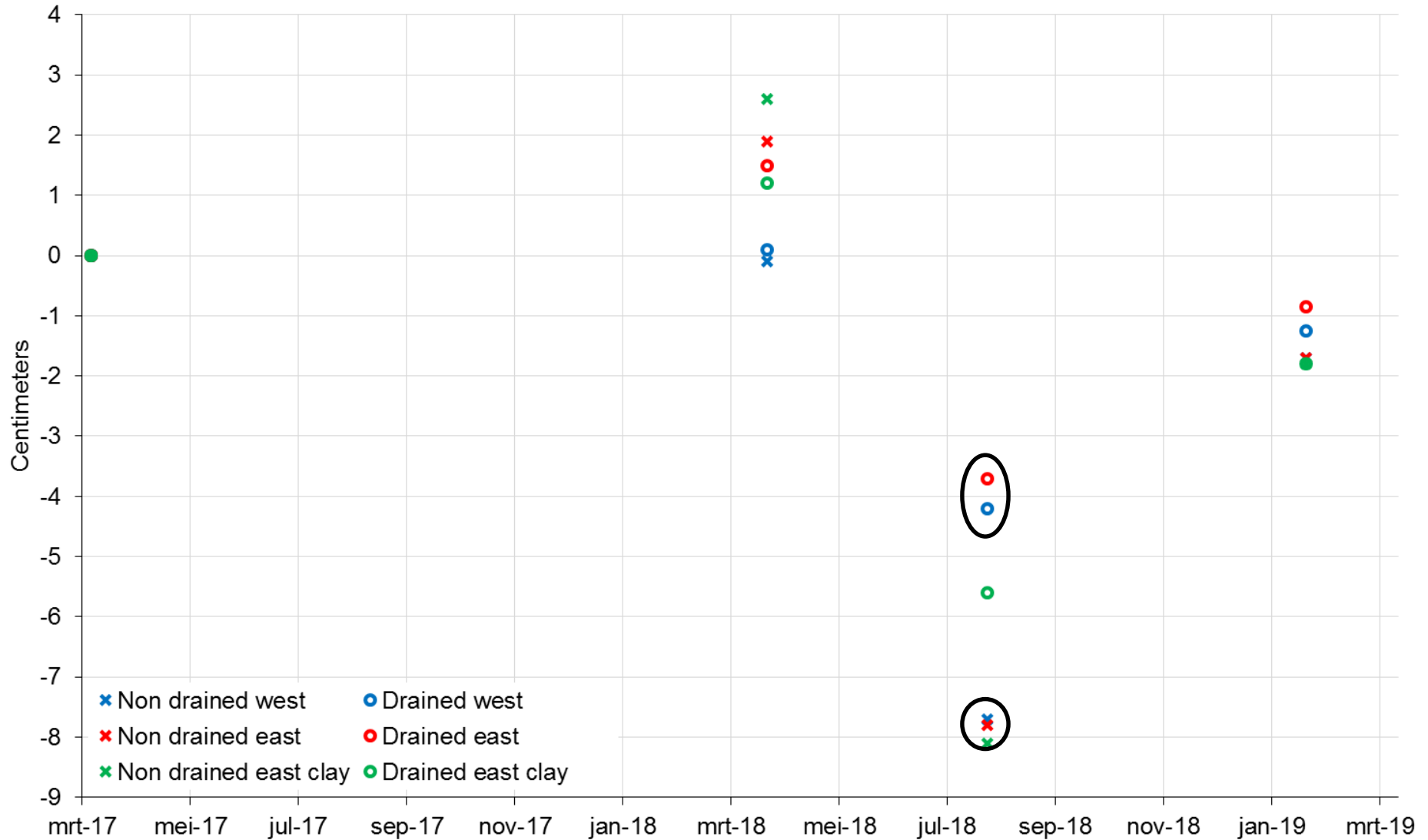
Ground surface level movement since 31 March 2017



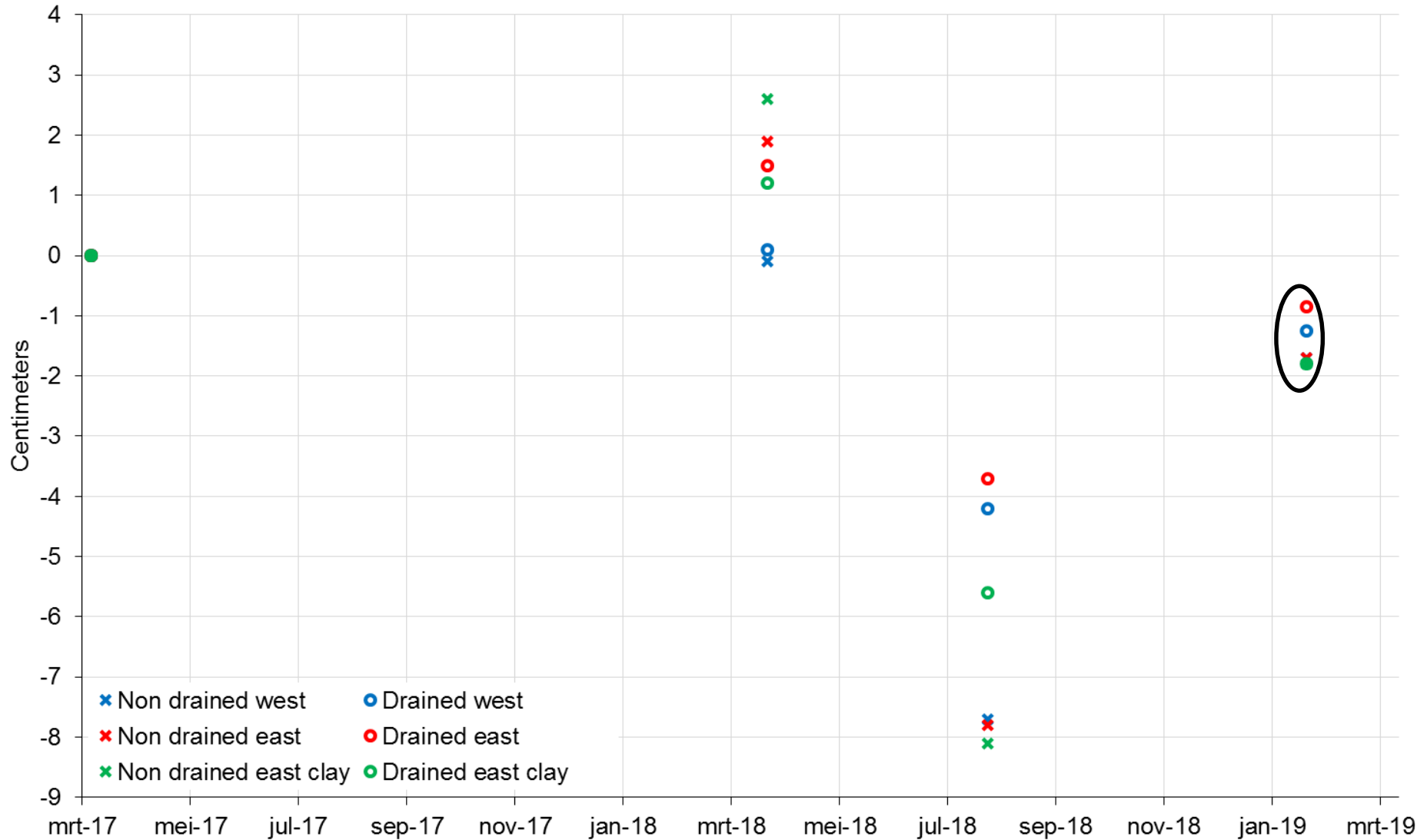
Ground surface level movement since 31 March 2017



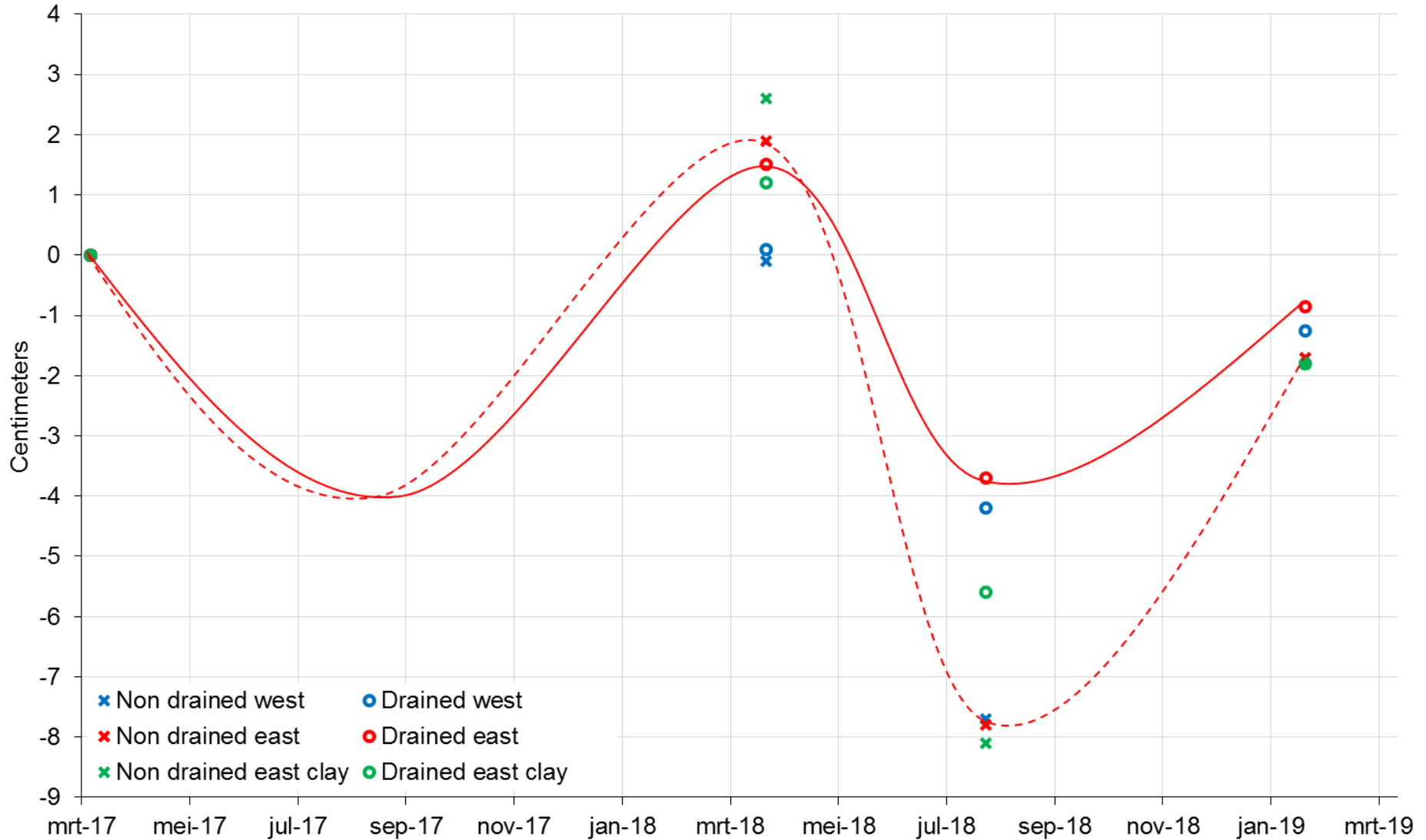
Ground surface level movement since 31 March 2017



Ground surface level movement since 31 March 2017



Ground surface level movement since 31 March 2017



- 1 Pressurized drainage successfully influenced groundwatertables during (extreme dry) summer 2018
- 1 Groundwatertable remains between 30 and 50 cm below surface
- 1 Soil conductivity limits “artificial” groundwater rise
- 1 Preliminary results look promising in reducing soil subsidence rate
- 1 Widespread application limited by high costs technique, mainly because of power source and automatisisation



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Thank you for your attention

Questions?