



Belgium for  
Biodiversity

remote sensing technology to monitor ecosystem restoration

**Case study Zwarte Beek**







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# NGO Natuurpunt



- **Conservation, restoration and management** of natural habitats in Flanders
  - 28.000 ha in 500 reserves
- **Volunteers** (+-45.000 active) supported by 550 **professionals**
- Nature management – research – education – volunteer support – marketing – policy



# The need to monitor large nature restoration projects

## Why?

There is no feasible standardised monitoring approach for large-scale nature and ecosystem restoration projects

## What?

to be able to periodically monitor the (a)biotic changes due to restoration measures on a landscape/ecosystem scale in a standardised, cost and time efficient way to:

- Assess the quality and efficiency of the chosen restoration/management measures
- Detect problem areas/opportunities for further restoration (i.e. drainage areas)

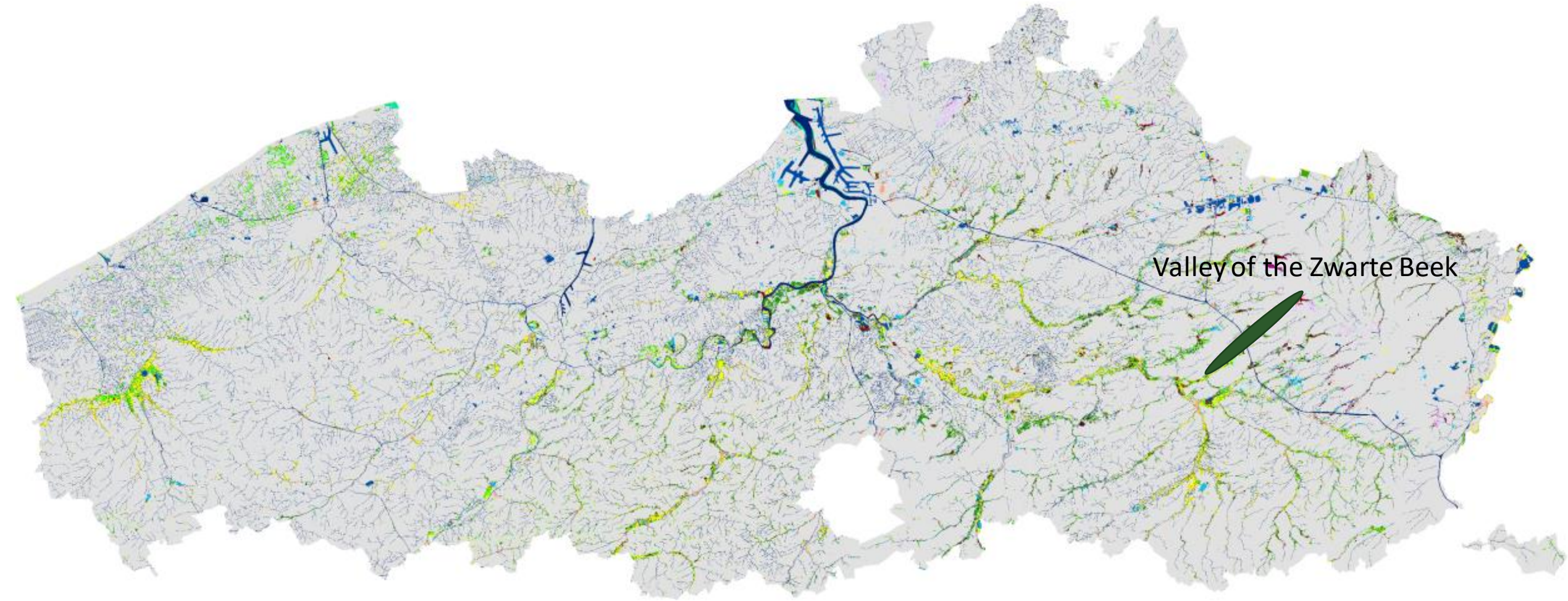
## How?

develop a new, remote sensing-based methodology to monitor ecosystem restoration





# Case study: Zwarte Beek



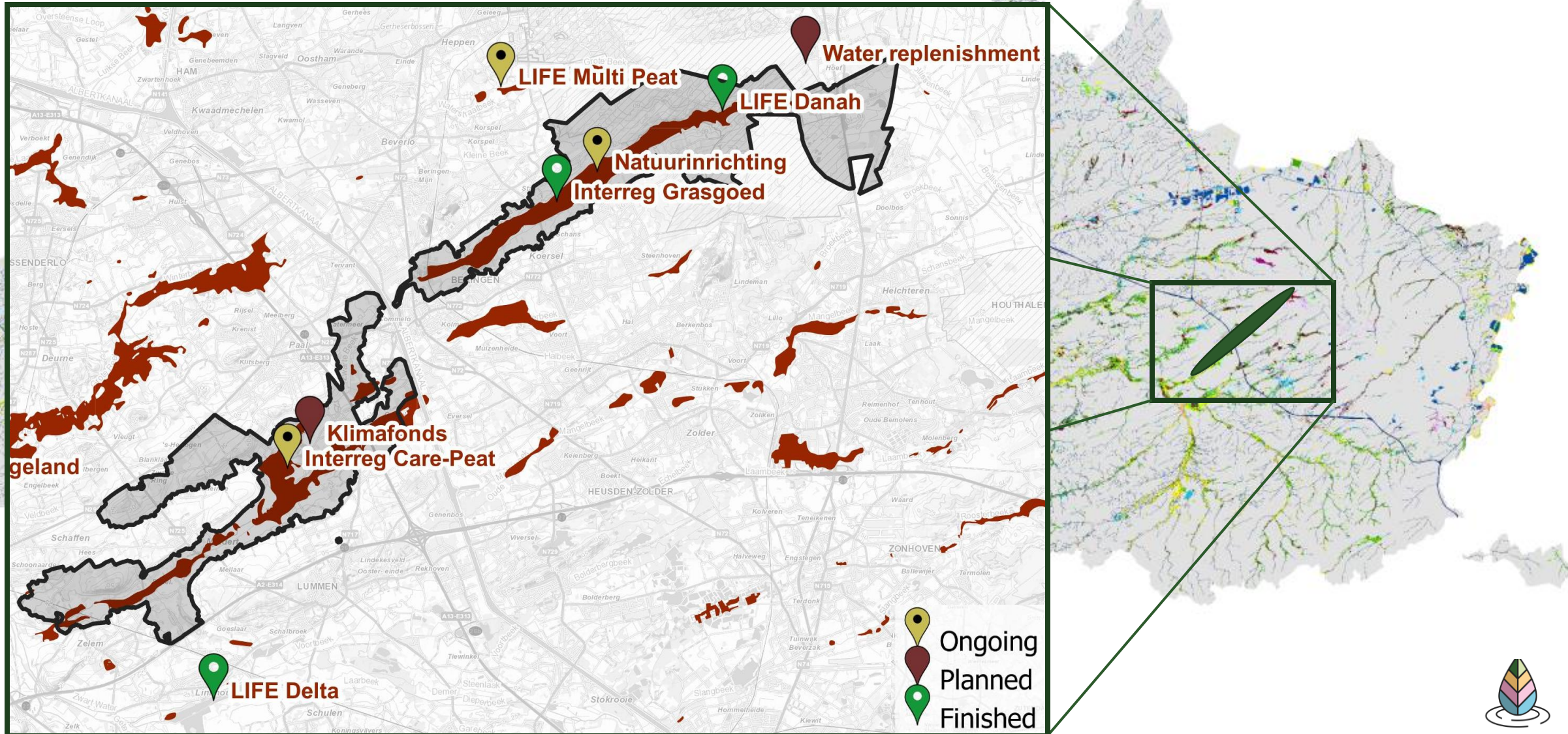
*Wetland map – actual situation (Source: INBO)*





# Case study: Zwarte Beek

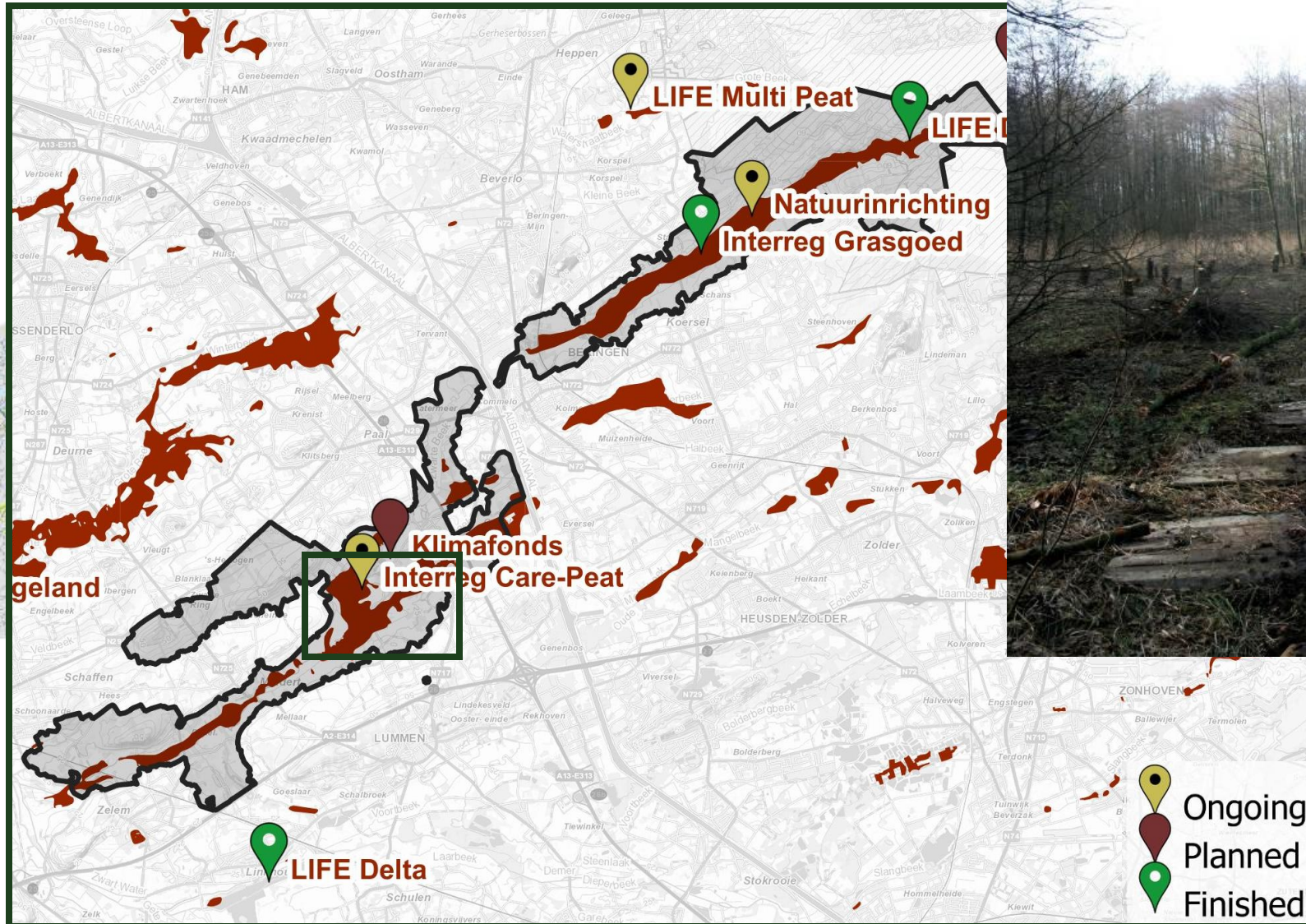
Many large restoration projects = large area to manage



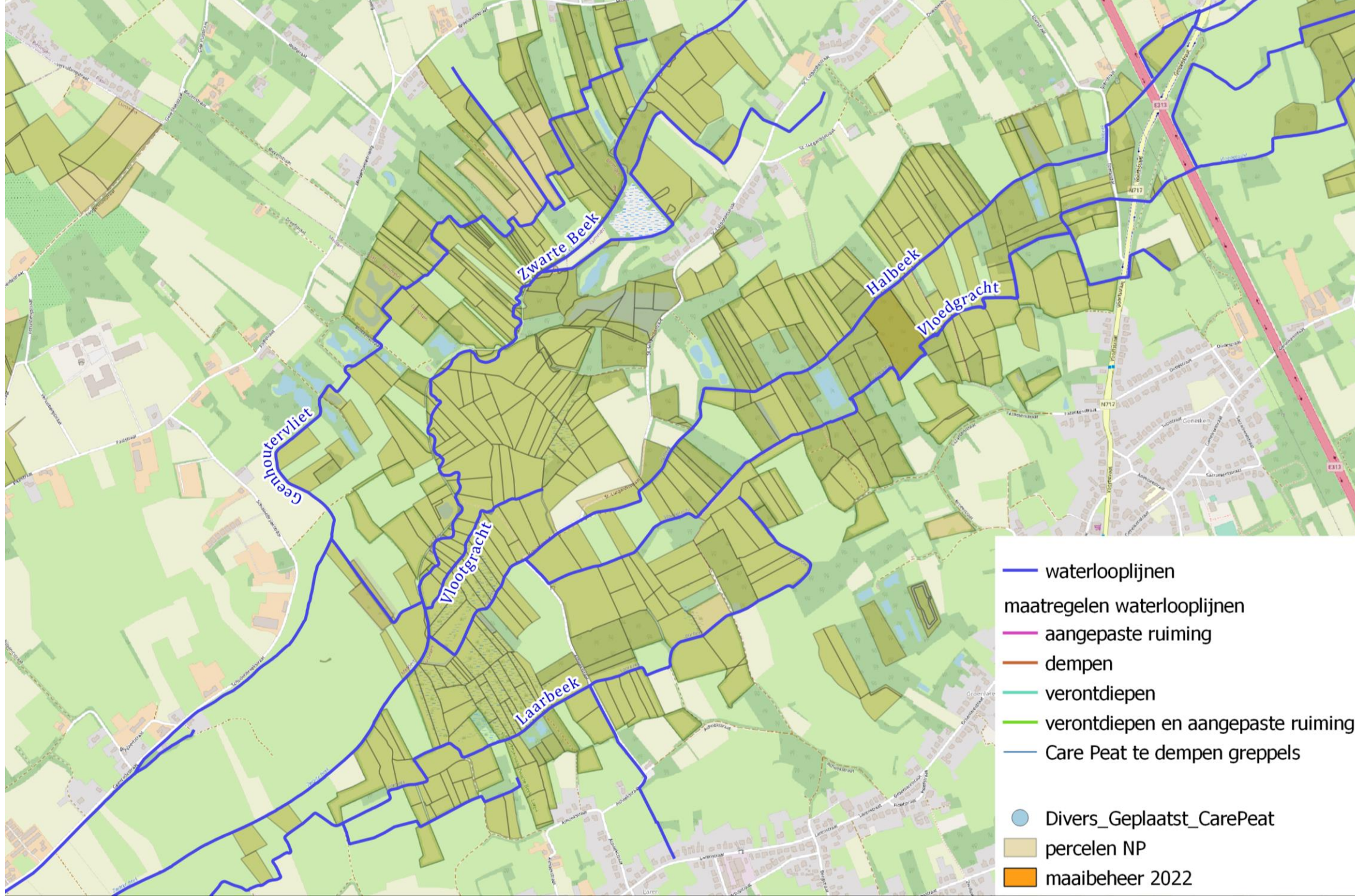


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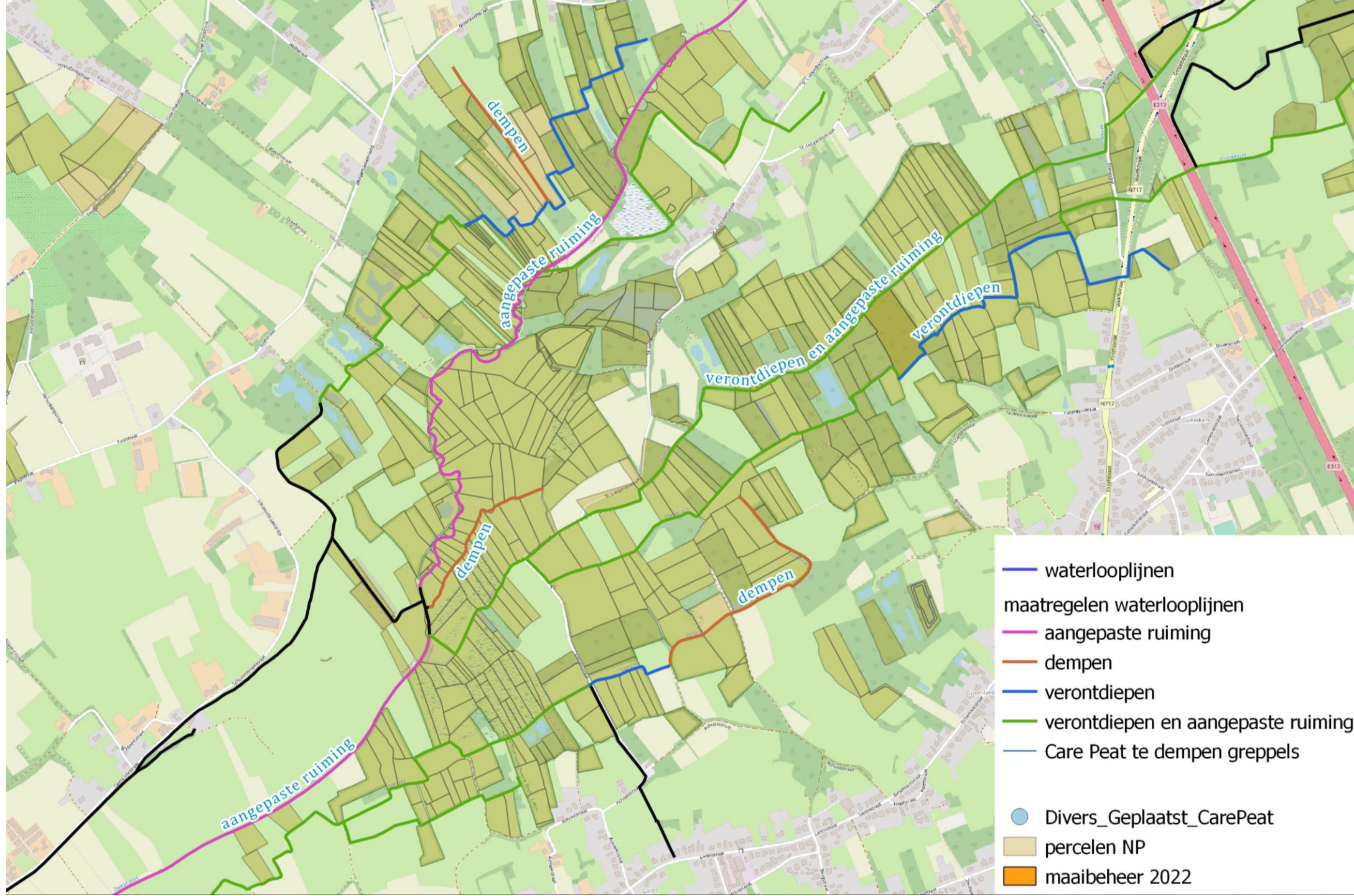




- waterloolijnen
- maatregelen waterloolijnen
- aangepaste ruiming
- dempen
- verontdiepen
- verontdiepen en aangepaste ruiming
- Care Peat te dempen greppels
- Divers\_Geplaatst\_CarePeat
- percelen NP
- maai-beheer 2022







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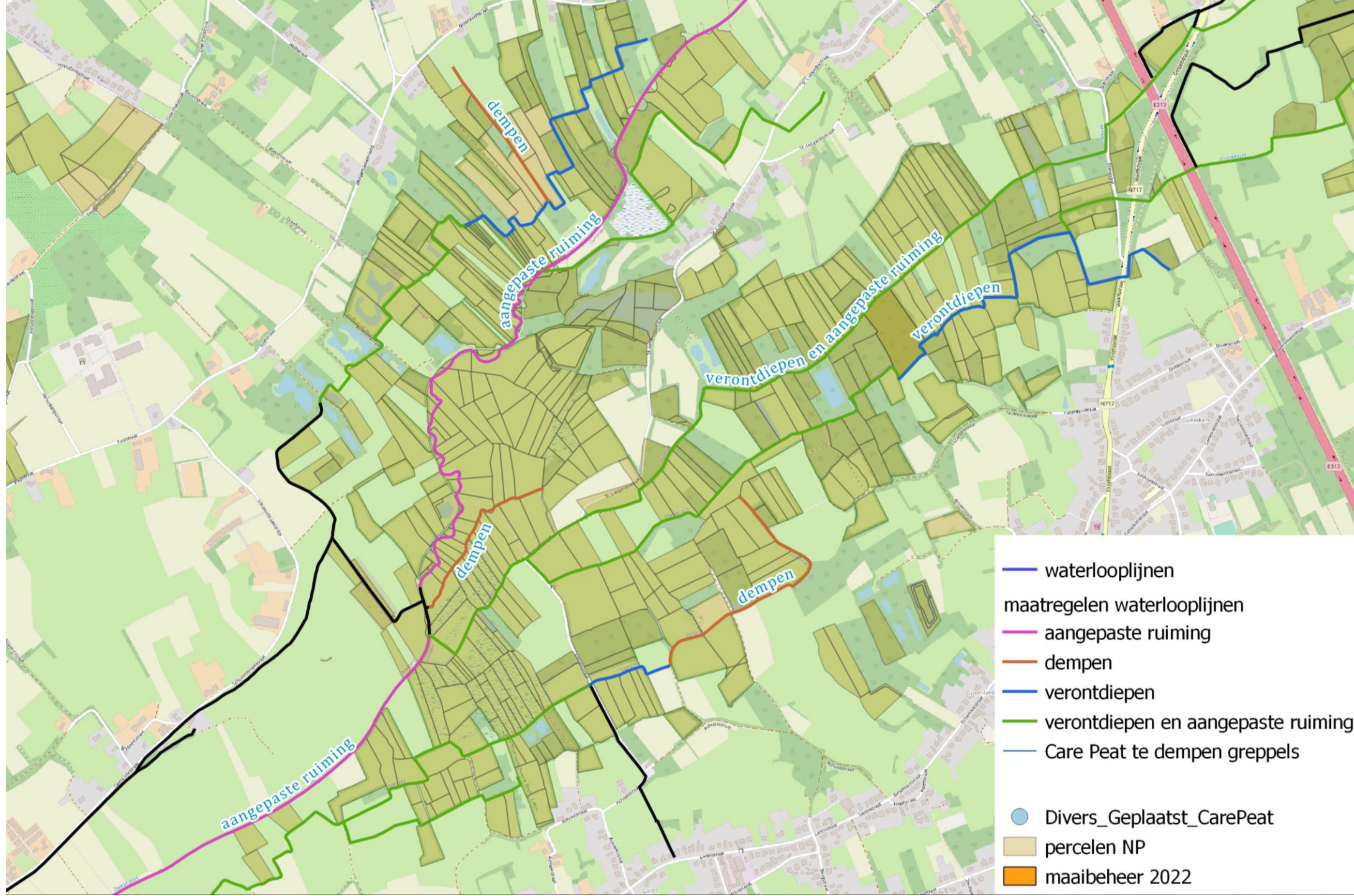
# Case study: Zwarte Beek

Intensive restoration and management:

- Interreg Care-Peat and Natuurpunt Beheer
  - 3.7km of waterways relevelled



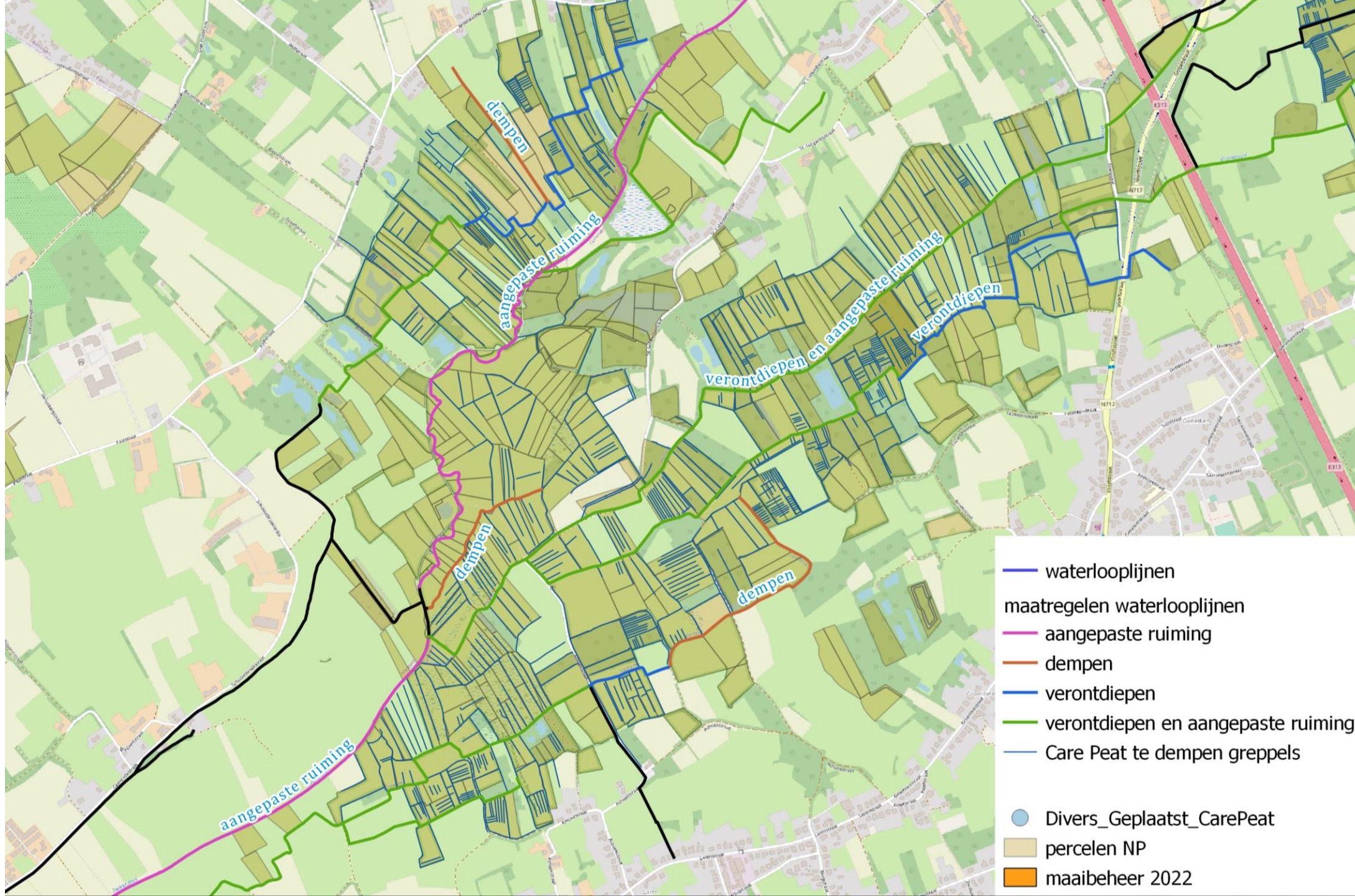




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# Case study: Zwarte Beek

Intensive restoration and management:

- Interreg Care-Peat and Natuurpunt
  - 3.7km of waterways relevelled
  - >15km of drainage ditches closed





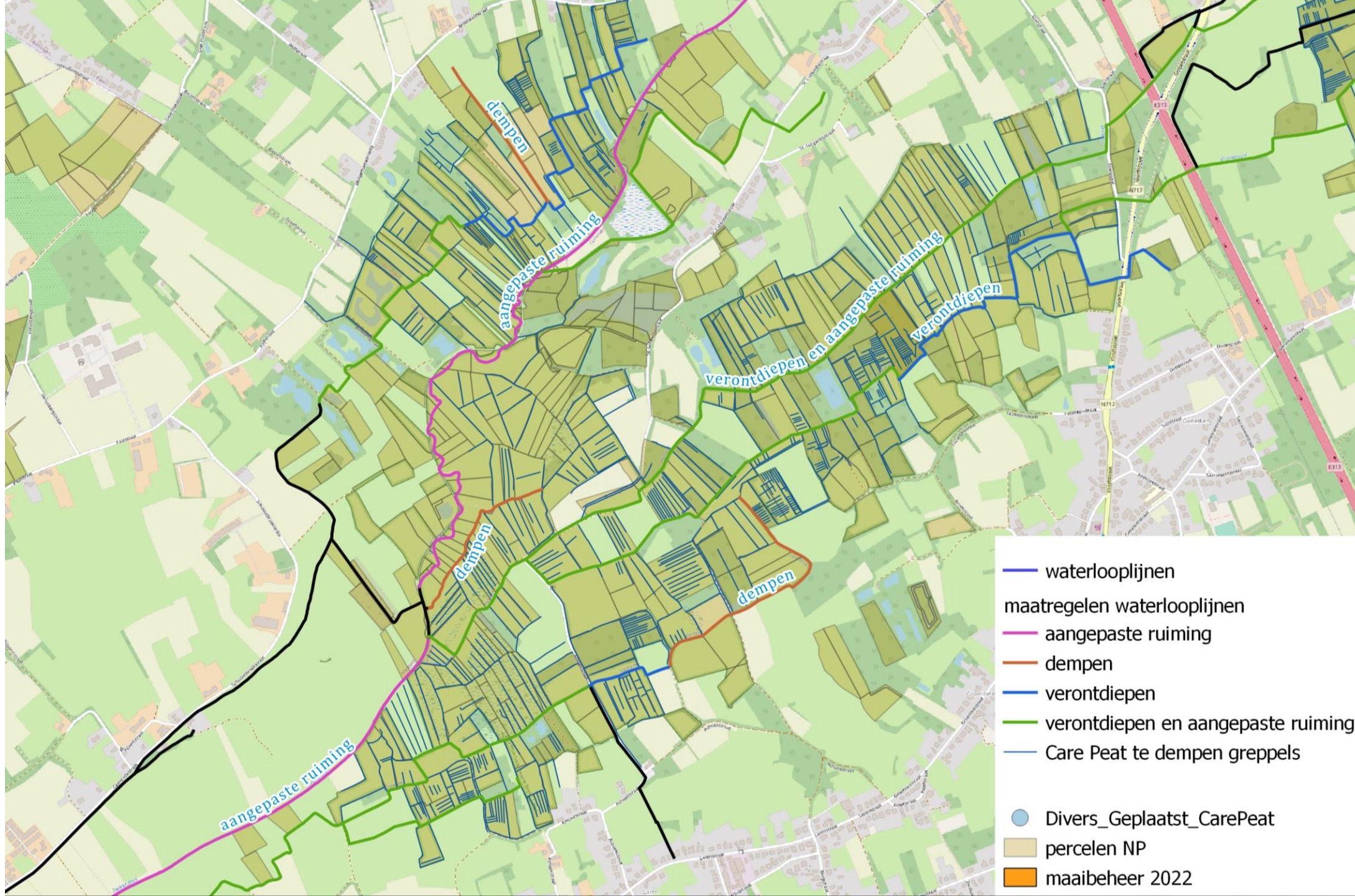
# Case study: Zwarte Beek

Intensive restoration and management:

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  - removal of weekend sites and ponds







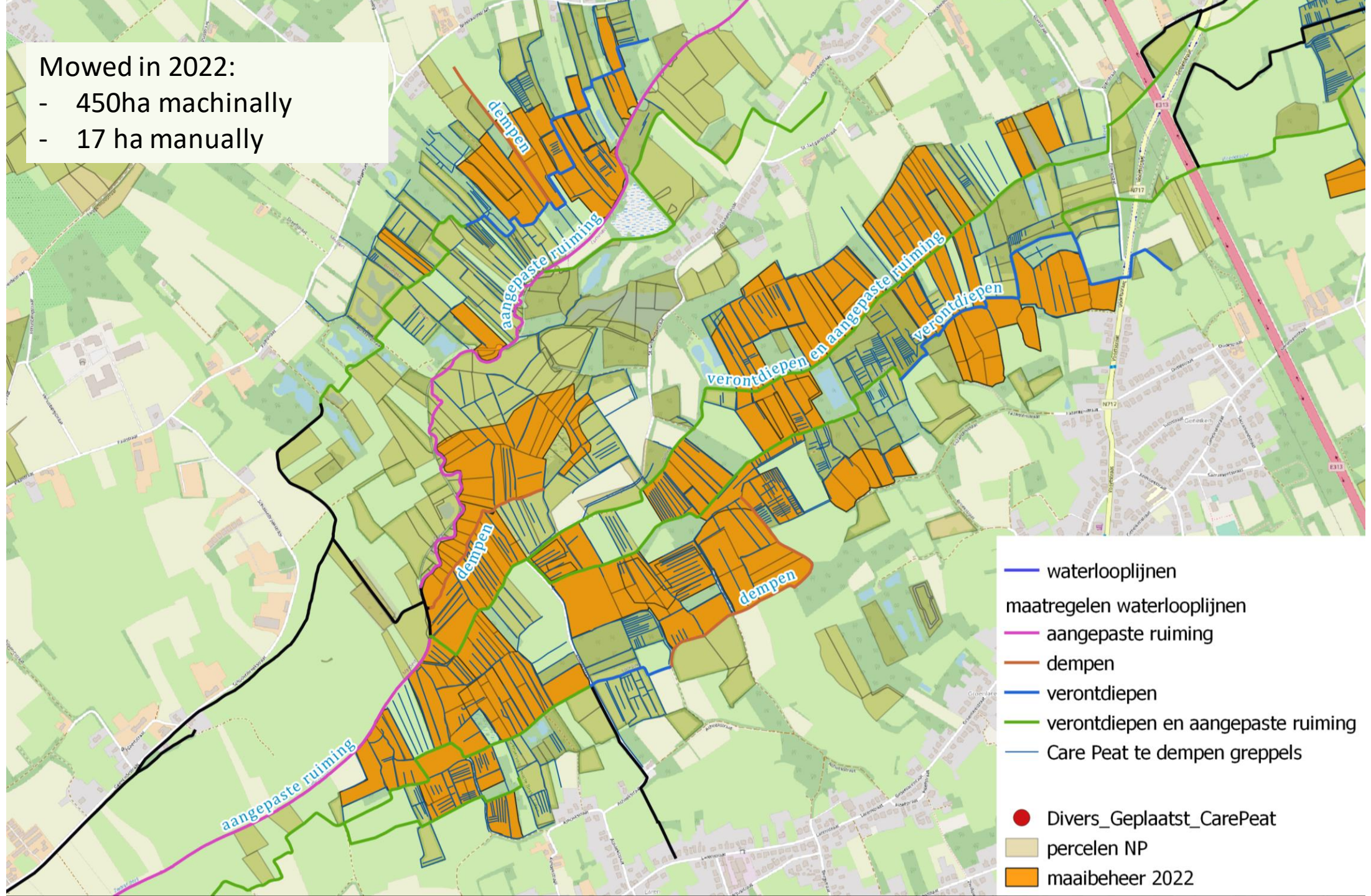
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Mowed in 2022:

- 450ha machinally
- 17 ha manually





# Case study: Zwarte Beek

Large scale restoration:

- Interreg Care-Peat and Natuurpunt
  - >15km of closed ditches
  - 3.7km of waterways relevelled,
  - removing weekend sites and ponds
- Natuurpunt (detailed management)
  - with specialized equipment





# Case study: Zwarte Beek

450ha mown machinally (2022)





# Case study: Zwarte Beek

Large scale restoration:

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  - >15km of closed ditches
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  - removing weekend sites and ponds
- Natuurpunt (detailed management)
  - with specialized equipment
  - manual labor (bush cutters, manual removal of juvenile trees)





# Case study: Zwarte Beek





# Remote sensing

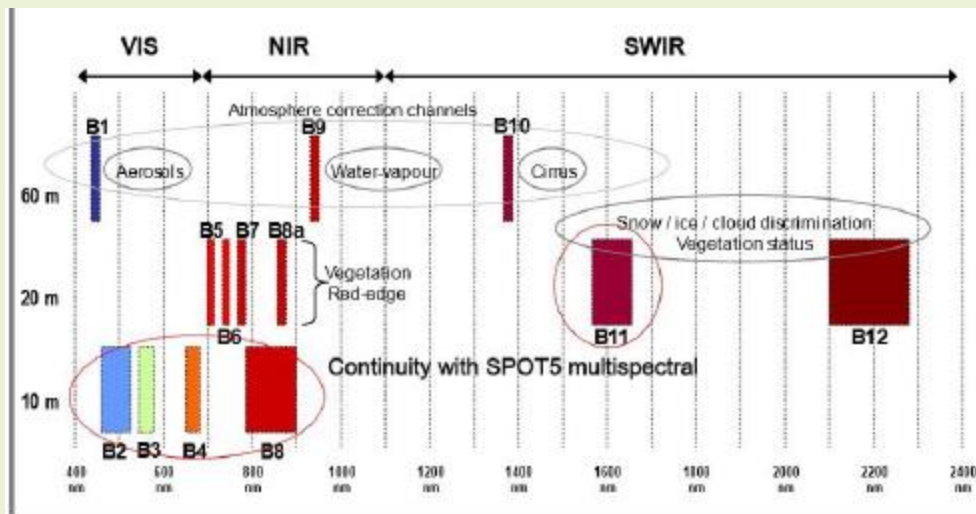
- Develop a feasible monitoring approach to apply in large wetland areas
  - By means of satellite (sentinel 2) and drone images (thermal and multispectral camera)



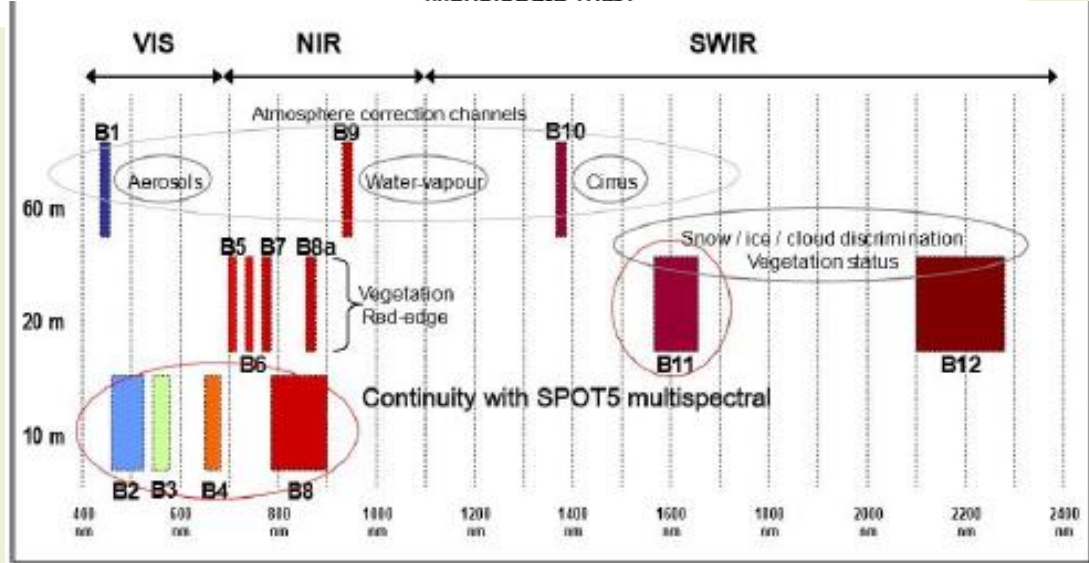
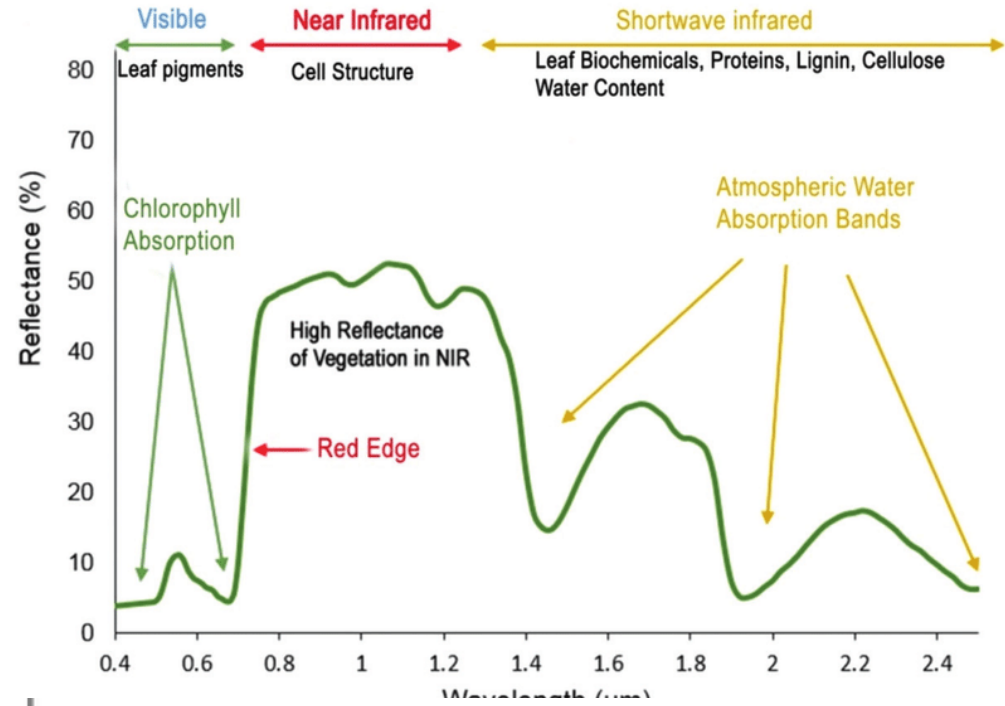
- No scale limitation
- Past and present situation
- Lower resolution (10-60m)
- Data every 5 days



- Scale limitation (battery life) → subselection for data acquisition
- Present situation
- High resolution (a few cm)
- multispectral and thermal images





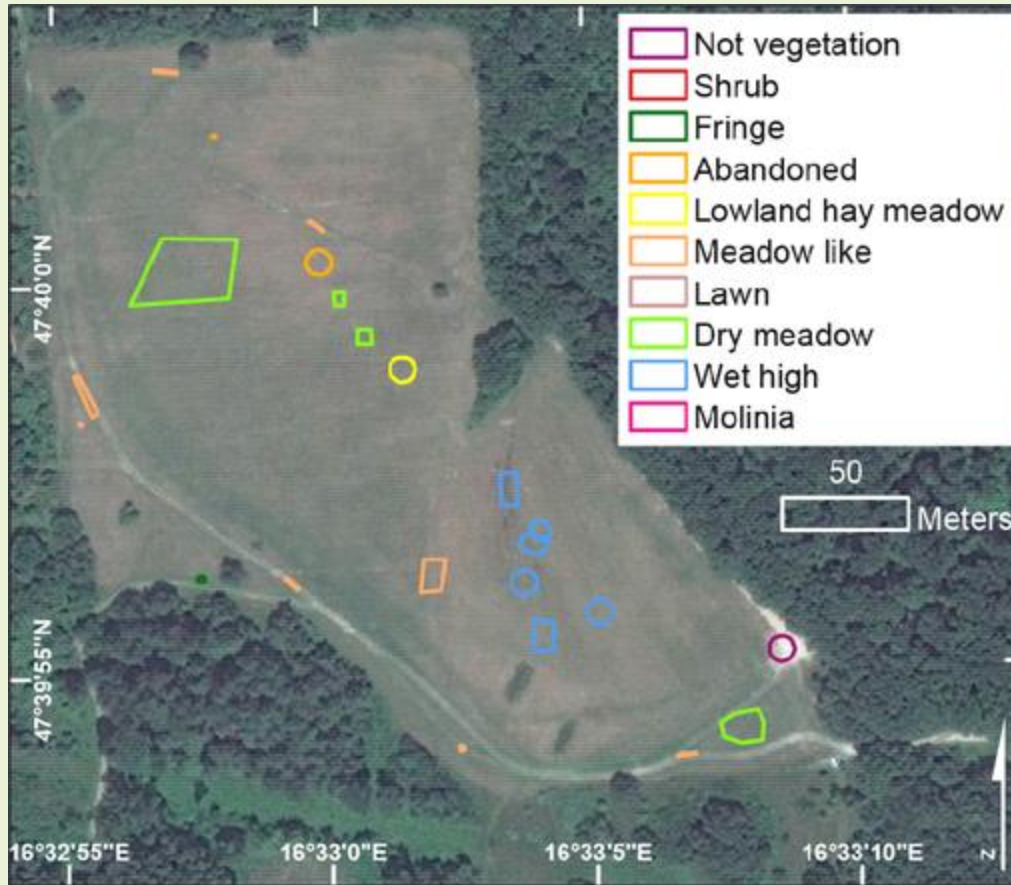


sensors benchmark report on sentinel 2A (EU)

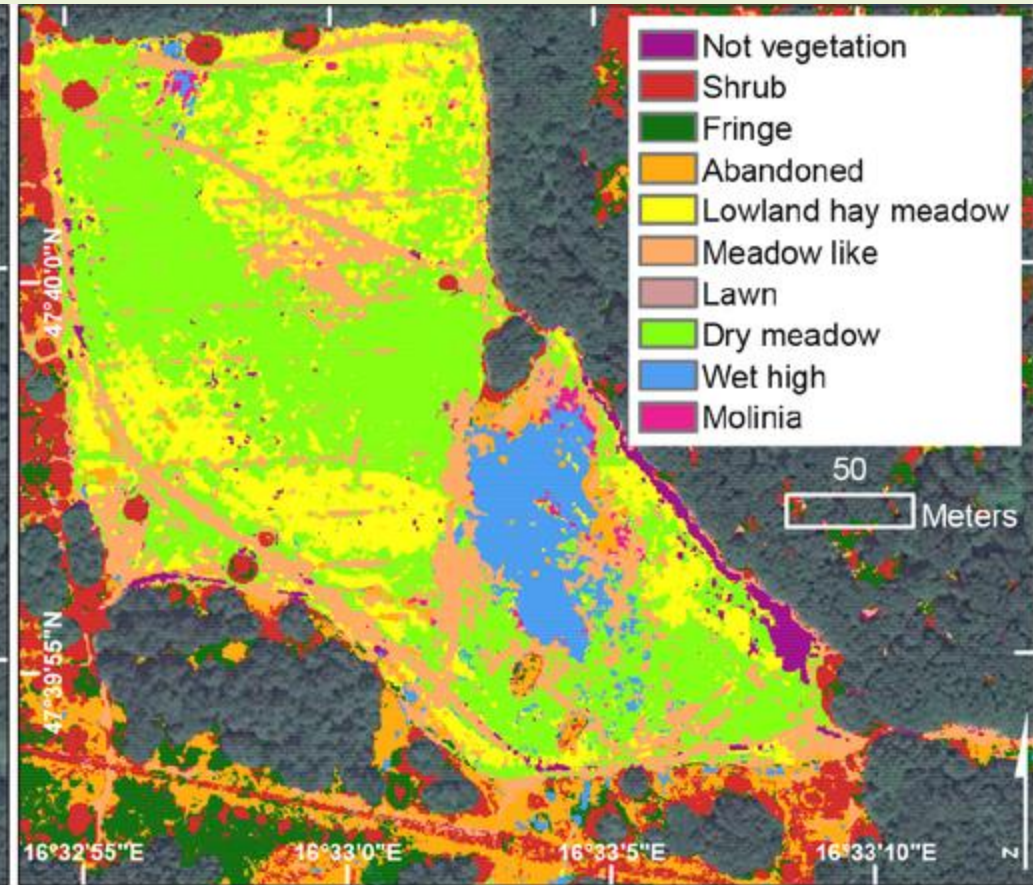




# Categorizing Grassland Vegetation with Full-Waveform Airborne Laser Scanning: A Feasibility Study for Detecting Natura 2000 Habitat Types



ground truth polygons



vegetation map resulting from hard-boundary classification of LIDAR data





# Remote sensing

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- High resolution (multispectral and thermal)

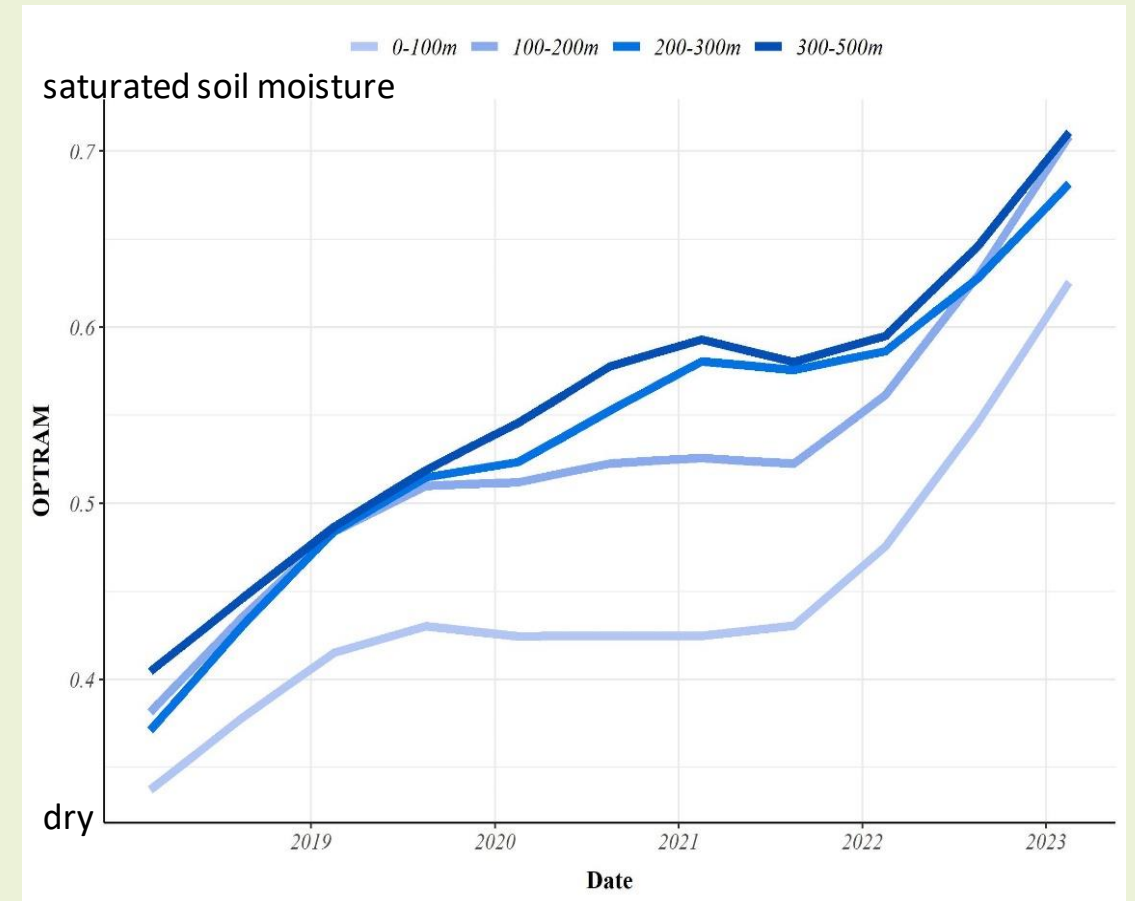
- Systematic and area-wide determination of (flight) contours in function of monitoring (i.e. calculation of essential parameters, such as seepage fed areas, infiltration areas, vegetation cover,...)
- Periodical monitoring (timing is essential) and evaluation of these fixed contours





# Preliminary tests with satellite imagery

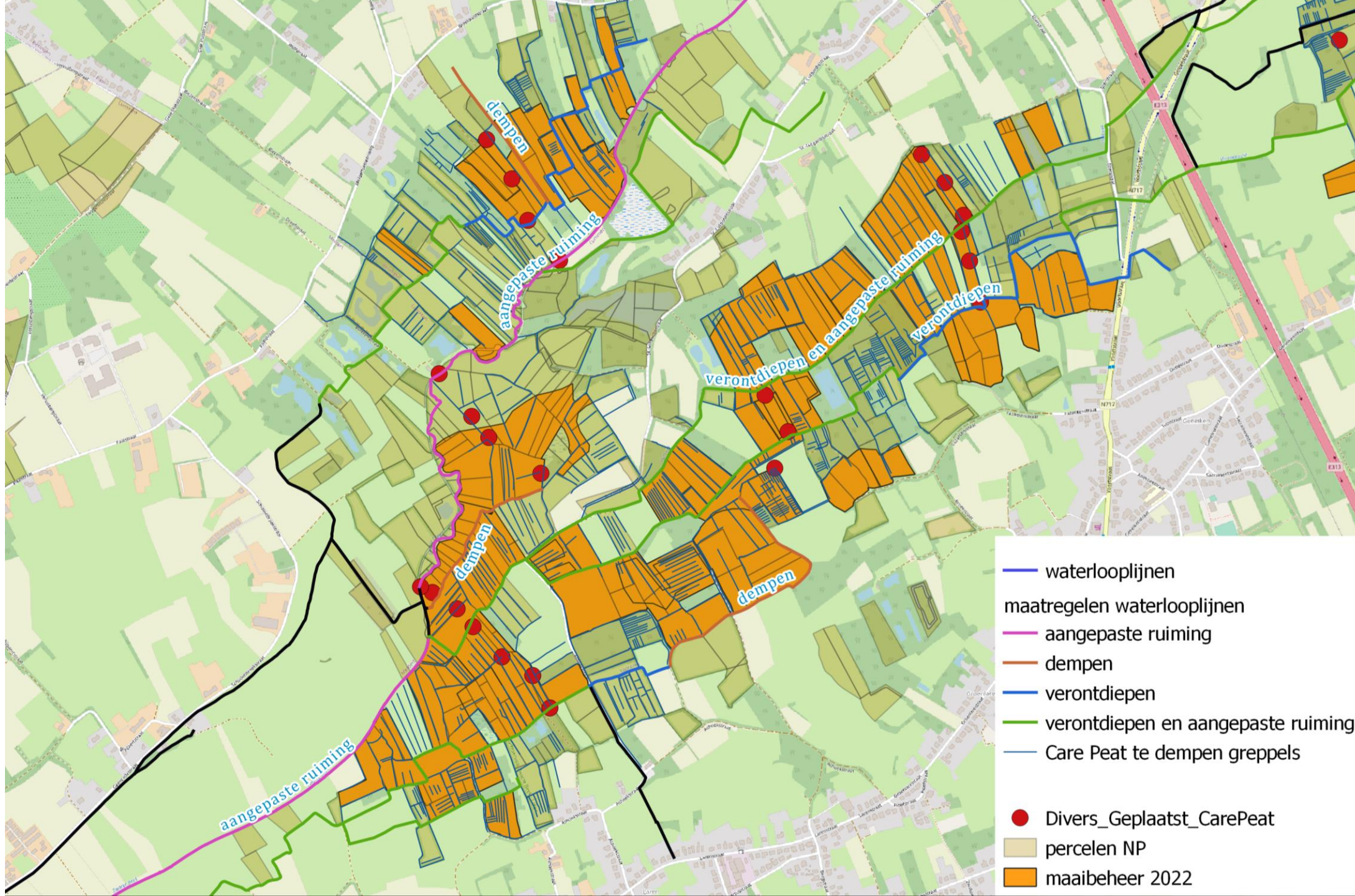
- within the Interreg Care-Peat project (by the Manchester Metropolitan University)
- To investigate the benefits of remotely sensed optical satellite imagery to monitor environmental change from peatland restoration
- Positive correspondence between site and remotely sensed measurements (such as soil moisture <> shortwave IR transformed reflectance (STR))



Conclusion: The 'rewetting' measures work, but the main creek is still a factor of drainage







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# Next steps

- Hire someone to work on this subject
- Establish collaborations with relevant institutions/persons (research interests?)
- Compile a solid data set of the different restoration management measures over the years
- Write out and test a preliminary methodology
- Check whether we can fly a drone close to a military area 😊





**Bedankt voor je aandacht.  
Zijn er vragen?**

**Meer info**

[www.B4B.be](http://www.B4B.be)

[info@B4B.be](mailto:info@B4B.be)

**Any questions?**



**Belgium for  
Biodiversity**

