



The July 2021 flood in the Geul catchment

System Analysis and Rapid Assessment

Klaas-Jan van Heeringen

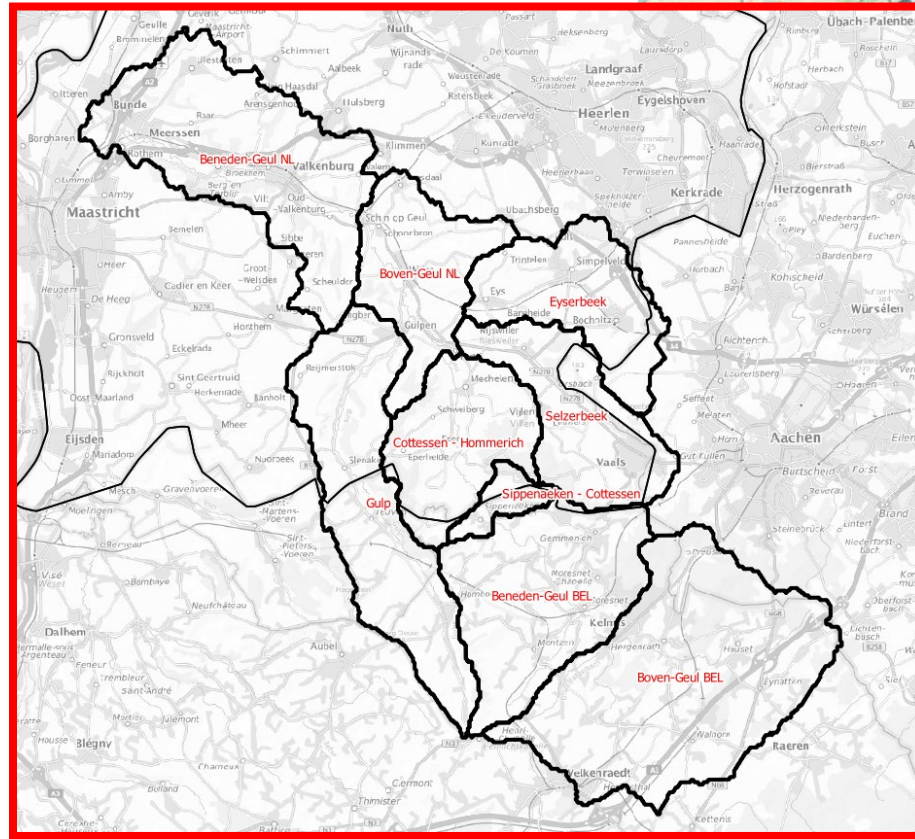
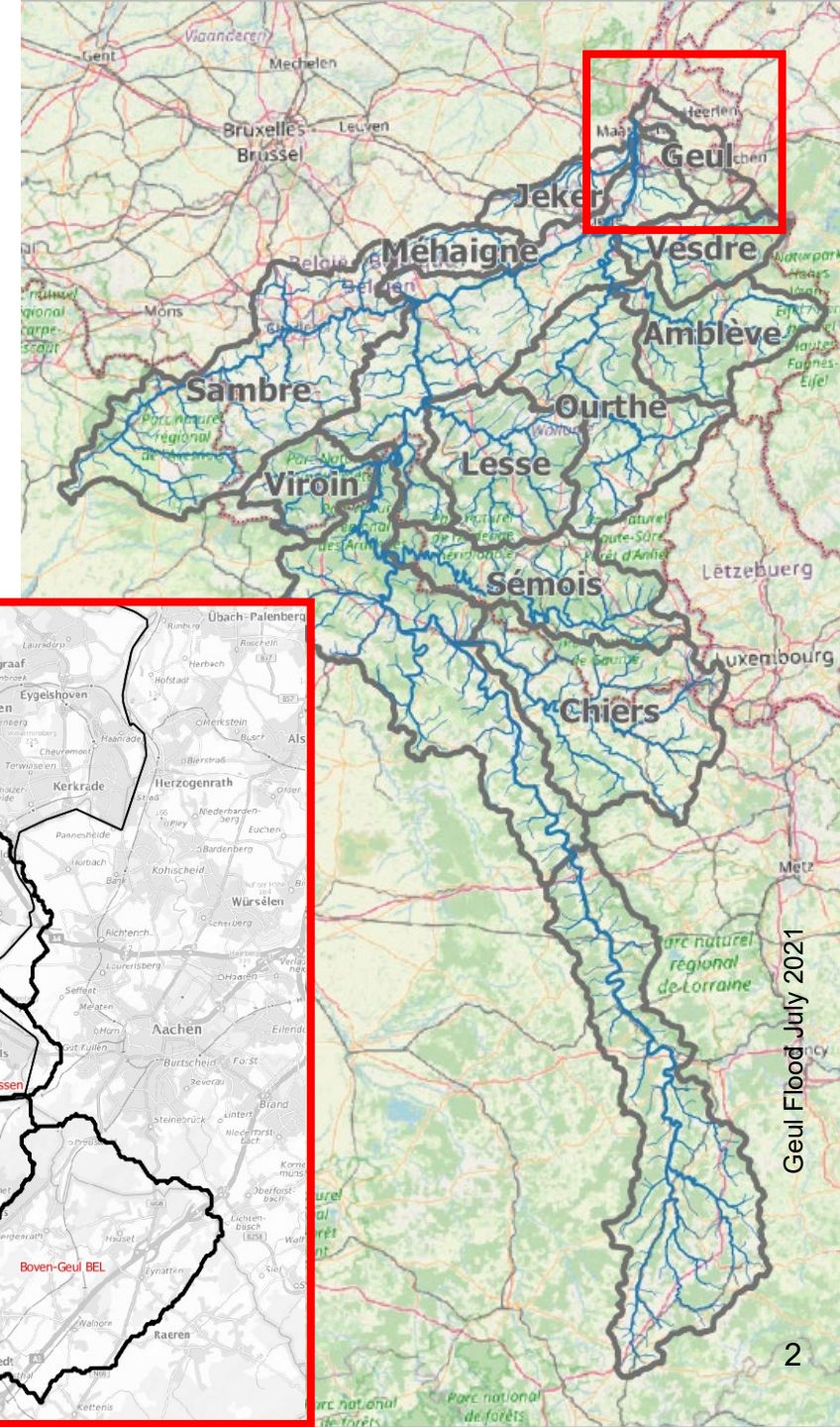
With contributions from:



The Geul / Gueulle / Göhl catchment

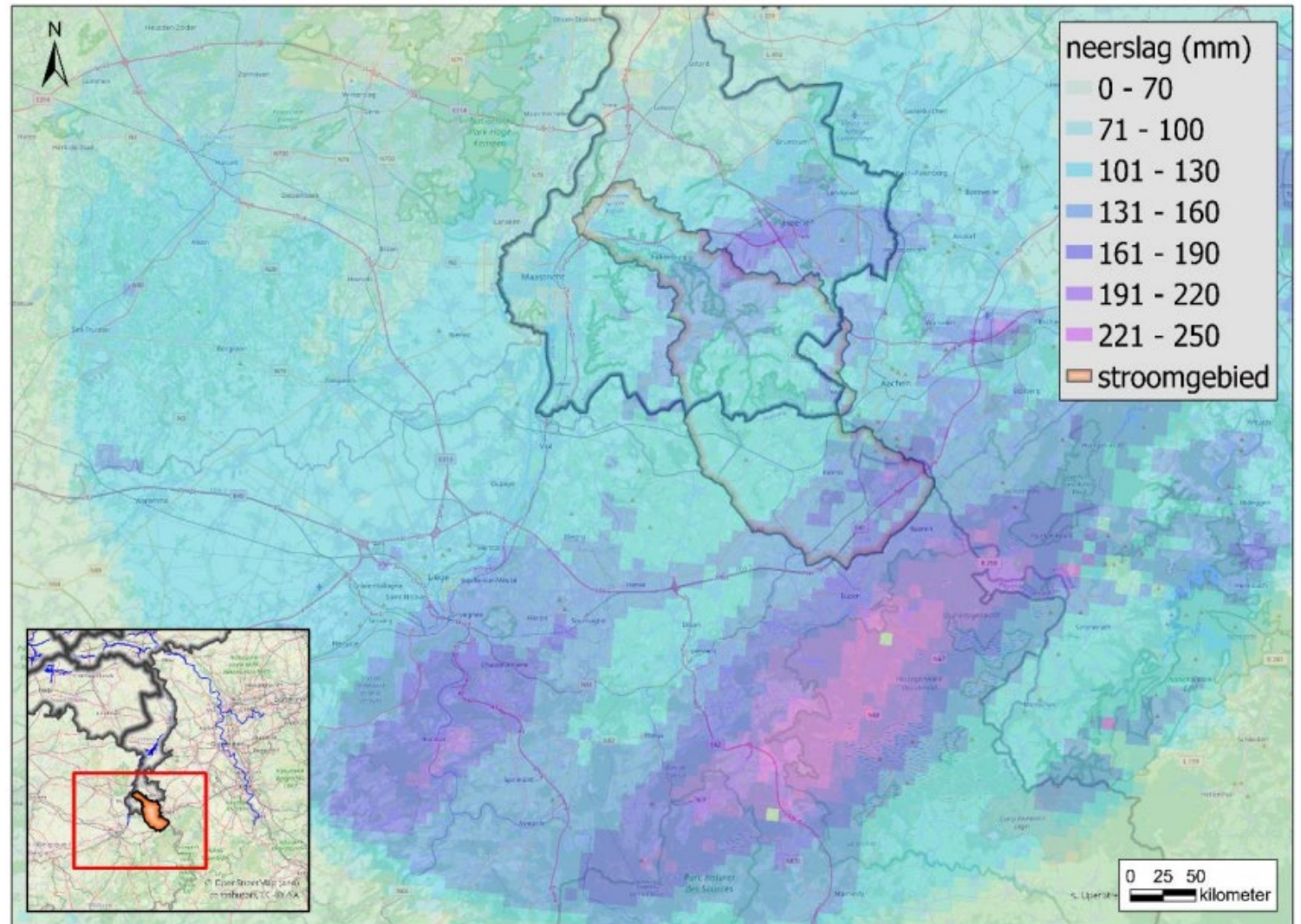
Subcatchment	Area
Boven Geul Wallonië	26%
Beneden Geul Wallonië	16%
Boven Gulp	9%
Total Belgium	51%
Boven Geul Nederland	21%
Beneden Gulp Nederland	7%
Selzerbeek	10%
Eyserbeek	10%
Total NL (till Valkenburg)	48%

* 1-2% in Germany



Rainfall volumes at July 13-15, after wet period

- Boven Geul Wallonië: 180 mm
- Nederland: 130 – 150 mm



Composite of Dutch, Belgium and German radars, corrected to precip stations, by KNMI

Some pictures of Valkenburg at July 15 12:00
(peak was around midnight)



Geul Flood July 2021

Source: Waterschap Limburg

Some pictures of Valkenburg at July 15 12:00



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Geul Flood July 2021

Some pictures of Valkenburg at July 15 12:00



Geul Flood July 2021

Source: Waterschap Limburg

The day after ...



The day after ...

Accueil > [VERVIERS ET SA REGION](#)

Moresnet sous eaux, mais le Pays de Herve a moins écopé



Le centre de Moresnet était noyé au pied du viaduc. - Commune

Régions > Verviers > Plombières

a "Une centaine de ménages inondés" à Plombières

Une centaine de ménages touchés par les inondations et des dégâts aux structures. Plombières ne fut pas épargnée non plus...

Pierre Lejeune
Publié le 11-08-2021 à 13h06

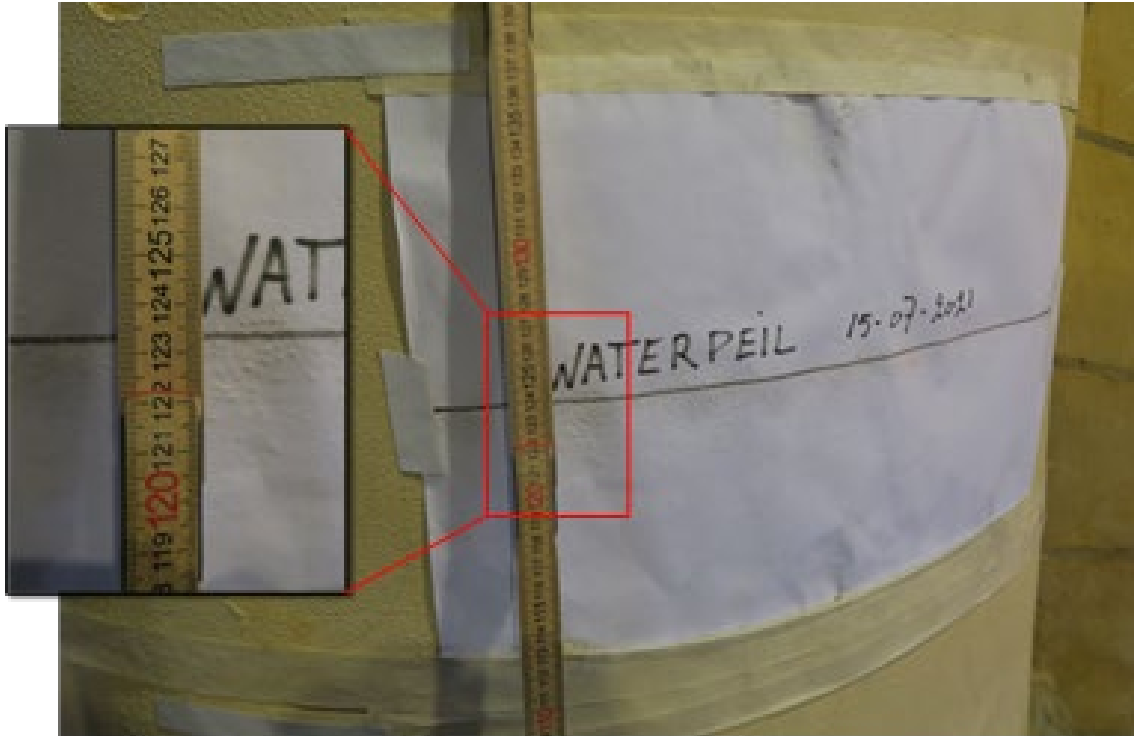


Les ouvriers de Plombières sont intervenus à Dolhain, sans oublier les dégâts chez eux. ©EdA LABEYE Philippe



Sea Flood July 2021

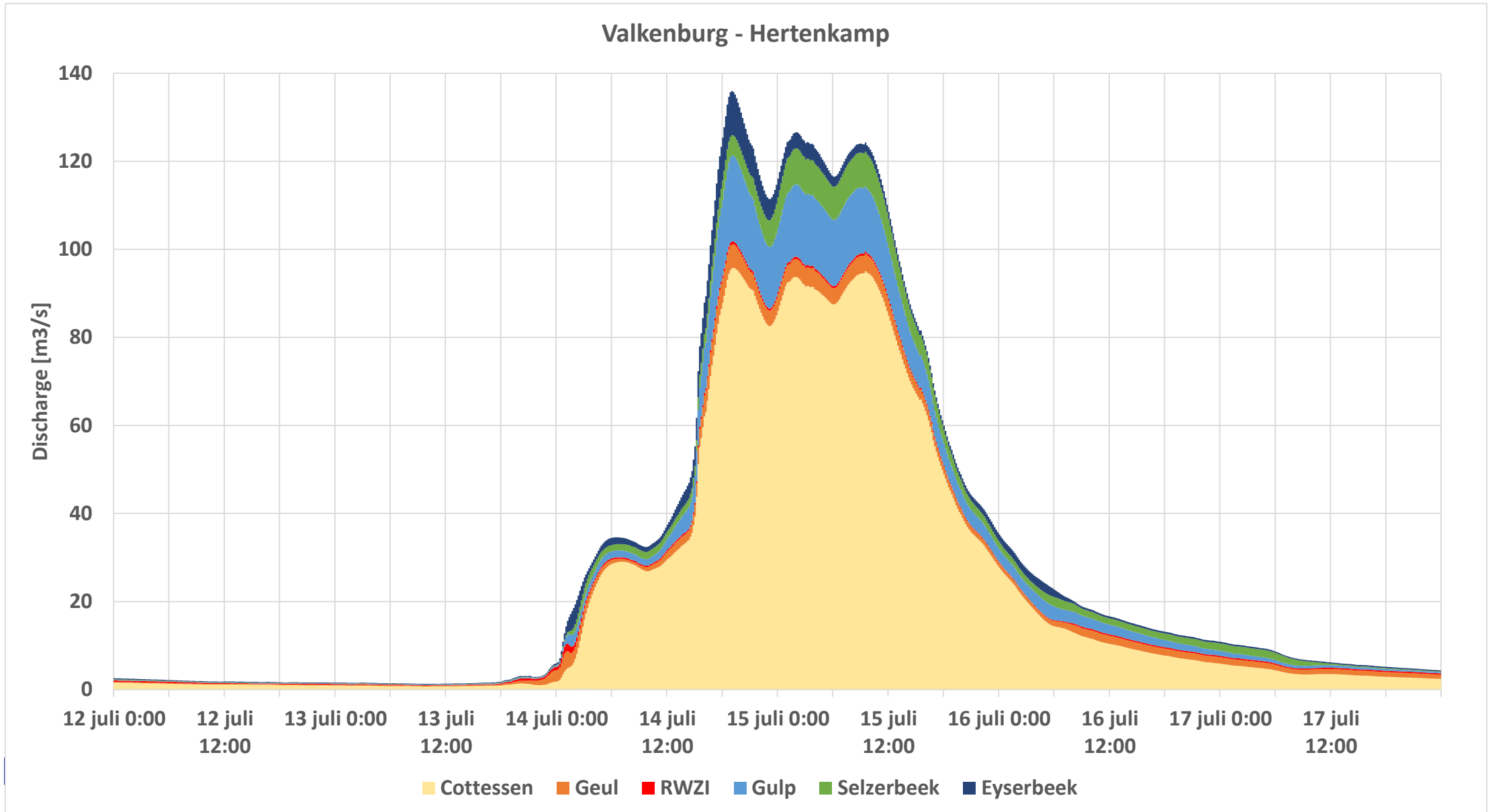
Most damage in Valkenburg ~ 400M€ damage



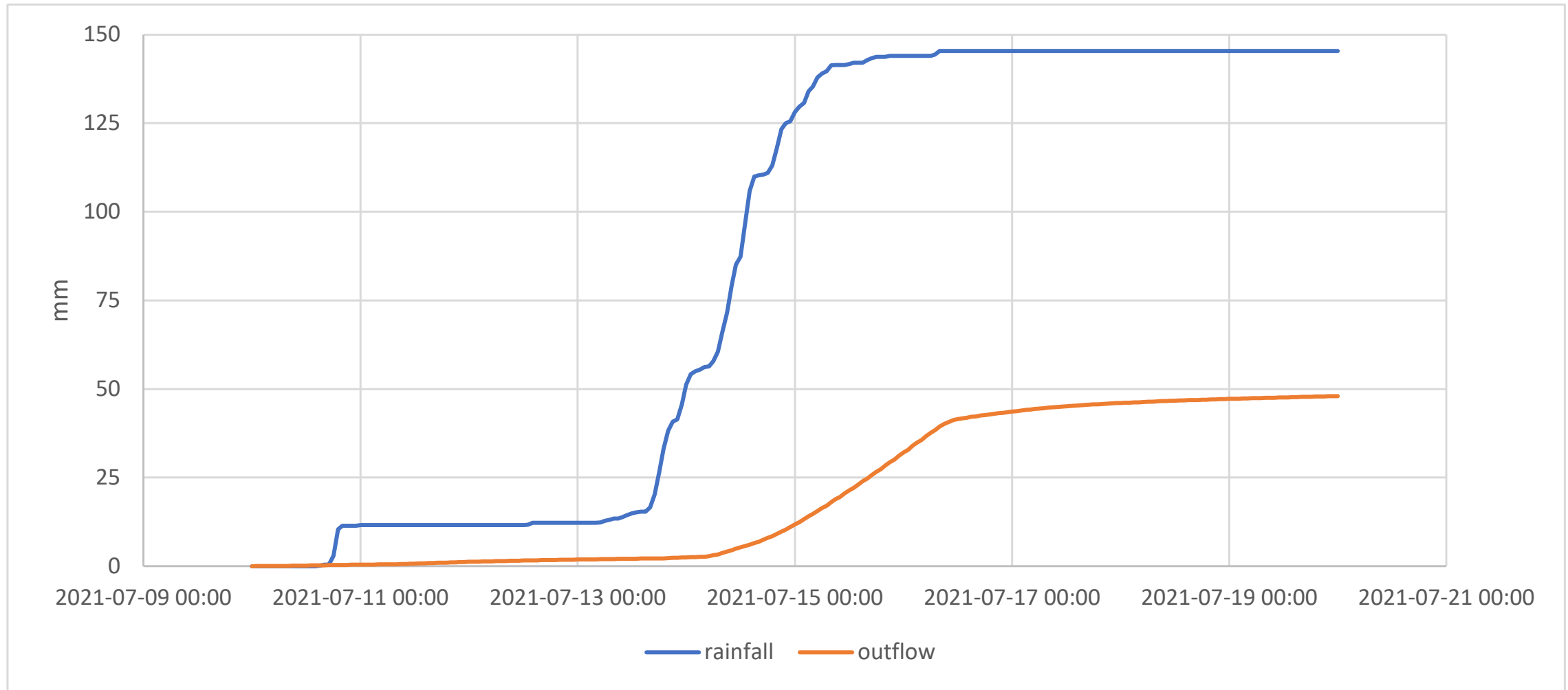
Discharges and run-off coefficients

Sub-basin	Precipitation (mm)	Discharge ¹ (%)	Run-off coefficient
Boven Geul Wallonië	180	41 %	0.45
Beneden Geul Wallonië	150	14 %	0.41
Boven Gulp België	130	5 %	0.21
Totaal België	160	60 %	0.58
Boven Geul Nederland ²	150	23%	0.40
Beneden Gulp Nederland	130	5%	0.21
Selzerbeek	130	6%	0.21
Eyserbeek ³	130	7%	0.23
Totaal Nederland	130	40%	
Totaal upstream of Schin		100 %	0.33

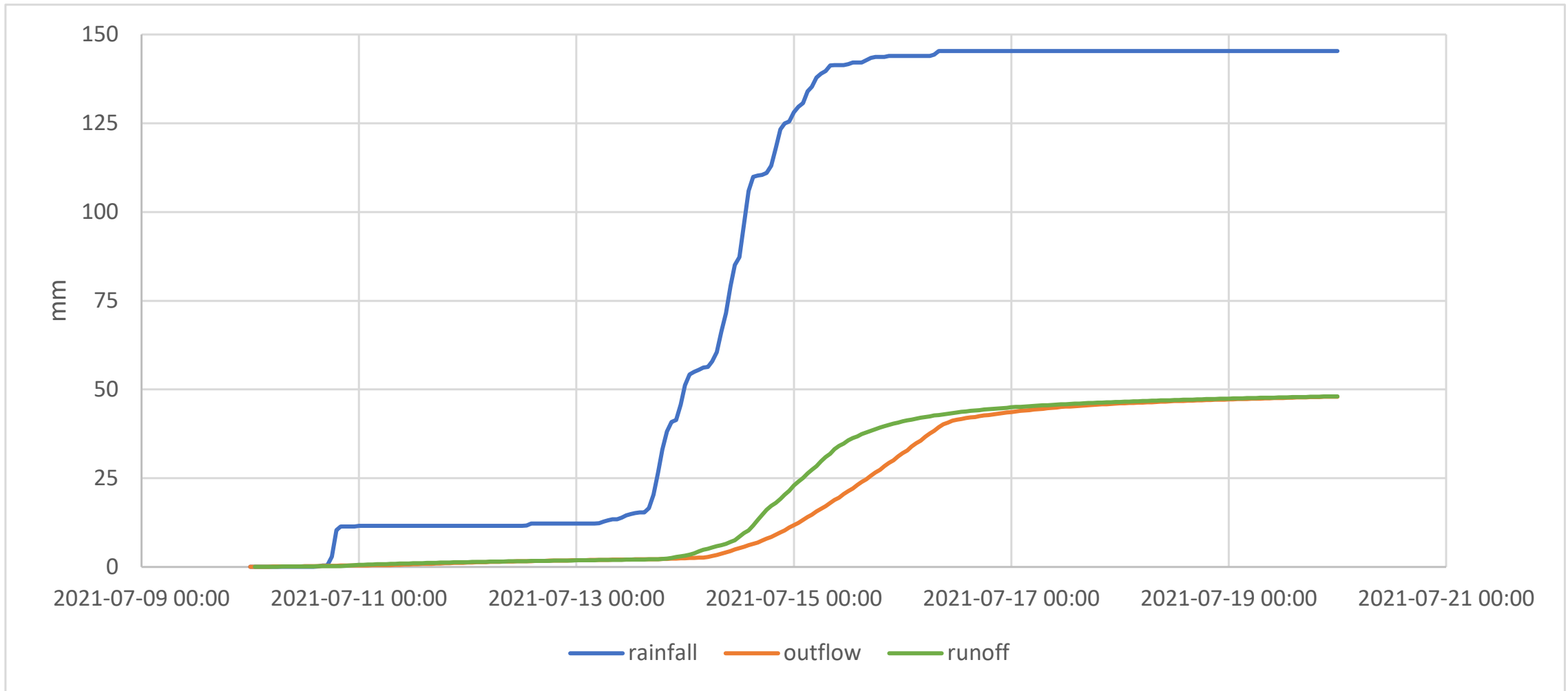
Where did it come from?



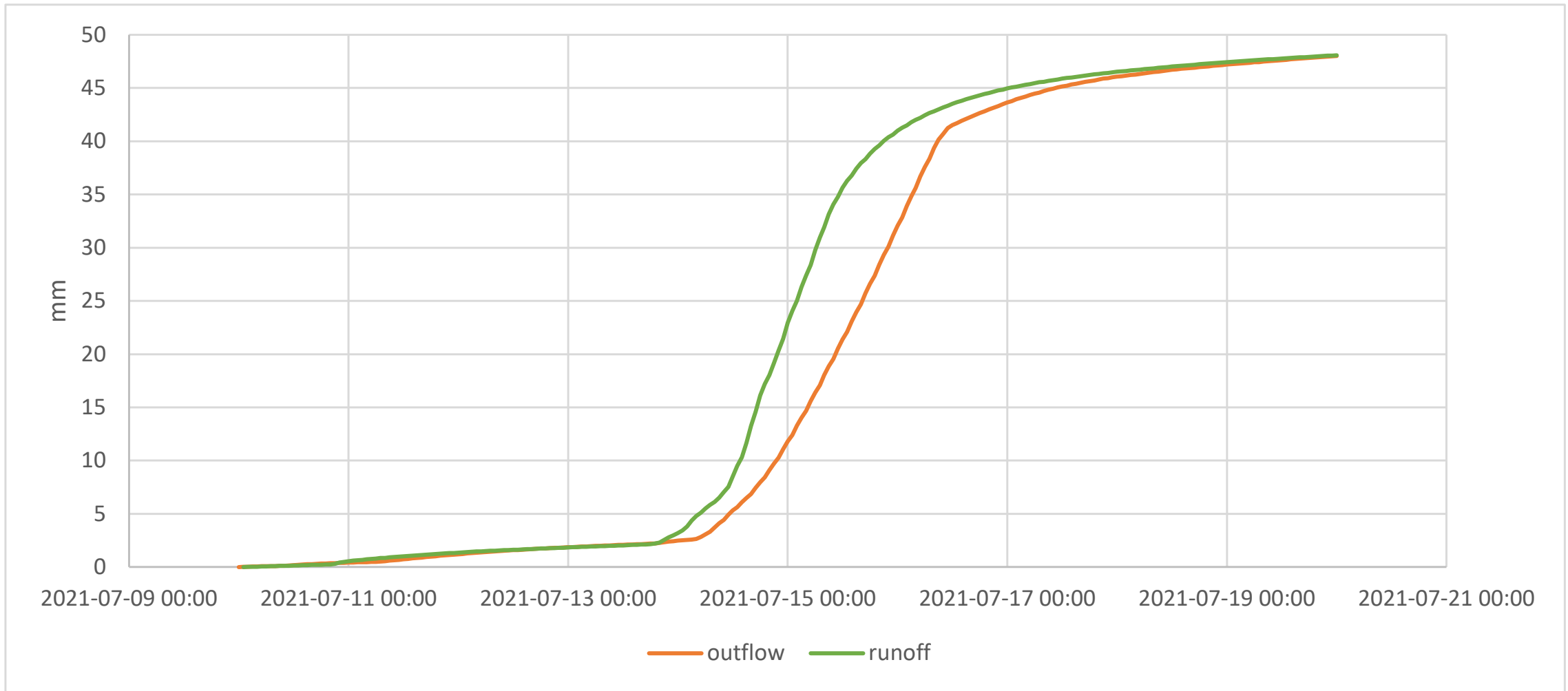
Some more details: rainfall and runoff details



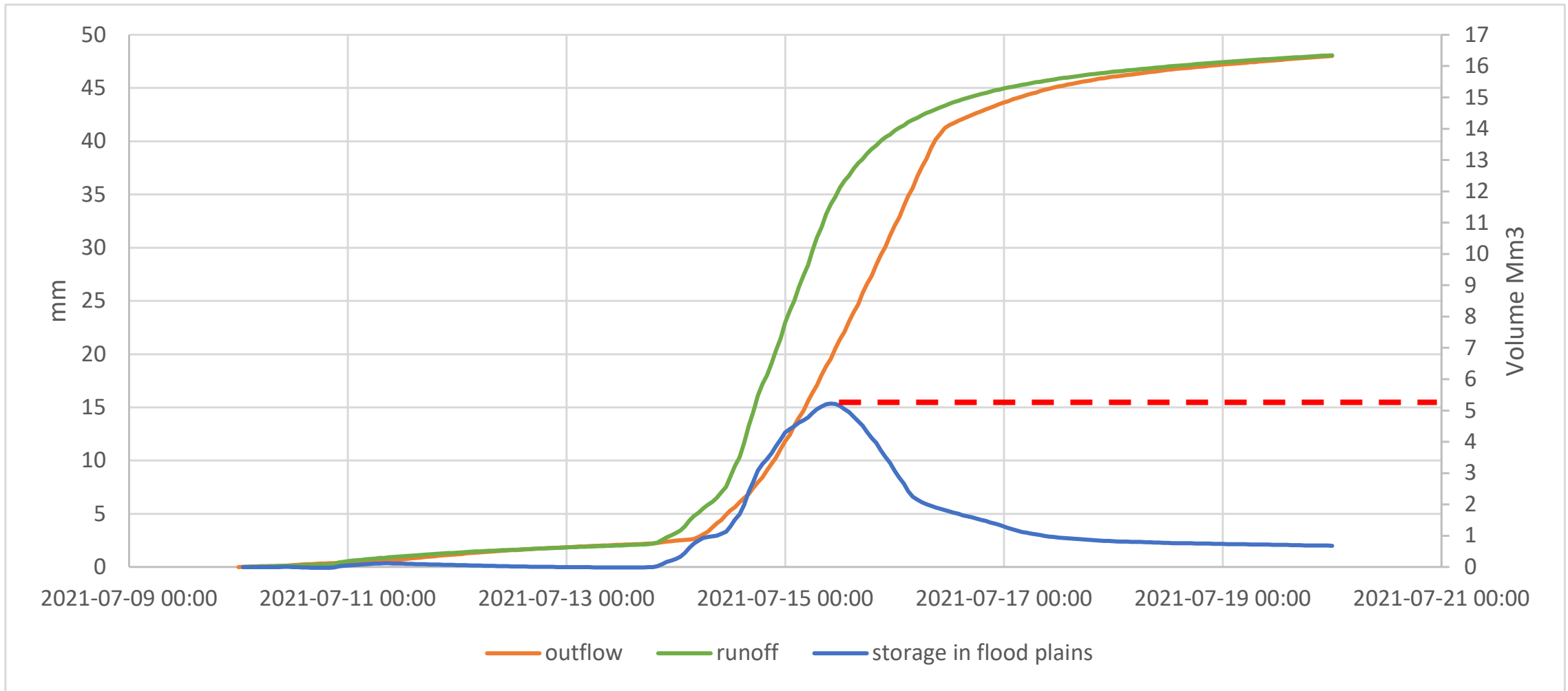
Some more details: rainfall and runoff details



Some more details: rainfall and runoff details

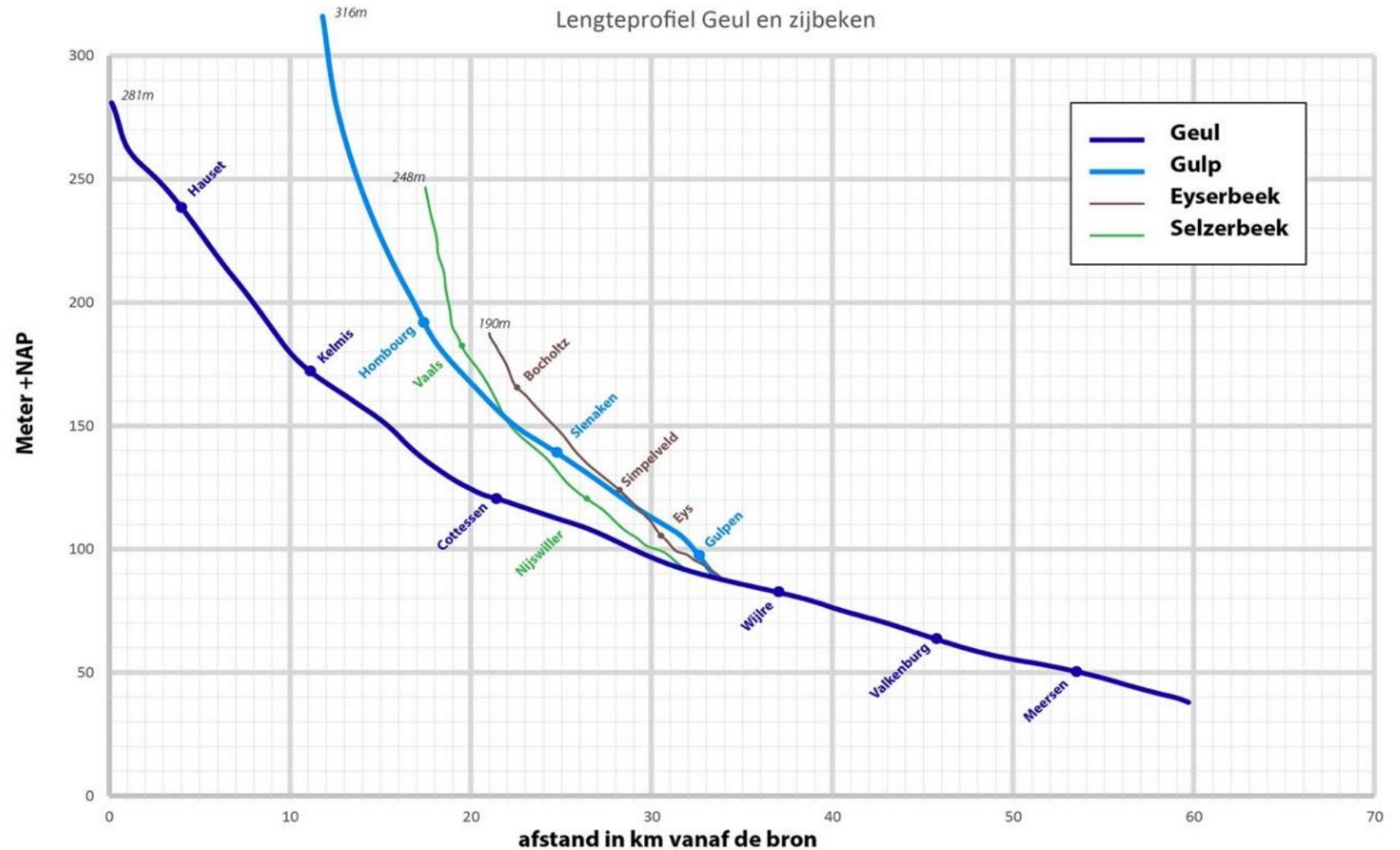


Some more details: rainfall and runoff details



Looking for the why

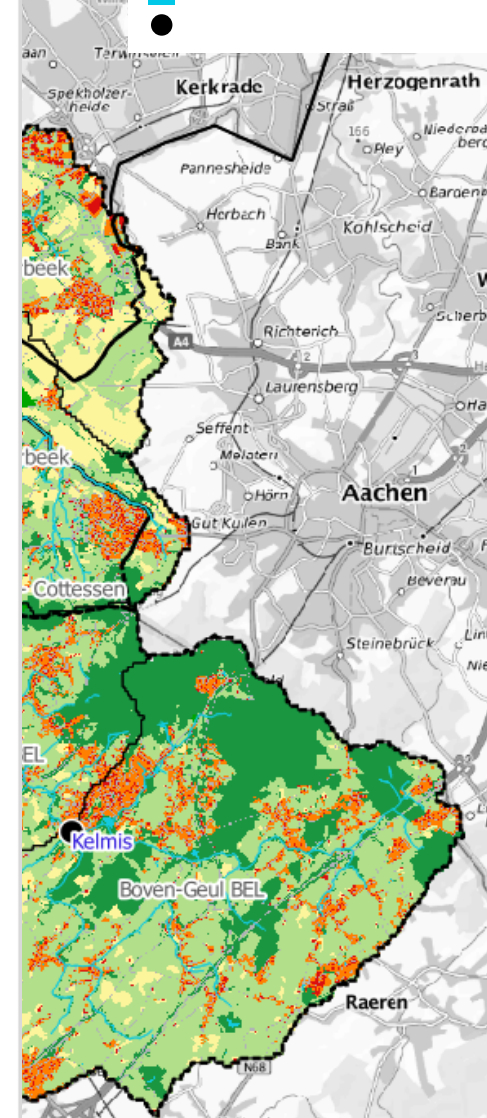
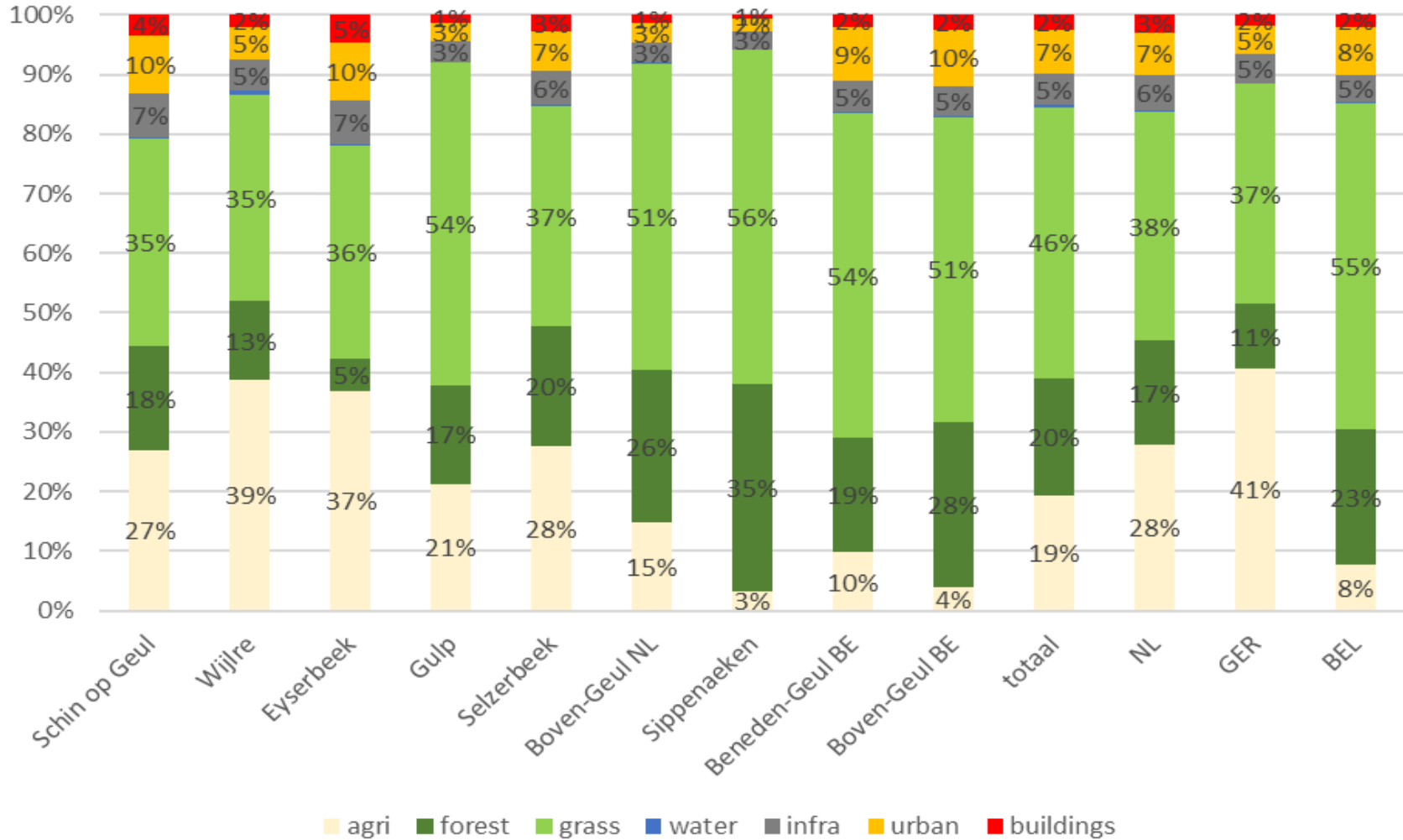
- Slopes
- Land-use
- Soil-types



Land use

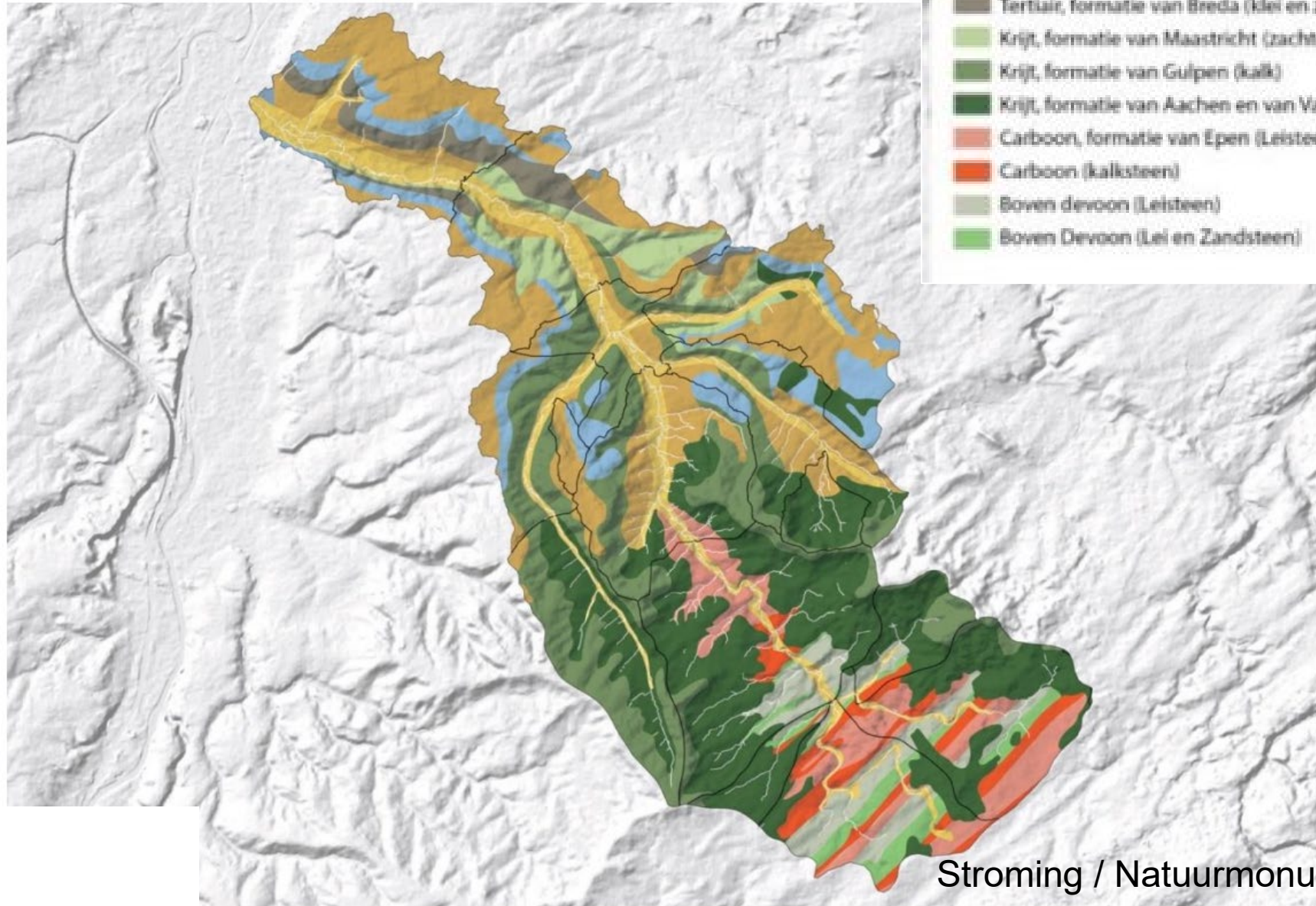


Land cover Geul Catchment



Openstreetmap, 2022

Soil types



Stroming / Natuurmonumenten, 2022

Conclusions on hydrology

- There was a lot of rain: 145 mm in 2 days (catchment average)
According to Dutch current precip statistics: return period $T \sim 900$ years
- There was already a lot of “natural” storage
- Storage varied significantly through the catchment:
 - Flat floodplains mainly in Dutch downstream part
 - Due to varying soil types more runoff in upstream / Belgium part
- Monitoring and early-warning has potential for improvement....

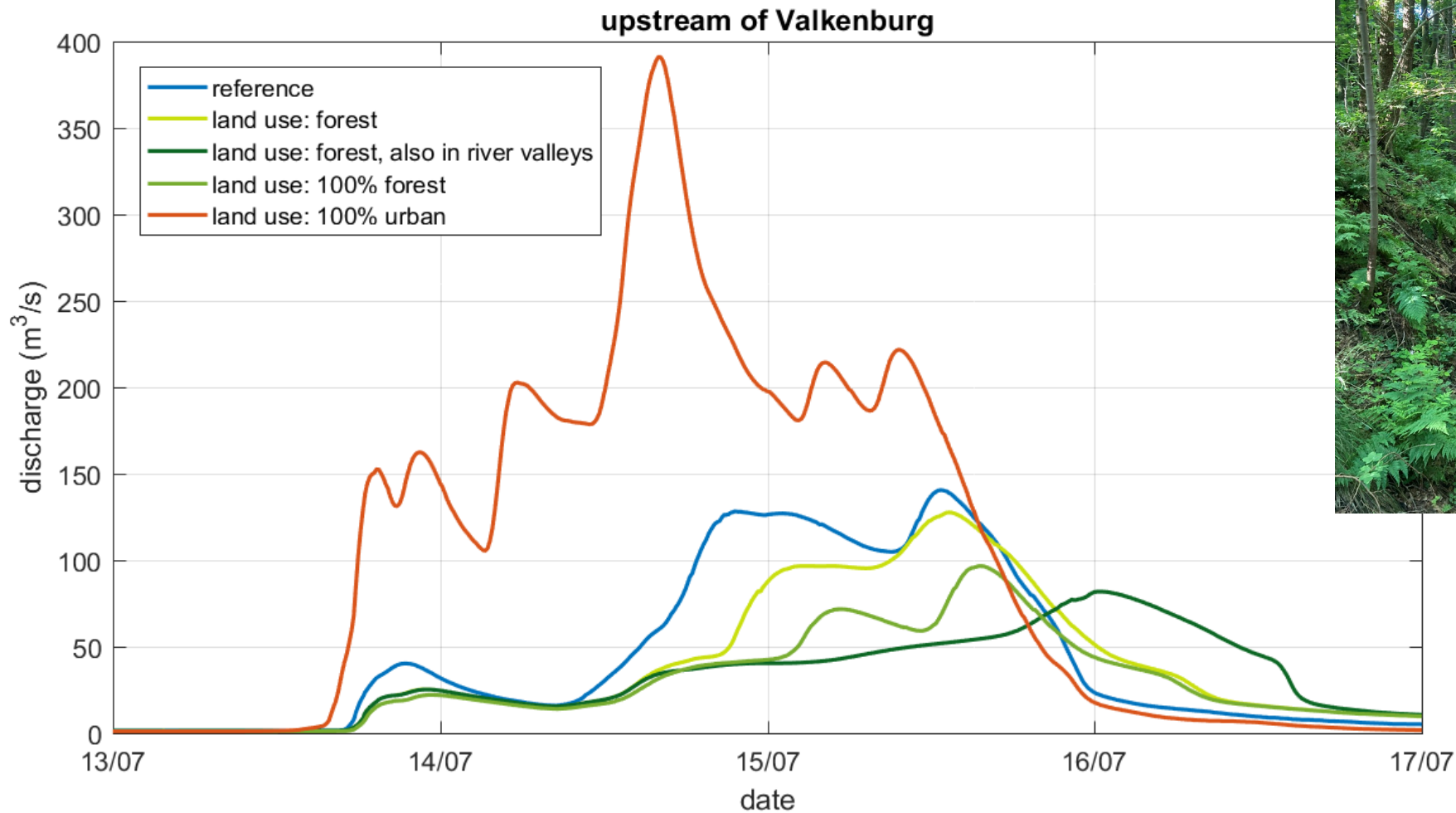
What to do?

- Main attention to Valkenburg
- Emotional discussions
 - on safety levels
 - this never again
 - we told you so...
 - all the water came from Belgium
 - extreme ideas (tunnels, even to the sea)
- Waterboard and Province Limburg
 - Water system analysis to investigate potential measures

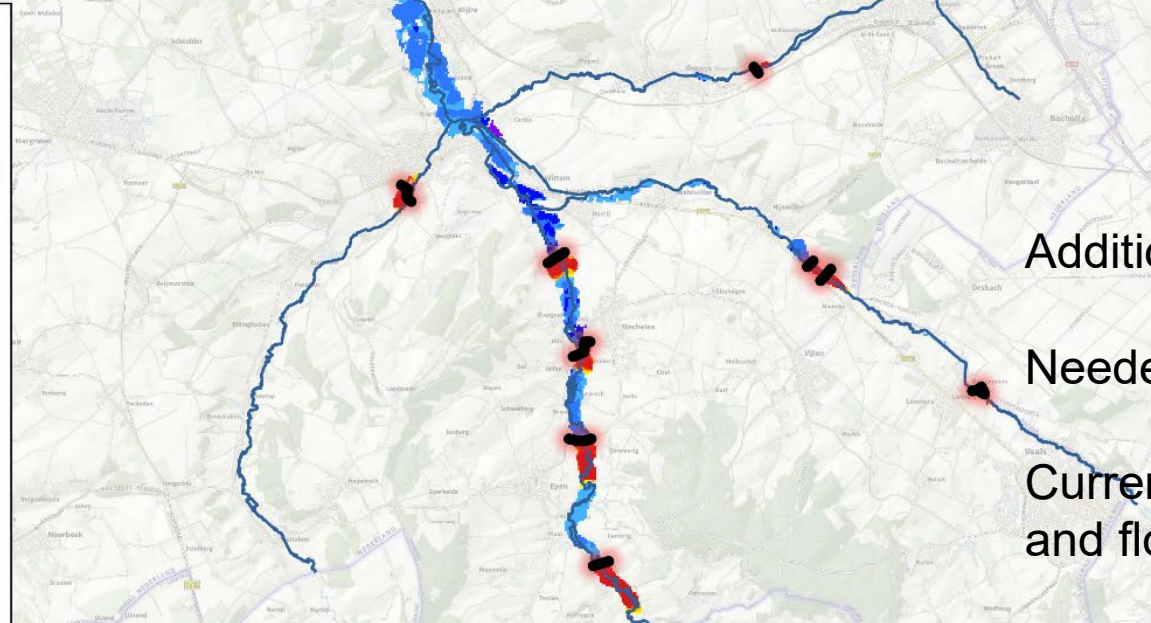
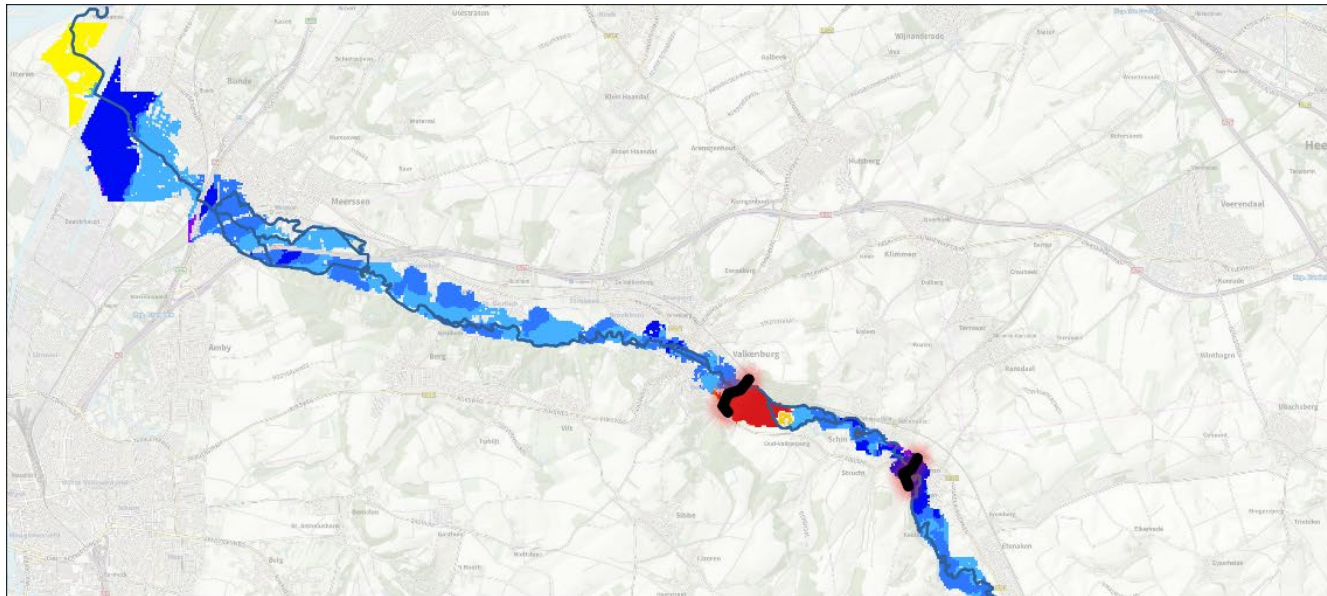


Daan Prevoo, Mayor of Valkenburg

Increase storage, infiltration capacity and reduce rapid response



More storage reservoirs

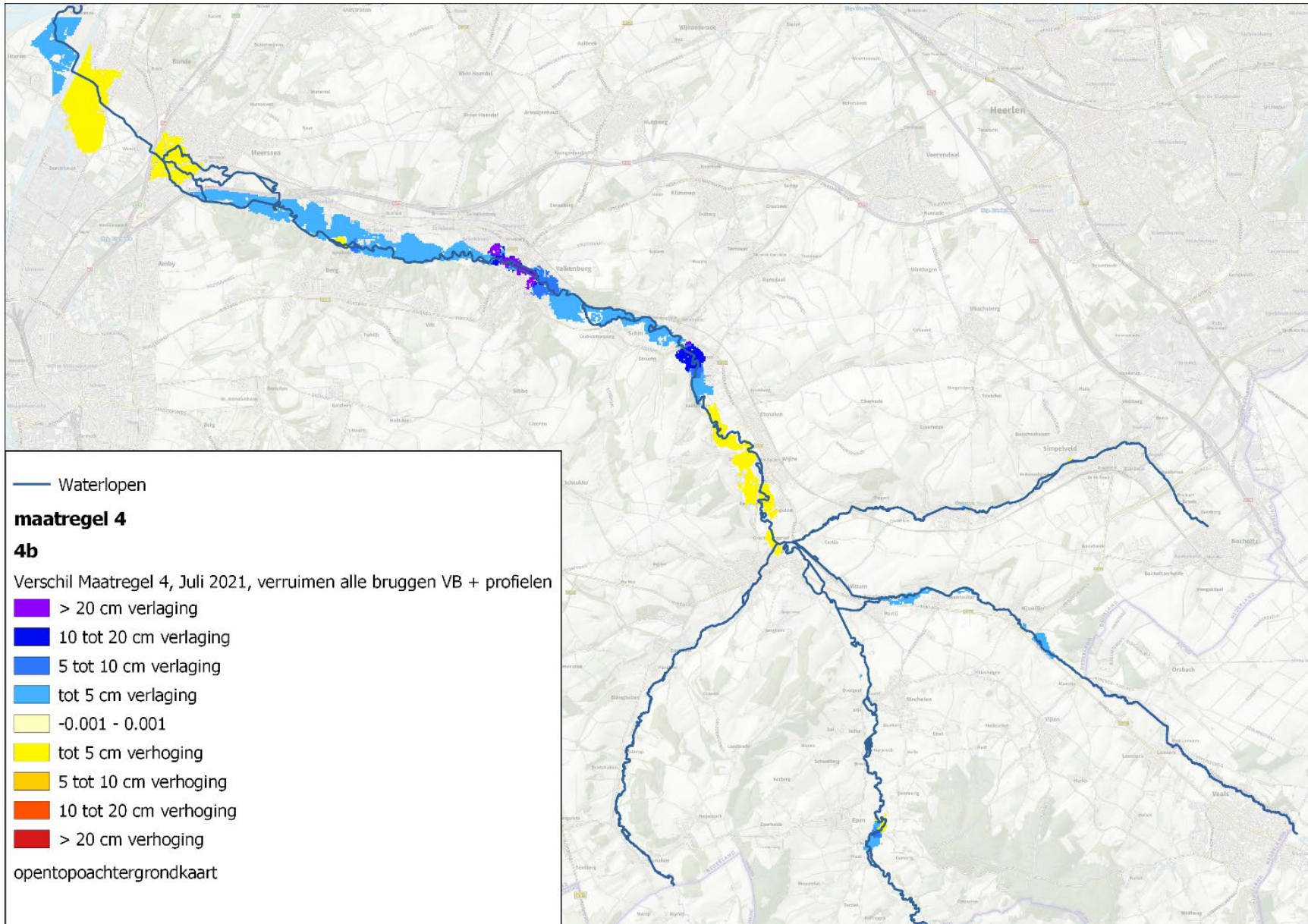


Additional storage: 1 Mm³

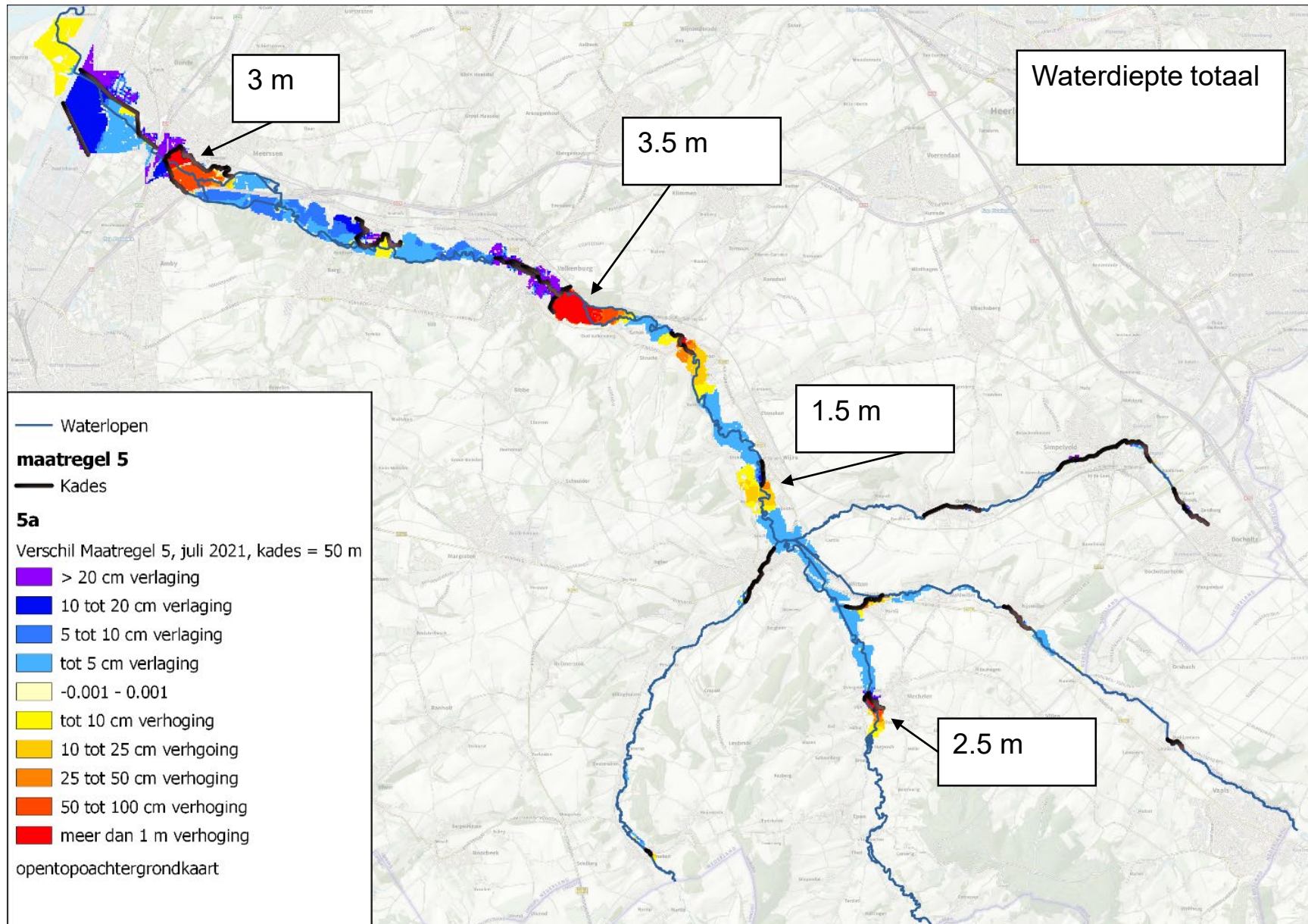
Needed for Valkenburg: 6-10

Current max storage in riverbed and floodplains: 5 Mm³

Fix hydraulic bottle necks (mainly bridges and 'Valkenburg')



Protect with additional levees



Potential of combined measures on July 2021 discharge at Valkenburg

