

FLOOD MAPS AND DEFENCES IN YOUR CAT MODEL: WHAT MATTERS AND WHAT DOESN'T?

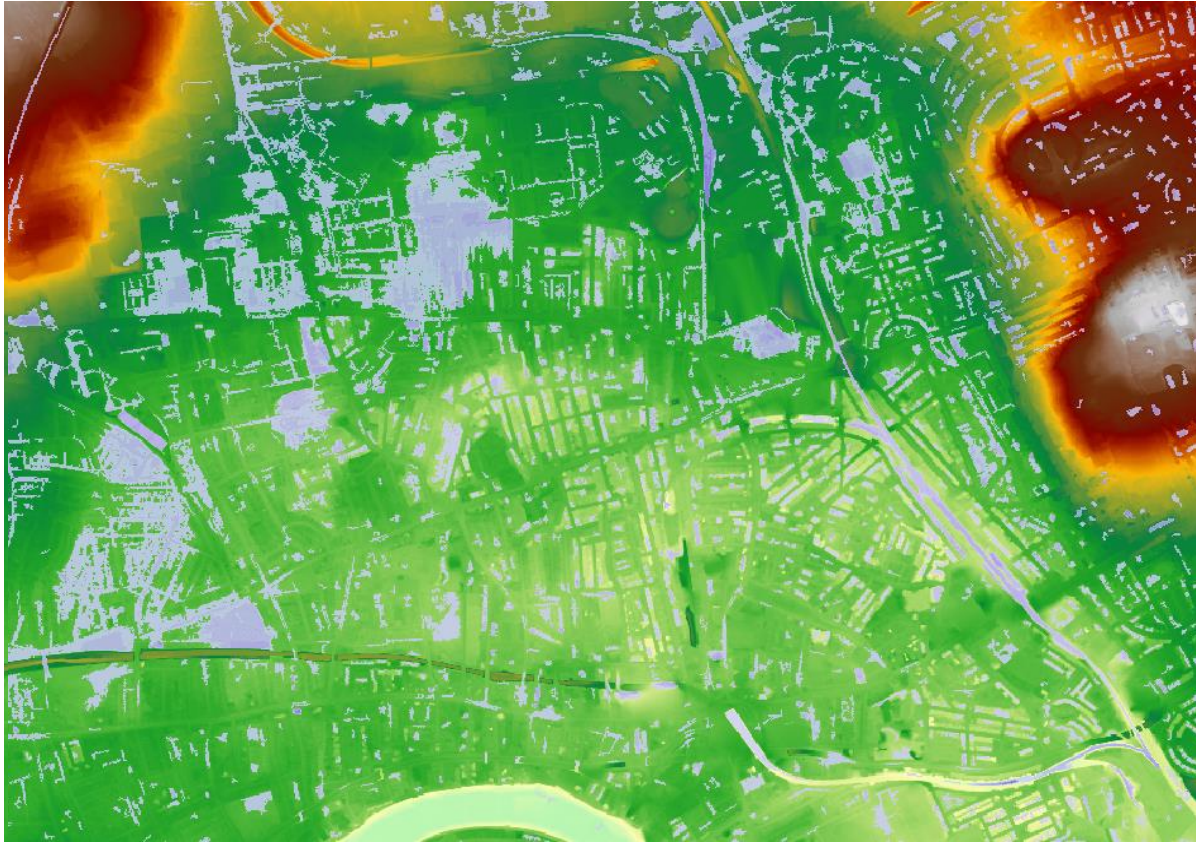
JBA
risk
management

THE
FLOOD
PEOPLE[®]

HYDRAULICS + DEFENCES

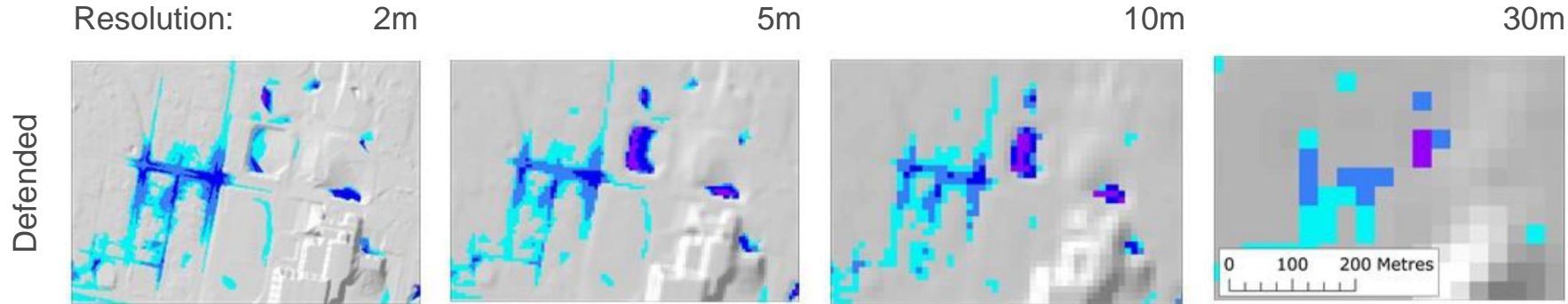
Jane Toothill, jane.toothill@jbarisk.com

TERRAIN DATA + MAPPING




2m Environment Agency Lidar data are accurate enough to pick up lowered gardens in front of basements.

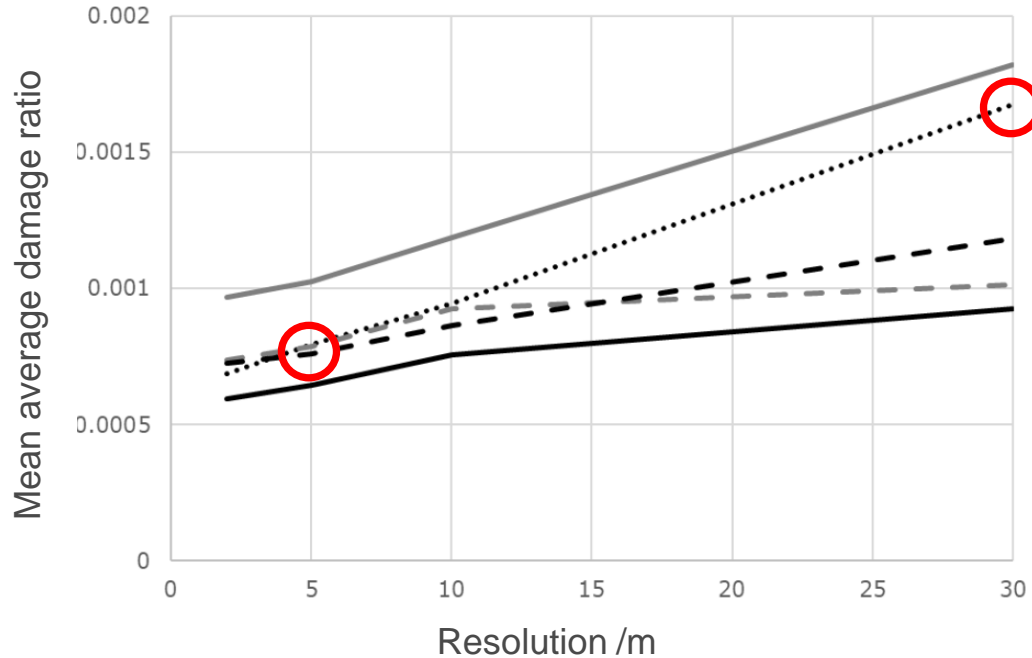
HYDRAULICS + RESOLUTION



Output from hydraulic modelling carried out on 1m Lidar data aggregated to 2m, 5m, 10m and 30m resolution

 **Benchmarking the latest generation of 2D hydraulic flood modelling packages.** <https://www.gov.uk/government/publications/benchmarking-the-latest-generation-of-2d-hydraulic-flood-modelling-packages>. II Lamb, R., Crossley, M., & Waller, S., 2009. **A fast two-dimensional floodplain inundation model.** Proceedings of the ICE-Water Management, 162, 363-370. II Hunter, N., Bates, P., Neelz, S., Pender, G., Villanueva, I., Wright, N. and Mason, N., 2008. **Benchmarking 2D hydraulic models for urban flooding.** Proceedings of the Institution Of Civil Engineers - Water Management, vol. 161, no. 1, 13-30.

HYDRAULICS + LOSS ESTIMATES

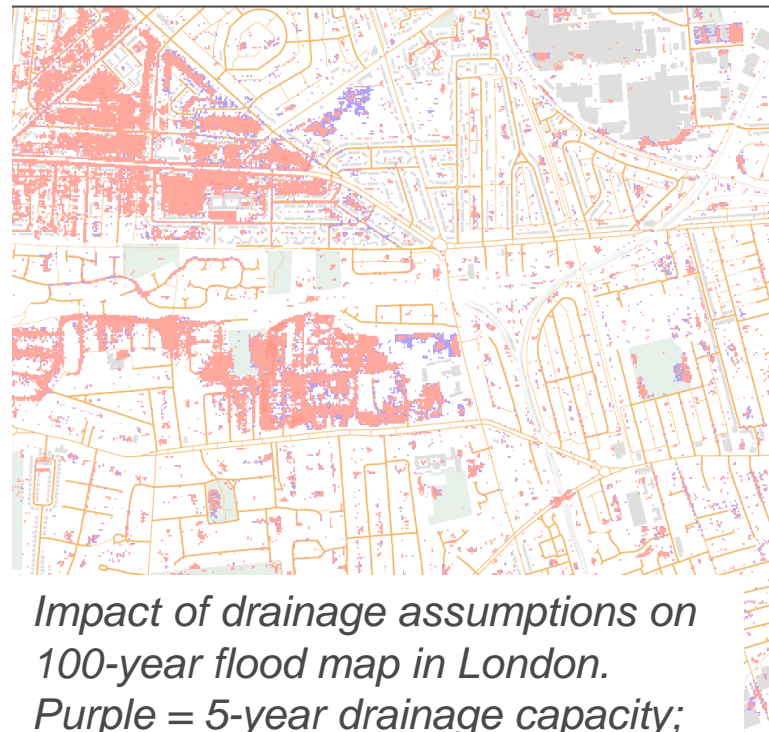
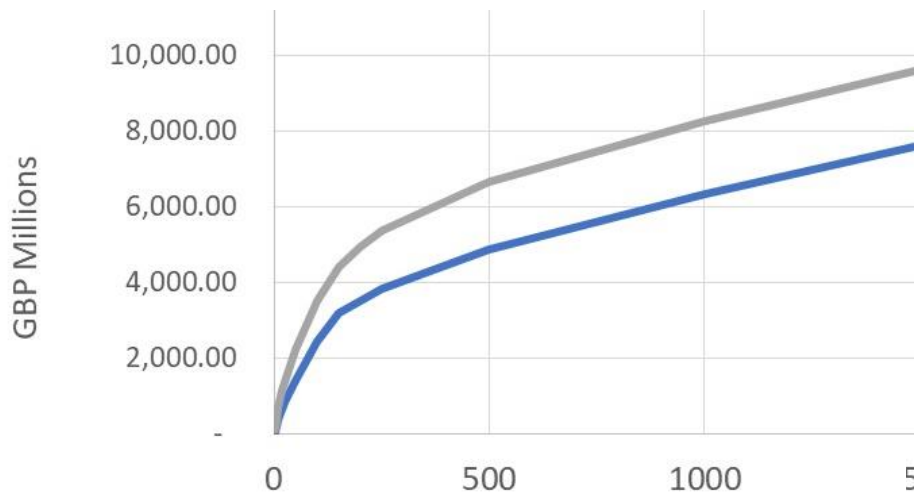


AAL is up to **x2 higher** when hydraulic modelling is carried out on DTM data aggregated to 30m vs 5m (same DTM data in both cases)

Terrain can change quickly in an urban environment: frequent updates are important.

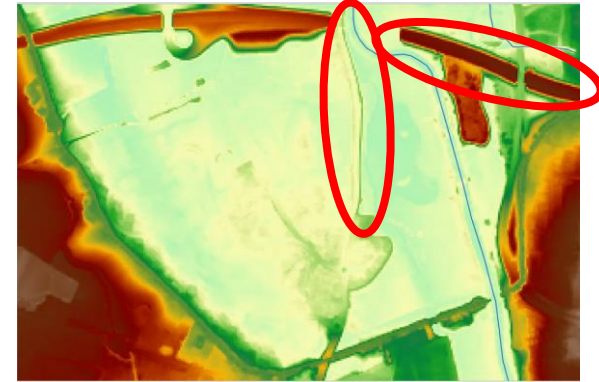
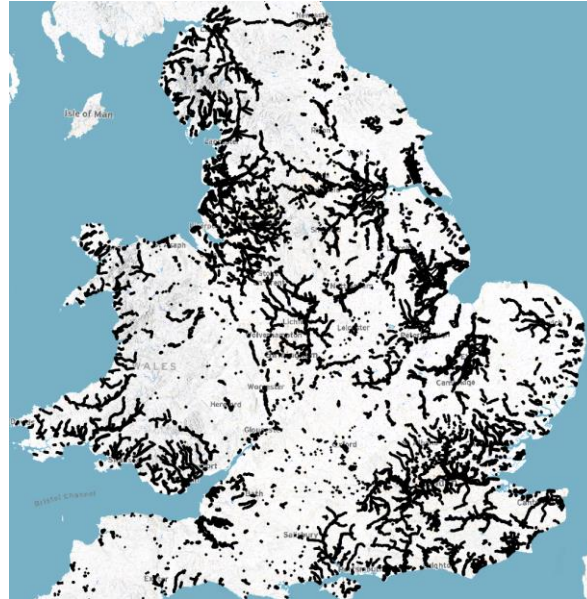
DRAINAGE ASSUMPTIONS


Impact of drainage assumptions on model results



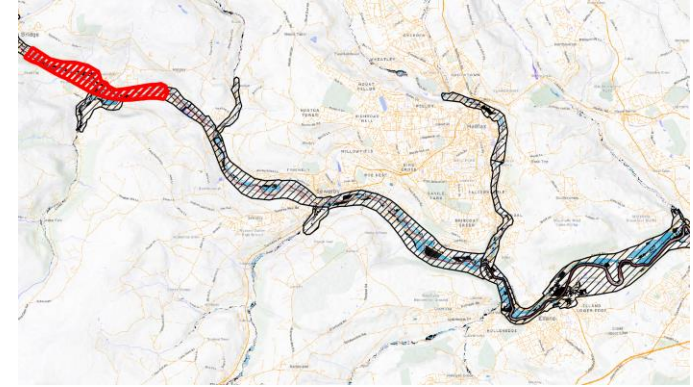
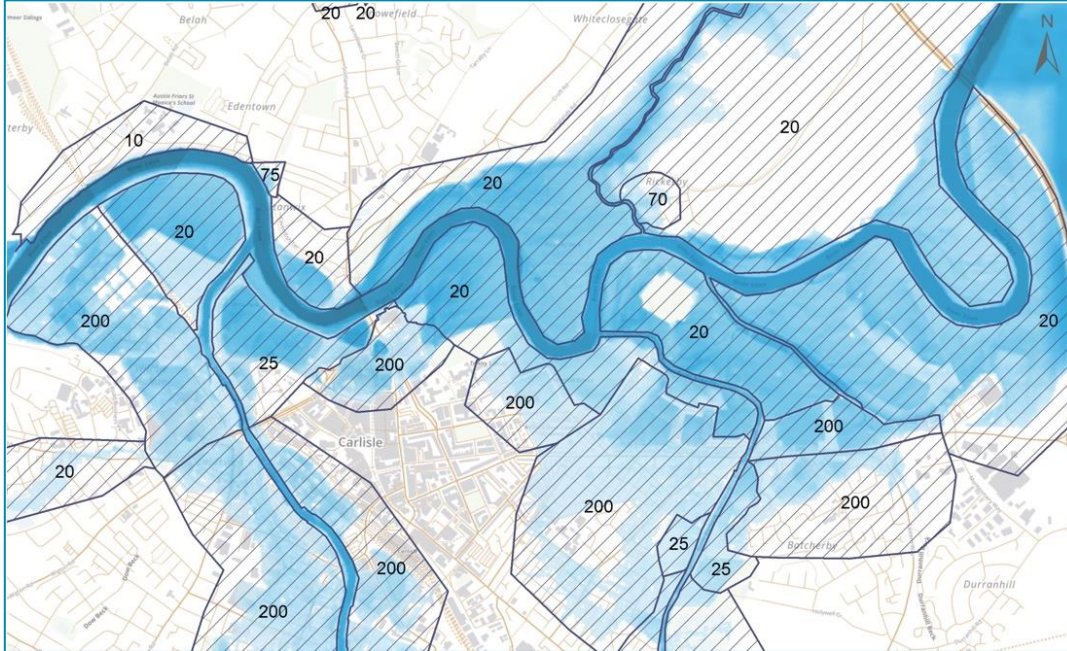
Impact of drainage assumptions on 100-year flood map in London. Purple = 5-year drainage capacity; red = 20-year

PHYSICAL DEFENCES



 Wood, D.J., Brown, C.R.M., Doyle, L., Smith, H.L., Waller, S.G., and Weller, E.F., 2021. **Identification of River Defences from Digital Terrain Models using Deep Learning.**
<https://repozitorium.omikk.bme.hu/handle/10890/15149?locale-attribute=en>

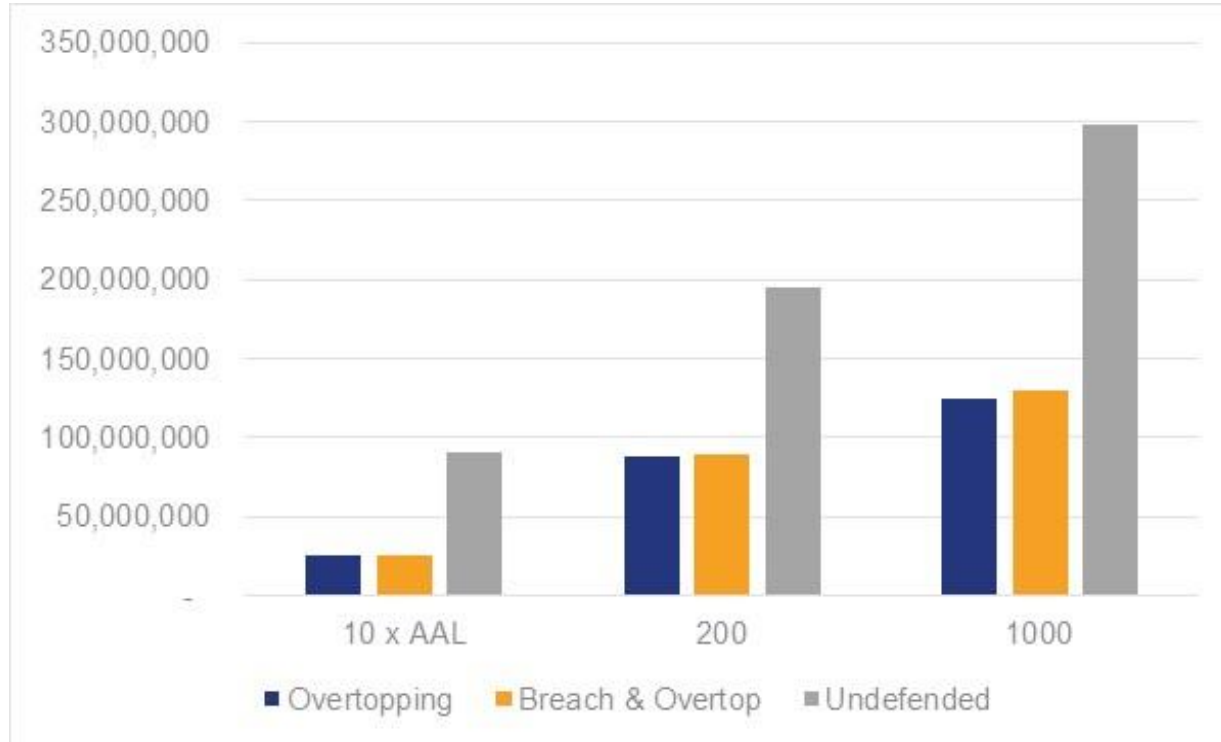
DEFENCE VARIABILITY



Release_Da	01/11/2021
JBA_Level	3
JBA_SoP	50
Defence_Ty	Raised defence

Defence standard of protection differs on either side of the river in many areas of Carlisle (shown with 100-year flood map)

DEFENCES: WHAT MATTERS?



UK River Flood:

Impact of defence assumptions on AAL, 200-year, and 1,000-year modelled loss



Burns, D. and Oldham, P., 2022. **Stepping into the breach: understanding the impacts of defence breach in a UK context.** <https://doi.org/10.5194/egusphere-egu22-5639>, 2022

MYTHOLMROYD



Mytholmroyd Flood Alleviation Scheme Caldene Bridge Relocation

This bridge was constructed as part of the Mytholmroyd Flood Alleviation Scheme. Opened in 2020 it replaced the old Caldene Bridge, which was 30 metres downstream, to enable widening of the river channel.

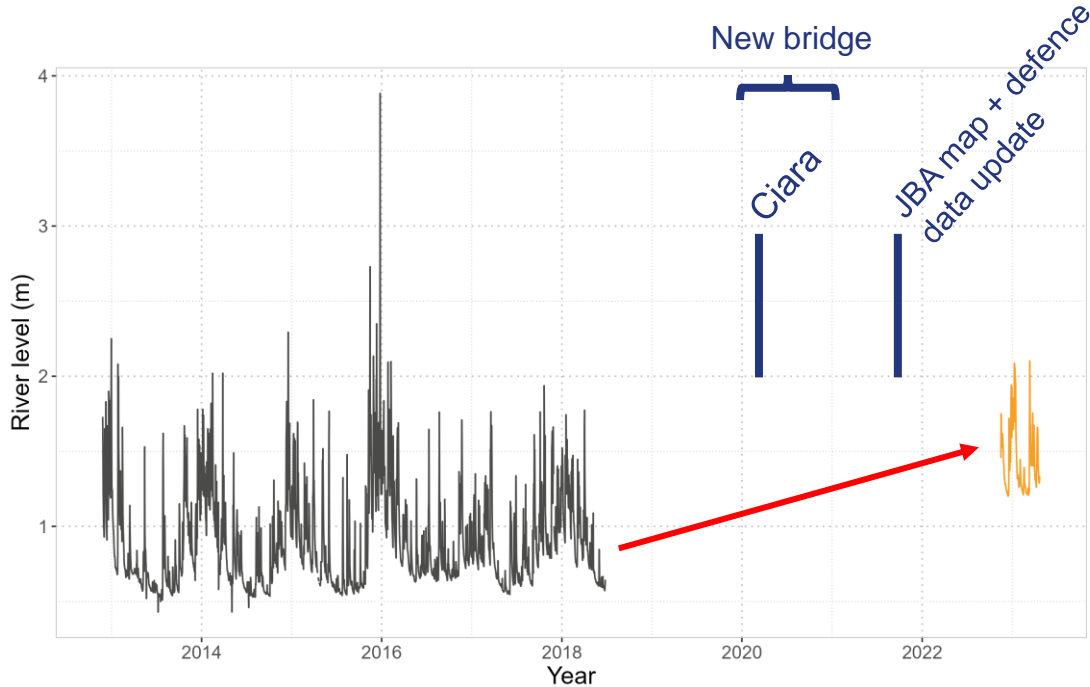
The bridge and associated channel widening is an integral part of reducing flood risk to Mytholmroyd. It was part-funded by the 2014-2020 European Regional Development Fund Programme.

European Union
West Yorkshire

Environment Agency
Leeds City Enterprise Partnership
LCP

“Opened in 2020, it replaced the old Caldene Bridge, which was 30 metres downstream, to enable widening of the river channel.”

MYTHOLMROYD



Historic gauged river level data at Mytholmroyd

Data source: riverlevels.uk



WHAT MATTERS?

HYDRAULICS

Solve the shallow water equations

Best possible DTM

Model at as high resolution as possible

30m modelling on a 5m DTM is 30m modelling and won't pick up flow paths in urban areas

DEFENCES

Frequent updates

Be practical about data availability

Make necessary assumptions

Model:

- Individual defences (not single assumption for river)
- Overtopping inclusive of water volume
- Detail in some areas

Expect choice, and test it

GLOBAL LEADERS IN FLOOD RISK MANAGEMENT.

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