NFM Calderdale Fact Sheet – Field Boundaries

Field boundaries such as dry stone walls influence the direction that water will flow across a landscape. They can help to reduce flood risk, by delaying and slowing overland water flow as it moves across the landscape. They can also increase flood risk by interrupting and redirecting flow paths of water toward each other, creating deeper and faster water flow by channelling the water from behind the walls to other areas, which can lead to localised flooding. Using the rainfall- runoff computer model SD-TOPMODEL, in three sub-catchments of the Upper Calderdale the impact of field boundaries on flooding was tested by comparing a baseline computer model run with all the field boundaries included against a computer model run with all field boundaries removed.

Field boundaries were identified through satellite imagery for the 3 test-sub catchments. Data taken from scientific literature has provided information on the impact of how field boundaries slow overland flow, and impact how water is absorbed into the soil, which can be put into the computer model. The field boundaries were removed from the computer model and replaced with values that represent the underlying land cover (for example, grassland).

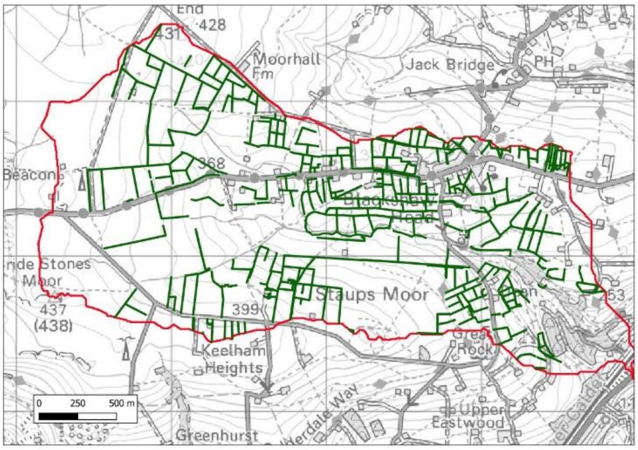

Figure 1: Location of field boundaries in the Jumble Hole catchment

The impact of the field boundaries on river flow can be seen when comparing the river flow values of the baseline model and the computer model run with no field boundaries used.

For a synthetic storm example 1 in 10 year, 3-hour event, the peak flood decreased by 11% and the flood peak was delayed by 30 minutes (Figure 2).

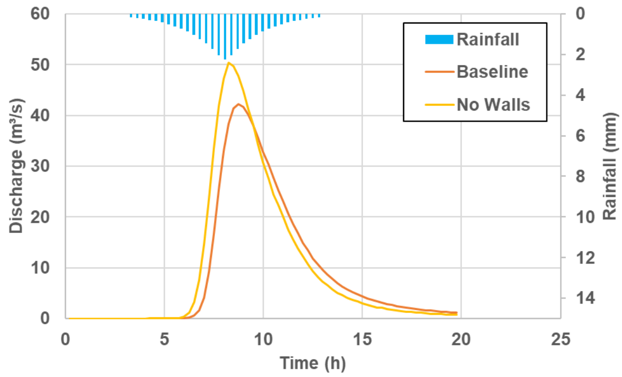

Figure 2: Comparison of the outflow for the baseline model against the no field boundary model computer model runs

When comparing models with and without field boundaries, for 6 rainfall events, (4 synthetic and 2 recorded events), the results suggest that the field boundaries play an important role in decreasing local flood risk, with an average decrease in the peak flow value of **6%**, an average reduction in the overall volume of flood water of **2%** and an average delay of **20 minutes** to the timing of the peak .Table 1 summaries the benefits of field boundaries compared to scenario without field boundaries across all catchments

Table 1: Summary of the benefits to peak discharge, changes to time of the peak and volume reduction from field boundaries

Rainfall Event	Change to the peak flow as a result of field boundaries	Change to the time of the peak as a result of field boundaries	Change to the volume of water as a result of field boundaries
3 hour 1 in 10 year	Reduces peak flow by 11%	15 – 20 minute delay	Reduced by 3%
3 hour 1 in 100 year	Reduces peak flow by 6%	15 – 20 minute delay	Reduced by 1%
12 hour 1 in 10 year	Reduces peak flow by 4%	15 – 20 minute delay	Reduced by 2%
12 hour 1 in 100 year	Reduces peak flow by 1%	10 – 15 minute delay	Reduced by 1%
December 2015	Reduces peak flow by 4%	25 – 30 minute delay	Reduced by 1%
June 2012	Reduces peak flow by 4%	25 – 30 minute delay	Reduced by 1%

These results suggest that the presence and maintenance of field boundaries can have an important role in local flood risk management. This could be further enhanced by the presence of **hedge rows** as field boundaries which would also increase rainfall infiltration in the soil and interception of rainfall before it reaches the ground

For more information about the results presented in this fact sheet please refer to the technical document hosted on the ICASP website or contact **icasp@leeds.ac.uk**