Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2018-476-AC1, 2019


Hydrology and Earth System Sciences
Discussions



# *Interactive comment on* "Assessing the perturbations of the hydrogeological regime in sloping fens through roads" *by* Fabien Cochand et al.

**Fabien Cochand et al.**

fabien.cochand@unine.ch

Received and published: 25 February 2019

Dear all,

Firstly, we thank the three reviewers and the editor for their time and insightful comments on our manuscript. In general, the reviewers highlight the uniqueness of the study. In terms of novelty, we are not aware of any other study that has analyzed the perturbation through roads in wetlands in the way we have. Reviewer 2 appreciated the integration of modelling results with the experiment. A number of comments were provided, mainly related to the description of the modelling approach as well as the discussion and presentation of the results. We will carefully address these comments



Printer-friendly version

Discussion paper

and pay particular attention to the presentation of the results. We will carefully integrate these comments, see also below the response to reviewer 3. The reviewer also points to a number of technical aspects that need a more detailed justification and explanation. However, no fundamental technical issues were identified. Reviewer 3 provides a number of specific and constructive comments to improve the presentation and the interpretation of the results. A useful suggestion, for example, is concerning the interpretation of flow-velocities. We carefully will consider these suggestions and extend the post-processing of the results (new interpretations are already done and presented at the end of the document). As opposed to reviewer 1, reviewer 3 considers the fieldwork and the modelling decoupled. We can to a certain extent agree and believe that the link can be strengthened. However, a detailed reproduction through calibration of the field site is not considered to be useful as the results are entirely field-specific. The models provide a general framework for assessing the impact of roads on the flow of water. The additional postprocessing results requested by the reviewer 3 (described and listed below) will help to make this point stronger. In the revised manuscript, we will further provide detail on how the modelling results can be interpreted at the field site, and discuss with the consistency of the field data obtained. Specifically, the following results will be added:

1) A graph in which groundwater velocities are presented according to the slope, KS and KD to clearly identified which parameters govern the fen dynamics (Figure 1 below).

2) Analysis of groundwater velocities downslope the road at different distances to assess the extent of perturbation induced by the l-drain (Figure 2 below). In this way, the water distribution downgradient of the L-shape structure is addressed (as suggested by reviewer 3)

3) Analysis of groundwater velocities upslope the road as suggested by reviewer 2 (Figure 3 below). In this way, the impact of the road in the upstream part of the fen is assessed.

4) Other quantitative analyses according to reviewer comments, for example, the percentage of the area drained by the L-drain.

5) A comparison between simulated velocities and threshold velocity values above which gully erosion appears.

We will follow the good suggestions made by the reviewer 3 to improve and extend the discussion, which align also well with the comments of reviewer 2.

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-476, 2018.

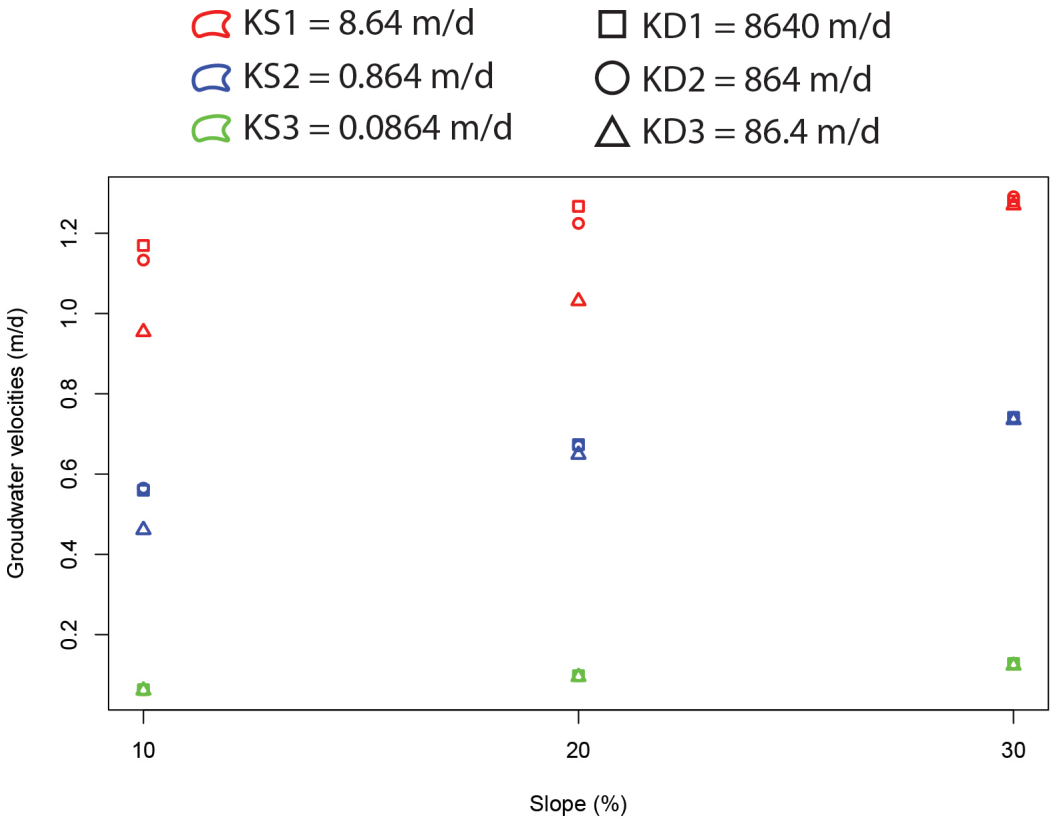


**Fig. 1.** Simulated groundwater velocities at observation point G depending on the slope, KS and KD

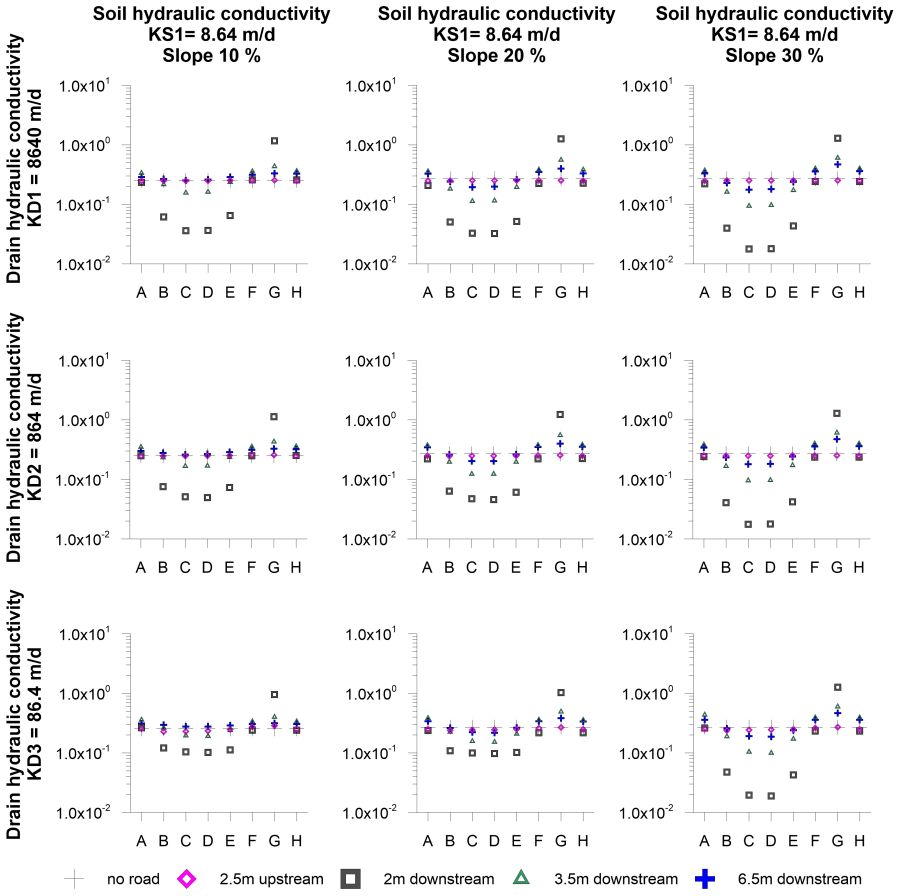


**Fig. 2.** Extent of perturbations due to the I-drain road type: Simulated groundwater velocities at G point at different distances the road

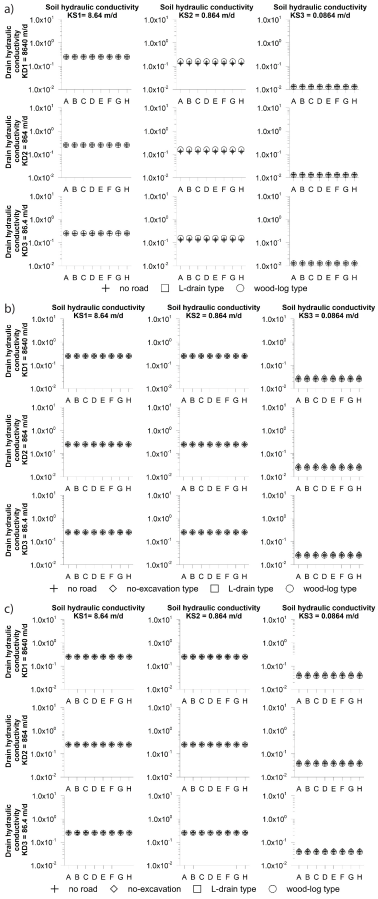


**Fig. 3.** Simulated groundwater velocities 2.5 m upstream each road structures and each parameter combination with a slope of a) 10%, b) 20% and c) 30%