The following is a summary of the main modifications introduced to the manuscript. Our first response to the reviewers contains a point by point answer to all the reviews. Please refer to that document if more details are needed.

1 Main modifications

1.1 Boussinesq equation and numerical schemes

We corrected the mathematical error spotted by Reviewer 2. We went back to the classical formulation of the Boussinesq equation [1] in terms of h for the peat hydrological module (PHM),

$$S_y(h)\frac{\partial h}{\partial t} = \nabla(T(h)\nabla h) + P - ET. \tag{1}$$

The numerical schemes were modified accordingly, with the difference that the time stepping is explicit now. Explicit time stepping requires tests of accuracy and convergence, which are usually carried out by comparing the results of the simulation with smaller timesteps. As mentioned in the text, we compared the WTD after 5 days of modelling with $\Delta t = 1/1000$ days against the usual timestep ($\Delta t = 1/24$ days), and the relative error was less than 0.1% everywhere. Thus, we accepted the validity of the explicit scheme.

1.2 Fewer modeled scenarios

We modelled WTDs for 2 sets of peat hydraulic properties, instead of the previous 4. We think that comparing low and high transmissivities is enough for the aims of the paper, and that having more than two sets of parameters added complexity without generating new insights —and, judging by some of the Reviewers' remarks on the original manuscript, we think they would agree.

1.3 Other minor changes

The resolution of the DTM was changed from 50 m x 50 m to 100 m x 100 m. The reason for this is that the original DTM resolution was 100 m x 100 m, and we filled and interpolated it to 50 m x 50 m. Since this preprocessing step is not relevant for most conclusions in the text, it was modified. This is now explained in the manuscript.
Additionally, we added the weather data to the data and code repository, as reminded by Reviewer 1.

2 New results and discussion

The results with the corrected version of the Boussinesq equation had many similarities and an important difference. During days of normal water input (i.e., not during the exteme drought of the dry year investigated in the manuscript), the effect of the blocks showed a very similar behaviour to the ones in the original manuscript:

- Dams raised the average WTD in all conditions.
- Heavy rainfalls reduced the difference between the blocked and unblocked scenarios
- high transmissivity peat increased the effect of the blocks, both in the overall average raised WTD, and in the distance at which the rise propagated in the peatland.
- After about 1 km the dams had no effect on WTD

[1] The reason for this change from the Θ version to the h version of the Boussinesq equation is the following. The formulation in terms of Θ was originally introduced for practical reasons: the finite volume library that we used cannot solve equations of the form of Eq.(1) implicitly. By making the change of variables to Θ, we thought we had circumvented the problem. But when we found out about our mistake, it no longer made sense to use this version—the extra terms present in the PDE in terms of Θ had the same problems than the formulation in terms of h. Therefore, we reverted to the classical formulation of the Boussinesq equation, although with an explicit time step.

However, the results did change during the extreme drought of the dry year. While in the original version of the manuscript the drought improved the effect of the dams, this time the results show the opposite: during the long drought the gap between the blocked and unblocked scenarios gets smaller and smaller. The reason for this likely lies in a combination of factors. Our interpretation is that two properties of our model are the main causes [2]. First, our simple model of the canal blocks completely block the water flowing through them. This means that canal segments that lie between two consecutive blocks become completely disconnected from the rest of the network. Therefore, the only water input to this canal segments comes either from precipitation or as inflow from the peatland. In extreme droughts, of course, there is almost no water input from precipitation. This leads us to the second cause: the likely underestimation of water inflow from the peatland to the canals due to the low resolution DTM. The canals are excavated in the peat, which, together with increased peat subsidence close to the canals, means that there is a depression of the peat surface around them. This depression increases the water gradient of the when the CWL is low. However, our low resolution DTM could not resolve those depressions with sufficient detail, and as a result too little water might be entering canals from the peat, especially during dry periods.

3 Modifications to figures

Since it is not possible to track figure modifications in a diff document, we briefly explain the differences here.

- Figure 1 was changed according to the suggestion by Reviewer 2. We included diagrams of the DTM resolution and the unstructured mesh.
- Figures 2 and 3 were not modified.
- Figure 4 now contains only two peat hydraulic property parameter sets. The diffusivity was eliminated because it does not exist in the formulation of the Boussinesq equation in terms of h, Eq.(1).
- Figure 5 contains the results of the new reality check, together with the separation between modelled and measured data proposed by Reviewer 2.
- Figure 6 now contains the block positions, as suggested by the Reviewers.
- Figures 7, 8 and 9 contain the new results.

[2]Other phenomena, such as decreased evapotranspiration when the WTD and CWL are low, or an increase in the specific yield, may also be involved in the observed behaviour. However, we don't think they are as critical.