General comments

The presented manuscript and corresponding dataset provide a useful survey of soil physical and hydraulic properties under several agricultural management practices and soil types within the Thames catchment, UK. I would like to congratulate the team involved for their sampling efforts and their contribution to environmental studies relevant to flood risk assessment and other significant hydrological processes. The manuscript is clear, the dataset is in good shape, and the metadata provides detailed descriptions. Before considering for publication, I suggest a minor revision to address some methodological aspects as well as clarifying decisions made for data quality control. Please find my comments and suggestions below.

Specific comments:

Table 3 – Why did not the authors make samples of Bd, VWC, Moisture retention, and Ksat in UN areas?

L.184 – The use of an assumed particle density of mineral soil (2.65 g/cm^3) is often a good approximation, but I wonder why the authors did not consider this variable as part of their laboratory estimations. The soils exhibited different land cover, bulk density, geological formations, among other factors, which would suggest it is likely to find differences in particle density. I suggest the authors provide information on the uncertainty of adjusted estimates (L.315) and the impacts of assuming this fixed particle density.

L.190 – The dataset includes a limited number of samples of soil water retention properties covering the wet range (0-2 pF), which primarily describes larger-radius pore volumes (macropores and wide-coarse pores) related to structural porosity. Including information in this range is beneficial for the purposes of this paper due to its relevance to rainfall/runoff partitioning and drainage. Therefore, elaboration on these observations should be emphasised and not relegated to the Appendix. For instance, focus not only on the steepness of the observations (L.332) but also on the magnitudes and uncertainties encountered. To provide a more informative plot, please add error bars in Figure A1.

L.278 – "A" is used to flag unsteady infiltration rates, which the authors describe as "sudden/rapid changes" in the infiltration rate. Could these values be realistic (and thus flagged as "good") due to the interaction of physicochemical properties, such as a water repellency breakdown?

L.282 – The reasoning behind the "C" classification seems ambiguous. As the authors state, these values might indeed be correct and potentially related to "*a novel soil state/structure/management at the moment of sampling*". Hydraulic conductivity is a highly variable non-linear property, so extreme values may often be encountered. For instance, it is common to find biopores created by earthworms, resulting in unusually high values. I think this could be a realistic representation of the spatial heterogeneity of the soil pore system.

L.294 – Please include details for what is considered “physically inadmissible.”

L.385. The authors interpret and derive conclusions that are not sustained by statistical analysis: “*The dataset highlights how trafficked arable field areas such as tramlines, in comparison to general infield areas, have a higher bulk density (and lower estimated porosity) near the soil surface and lower saturated hydraulic conductivity (both attributable to compaction). These trafficked areas, although forming a small proportion of the field area, will therefore have a disproportionate impact on the potential generation of surface runoff in response to storm events and likely provide rapid overland flow routes connecting runoff to the local watercourse network*”. I suggest avoiding statements of this kind if the aim of this manuscript is to present and describe a dataset.