Anonymous Referee #2

This manuscript is well written and suitable for publication in HESS. Tile drains and potential groundwater flow to streams are two important pathways in many agricultural watersheds. Adding these processes to the well-established SWAT model will undoubtedly expand the model utility for watershed managers, researchers, and ag-engineers and practitioners in the farming community to develop and assess best management practices and stewardship programs that support sustainable and more environmentally friendly agriculture. Two specific comments are below.

Response: Thank you for the positive feedback, for taking the time to review our manuscript, and for the helpful suggestions.

1. Section2.4 Lines 110-115. Was the general term "soil profile" defined as the same as "root zone" or the layer between the bottom of the root zone and shallow ground water? A clear description of the "soil profile" is needed to understand Eq 5.

   Response: The soil profile, as defined in SWAT, contains multiple soil layers in which the 'root zone' is defined through an additional parameter (the rooting depth). The rooting depth can be set to a depth that is shallower or the same as the soil depth. We will add this information to the manuscript to Section 2.2:

   The current version of the SWAT model does not track soluble pesticide after leaching out of the soil profile (which includes the root zone below the maximum soil depth). Thus, chemicals are prevented to flow through tile drains or enter the groundwater.

2. Section 3 Lines 165-170. The author(s) should provide the specific values of the pesticide use rate and basic environmental fate parameters such as soil half life and Koc for both parent and metabolite. It is disingenuous by only providing qualitative descriptions of "readily degradable" or "moderate", etc., unless the model can take such qualitative inputs for a simulation.

   Response: We agree that these parameters are useful to understand the model simulations. We will add the following information to Section 3:

Based on the pesticide's soil half-life (between approximately 6 and 40 days, depending on soil type; Bayer Crop Science, 2018), it is classified as "readily degradable", its mobility is classified as "moderate", and it is considered "readily soluble" in water (Koc of ~250 mL/g). In contrast, the metabolite is stable, "highly mobile" (Koc of 0 mL/g), and "highly soluble" (FAO, 2000).

The pesticide's average application rates are 221g/ha in C1 and 462g/ha in C2.

3. Section 3 Line 171. Did the "multi-metric calibration" include pesticide use and fate parameters of the parent and metabolite? if yes, what are the final calibrated values?

   Response: The calibration did not include pesticide use. Soil half-life for the pesticide was modified within the reported range that varies by soil type and is reported for the two catchments in Section 3, Table 2 (see also revisions made based on the comments of Reviewer 1):

A list and description of the calibration parameters and the processes they are associated with is provided in Table 2. A parameter is included in the table if it was changed in at least one of the catchments.

Table 2: Calibration parameters with initial value and calibrated end value (changed values in bold)

	SWAT Parameter	Parameter Description	Initial Value	Calibrated end value	
				C1	C2
Surface runoff	CNCOEF	Plant ET curve number coefficient.	1	**1.1**	1
	SURLAG	Surface runoff lag coefficient.	1	1	**0.5**
Tile drains	DEPIMP	Depth to restrictive layer (mm)	N/A	**2010**	**2250**
	GDRAIN	Drain tile lag time (hr)	0	**2**	**12**
	TDRAIN	Time for tiles to drain soil to field capacity (hours).	48	48	**24**
	DDRAIN	depth to subsurface tile drain (mm)	1000	**990**	1000
Groundwater	ALPHA_BF	Baseflow alpha factor	0.048	**0.77**	**0.01**
	GWDELAY	Groundwater delay (d)	31	**47.4**	**1**
	ALPHA_BF_D	Baseflow alpha factor for deep aquifer	0.01	0.01	**0.0001**
	GWQMIN	Threshold depth of water in the shallow aquifer required for return flow (mm)	1000	1000	**500**
	RCHRG_DP	Deep aquifer percolation fraction	0.05	0.05	**0.15**
Soil	AWC	Available water capacity	varies by soil	**1.1*default**	**1.33*default**
	ESCO	Soil evaporation compensation factor	0.95	0.95	**1**
Pesticide and Metabolite	PERCOP	Pesticide percolation coefficient	0.5	0.5	**0.6**
	HLIFE_S (Pesticide)	Soil Half-Life (d)	N/A	**14**	**35.7**
	PESTGWFACTOR	mixing ratio of pesticide entering shallow gw aquifer (-)	1	1	**0.02**
	PEST_GW_D	mixing ratio of pesticide entering deep gw aquifer (-)	1	**0.02**	1