

The authors have adequately addressed most of the reviewers' comments, which has led to an improved manuscript. While responses are provided to reviewers' comments, some of the information has not been incorporated in the manuscript. Please ensure to do so while preparing the final revision, for example, the manuscript or supporting information should provide specific information or clarification in response to comment #1 of reviewer 2 and comments #3 and #4 of reviewer 3.

Reply: Thanks for your suggestions! All the suggested revisions have been addressed and the relevant information has been incorporated into the manuscript text and supporting information as required.

In response to Reviewer 2 Comment #1: Comprehensive calculation details of mass conservation have been added to the supporting information (see Text S2).

In response to Reviewer 2 on Figure 5: We added the clarification: RMSE values are computed by comparing simulated results with averaged experimental data under identical hydraulic conditions, see Lines 516–517.

In response to Reviewer 3 Comment #3: A brief discussion on the lack of experimental data for mixing metrics to validate the simulation results has been included in Section 3.1.2 of the manuscript text (Lines 537–540).

In response to Reviewer 3 Comment #4: An explicit description of the model conceptualization (stream-borne and groundwater-borne nitrate are defined as two distinct reactants) has been added to the main manuscript at Lines 178–180 and 259–269. The line numbers correspond to the clean version of the manuscript text.