The manuscript titled "*Nitrate-nitrogen dynamics in response to forestry harvesting and climate variability: Four years of UV nitrate sensor data in a shallow, gravel aquifer*" explores nitrate-nitrogen dynamics in groundwater and riverine systems influenced by forestry harvesting and climate variability. The revised manuscript clarifies the methodology very well and sharpens the result analysis and discussion. However, the **overall method introduction can be streamlined** for better readability, such as the hysteresis approach and content in Line 250-258:

"A 1-D land surface recharge model was calibrated using nearby lysimeter data to determine when rainfall recharge occurred. The parameters used in the land surface recharge model ~~were~~ included precipitation~~,~~ and Penman PET data sourced from a nearby weather station (Fig. 1).~~,~~ S~~s~~oil water capacity (86.0 mm), ~~an~~ evaporation reduction function (10.0) and drainage threshold (50.0) were derived from the nearby lysimeter (Fig. 1), while the crop factor (0.77) was sourced from Allen et al (1998) ~~and drainage threshold (50.0)~~ (Bidwell and Burbery, 2011). ~~The precipitation and Penman PET data was sourced from New Zealand's National Institute of Water and Atmospheric Research nearby automatic weather station (Fig. 1). The soil water capacity, evaporation reduction function and drainage threshold values were determined from the nearby lysimeter (Fig. 1). The crop factor was estimated using values from Allen et al (1998).~~ In this model, rainfall recharge occurs when rainfall is above the soil water storage capacity. Evaporation, plant uptake and runoff are factors that reduce soil water storage."

Some minor revisions could be considered before final publication:

1. Line 327: Add "(1)" to the right end of this equation

2. Line 354: Add "(2)" to the right end of this equation

3. Line 347: *"This resulted in a 25 percent increase or decrease in exported nitrate-nitrogen* (Table 2)". Referring to Table 2 improves readability by providing clarity on source of (± values).

4. Fig. 5: *"The map of the South Island of New Zealand shows the Canterbury region where the groundwater level measurements were taken and the area of the study site."*

   You added this map in response to one of the reviewers' comments: *"L307: Where is Balmoral? How does this site relate to the sites included in Fig. 5?"* Your response was: *"We have added a map to this figure to show where the regional groundwater levels were measured in relation to the study site. This provides context on where the study site is in relation to the Canterbury region."*

   However, there is no clear indication or relationship to Balmoral in the added map. Furthermore, this map appears similar to the one in the top-right corner of Fig. 1. Consider explicitly pointing out Balmoral on this map and placing it in the top-right corner of Fig. 1, instead of introducing the study area in the Results section.

5. Line 468: "*There were higher intensity rainfall recharge events in 2021 and more rainfall recharge (265 mm) but the nitrate-nitrogen exported was slightly less than 2020 at 6.91 t* yr^{-1}."

Could the causes of this observation be further elaborated in Section 5.3? Based on your previous statements, my understanding is that the lower nitrate-nitrogen export in 2021, despite higher-intensity rainfall recharge events, is due to the depletion of nitrate-nitrogen stores after the initial recharge events (i.e., larger hysteresis areas and rapid mobilization of nitrate-nitrogen). In contrast, in 2020, these stores were less depleted, resulting in higher cumulative export over the year. Please correct me if my interpretation is incorrect, and consider discussing this result in Section 5.3.

6. Line 515-523: this paragraph is not discussing the drivers of nitrate-nitrogen dynamics but comparing the measured/calculated nitrate-nitrogen concentrations with other literature (Table 1). For better coherence, consider merging this content with the paragraph at Line 565 to consolidate your discussion on the benefit of using high-frequency UV nitrate sensor data and integration method.