

***Interactive comment on* “Effects of golf course management on subsurface soil properties in Iowa” by Matthew T. Streeter and Keith E. Schilling**

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We would like to start by thanking the referee for the detailed comments and effort that has been put forth to review this manuscript. Similar to the initial reviewer’s comments, most issues brought forth were minor. In response to the general comments made, which were similar to the first reviewer, which suggests a comparison by location on the golf course rather than comparisons between golf courses by depth: To reiterate from comments made in response to reviewer 1, while it is true that management may vary between tees, roughs, and fairways, we found through interviews with golf course managers that management varied much more significantly between courses than between locations on the course. For example, the two central courses were located on the same landform region, yet course average N fertilizer was more

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than doubled at Central 18 compared to Central 9. When looking at these same two courses, N fertilization was the same for Tees and Fairways at the Central 9 course and was only 25% less on the fairway compared to the Tee on the Central 18 course (Table 2 in manuscript). Based on these types of observations, the decision was made to combine samples at golf courses and compare between courses where differences in management were most pronounced. Furthermore, as noted in the manuscript discussion starting at line 143, typical particle size content within parent materials in Iowa is well documented. In the case of loess derived soils in our western site, variability in particle size by depth may easily be attributed to anthropogenic factors (45% sand in the altered surface compared to less than 10% sand in the unaltered parent material). Likewise, with detailed soil description (which was done for each of our sites), soil alteration due to anthropogenic factors may be differentiated from natural pedogenesis visually (see attached image). Furthermore, while the reported observations may appear predictable in some cases, these data in spatial scale and depth are quite unique to Iowa and therefore, relevant and valuable to advancing the ecological sustainability of the region.

Response to specific comments, all grammatical suggestions have been noted and will be corrected in the revised manuscript. Line to line comments are as follows: Line 75 – scientific names will be added. Line 98 – While nitrate concentrations may have changed via the analytical process, in-situ concentrations were not specifically the goal, but rather, site to site comparisons. Line 150 – Implications of golf course management pertaining to addition of sand are explained in the paragraph starting at line 158, as self-noted by the reviewer. Lines 95, 122, 183 pertaining to TC - The information related to TC is a relevant addition to this work because, In the case of our paper, we were not correlating organic and inorganic carbon (as the first referee suggested), but correlating TC and SOM, which are derived via two separate testing procedures. This correlation helps to highlight the variability in parent material. “The variability in TC (and C/N ratio below 100 cm) that we have identified through this study may be entirely affected by parent material and natural weathering patterns” (lines 184-186). Since we

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are making comparisons by depth in soils that are naturally calcareous, we chose to make our comparisons using TC, which helps to highlight these natural variations. Line 210 – Yes, mg/kg of soil. We will modify. Line 367, 379 – In the case of our study sites, natural variability is quite high. With limited sample size in a highly variable landscape, it is not uncommon to have large standard deviations (even greater than the mean in some cases). A note will be made in the description that +/- is referring to the standard deviation.

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Fig. 1.

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