We thank the reviewer for his/her review of our paper which helped to improve the manuscript. We thoroughly worked on the comment, and the responses are given below.

General comments

The paper by YU et al. presents analysis of water quality conditions and nutrient chemistry in polders found in the Amsterdam area. I found the analysis to be well done and I have no issues with it.

My main criticism of the paper is the lack of context for any readers outside of the Amsterdam area. The authors immediately jump into the specifics of the Amsterdam/Netherlands region and describe the area in great detail. Many times, the paper reads like a history of the region and monitoring activities conducted in the area. Those reading the paper from anywhere other than the Netherlands are left wondering why they should care about it. The authors need to spend some time introducing and discussing the larger issues relevant to the rest of the world. How are the issues and study methods and results used in the paper relevant to other locations and issues? This is a matter of doing some homework to see what has been done related to these systems or similar environments.

This is my only comment but it is not trivial. In my opinion, the authors need to provide some global relevance for this analysis before it can be accepted. The authors need to make a case for why anyone outside of the Netherlands area should care about this topic and their results.

Agreed. We thank the reviewer for the compliments and we agree with the comment that we should elaborate more on the relevance of our study for other areas outside Amsterdam and The Netherlands. Although we mentioned in the abstract that "we expect that taking account of groundwater-surface water interaction is also important in other subsiding and urbanising deltas around the world, where water is managed intensively in order to enable agricultural productivity and achieve water sustainable cities.", we agree that we did not make this very specific in the rest of the manuscript. We intend to add text on this issue in the revised paper. We will elaborate on the international relevance of the paper in the introduction, the discussion and the conclusions part of the paper.

In the introduction, we will add the following text after the first sentence:

> Lowland deltas account for 2 % of the world's land, but accommodated around 600 million people in 2000, and about 1400 million by 2060 as was estimated by Neumann et al. (2015) [1]. The reclamation of swamps and lakes and the drainage of peat areas to enable urbanisation and agriculture severely change the hydrological, chemical and ecological environment of these areas (Ellis et al., 2005; Yan et al., 2017) [2,3]. Lowland delta areas are vulnerable for water

[1] B. Neumann, A.T. Vafeidis, J. Zimmermann, R. J. Nicholls: Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment, Plos One, 10, 3, 2015. e0118571. doi:10.1371/journal.pone.0118571.

[2] J. B. Ellis, J. Marsalek, B. Chocat: Encyclopedia of Hydrological Sciences, Urban Water Quality, 1st edition, M G Anderson, John Wiley & Sons, Ltd, United States, 8, 97, 2005.

quality deterioration by processes like salinization and eutrophication, which can be amplified by climate change (Wu et al., 2015)[4] and land subsidence (Minderhoud et al., 2017) [5].

In the discussion section, our study indicates that groundwater seepage can be a significant and even dominating source of nutrients in lowland areas where water is pumped out of polder systems that without pumping would turn into fresh water lakes. Our study shows that the groundwater seepage leads eutrophication and that redistributing water out of some deep elevation polders with upconing brackish water had further spread the nutrients to the whole water system. We will add the following paragraphs:

Section 4.2 Similar patterns are expected to be present in other lowland areas, which are highly manipulated by human. Typical delta areas where subsurface processes are expected to release nutrients from reactive organic matter and peat in the subsurface are the Mekong delta (Minderhoud et al., 2017), the Mississippi delta (Törnqvist et al., 2008)[6], and the Sacramento-San Joaquin delta (Drexler et al., 2009)[7]. In many of these areas the water management shows resemblance to the Dutch situation. However, the large amount of groundwater quality and surface water quality data that was available in our study area is unique. Still, signals of groundwater influence on nutrient concentrations were reported from eastern England (pers. comm. M.E. Stuart, British Geological Survey) and from the lowland parts of Denmark (Kronvang et al. 2013)[8].

Section 4.3 line 20-21: However, the results indicates that reducing the amounts of manure and fertilizer and the associated N and P inputs in agriculture might not contribute enough in reducing N and P concentrations and fluxes for environmental purposes, as the N and P concentrations in the surface water are dominantly caused by seepage of groundwater. This certainly holds for urban areas where these inputs are absent (see new Figure Supplementary Info). Given the large loads of N and P that originate from one large polder with upconing brackish groundwater - the Groot Mijdrecht polder - one of the solutions proposed in The Netherlands was to turn this area back into a fresh water lake. By doing so, the seepage of nutrient rich groundwater would stop as the higher water levels would lead to neutral or even infiltrating conditions. However, this proposal led to a lot of protest among the municipalities and farming communities in the polder and was not considered feasible given the economic values that were involved. This example shows that the reclamation of swamps and lakes for

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[3] R. Yan, J. Huang, L. Li, J. Gao: Hydrology and phosphorus transport simulation in a lowland polder by a coupled modeling system, Environ Pollut, 227, 613-625, 2017.

[4] J. Wu, M. E. Malmstrom: Nutrient loadings from urban catchments under climate change scenarios: Case studies in Stockholm, Sweden, Sci Total Environ, 518-519, 393-406, 2015.

[5] P. S. J. Minderhoud, G. Erkens, V. H. Pham, V. T. Bui, L. Erban, H. Kooi, E. Stouthamer: Impacts of 25 years of groundwater extraction on subsidence in the Mekong delta, Vietnam, Environ Res Lett., 12, 2017.

[6] T. E. Törnqvist, D. J. Wallac, J. E. A. Storms, J. Wallinga, R. L. Van Dam, M. Blaauw, M. S. Derksen, C. J. W. Klerks, C. Meijneken, E. M. A. Snijders: Mississippi Delta subsidence primarily caused by compaction of Holocene strata. Nat Geosci, 1, 3, 173-176, 2008.

[7] J. Z. Drexler, C. S. De Fontaine, S. J. Deverel: The legacy of wetland drainage on the remaining peat in the Sacramento San Joaquin Delta, California, USA, Wetlands, 29,1, 372-386, 2009.

[8] B. Kronvang, J. Køgestrand, J. Windolf, N. Ovesen, L. Troldborg: Background phosphorus concentrations in Danish groundwater and surface water bodies, EGU General Assembly 2013, 7-12 April, 2013, Vienna, Austria, id. EGU2013-2249.

urbanisation or agriculture can lead increased nutrient loads to surface waters in the surroundings which are hard to mitigate. This scenario has wider implications for water management in other urbanising lowland areas around the world.

In the conclusion, we will add the following sentences:

Our results strongly suggest that organic matter mineralization is a major source of nutrients in lowland deltas where water levels are lowered to enable urbanisation and agricultural land use. The discharge and redistribution of nutrient rich water from reclaimed lakes and swamps enhances eutrophication in downstream water resources and is hard to mitigate.