Review: **Drainage of soft cohesive sediment with and without *Phragmites australis* as an ecological engineer**, HESS

General comments
This paper strives to assess the use of plants for consolidation processes. I think this overall question is a relevant one, of which the results could potentially be used in nature-based restoration management. However the paper could be streamlined to improve the readability (reduce verbosity) and scientific value to the community. Generally, the graphs are not appearing successively upon mention in the text and some results (although provided) are not reported or discussed. Additionally, tenses are used inconsistently, especially in the results and discussion this needs to be improved.

Specific comments
P1 line 23: It is stated that reed interferes with sediment drainage and consolidation processes but the effects of reed on consolidation are omitted from the abstract. Either focus on purely drainage or add consolidation results.

P2 lines 29-31: This sentence indicates the knowledge gap from the previous paragraph, add it there.
Lines 31-33: Integrate in the previous paragraph (same topic).
Line 36: Define what you mean with ecosystem development or use sediment consolidation.

P3 Line 3: Is reed an ecosystem engineer or are you testing to see if it functions as an eco-engineer? Please be more to the point.
Line 4-5: The second part of the sentence is what you want to assess but the way it is formulated seems as if this is already your conclusion.
Line 13-14&17: If I understand correctly the drainage pipe is supposed to drain as well as resupply water to the accurate water table level? Please clarify.
Line 16: How did you keep the water table of the water column at 77 cm, was it refilled manually?
Line 17, figure 1 (P16): For a more complete overview of the experimental set-up, please include the drainage pipe and indicate if the column is vegetated. Are the black or the grey ovals your pressure sensors? How come your sediment level is measured at t=176 when your experiments ran 118 and 129 days?
Line 19, table 1 (P24): if the data from column 5&6, exp 1 are not used anywhere, omit them from the table. If they are similar measurements as column 1&2, exp 2 you may be able to use them to increase your sample size for either pore pressure or sediment height.
Line 37: Is your 'reference column' the same as your 'water column' ?

P4 line 3-4: Do you know anything about the benthos (such as oligochaetes and copepods) from your Markermeer mud? They may affect consolidation processes (see articles in thesis F. Cozzoli 2015).
Line 16-18: Similar topic as above and below, integrate in the previous paragraph or in the section on pore pressure below data collection.
Line 18-22: This seems more appropriate for the discussion.
Line 33-34: Same topic, not necessary to start a new paragraph.

P5 line 17: Repeated header from p3, line 28.
Line 18: statistical package Plantecophys (Duursma 2015) in R (cite R). Move to paragraph above.
Line 19-25: These are results, a results section on photosynthetic parameters is missing. Move to results.

Line 28-29: What were the leaf area and biomass at the start? As you planted seedlings this must have been above 0 from the start.

Line 32-33: Are you referring to the 3 plants in each harvest column or between harvest columns. Generally, when you present plant data does it represent the total of the 3 plants or the average for each plant?

Line 34: Figure 2 (P17) 2a and 2b seem unrelated, actually fig. 4d would be more appropriate here. Root surface area and the ratio are related graphs. Figure 2b could be a standalone figure or added to current fig 3. as you subtracted your average evaporation rate of 0.6 from all these points, correct?.

P6 line 3: Here you state 1.22g versus table 3 0.9g

Line 5: figure 3 (P18) is repetitive of fig 6 but omitting the first 2 measurements. Merge information of fig 3 and 6 or just keep fig 6 and omit fig 3.

Line 6: Why are you omitting the first two measurements of evaporation rate from your average calculation?

Line 14: Is photosynthetic capacity a combination of V, J and R from table 2, p24? Please clarify.

Line 15-18: More suitable for the discussion.

Line 27: fig 4, p19 How have you calculated this total pore water pressure? The data for your 3 phases have different lengths but from the control treatment the total of phase 2&3 overlap, 28 vs 90 days of measurements. If you have multiple measurements why don't you display errorbars/uncertainty with your pore pressure data? You are often comparing vegetated and unvegetated data, maybe it would aid the reader to display control and veg in 1 graph for each phase. 4b are the daily errors similar between phases? Figure caption contains repetitive info regarding daily errors. 4d As stated above this panel may be more informative with fig 2. How can 4d contain individual plant data when 3 seedlings per column have been planted?

Line 33: 50 and 70 cm data seem reversed.

Line 36: If 'these results' refer to your pore pressure data then continue at previous paragraph.

Line 37: Root growth mainly occurs between day 40 and 129 (fig 4b), did you check final root production data from your pore pressure vegetated column? That may differ from exp 1 and somehow explain the peak at 50 cm.

Line 37-38: When looking at fig 8 the actual consolidation in that period seems to be little, from day 40-129 less than 1 cm. How can you thus conclude that presence of reed affects consolidation?

P7 line 7: fig 5 (p20) 5a measurements from 20 and 70 cm seem to be missing. Have you chosen t= 92-98 for a specific reason? Figure caption mention phase 3 in fig 4 as comparison, 27cm should be 50cm in graph. Comparing between fig 4&5 is difficult because 4 is total and 5 is relative pore pressure.

P8 line 25-27: Did you check final root characteristics at exp 2?

P9 line 14-15: Please explain/discuss what it was in your experimental set-up that may have caused this.

Line 25: provide ref for vegetation type as you only checked for reed. Provide ref for soil properties or explain how your soil properties may have affected consolidation versus other types of soils. You mentioned bulk density of the soil but for example grain size, would that affect your results?

Line 27-28: In which phase did vegetation alter hydraulic conductivity or is 40% during the entire experiment.

P10 Line 23: topography of the bed? Is the water table stable in the field? How would that influence the applicability of your results in the field?

Line 23-24: Why is this important?

Line 28-30: The soil forming that you are discussing is mainly consolidation. From fig 8 it appears that vegetation (at least in this set-up) did not affect consolidation. The consolidation was mainly induced by physical processes in the first 15 days. Maybe this should be implemented as part of your conclusions.
Line 35: specify zone (80-40 cm?).

P11 line 2: Is this (plants drain but did not affect consolidation) a side effect of the experimental set-up? Would you have expected increased consolidation with reed if you hadn't kept the water table constant? If so, discuss this at 4.3.
Line 2-3: not a conclusion
Line 6-13: These are not questions as stated in line 5. Line 9-10 is rep. with line 6. Do you mean to say that 1. Roots are able to enhance drainage through macropores while simultaneously reduce drainage through soil densification and an experiment should resolve what the cumulative effect is (positive or negative for drainage). Are armouring and densification the same here? 2. Do you mean to question what else determines consolidation apart from drainage (and do you have a suggestion as to what this might be?). These 'questions' may better be posed at the end of the discussion and not in the conclusion.

Technical corrections
P1 line 37: installation
P2 line 25: 5) provide ref.
Line 27: alters, be conclusive about direction (reduce or increase or both?)
P3 line 17: Fig 1 in brackets
Line 18: remove
Line 26: redo should be repeat
P4 line 12: pore water that sqeeuzed
Line 16: remove 'It should be noted that'
Line 23: please indicate the correct number of shoots for both experiments
Line 24: Mention type of grow light upon first occurrence p3.
Line 29: remove by
Line 31: data gaps were
P5 line 8: was calculated
Line 17: remove
Line 20: showed and were, use appropriate tense
Line 28: remove 'Table 3 shows that' and add table 3 in brackets at the end of the sentence, thus focussing on the actual results.
Line 31: To correspond to the graphs this should be 0 cm, day 129. And you harvested at day 102 or is this data from harvest column 5?
Line 34: i.e. over time plants invest more in roots than in leaves?
P6 Line 1: leaf area), because
Line 6: Remove All, not correct from fig 6. Fall in > ranged
Line 11: remove 'this figure shows that' and add (fig.) at the end.
Line 21: number figs successively
Line 36: replace plants with reed as these results were specifically for reed.
P7 line 6: replace 'in the presence of plant roots' with when vegetated
Lines 7,8,10,13: is should be was / are were
P9 Line 8: Although
Line 13: Remove 'as discussed in the introduction'
Line 14: remove 'though. This' and connect sentences
Line 22: , should be .
Line 24: Replace 'wins' with 'is dominant'

Line 28: induced, after how many days?

Line 33: Verbose, remove 'A mechanism by which'

Line 35: Which macropores? This in new info reverse sentence structure

P10 line 8: decelerating

Line 29: remove dash

Line 33: start sentence with 'In the top 40 cm,' an remove the sentence after

Line 36: add (fig 5b)

P11 line 35: NCK?

P17 line 4: were combined. Maybe indicate exp 1&2 datapoints with color. In 2b control evaporation rates were subtracted from datapoints?

P19 line 2-5: merge info on 4b.

P21 line 5: remove brackets.

P22 Figure 7: why do the columns differ in height? I would expect them both to start at 80 cm, if not then at least at the same height, is the data missing?

P23 Figure 8: Have you measured sediment height in your harvest columns? As the most significant change has occurred in the first 15 days maybe you can use those data to increase your sample size (at least for vegetated). If absolute height differed you could use relative height to indicate the amount of consolidation (reduction from start oid).

P25 Table 3: Can you distinguish between root decay and intra plant variation? Root length, biomass and volume decrease from 88 to 102 days while roots continue to grow (fig 4d). This seems contrasting. Could it be the plants in harvest column 3 grew 'better' than the plants in harvest column 4? Or did something else indicate the possibility of root decay?