Please check the appropriate box or rank the answer on a scale of 1 to 3 where 1 is the highest rank and 3 is the lowest.

SCIENTIFIC QUESTIONS

I. Is this a new and original contribution? [] Yes [] No

II. Is the topic

A. Suitable for the journal? [] Yes [] No

B. Of broad international interest? [x] Yes [] No

C. Better suited for local journal/audience? [] Yes [] No

III. Is the quality assurance/quality control documented? [] Yes [x] No

IV. Quantity of data presented

[] Too much [x] Adequate [] Too little

V. Quality of interpretation and conclusions

[] 1 [x] 2 [] 3

VI. Support of interpretations/conclusions by data presented [] 1 [x] 2 [] 3

VII. Importance of this work [] 1 [] 2 [] 3

TECHNICAL QUESTIONS

VIII. Is the abstract informative? [x] Yes [] No

IX. Is the title adequate and are the keywords appropriate? [x] Yes [] No

X. Is this paper

A. Properly organized? [x] Yes [] No

B. Difficult to read/understand? [x] Yes [] No

C. Written in good grammar and syntax? [] Yes [x] No

XI. Are the illustrations/tables

A. Useful and necessary? [x] Yes [] No

B. Of good quality? [] Yes [] No – **Half and Half (see comments)**

XII. Are the references cited relevant and up to date? [] Yes [] No

XIII. Is the length of the paper in keeping with its importance? [] Yes [] No

XIV. Is a testable hypothesis presented? [] Yes [] No

XV. Overall quality of the work [] 1 [x] 2 [] 3

OTHER COMMENTS AND/OR ELABORATION OF YOUR REASONS FOR THE ANSWERS:

General Comments:

* Overall, I think the paper presents a viable evaluation of the different treatment processes for nitrogen removal with respect to the influence of the microbial communities within these processes.
* There are several issues that need to be addressed in the manuscript:
  + General experiment design:
    - The lack of any repeat samples for the SBR process strikes me as a potential issue with this study. The study concludes that this technology offers significant advantages with nitrogen removal based on the results of one sample. While it is entirely possible that this one sample is a great representation of this processes performance, what if it is an outlier to normal conditions? With only one sample the results have a slight asterisk associated with them, in my opinion.
  + The methods section needs to be greatly expanded. Here are a few of the issues in this section:
    - detailing what regions of the 16s rRNA gene were amplified for sequencing
    - What does “qualified” mean in line 121 when describing which sequences were used in OTU clustering.
    - Similarly, how was OTU clustering performed? What software was used to accomplish this?
    - Not necessarily something that can be changed now, but excluding temperature seems like an important oversight. While there may not be much change between temperature at the time of sample collection, temperature is a major factor in the nitrogen cycle and should still be measured and reported.
  + Figures:
    - Figure 7 is **extremely** hard to interpret since the authors are using separate scales on the same plot and the legend is intermixed with the caption. This figure should be reworked to better distinguish the results and make it more readable. One approach that would be fairly straightforward would be to split the graph from 2 sub graphs to 4 sub graphs, with each activity variable getting its own chart. This will, in my opinion, greatly increase the readability of this chart.
    - Figure 2 is labelled a Venn diagram, but what about the overlapping sections of the petals? This may look like a pretty chart, but in all reality it just seems to be sending a lot of disinformation with it. It appears that all neighboring petals have some kind of overlapping OTUs, when I doubt that is the authors meaning. In addition, I think this figures meaning can be easily explained in plain text without this figure
    - There is some inconsistency in the figure captions distinguishing the meaning (and labelling) of subplots. For example, in Figure 2 the identification of plot (A) and (B) comes after the meaning, while in Fig S1, the (A), (B), etc. come before the chart meaning. Either way is fine as long as it is consistent
  + Spelling, Grammar, and word-choice needs to be severely modified in this paper. There are numerous misuses of words, misspelling, and improper grammar.

Specific Comments:

* OTUs is spelled OUT several places throughout the paper (likely due to autocorrect) and needs to be fixed
* Lines 19-20, the definition of acronyms should come before the acronym and the acronym should be in the parenthesis and not the other way around
* Line 42 – “This ambition” doesn’t seem like the right wording for this sentence. Should change to “This requirement”. This sentence is also a run-on.
* Line 63 – “non-ubiquity” should be “not ubiquitous”
* Line 70 – “bio-activity” should probably just be “Biological activity” since you have not defined this short hand anywhere
* Line 87 – In the paragraph above this line, you define the acronyms for the different treatment processes but then in this line the acronyms are just mashed together to form combinations that are not defined above. This is potentially confusing. While I was able to decipher what (I think) the author intended, it would be better if the different versions were explicitly defined
* Line 130 – What does PBS mean? This acronym is not defined anywhere in the paper
* Line 158 – What was the detection limit for Nitrite in this study? There are several different methods resulting in different detection limits for Nitrite.
* Line 161 – “unmorally” is used, but this is not a moral issue. I think the author is looking for “unnormally”
* Table 2 could probably be displayed in graphical format which may make it easy to digest for the reader
* Lines 171-174 – This sentence says a trend is observed but it is insignificant. If the trend is not significant, then should it be mentioned?
* Lines 181-182 – “However, there was no shared…” this whole sentence needs to be reworded
* Fig S3 – the text identifies this as showing “Distribution of bacteria and archaea at family level” but the caption makes no mention of this showing the family level of the OTUs. This caption should be reworded to reflect this
* Line 191 – “abundance” should be “abundant”. In addition, Fig S5 should be referenced somewhere around this sentence.
* Line 197 – “The unclassified archaea at family level in DW WWTP was belonged to the genus….” – In addition to needed grammatical reformatting, it is not clear to me how the authors could have any idea what *genus* the OTUs are in if the *family* is unclassified. The rest of the paragraph goes on about the genus in this unclassified family and it seems like it should likely all be removed, since it does not seem possible to identify the genus when the family is unknown.
* Line 204 – “concern” should be “discern”
* Figure 3 – this figure groups the samples (i.e. color and shape) by treatment plant rather than treatment process. Conclusions are then drawn about the plot based on treatment process (line 210-211) even though another plant with the same treatment process is in the main cluster. The rest of the paper focuses on clustering samples by treatment method and this seems like that should be carried out here as well.
* Lines 225-228 – “It was not able to distinguish aerobic ammonia-oxidizing bacteria, nitrite oxidizing bacteria and comammox bacteria based on 16S rRNA genes at genus level. … Therefore, all of Nitrobacter, Nitrosocuccus, Nitrosomonas, Nitrosospira and Nitrospira OTUs were merged as nitrifiers.” – This paragraph is confusing. The authors suggest that classification prevents them from identifying individual genus or species but then they are separated by genus in Fig 5 A. In addition, as part of you case you say that *Nitrococcus mobillis*  is an NOB and *Nitrosococcus oceani* is an AOB but these species are not even in the same genus…
* Lines 244 – “abundance” should be “abundant”
* Lines 248 -250 – this sentence does not make sense and needs to be rewritten
* Line 255 – “dominated” should be “dominate”
* Line 281 – “might confirm” is a pretty passive way to begin the discussion of your research
* Lines 293 – this sentence needs to be reworded
* Line 305 – “Inconsistence” should likely be “Inconsistency”
* Line 306-310 – This paragraph starts with a long run-on sentence that is only half coherent.
* Lines 329-332 – Same as above. The sentence is a run-on and is not very clear as to the authors meaning. In addition, this comments on the SBRs operating conditions leading to a favorable microbial condition (as far as I can tell) but this is hard to confirm from this study since this is the treatment process that was only sampled once.
* Lines 349 –16s should be 16S

RECOMMENDATION

[] Accept without revision

[] Accept with minor revision (please indicate what form the revision should take)

[x] Accept with major revision (please indicate what form the revision should take)

[] Reject

Please note that your recommendation and reviewer report are expected to cover the Highlights and Graphical Abstract if submitted with the manuscript.