Response to Reviewer 1 Comments

Point 1:
Line 33: non-point (and not nonpoint) as in the rest of the text.

Response 1: Corrected to non-point.

Point 2:
Lines 35-36: even if the reference 7 is relevant, in my opinion it is misleading ... as stated by the authors "nitrogen pollution has been identified in the large portion of water bodies” therefore it cannot be defined as an exclusively concern in the saltwater management. Moreover, as the authors will certainly know, the major sources of nitrogen come from agricultural activities, and I expected to find some references about it, which I did not find:.

Response 2: (Therefore, nitrogen became a primary concern in stormwater management) [7]. I meant stormwater not saltwater, it is software checker error. Line 80-82: Nitrogen represents a highest rated nutrient in stormwater runoff [7]. Nitrogen concentrations in stormwater differ according to land use activity such as residential land, parking lots, highways, commercial use areas and agricultural lands [6]. I added agricultural lands in the text as well as in Figure 1 agricultural land ref [38] (M. Lang, P. Li, and X. Yan, “Runoff concentration and load of nitrogen and phosphorus from a residential area in an intensive agricultural watershed,” Sci. Total Environ., vol. 458–460, pp. 238–245, 2013.

Point 3:
Line 47: Correct the section title with 1.1 and not 2.1.

Response 3: Corrected to 1.1 (1.1 Stormwater Runoff Characteristic).

Point 4:
Lines 66-68: The typical pollutants characterizing stormwater runoff (TSS, N, P, BOD and COD) are mentioned, but the sources of these pollutants are not described, which could be especially useful for a review and for readers, particularly in the choice of the most appropriate BMP or LID (beyond the bioretention system here analysed).

Response 4: The source of pollutants is added: Dissolved pollutants include nutrients, heavy metals, and hydrocarbons and mainly result from emissions, fluid leaks from vehicles, and agricultural operations [25]. Pollution may occur by direct runoff, or by infiltration through the root zone then discharge to surface water [26]. The pollutants corrected to:; There are typical pollutants characterizing stormwater runoff, the most common pollutants are, total suspended solids (TSS), nutrients including total nitrogen (TN), ammonium-nitrogen (NH4-N), nitrate-nitrogen(NO3-N), nitrite-nitrogen (NO2-N), total phosphorus (TP), and orthophosphate (PO43−) [27]. The classification of pollutant load according to Water Quality Standards [28,29] is shown in Table 1. There are five classes, class I is clean water, class II is moderately polluted, class III is heavily polluted, class IV excessively polluted, and class V is extremely polluted.

Point 5:
Lines 75-76 and Figure 1: I suggest inserting an explanation of the sources of each nitrogen pollutant both for completeness of the revision and to better clarify the graph shown in the Figure 1;

**Response 5:** The explanation of the sources added: Nitrogen concentrations in stormwater differ according to land use activity such as residential land, parking lots, highways, commercial use areas and agricultural lands [6] as shown in Figure 1. Higher concentrations of nitrogen were found from emissions (e.g. high density traffic and commercial areas) and agricultural land [30].

*Figure 1 changed.

**Point 6: Section 1.2 and 1.3:** In general, these sections (1.1, 1.2 and 1.3) should be improved; many concepts are poorly written and exposed in a confused and approximate way ... often the same concepts are repeated in different parts of the text, citing studies without a common thread.

**Response 6:** Sections (1.1, 1.2 and 1.3) have been rewritten.

**Point 7:** Line 80: Correct the section title with 1.2 and not 2.2;

**Response 7:** corrected to 1.2

**Point 8:** Lines 82: I think it’s necessary to insert some more References (over the 35 and 36);

**Response 8:** Line 88 the description of figure 1, the missing references [31-38] were added. Then continued in Line 91: references [39,40].

**Point 9:** Lines 86-88: The authors state that "Water quantity control is measured to curb post construction flash flood problems while erosion and sediment control is measured to minimize erosion and sedimentation problems during construction". authors should better conceptualize the distinction between "post- and during- construction" problems, that here it is not clear;

**Response 9:** Corrected Line 97-98.

**Point 10:** Table 2: since the revision is not specific to the Malaysian territory, the authors should specify (not only by Reference number) that the standards shown in the Table 2 are not generalized but are only refer to Malaysia.

**Response 10:** For water quality standards in table 1, changed to national standard table 1 according to ref “Chemical assessment methods EU-wide environmental quality standards – chemical status National environmental quality,” For table 2; Minimum Pollutant Reduction Targets in BMPs and LID was changed to new table 2; Classification of reduction targets according to LID and BMPs.

**Point 11:** Line 99: I think is a journal editing problem, but I suggest moving the title of the section 2.3 to the other page. Moreover, correct the section title with 1.3 and not 2.3.

**Response 11:** The title of the section 2.3 corrected to 1.3 and repositioned.


**Point 12:** Lines 101-102: The sentence "In recent years, there has been an increasing interest in bioretention for stormwater quality treatment" needs to be supported with reference;

**Response 12:** Ref 49, 50, 51

**Point 13:** Section 2 (and related subparagraphs 2.1 to 2.4), as well as section 1, is approximate and not comprehensively described; it seems that the authors have included a number of sentences citing other studies, but without following a precise logical thread, except the title of the paragraph (and not even always).

**Response 13:** this section has been corrected and rewritten from 2.1 to 2.4.

**Point 14:** Lines 147-149: Among the factors influencing nitrogen removal the authors cite vegetation, soil filter media, N concentrations and hydraulics factors, but I believe that there are other factors to be analyzed such as: 3 - Temperature dependence [look at Blecken G.T., et al. (2007). The influence of temperature on nutrient treatment efficiency in stormwater biofilter systems; Blecken G.T. et al. (2010). Laboratory study on stormwater biofiltration: Nutrient and sediment removal in cold temperatures]
- Structural Configuration [look at Jiang et al. (2017). Experimental study of nitrogen removal efficiency of layered bioretention under intermittent or continuous operation.]
- Saturated zone (wet and dry periods) [look at Wang et al (2018). Effect of saturated zone on nitrogen removal processes in stormwater bioretention systems.]

**Response 14:** Nitrogen removal in bioretention is always variable and mainly dependent on some factors such as vegetation, soil filter media, influent concentrations and hydraulics factors [10,64,69]. We have discussed some design factors and still there are many factors but not under designing factors. There are climatic factors and they are not of concern in this paper.

In section 3. Nitrogen leaching
The effect of temperature is added
(However, the temperature has also shown a clear effect on nitrate leaching. In cold areas (2 to 20 °C), the nitrogen removal was poor and leaching was observed, which increased with temperature decrease [111])
The reference is The influence of temperature on nutrient treatment efficiency in stormwater biofilter systems; Blecken G.T. et al. (2010). Laboratory study on stormwater biofiltration: Nutrient and sediment removal in cold temperatures] is cited as you suggested.
hydraulic conductivity in line was added in section 2.4.
Configuration was discussed under filter media.
Saturated zone is considered a design feature to improve bioretention performance and it discussed separately in section 4. Design Features that Enhanced Nitrogen Removal, and the section has been rewritten in detail: (In some bioretention systems, the poor N removal could be enhanced by retrofitting of the saturated zone to create anaerobic conditions for effective denitrification process. It is well known that, high removal efficiency of nitrogen requires the ability of the system to provide aerobic and anaerobic conditions to ensure good removal and avoid leaching [129]…….)
References 69, 87, 114, 129-133 all about saturated zone.

**Point 15:** Line 162: The authors, referring to Reference 61, claim that "native species are more effective than exotic ones", but - as reported below - the reference cited affirms the contrary "no scientific results can support the hypothesis that native plants or diversely-planted systems offer better performance than systems planted with fewer species or with exotic species";
Response 15: This sentence has been removed.

Point 16: Table A1: Since the aim of this Table is to summarize and evaluate the different plant species for nitrogen removal in bioretention studies, I suggest to invert the column "Site Name" with "Type of Plants used" and introduce units (I guess are concentrations in mg/l or %).
Lines 163-166: Observations and comments made in these lines should be (also) related to the table just shown (Table A1);

Response 16: (%) added to the table title and suggestion done.

Point 17: Page 6 Section 2.3: Considering the topic of the revision, I find this section too short; Lines 224-225: the sentence “The higher the nitrogen load of stormwater discharged from the bioretention was because of nitrite and nitrate”, as written, does not make sense;

Response 17: Sections have been rewritten.

Point 18: Section 4: I thought it was a paragraph more focused on the different design/construction details that influence nitrogen removal (eg length/slope of the bioretention system, stratigraphy, layer thickness)...but, apart from Line 254, I find nothing about this.

Response 18: This section is 4: Design Features that Enhanced Nitrogen Removal, it is about how previous work improved the removal of nitrogen by adding some features, it is not about the general design details which already discussed in section 2 including 2.1, 2.2, 2.3 and 2.4. Suction 4 has been rewritten.

Point 19: Table 5: I find it useful this table but I do not find correspondence with what is written in paragraph ... I expected to find the same references or - at least - find those mentioned in the text. I would also suggest not limiting the analysis to a single study for each type of design feature but to compare different ones and/or create sub-groups;

Response 19: Table 5 combined with table 4 and discussed together as design features to improve nitrogen removal because they reflect the same meaning. The discussion was rewritten from line.

Point 20: the suggestion of some references for citation

