Response to reviewers:

Comments from reviewer 1:

Based on CFD simulation and laboratory experiment, this manuscript proposed a framework to evaluate the relation between wind and runoff of high-rise building. Both mathematical and experimental results are well prepared and in good comparison. The topic fits well to the scope of HESS journal, the results are unique and interesting. I recommend minor revision before potential publication in HESS and have the following concerns:

How high are the buildings to be considered as high-rise?

Reply: In architecture, the definition of high-rise building varies with different countries and regions. Generally, buildings higher than 28 meters are considered as high-rise buildings in China. In this paper, we focus on high-rise building areas in which the average ratio of building height to distance between two buildings is larger than a threshold (for example 0.2). In these areas, the building walls can be considered to have obvious impact on runoff generation. Thank you.

Runoff from walls may flow into pervious areas like grass land etc. around the building.

Reply: Yes, you are right. In some building areas, especially those older building areas, runoff from walls may flow into pervious areas. However, in many newly built high-rise building areas, runoff from building walls flow into the drainage system directly through dispersal and cut-off ditches around buildings. Our study focuses on this type of building areas. The explanation has been added in the manuscript. Please refer to line 58-59. Thank you.

It is concluded that rainfall with larger droplets is less influenced by the wind, while larger droplets also mean large amount of rain brought by wind, what is the balance here.

Reply: The total amount of rain falling on building walls influenced by wind is calculated by considering both the raindrop trajectory and the rainfall intensity through Equation 14. Thank you.

It seems the area of building, or the ratio of building area to the whole area, is associated with the runoff coefficient calculation.

Reply: Yes, the ratio of building area to the whole area can affect the proportion of impervious surface, so it is associated with the runoff coefficient calculation (see Equation 17). Thank you.

Based on the results of this study, the impact of wind on runoff coefficient is not that significant, under which circumstance the influence could become more important.

Reply: According to Equation 17, the influence of wind can be more important in the area with more high-rise buildings and large infiltration capacity. Thank you.

Figure 6 reveals that… Additional explanation of the differences of rainfall intensity is expected, and should these differences be modified for reaching consistent runoff results? although the intensity values are not used in the runoff coefficient calculation as in Figure 7.

Reply: We have put the relevant explanations of Figure 6 in the discussion section. "Figure 9 and 10 can explain the decrease in rainfall intensity caused by wind. The figures show that the rainfall area increases as wind speed increases, resulting in a decrease in rainfall intensity according to the law of conservation of mass." Please refer to line 376-378.
We reduce the effect of rainfall variability by dividing the runoff by the total amount of rainfall on the experiment platform (See Equation 17). Thank you.

In Figure 10, diameter 1.5 mm does not match with the values in Table 1

Reply: Sorry, this is a typo. It has been corrected in the revised version. Please refer to Figure 10. Thank you.

Comments from reviewer 2:
General comments:

This paper discusses the development of an equation to describe the effects of wind on the rainfall-runoff process in areas with high rise buildings, developed using a CFD method and validated using scale model-based experiments. It appears to be well-structured and well-written, with referencing of relevant material and limitations clearly stated and accounted for where appropriate.

The paper appears to be appropriate for, and of interest to the readers of, HESS. I suggest below some changes that I believe are needed before publication, but most of these are fairly minor in nature. Please find some specific comments and technical comments below.

Specific comments:

Although this method appears to be novel, a recent work by Yoo et al. (2021) in the Journal of Hydrology, titled "Change of rainfall–runoff processes in urban areas due to high-rise buildings", covers some of the same material. I think that it is vital to acknowledge this early on in the work (e.g. in the introduction) and explain how this paper is still novel. Some comparison of the results from the two studies would also be of interest, where the results are comparable (perhaps added in the discussion section).

Reply: Thank you for your suggestion. we have explained how our manuscript is still novel compared to the recent work by Yoo et al. (2021) in the revised version as follows:
"Yoo et al. (2021) reveals the impact of high-rise buildings on runoff hydrograph though a newly improved hydrological model and a laboratory experiment. However, their work ignores the infiltration and focuses on changes of peak flow mainly caused by changes of flow path in high-rise building areas. The paper does not elucidate the effect of wind on runoff

generation in high-rise building areas at the physical level." Please refer to line 60-64.

Since the two papers have different focuses, the results are hardly comparable. We do not compare the results of the two papers in the revised manuscript. Thank you.

Technical comments:

Line 17 (abstract): Main result 2 here does not mention the angle, although this is mentioned in the conclusions, so that it may be of interest to add here too.

Reply: It has been added (see line 18). Thank you.

Line 49: \varepsilon is shown here (and throughout the paper) instead of the symbol itself.

Reply: It has been corrected. Thank you.

Line 191: I think "cube" should be "cuboid", as not all sides are of equal length.

Reply: Yes, you are right. It has been corrected in the revised version of the paper. Thank you.

Lines 274 and 276 (Figure 4 and 5): The individual lines of the plots are hard to see here. Can the line width and/or plotting symbol size be reduced to make these plots clearer?

Reply: We have redrawn the picture as your suggestion. Please refer to figures 4 and 5. Thank you.

Lines 314 and 331 (Figures 8 and 9 captions): A bit more explanation is required here. For example what exactly do "Location x" and "Location y" mean? I think "x" means different things on different plots, but "y" is always along the vertical direction? It would be good to clarify this.

Reply: Location x means horizonal position while Location y means vertical position. The figures show the values of the relevant variable at different positions in two-dimensional plane space. The explanation has been added in the revised version of the manuscript. Please see line 319-320 and line 340-341. Thank you.

Line 348: "spatial" should be "spatially".

Reply: It has been corrected. Thank you.

Line 362 (Figure 13 caption): The caption states that the Figure shows uncertainty, but it does not look like this is what the plot shows. Can this be checked?

Reply: The caption has been revised as "The rainfall intensity atop the scale model under

different wind speeds for rainfall 1 of three replicate trials". Please refer to 371-372. Thank you.

Line 370: I think there is a missing word after "impervious".

Reply: Yes, you are right. it should be "impervious building walls". Please refer to line 380. Thank you.

Changes made in the manuscript:

1. line 58-59 in the marked manuscript.
2. line 60-64 in the marked manuscript.
3. Line 18 in the marked manuscript.
4. Figure 4 and Figure 5 in the marked manuscript.
5. Line 319-320 and Line 340-341 in the marked manuscript.
6. Line 371-372 in the marked manuscript.
7. Line 380 in the marked manuscript.