Responses to comments of Reviewer #1:

We thank the reviewer, Raphael Paris, for the very thorough review and generous comments on the work under review. We are pleased to have found their suggestions exceptionally insightful, and our responses are as follows (in bold black), in order of the written comments (in blue):

The use of the Volcanic Explosivity Index VEI (e.g. at lines 8-9, 264, 266, 320-324, 371) is not fully appropriate here, because it is based only on the total erupted volume. Here you are dealing with short discrete explosions. You can keep the VEI values in Table 1, for information. However I would recommend referring to the energy or mass eruption rates in the text.

- Thank you for this point, we shall either replace instances with energy/rate or remove reference where this is not necessary.

I suggest adding a sentence on the tectonic setting, which is too briefly mentioned at line 24: "The 350 km-long TVZ forms the southern part of a back-arc basin behind the Tonga-Kermadec subduction zone. Most of the eruptive centres are aligned along the intra-arc Taupo rift."

- Thank you, we accept this and will insert as-is at sentence end on L25.

The TVZ cannot be considered as a purely silicic magmatic system, because the magmas erupted range from andesites to rhyolites.

- We agree; this may have persisted from when actually discussing the local reservoir beneath Lake Taupo, rather than the TVZ as a whole. "silicic" will be removed from L24.

At line 169 you state that "the water and explosion depths are equivalent." This is valid only in the case of a new vent formed on flat lake bottom. If the explosion comes from a pre-existing submarine cone, then explosion depth and water depth are not equivalents. This statement should therefore be qualified.

- The "water depth" of these explosions is limited to the immediate surrounding directly underneath the explosion. As these parameters were designed for explosives which could be held midway through the water column or near the surface, these were designed to help determine the shallowness of an explosion and account for the effect of the bed directly under any explosion (Méhauté & Wang, 1996). A volcanic explosion is inherently from the surface beneath the water, so therefore the water depth at the explosion must always be the same as the explosion depth, even with a shallow change in the surrounding due to a volcanic cone.

- In any case, while this may pose an interesting investigation possibility with a particularly steep cone, the scenario locations in this study are not placed in locations of steep bathymetry. To clarify these points within this work, an additional clause will be inserted at L169 to reflect the above point.

I suggest slightly reorganizing the paper as follows:

3. Results

3.1. Tsunami propagation and wave heights at the coast

3.2. Tsunami inundation and potential impact on infratructures

- We accept this good suggestion for structure with thanks. Sections 3 and 4 will be made into the suggested two sub-sections as-is without additional text.

In the discussion, we lack a short discussion (at line 324?) on the probabilities mentioned on Table 1, in the light of the new results obtained here.

- Thank you for this point; given this verges towards a full probabilistic assessment, we instead suggest a short inclusion at this point to note the relevant uncertainties and how a more formal study may be undertaken with the information from this study.

The scenario presented at lines 330-334 is very pragmatic and relevant. Indeed in the case of such an eruption, all people would be probably evacuated before a tsunami could impact them. Could you add a short sentence of the consequences in terms of evacuation policies?

- At this point we shall add that any evacuation routes that require transportation links adjacent to the lake shore should be assessed for potential compromise from any such tsunami.

In the conclusion, maybe you could formulate some recommendations for a local tsunami warning system in Lake Taupo?

- The relevant timeframes involved in this hazard are likely too short to recommend any kind of reactive warning system. Instead it may be best to rely on education, awareness and preparedness. We will ensure this point is raised in the conclusion.

Line-by-line corrections/suggestions:

line 7: "This minimum size corresponds to..."

9: "slope" rather than "run-up"?

37: "(HTHH, January 2022)"

- We agree with these corrections/suggestions.

37: You could cite other references on the HTHH tsunami (e.g. Carvajal et al., 2002; Omira et al., 2022).

- Agree - this manuscript was originally submitted prior to most of the recent work developing from that event.

41: cite also Maeno & Imamura (2011) for the 1883 Krakatau tsunami debate.

56: "and in the present work it is..."

- We agree.

59-63: this sentence is perhaps too long.

- We agree; this is adjusted as also asked by Reviewer 2 (see other response for detail).

92: refined against what?

- Clarify to:

"...for instance, in tsunami models it is the free-surface elevation field that is typically used for refinement criteria."

127: 7% of what?

- Clarify as "...maximum 7% of recorded tsunami sources as determined by..."

128-129: not sure if these lines are really useful here.

- These couple of lines related to an earlier comment about the importance of awareness and preparedness rather than reliance to on warning systems.

194: "'We selected the five..."

- We agree.

230-232: again, this sentence is a little bit long.

- Will change to (removing last part of sentence):

"Fig. 6 compares the crest amplitude and velocity data between the different simulations. This shows that a positive relationship exists between both crest heights and horizontal wave velocities at the shore and the explosion energy (and, therefore, also ejecta volume and MER)."

248: refer to Fig 6 (c-d).

- We agree.

257: 1 m instead of 1 cm?

- 1 cm is correct as the plots show the extent of inundation which exceeded 1 cm depth.

340: "asteroid-ocean impact, megatsunami from ocean-island flank collapse, and the recent tsunami..."

- Agree to change, excluding "megatsunami from".

345: "over half a decade old " -> a reference is needed here.

- Will reference the past technical reports and associated work documented and reviewed in Méhauté & Wang (1996)

350-352: I was quite surprised that you don't cite here the work of Shen et al. (2021a, 2021b).

- Many thanks for this, we will include.

367: "of what any tsunami hazard"

- We agree.

384: What is the address of the website where Basilisk can be found?

- EGU formatting requires it to be contained in references.

Suggestions on figures:

change the colour of the eruption sites on figure 2 (white or yellow?).

- We shall adjust the colour of the markers to make them darker yellow or orange, dependent on visual accessibility.

Fig 4: add source location (eruption sites) on the maps (same for fig 5).

On the left side of fig 4, could you please mention the location number (1 to 5) as in Table 2, for more clarity (same for fig 5).

Fig 6: add a dotted line to indicate the 1 m threshold value?

Fig 6 c) d): in the caption, indicate that the first numbers refer to the scenarios and the name to the source locations 1 to 5.

Fig. 8: Indicate to which closest source it corresponds on the different maps (same for fig 9).

- We agree with these suggestions. Many thanks for identifying these oversights and potentials for improvement.

References:

Le Méhauté, B. and Wang, S., 1996. Water waves generated by underwater explosion (Vol. 10). World Scientific.