General comments.

1. I find the abstract and intro confusing as it is stated that you (we :-) propose an approach to estimate the magnitude and zone of influence. I read this as our two measures of influence, however later on in the abstract and intro the focus on “two measures of influence” refer to a measure based on nearest infrastructure and a measure based on the accumulated effect of all infrastructures (of the same kind, inside the ZoI).

**I have worked quite a bit to develop more the part on definition of concepts and derivation of the equations, as well on keeping it well synced with the Box with definitions and the introduction. I hope the new formulation and nomenclature deal with that.**

1. I believe we need some more focus on the two measures, or aspects, of influence (magnitude and zone) initially (e.g. the description of magnitude is very poor inn Box 1). I believe we could have a separate section on measuring influence where the influence function Ik(β, φ) associated with infrastructure k is defined as a multiplicative function of the magnitude of influence as modelled by beta (maybe a function in its most general form, as in principle it may vary in space and time due to environmental variation) and the spatial pattern of influence as modelled by the phi function. In this case I wouldn’t use βX on the left side in equation 2-4, rather use Ik.

**Ok, I defined better the Impact Ik = βk φk and replaced some nomenclature (e.g. effect size instead of magnitude of the impact), so to avoid defining new things that are already consolidated in the literature. In this way, the impact is defined as the effect size and a spatial component φ that shows how the impact varies spatially. I also worked mainly on the text on explaining how the two influence measures φnearest and φcumulative lead to two possibilities of assessing the impact.**

1. (Also, have to say I would prefer the use of some other subscript than φcum , e.g. φcumul, I may have a culturally more rough background than you 😊).

**Done! But then I preferred (so far) to call them φnearest and φcumulative then, which is more straightforward.**

1. In this section you should also give the parametric form of the phi-functions you use (could be in a box). In some cases, these may have ZoI as a parameter, but in other cases how to estimate ZoI should be specified.

**I thought about it, but we have an issue with the paper length. I could put it in a concise table but I tried to highlight that those specific functions are not the focus – they are just examples or possibilities. So I am adding their formulation parameterized on the ZoI to the Appendix A instead. What I did in the text in section 2 is to clearly define now that the influence functions φ could be any decay functions that goes from 1 towards zero as the distance to the infrastructure increase, and then point to Appendix A for more details. Do you think this would be enough?**

1. We should also point out the usefulness of ZoI as a descriptive statistic for a given infrastructure. (I don’t like the x-axis on figure 1B, as it is named distance, I expected a decreasing trend from zero, ).

**Still need to be worked, I’ll come back to that in my final review next week.**

**About the x-axis in Fig 1B, I totally agree. But I did not think about a good name yet. Maybe “Spatial dimension”?**

1. As pointed out above, more focus should be also on the interpretation of the beta parameters. Bullet points being relative effects of change in 1 on the phi scale, multiplicative effects across infrastructure types in the exponential model.

**Done, thanks for the comment!**

1. In the abstract we state that a main delivery is a test for whether influence accumulate across several objects of same infrastructure. However, in the main methods part – part 2-3 in the paper, this is not developed. I think section 3 could be rephrased to focus on this method. I wouldn’t use call it a “test”, but an evaluation of whether accumulation is important. To me it seems like the method suggested is to fit models based on nearest infrastructure and φcumul, and compare models using AIC.

**Perfect! I use “evaluate” instead of “test” now.**

1. You could then continue by describing situations when they should be the same (no evidence of cumulative impacts) (ZoI small in relation to density) and how spatial distribution affect estimates. I didn’t find the title and text used to describe the simulations done that relevant/precise (e.g. “which conditions the two measures of influence represent different gradients of spatial variation” in abstract, and “represent similar spatial variation” in heading of section 3).

**I worked on this text to try to make it clearer. The point of this section is mainly to show that in some cases (depending on the ZoI and spatial configuration), φnearest and φcumulative are too correlated, so this might decrease our ability to detect these cumulative impacts. It does not mean they are not there, but that in a given study area or context, we lack in power to infer that. The main point of this section is to highlight that, so that readers are aware and can really say whether their findings are an absence of cumulative impacts or an absence of statistical power to detect it.**In my opinion the spatial variation in infrastructure is independent of the measures but affect estimates of in particular magnitude (β) (and perhaps ZoI too?). furthermore, it is also a biological aspect to this. Some infrastructures may be less prone to accumulative effects, independent of spatial configuration, I don’t know.

**True. But that goes beyond the discussion in this section, and I tried to make it clearer now. I discuss this point more in the illustration example and Appendix C, as well as in the discussion.**

1. When it comes to the practicalities of model fitting/estimations, quite a bit on estimating phi functions is hidden in section 4. I think it should be made more explicit, perhaps as a separate section, or part of section 3 (and rather do the spatial simulations a new section). It is unclear to me how some of the models were estimated. Ok, the threshold and linear decay versions are obvious given when ZoI is known, but the Gaussian and exponential decay functions have additional parameters that needs to be estimated or specified/defined as a function of ZoI.  
   **I did not want to emphasize that because this is not the point of the paper – the point is how to process the input covariates to calculate φ measures which are based on the ZoI, and then use this in whatever statistical analysis approach we want. But I recognize this was not clear. So what I did is:  
   - I added a short session 3 where I show this, including a new Figure, to emphasize this step before data annotation and statistical analysis, and letting the reader/user decide if they want to do model selection and AIC, machine learning, or other methods to define the ZoI and evaluate if and how the impacts accumulate.  
   - I also added a figure (but only in the supplementary material, Appendix C) with the steps for model fitting that we used in our illustration case study with reindeer, to make it clearer.**

Minor

1. I would prefere to call X in eq 1 a matrix and X1 etc vectors. Alternatively introduce a index for space (i) in eq. 1. If you go for the vector formulation you have to write Xbeta, rather than beta X in the equation. I think you should also first use a more general version e..g. w(X) = exp(X beta+ E alpha) where X beta can be described in more detail as in eq 1 (perhaps remove beta\_0, and only use alpha\_0) while E is a matrix of other environmental variables (not infrastructure) and alpha is associated coefficients.

**This is a good suggestion, but I am worried because of space. Also, in a way I like the notation we used (less synthetic) because we can clearly show the different terms, which are illustrative for a reader not used to statistical language. The point of the other environmental variables is very important, but to not increase the number of equations I kept eq. 1 as it is. However, I added in the text that these variables might also be in the formulation (minor change to the text) and also added those variables to the new Figure 3 (with the workflow, which I mentioned above), so that it is clear that other variables could/should also be in the analysis but are not shown in eq. 1.**

**That is how it is so far, but we can still change it further if you feel it is important.**

1. Fig 2 error in legend “correlation between phi\_nearest and phi\_nearest in each landscape” should be “correlation between phi\_nearest and phi\_cumul in each landscape”  
   **Done.**