KEM Innovation/Research Question (max. 4 pages + annex)

TITLE ***Comparison of seismic impact assessment approaches of NAM and NPR***

Objective

The objective is of this research request is to compare the two impact assessment approaches and models used to determine the expected damage to buildings and safety risks due to collapse: the Groningen seismic hazard and risk model of NAM and de assessment approach of NPR. Given the safety and building norms in The Netherlands, various - may be too conservative - safety factors are incorporated in the approach of NPR. The objective is to clarify the approach, applicability and robustness of the approaches followed.

State of the art, background

In Groningen damage to building have been observed (see Staalduinen, Roos, etc.). A strengthening program for the risk prone buildings is currently underway to mitigate seismic safety risk, starting in the most risk prone areas. NCG is coordinating this program.

The strengthening measures to be taken are defined by applying the safety and damage risk assessment approach of NPR, which uses the most up to date expected PGA and PGV maps available from the NAM seismic HRA model.
The impact assessment includes four steps: (1) soil-construction interaction (see Crowley), (2) structural response or resistance of the building, (expected Damage class, see Crowley, Arup et al, Michalaki) and probability of collapse and casualties (see Taig).

In the NCG organised platform meetings several questions were raised to clarify the differences in impact assessments of the NPR and NAM approaches.

Research Question

1) ***Are or can currently applied seismic impact assessment models used by NAM and NPR be aligned or harmonized, improved based on a critically review checking amongst others the possibility of an accumulation safety risk factors in the underlying models.***

2) ***Are the norms used for seismic risks and vibration hindrance (railway, pile installation, etc.) comparable, what are the best practices in modelling and can this be further harmonised and simplified in The Netherlands? What can be learned by the building sector?***

Deliverables expected

Critical Review Report, including suggestions for clarifying, improvement or harmonisation strategies and suggestions for improve normative system for dynamic seismic loading to buildings.
Suggestions for improving the Normative system for vibration risks in The Netherlands aligning it with European standards or vice versa.

Timeline

Three month.

Expected use

The results will be used by NCG, EZK and SodM for interpreting:

- and specifying seismic hazard and risk assessment instruments (impact models)
- optimisation of the building strengthening program scope in Groningen
- the normative system voor external dynamic loading risks to buildings