

Input by Dr. İhsan Engin Bal, Professor on Earthquake Resistant Structures
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at the

Round Table on “Handling Mining Damage in Groningen - *Afhandeling mijnbouwschade Groningen* ”

on

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Introduction

I would like to have a short introduction of myself here. I am a civil/structural engineer with expertise in earthquake engineering. I have dealt with earthquakes and structural damages in several seismically active countries, worked as an engineer for assessment and strengthening of structures against earthquakes, worked in or directed national or international scientific projects and authored several peer reviewed papers and publications on seismic behaviour and strengthening of structures ([please click for the detailed CV](#))¹. I am member of technical committees on behalf of National Coordinator Groningen and Ministry EZK. I have consulted SoDM on the latest KNMI issue of wrong measurements. Together with other colleagues from industry and other research organisations in the Netherlands, we have recently formed the Dutch Earthquake Engineering Association, and at the moment I serve as the chair of it. I have strong ties with earthquake engineering professionals and the scientific world not only in Europe but also around the globe. My views on the earthquakes in Groningen are combination of my international experience together with my interactions in the last 2.5 years with all relevant stakeholders including technical experts, state administration, NGOs, and people in the region of Groningen. I summarized my views also on a booklet titled “[Myths and Fallacies in the Groningen Earthquake Problem](#)”, that is published by Hanze in June 2018².

I am invited by the House of Representatives (*Tweede Kamer*) to a round table discussion on Handling Mining Damage in Groningen (*Afhandeling mijnbouwschade Groningen*). In this short document, I try to summarize my views, not only on the damage claim issues but also on other matters related to handling of earthquake damage in Groningen. Apart from stating the problems, I also propose solutions with a technical base. In this current document, I present the basics of, what I call “*The Comfort Plan*” for handling the damage. More details on the plan will be provided in a further stage.

I am a technical expert. However, in NoorderRuimte, Research Centre for Built Environment at Hanze, related knowledge on social aspects of the problem is available. Overviewing these different knowledge areas, I conclude that the foundation of any solution for Groningen is

¹ A detailed CV can be found at:

<https://drive.google.com/file/d/1tBUDZsOUclu5OWwEkF2Dzn5XWJy6URQR/view?usp=sharing>

² The booklet can be found at: <https://bit.ly/2WLXBzI> (or by searching “hanze+myths+groningen” in Google)

restoring “*trust*”, a property that is absent in the region for a long time. My technically-oriented proposals will only be fruitful in connection of social problems, especially the restoring of trust.

The Comfort Plan

Currently, the existing damage claim system seems to be hampering seriously, and this is the very reason why we are gathering around the round table. Moreover, the very reason why TCMG and the Ministry EZK are trying to correct it, with great effort, is that it does not work. But the existing system is wrong as a system, thus any improvement can only give a temporary relief with an ever-increasing cost, and only until the next “sensational” earthquake. Thousands of files will pile up in the next 3+ magnitude earthquake, yet again. It only reminds me of the Red Queen’s Race from the Alice in Wonderland³.

In the TV program De Monitor on 21st of April 2019 and in my inaugural lecture “[Myths and Fallacies in the Groningen Earthquake Problem](#)” (Groningen, June 2018) I describe the existing damage claim system as “*Mission Impossible*”. More than a year has passed from the time I published the book, and the developments over time, unfortunately, only have proven my statement.

I hereby propose “*The Comfort Plan*” as a possible solution. First, I need to explain the conscious choice of the word “*comfort*”, because it basically brings down all the elements of the philosophy behind it. Comfort is a state of physical ease and freedom from pain or constraint, that is the trouble of the continuous earthquakes in our case. The bottom of the whole “*Groningen issue*” is that the people in Groningen are not only entitled to have the same level of **safety**, per Meijdam norm dictated, which is the constitutional obligation of any elected government by definition anyways, but also the same level of **comfort** as other people in the rest of the Netherlands. I obviously do not mean the quality of life or income. What I mean is that, the people in the rest of the Netherlands have “*ease and freedom from pain or constraint of flood danger*”, for example, thanks to the efforts of several decades of investments and world-class work of Dutch engineers. The people in Groningen thus deserve the same level of comfort, not only from flood but also from the earthquakes. The way the Dutch society fought with flood and managed to relieve the worry of flood from the everyday life of citizens is the way to be followed for earthquakes as well. When the earthquake problem is placed in comfort perspective rather than the safety perspective (because the safety has to be granted to the residents anyways) then the contrast becomes clearer and the existing policy of damage-claim procedures becomes irrelevant.

My proposal has two levels of compensations: **i**) a risk-based (not hazard-map based) compensation that will cover the cracks when vibrations reach to a level of being significant, and **ii**) an additional unconditional compensation to the loss of comfort for the people in the region via a regular financial support. This regular compensation can be related to a fraction of the profit from the gas extraction and paid annually to every house/family/individual in the region. This is an idea based upon other examples [in the world \(see an example from Alaska\)](#). This compensation can be paid by an index between 0 and 100, based on risk (not based on hazard or a hazard map). The index may take the value of 100 in Loppersum, for example, and 0 somewhere outside a buffer zone from the gas field.

The claim threshold is at zero at the moment. It means that, even a house owner far from an earthquake epicentre, and with possible close-to-zero shaking, can file a compensation. When an unconditional (i.e. not conditioned to damage proof) compensation scheme is set, this

³ https://en.wikipedia.org/wiki/Red_Queen%27s_race

threshold will be set higher. It means that, only the owners of the houses with considerable shaking will be entitled to claim further damage as mentioned in *i)* above. Defining the level of “*the considerable shaking*” is more the topic of earthquake engineering. We have worked on this at Research Centre for Built Environment NoorderRuimte at Hanze University of Applied Sciences, and came up with the idea of the “*CLE – Comfort Level Earthquake*”. The technical details of this can be found in the attached conference paper.

There are conditions for The Comfort Plan to work well. These are:

- *All existing measurement network, including NAM/TNO, should be improved and should be open source (not the individual and private data but an overall shakemap with high resolution), so that we can estimate the vibration levels for all buildings with high level of confidence*
- *The Comfort Plan can start as an optional plan for which the citizens can opt, and those who do not prefer it can stay with the existing system*
- *Each applicant should photograph all existing cracks with mobiles (to detect the date/time and the geo-tags) in their building at the time of entering “The Comfort Plan” and should hand these to the authority (could be TCMG)*
- *The plan can start with a pilot application in a village, and can be extended to the entire region when operational problems are resolved*
- *The boundaries of the effected region should be defined in a scientific way, by using the knowledge in earthquake engineering*

We know that some of the damage claims are actually not related to the earthquakes. We also know that some of the damages are really related to the earthquakes and put people in serious difficulty in maintaining their everyday life. It is very difficult, but it is the responsibility of authorities to make reliable boundary decisions that safeguard the comfort of the citizens. I propose to find out the structures that suffered considerably during earthquakes and compensate the owners of these structures based on the visible and detectable damage. The rest of the building owners should be compensated regularly and unconditionally (without seeking relations between the earthquakes and the cracks). This is the essence of The Comfort Plan.

Some Words on the Improvement Plans of the TCMG

In the letter of TCMG on 31st of May to the Minister Wiebes, he states that the number of damage assessment companies as well as the number of experts will be increased drastically in a relatively short term. I am sceptical how in a non-earthquake country, so many “*experts*” will be “*generated*”. Earthquake engineering is a serious discipline with rules of scientific rigour, as in many other disciplines, and is strictly related to human lives. This discipline is often underestimated in the Netherlands, which stems from the fact that the earthquake expertise is a rare property. In the Dutch situation, earthquake engineering as a scientific discipline is continuously undermined with unsubstantiated claims and conclusions from unreliable sources. I sincerely hope that TCMG does not fall into the same mistake.

Some other Issues that DO NOT Help in Solving the Problem

Eurocode, NPR and NEN

The Netherlands is the only country in EU that “banned” the use of Eurocode 8, that is the seismic regulation for structures in Europe. This, to my limited knowledge, is against the European rules of competition. Furthermore, the Eurocodes are the European consensus documents that have been produced by experts with tireless work and discussions over the years. As an earthquake expert, I have difficulty to understand why the Netherlands banned using Eurocode 8 and started to rebuild a new regulation from scratch, NPR, that has caused a lot friction in the last years. Eurocode 8 could be applied with proper National Adaptation Document since the very beginning.

The Eurocode documents are being changed by experts from all over Europe in the recent years, committee meetings are held regularly. Even if the Eurocodes would not be applicable in the Netherlands, this may change in the future. It would thus only make sense, as happened in other Eurocode committees, that the Netherlands provides at least one representative to follow up the discussions on the upcoming Eurocode 8. I volunteered for that more than 2 years ago and have been trying to convince NEN to nominate me as a national representative in the Eurocode 8 committee, for over 2 years now. NEN does not even provide me with an answer to my requests, positive or negative. I urge the House of Representatives to investigate the steps of the decisions that led to banning of Eurocode 8, and explanations why the Netherlands does not have even a representative in Eurocode 8 committees, and whether this is to the interest of the citizens or not.

Funding of Independent Research

The independent research on the technical aspects of the Groningen earthquake problem is often praised and encouraged by everyone, and very much appreciated by the citizens in the region. There are several questions awaiting clear answers from such research, such as the structural damages, strengthening, effects of earthquakes on the built environment, measurements etc. I ask a simple question to everyone, I even challenge everyone reading this document with that question: what are the financial sources of conducting such research? I, unfortunately, cannot find any other institution then NAM paying for quality research that can answer these questions.

Some may point the DeepNL program, but this is not the answer to my question since this program is dedicated to deep underground, limiting the coverage to geological and geophysical domains, that have almost no practical relevance to answering the questions I raised above.

Some others may point the KEM program of SoDM, but in fact, this is not a research program as specific and very limited number of questions are asked by SoDM, to be answered in 9- or 12-month period. Furthermore, the KEM program works with financial tenders (unlike research programs), and many companies are involved running the granted tenders.

To my knowledge, NWO does not have a program dedicated to earthquake issues, as if it is not a problem existing in the country. Furthermore, as HBO, my research group runs research projects funded by SiA-RAAK and by EU Interreg, but these programs are general research funds that have partial subsidy and require to make innovation by cooperating with companies. Although we appreciate the funds provided to us by these programs, the focus is not answering the earthquake-related problems but instead developing a viable market product.

Concluding my input document here, I repeat my question. The independent technical research is needed and is very much appreciated for the earthquake problems in Groningen, but who funds that in the Netherlands?