Study of the Perception of Environmental and Societal Impacts of Gas Extraction Oosterpoortbuurt, Groningen

By

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Abstract

The purpose of this study is to explore the perception of the societal and environmental impacts associated with gas extraction in the municipality of Groningen, specifically the Oosterpoortbuurt. Main question of research is: What are the differences between the perceptions of societal and environmental impacts associated with gas extraction in the Oosterpoortbuurt and the key environmental and societal impacts in the Province of Groningen? Key environmental and societal impacts will be identified within the literature and translated into key indicators of these impacts. These key indicators will be used to assess the perception of the population of study. The research question will be answered by adopting a multifaceted approach, firstly to identify the environmental and societal impacts literature analysis is conducted. Furthermore, a survey is conducted to gather firsthand perspectives on environmental and societal impacts of gas extraction. The literature identifies a causal relationship between environmental impacts and societal impacts of gas extraction. Survey data indicates that regarding environmental impacts respondents feel Groningen Province has not profited enough from gas extraction to deal with the consequences, as opposed to the country of the Netherlands. Especially responses to the open question revealed resentment and frustration about the uneven distribution of the benefits of gas extraction. Furthermore, a decline in desirability of the area is not observed, respondents feel safe inside their homes in relation to earthquakes, and, visible damages are not especially prevalent. Nevertheless a decline in trust regarding the national government, experiencing earthquakes and damage to housing could potentially add to feelings of insecurity in the area.

Keywords: Environmental Impacts, Societal impacts, Gas Extraction, Perception

Word count: 8406

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1. Introduction

For the first time in 60 years, the Netherlands will be going into the winter without gas from the Groningen gas fields, from October 1st, 2023 there will be no more gas extraction from the Groningen gas field, because of earthquakes and their associated risks. The Groningen gas field was discovered in the 1950s, the gas field in the Northeastern part of the county is the largest in the Netherlands and Europe (CBS 2019). In 1963 the first drilling for natural gas started and halfway through the 1970's about half of the energy supply came from natural gas (CBS 2019). At first, natural gas was mainly used for industrial purposes and the generation of electricity, however at the end of the 1970's nearly all households were provided with a connection to natural gas. The discovery of the natural gas field has played a key role in the energy supply of the Netherlands which has profited significantly from the extraction of natural gas reserves, in 60 years more than 80 percent of the gas field has been extracted and used up. In this period the natural gas revenues for the government are close to 417 billion Euro (CBS 2019). In short the Northern part of the Netherlands, especially the Province of Groningen has been a significant natural gas extraction site for decades, providing the Netherlands with economic prosperity, and a steady energy supply.

1.1. Small History of Gas Extraction

Between 1986 and 2013 there were about 1000 small earthquakes recorded in the northern Netherlands, especially in the Province of Groningen (KNMI, 2013a). These earthquakes are induced seismicity, which means that they are not caused by natural processes and are the consequence of natural gas extraction as indicated by SodM (2013) (*Staatstoezicht op de Mijnen or State supervision of the Mines)*. Up until around 2011, the company in charge of natural gas extraction, NAM (*Nederlandse Aardolie Maatschappij or Dutch Petroleum Company*), politicians, and the residents of the Province of Groningen had underestimated the impacts of this seismic activity. The NAM at first denied the connection between gas extraction and earthquakes. however, when the frequency of earthquakes increased Parliament established a commission to investigate, this commission concluded that under certain conditions earthquakes can be caused by gas production (van Voort and Vanclay, 2015). Nevertheless, NAM refused to pay for damages and claimed that structural damages could not be caused by earthquakes with a magnitude of less than 3.3 (van Voort and Vanclay, 2015). This changed in August 2012, when the village of Huizinge experienced the greatest earthquake ever measured in this region, measuring 3.6 on the Richter scale (KNMI, 2013b), which changed the perception of residents and put the event and the risks associated with them higher on the political agenda and generated more media publicity. A report of SodM sanctioned by the Ministry of Economic Affairs concluded that the increase in gas extraction has led to more frequent and stronger earthquakes (SodM, 2013). However, at the time reduction of gas production was not an option due to contractual commitments (van der Voort and Vanclay, 2015). The SodM report of 2013 also led to the decision to reduce gas extraction in the most affected areas around Loppersum, to support the population and allow for more sustainable gas extraction in the future. Nevertheless, in 2018 the decision was made to start the phase-out of natural gas up until 2023 to reduce the safety risks associated with gas extraction over time. An overview of the short history of gas extraction in Groningen is given in Figure 1.

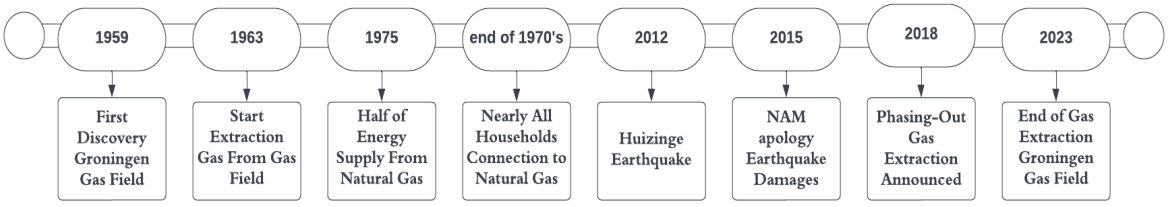

Figure 1: Timeline of gas extraction practices

1.2. Questions of Research

This thesis explores the perception of environmental and societal impacts of gas extraction in the municipality of Groningen utilizing a case study. This case study aims to assess the perceptions of environmental and societal impacts associated with gas extraction in a distinct area within the municipality of Groningen: the Oosterpoortbuurt, a neighbourhood in the city of Groningen.

The main question of the thesis is: What are the differences between the perceptions of societal and environmental impacts associated with gas extraction in the Oosterpoortbuurt and the key environmental and societal impacts in the Province of Groningen?

Firstly there is a need to establish the general environmental and societal impacts related to gas extraction in the Province of Groningen and their potential relation to the perception of residents of the community. Identifying these impacts related to gas extraction allows for understanding of firsthand perspectives of inhabitants of the Oosterpoortbuurt. Furthermore, differences between the key environmental and societal impacts and the perception of residents of the Oosterpoortbuurt are researched. This translated into the following sub-questions:

1. What are the key environmental and societal impacts associated with gas extraction in the Province of Groningen ?
2. What specific aspects or concerns do residents in the Oosterpoortbuurt, Groningen, highlight in their perception of the environmental and societal impacts associated with gas extraction?
3. What are the differences between the perceptions of societal and environmental impacts associated with gas extraction in the Oosterpoortbuurt and the key environmental and societal impacts in the Province of Groningen?

1.3. Structure

First, the theoretical framework will be discussed, this will outline the theories that explain the footing of research in contemporary literature, especially perception and risk perception theory. Secondly, this theory will be outlined in a conceptual model that will help in structuring the theory and relating this to the sub-questions and empirical evidence. Third, following the conceptual model, and drawing on the perception and risk perception theory in the theoretical framework, the expectations and hypothesis of the research will be elaborated upon. Fourth, the methodology for the empirical data will be discussed, this section will elaborate on the choices that have been made concerning the multifaceted approach as well as the details regarding empirical data collection in the form of the survey. Fifth the empirical evidence is presented aligning with the sub-questions and the developed Figure 7. Finally, the discussion and conclusion including the interpretation of the results are presented, in the discussion section limitations of the study are presented along with recommendations for further research.

2. Theoretical Framework

2.1. Perception

According to cognitive psychology, perception refers to the mental processes a person undertakes to take in, process, and evaluate information from their environment (physical and communicative) through their senses (Renn, 2014). However, this definition focuses on the perception of individuals. For this research, the perception of individuals will accumulate to form a group perception (of environmental and societal impacts). The concept of 'perception' seems harder to define in a non-individual setting, concerning groups, most authors when talking about perception do not define the concept itself. The same occurs with concepts such as 'public opinion and 'public perception' on the level of group perception. Therefore a definition is used from Cambridge Dictionary (2018): "Public perception refers to the subjective judgment that a member of the public forms about an entity." Within the framework of this research, when talking about the perception of a group this definition of public perception will be used. However, to understand the perception of societal and environmental impact, risk perception is an important concept. According to Slovic (1987), there is no 'objective' sense of danger; rather, risk perception is a 'subjective' concept impacted by things like personality traits, culture, and socioeconomic status. Yates and Olivera (2016) argue that culture even plays a role in decision-making, the study of culture and decision-making focuses on the differences in how and why people from other cultures occasionally tend to make different decisions. However, the cultures within the municipality do not vary as broadly as mentioned in the research of Yates and Olivera (2016). Summarising, perception is subjective. Risk perception theory therefore explains that individuals assess risks differently. Risk theory helps understand why certain societal and environmental risks may be perceived differently among residents, and accordingly perceptions of different communities.

2.2. Perception of Risks

To understand the perception of environmental and societal impacts of gas extraction it is valuable to understand risk perception theory. These impacts are related to risk theory because they cause risks that are perceived differently by individuals; "people construct their own reality and evaluate risks according to their subjective perceptions" (Renn, 2004, p.406).

Renn (2004) identifies risks associated with earthquakes and other natural disasters in the 'risk as fate' model. Technical risks are seen as a result of choices and activities, whereas natural risks and burdens are perceived as a predetermined, nearly unavoidable fate. Natural disaster risks cannot be evaluated in the same manner as technology accident risks because people's awareness of the potential to prevent or decrease natural disasters has not yet grown to a sufficient degree (Renn 2004). However, given the growing impact that human actions can have on natural disasters, the 'risk as fate' model is less about man-made risk and more about a combination of risk perception aspects This is seen, for instance, when a natural disaster strikes—the issue of responsibility emerges, and the inability to take appropriate control or preventive action is determined to be the cause of the disaster (Renn 2004). This can concretely be seen in the 'crisis in slow motion' regarding the Groningen gas extraction practices. Earthquakes are not seen as unavoidable and beyond human control, rather it is perceived as an issue of responsibility and accountability.

2.3. Level of Analysis

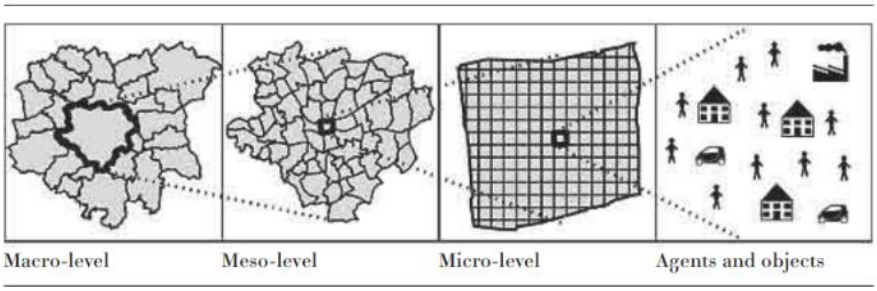

Figure 2: Adopted Model of Level of Analysis Source: Schwarze et al. (2004)

For this research, the Figure 2 model of Schwarze et al. (2004) will be adopted with a different focus. Schwarze et al. (2004) used the three levels of disaggregation: micro, meso, and macro. The level of analysis used for this thesis will be the meso and micro level. The meso level focuses on community and local factors that may shape perceptions and considers social dynamics and interactions within the communities, but also, the role of community networks, social capital, and community engagement in shaping perceptions. The micro level focuses on the individuals and their immediate surroundings. Concerning perception, this level could consider how individual characteristics, experiences, and interactions shape the perception of environmental and societal impacts in line with risk perception theory mentioned before. Withinn the study, the level of analysis can be considered the micro-level, as the survey was conducted among individuals.

2.4. Societal and Environmental Impacts Associated with Gas Extraction

To understand what environmental risks entail within this study will adopt the definition of environmental impact(s) provided by Abdallah (2017): Environmental impacts are changes in the natural or built environment, resulting directly from an activity, that can have adverse effects on the air, land, water, fish, and wildlife or the inhabitants of the ecosystem.

2.5. Conceptual Model

On the basis of theory discussed, Figure 3 provides a conceptual overview of the theoretical framework.

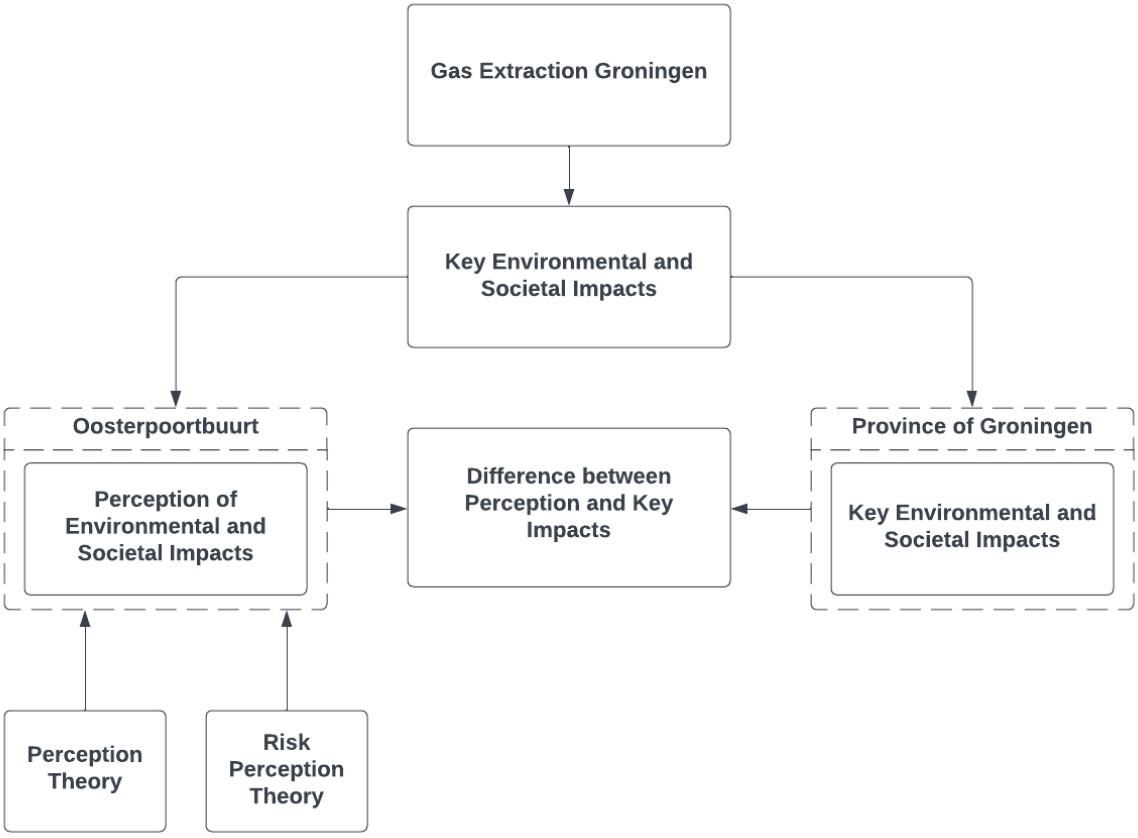

Figure 3: Conceptual model on the basis of theoretical framework

2.6. Hypotheses

On the basis of perception and risk perception theory it is expected that there will be a notable variation between the concerns raised by residents in Oosterpoortbuurt and the overall trends identified in existing literature regarding environmental and societal impacts associated with gas extraction. Nevertheless, perception is influenced by experiences, therefore I expect that residents who have dealt with direct impacts of gas extraction activities will express higher levels of concern regarding environmental and societal impacts.

However, a deeper understanding of the specific impacts of gas extraction in the Province is needed, the results of the first sub-question will form the basis of the study in the Oosterpoortbuurt and allow for comparison.

3. Data and Methods

3.1. Multifaceted Approach

This thesis uses a combination of qualitative and quantitative methodologies to answer the overarching research question. In order to address the overarching research question, it is imperative to obtain answers to subsidiary research questions. Comprehensive understanding of environmental and societal impact of gas extraction in the province of Groningen is required to provide an answer to our first sub-question. In pursuit of a comprehensive understanding of the environmental and societal implications of gas extraction literature and grey literature such as: reports and government documents will be utilized. This review will traverse the literature delving into scholarly articles and grey literature from the initiation of gas extraction in the Province of Groningen in 1963 to contemporary literature. This exploration of literature aims not only to display evolving environmental impacts but also to reveal the complex chain of societal impacts in addition to the environmental effects associated with gas extraction in the Province of Groningen. Recognizing the dynamic interplay of societal impacts, a broader focus is adopted to discern the dynamic interaction of societal impacts. This approach ensures research is not solely based on scholarly literature but also resonates with the experiences and perceptions of communities affected by the gas extraction practices. In addition to this methodology for the first sub-question, the indispensable importance is recognized. A survey will be carried out to delve deeper into communities' perspectives on environmental and societal impacts associated with gas extraction. A structured survey will be conducted to better understand the perception of the Oosterpoortbuurt, and the outline of the survey will be elaborated upon. This survey will enable a study of the perception of the community of Oosterpoortbuurt. Integrating survey responses with the insights and concepts gathered from academic and grey literature will provide a comprehensive answer to the main question.

3.2. Primary Data Collection

Data collection is done through a survey (Appendix 1), delivering ordinal data, which is suitable to measure the perception of respondents. Our research adopts a descriptive research approach using survey methodology. This method is deliberately chosen to gather data that enables us to articulate and define the attitudes or perceptions held by the population. The survey is based on the indicators of perception as presented in the first sub-question. Literature of Voort and Vanclay (2015) as well as Stroebe et al. (2023) and Stroebe et al. (2022) allowed to ask question about a several environmental and societal impacts. In the first part of the results section, societal and environmental impacts will be presented to allow for comparison to the perception of the residents of the Oosterpoortbuurt and the impacts that originate from the literature. Data was analysed in SPSS using descriptive statistics. Open-ended questions are used to elaborate upon and provide clear examples relating to the perception of respondents.

To ensure responses strictly originate from the target population of the Oosterpoortbuurt, door-to-door spreading of the link to an online survey proved effective. This resource-intensive method allowed for high control over the sample, ensuring sampling from the population of the specific geographic area. Systematic random sampling within the population gives everyone in the population an equal chance of being selected and avoids sampling bias. In this instance, alternating sampling is employed, signifying that survey sampling occurs in a alternating fashion, with survey request being delivered to every other household via their mailbox.

The questionnaire includes Likert-scale questions that allow for their perception of a certain statement, the questionnaire includes a few Likert-scale questions on the societal and environmental impacts of gas extraction. The survey also includes open-ended questions in which the respondents can freely give their perceptions on the subject. This option was extensively used and clarified their responses. The survey was exclusively in Dutch since the main part of the respondents are Dutch, however giving answers to open questions in English was also allowed.

Sample Characteristics (n=32)

		Gender		
		Man	Woman	Total
Age	<18	0	1	1
	18-25	3	5	8
	26-35	3	1	4
	36-45	2	3	5
	46-55	1	2	3
	56-65	2	3	5
	65-75	3	2	5
	>75	0	1	1
Total		14	18	32

Table 1: Sample characteristics

Findings are based upon a total of 32 respondents, out of 36 responses 32 responses proved complete. Sample sizes remain uniform throughout the questions, however, sample sizes might deviate between open questions since answering open questions was not obligatory. Looking at Table 1, the sample characteristics provide some limitations; the sample includes slightly more woman opposed to men. Furthermore, the age group of 18-25 is relatively overrepresented in the sample, which might be explained by amount of students in the sampling area, nevertheless background characteristics such as education level have not been collected in this survey. Furthermore, no personal data is collected in order to ensure anonymous participation in the survey. Participation in the survey was voluntary, permission to utilize data gathered was ensured by an informed consent form that can be found as part of Appendix 1.

Although the aforementioned measures aim to eliminate potential biases, complete prevention of bias is not entirely achieved. The study relies on their willingness and time for participation, this might result is a non-response bias. Respondents that have more time, or are more engaged with the topic of research might be more present within the sample. Among the consequences of gas extraction is damages to homes, individuals who have experienced such damages may potentially hold a negative perception towards the impacts of gas extraction. Consequently, this may result in an overrepresentation of the individuals in the sample, since they might be more inclined to give their perception on the topic.

4. Results

4.1. Societal and Environmental Impacts

Before exploring environmental and societal impacts of gas extraction in the municipality of Groningen, it is essential to highlight that environmental and societal impacts cannot be seen as separate consequences associated with gas extraction in the Netherlands. Environmental and societal impacts appear in a causal relationship, in which gas extraction is the root cause of the environmental and societal impacts, as graphically demonstrated in the simplified overview of Figure 4. Understanding which environmental impacts have arisen from gas extraction is the first step in understanding the societal impacts that are associated with these impacts.

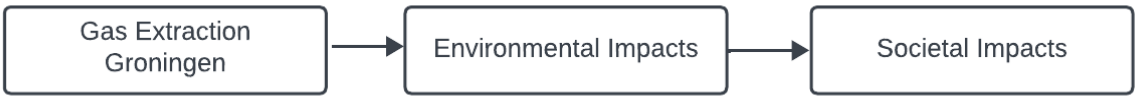

Figure 4: Causal relationship between environmental impacts and societal impacts

4.2. From Environmental Impacts to Societal Impacts

Located approximately three kilometres below the surface of the Groningen gas field, gas lies nestled within the porous layers of sandstone. The gas extraction process involves drawing the gas from the sandstone, leading to the subtle transformation of surface sinking. As the gas is removed, the sandstone contracts, causing a gradual reduction in surface elevation which is called land subsidence. The complex nature of this subsidence is not limited to a slow settling of the surface layer. Deltares (2011) has presented the results of the analysis of the interplay between sandstone layers. These layers due to their composition exhibit a capacity for rapid shifts, particularly along the fault lines. The consequences of these rapid movements are not merely limited to subsidence, rather it manifests a dynamic process, capable of inducing seismic events.

Adding to the report of Deltares (2011), SodM (2019) stated there was an imbalance in the Groningen gas field. Around clusters like Loppersum, where extraction has been halted for some time, there is a considerable amount of pressure. The pressure is lower in the South, where gas extraction remains to be conducted (at the time). The gas field's pressure is readjusting. The pressure of the natural gas shifts from high to low. Due to the tension this process creates along fault lines, seismic activity can occur. Earthquakes will not stop occurring until there is an equitable distribution of pressure across the entire gas field. This indicates that after the Groningen gas field's gas extraction eventually comes to an end, earthquakes would still occur. Pressure equalization may take years to complete. While this is happening, the probability of large earthquakes decreases and there will be fewer earthquakes overall. It is crucial to recognize that the consequences of gas extraction extend beyond the geological transformations. The effects of land subsidence and induced earthquakes pose significant environmental impacts with come with concerns. Subsiding land can impact surface infrastructure such as buildings, roads, and other infrastructure, the same goes for induced earthquakes (Deltares, 2011 and SodM 2019).

Summarising, gas extraction has several consequential impacts. Gas extraction causes land subsidence and adjusting gas pressure, which causes seismic activity or in other words: induced earthquakes, which result in the impact of surface infrastructure. A graphical representation of this causal relationship between gas extraction and environmental impacts is provided in Figure 5.

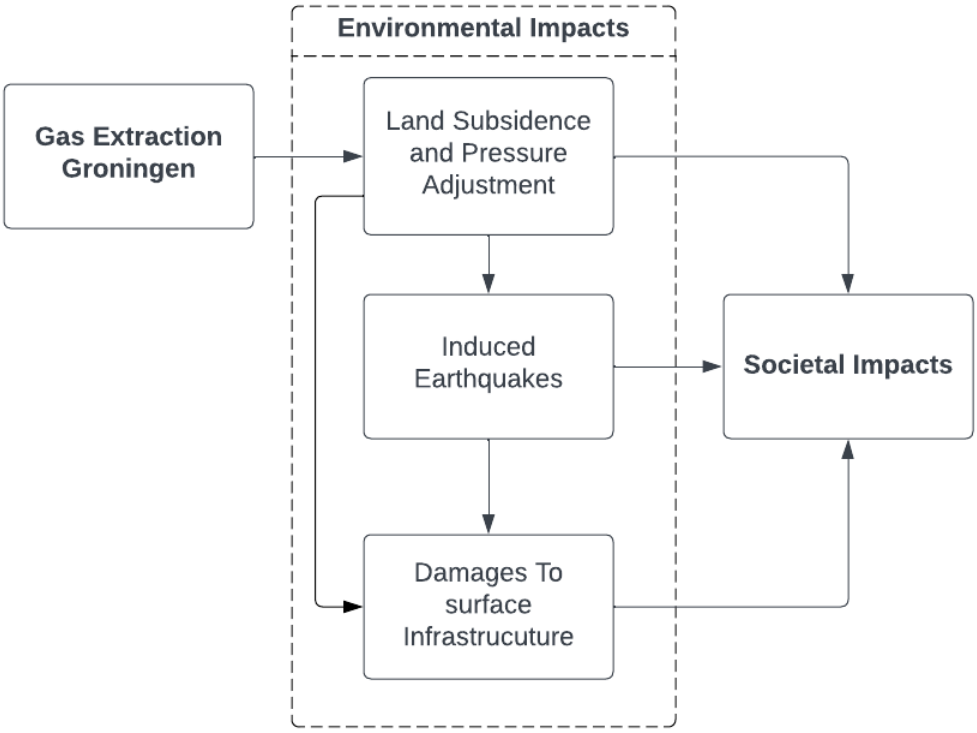

Figure 5: Elaborating on Environmental Impacts and their Influence on Societal Impacts

4.3. Societal Impacts of Gas Extraction

As indicated by Figure 4 and Figure 5 a causal relationship between environmental impacts and societal impacts is present. Societal impacts associated with gas extraction are recorded in academic literature, grey literature, and newspaper articles. For this section, grey literature e.g. governmental reports, and NGO reports will be used to distinguish these impacts. The main goal of this section is to identify potential societal and environmental impacts and perceptions. Specifically, which societal impacts result from the environmental effects of gas extraction? According to Van der Voort and Vanclay (2015), social consequences may include property damage, decreased house prices, concerns about dykes, feelings of insecurity, health issues, and increased distrust and anger.

4.3.1. Damage to Surface Infrastructure

As indicated by the Parlementaire Enquête of 2023, on the 31st of December of 2022 the result of sixty years of gas extraction can be summarised in the following numbers; 1.615 earthquakes; 267.466 damages reported; around 85.000 addresses with damage more than once; 11.880 addresses not safe; 7.289 addresses unclear whether safe or not. These numbers indicate the severity of the issues at hand and indicate that the environmental impacts of earthquakes lead to damages to surface infrastructure as previously indicated. However, van der Voort and Vanclay (2015) indicate that on top of direct damage to buildings, there may also be indirect societal effects such as lost business related to the repairs. In addition to the 'traditional' damage to housing, there is the case of damage to heritage-listed buildings. Consequently, a decline in house prices resulted from the immediate damage to buildings and the decline in the desirability of the area (van der Voort and Vanclay, 2015).

4.3.2. Concerns about Flood Risks

Concerns about breaching of dykes are part of the concerns indicated by van der Voort and Vanclay (2015), strong earthquakes could damage dykes and contribute to flood risk. The main concern about flood risk because of earthquakes was focussed on the Eems canal, which runs from Delfzijl to the city of Groningen and therefore crosses the area of high earthquake risks (van der Voort and Vanclay, 2015). However, Deltares has looked into the matter. The conclusion was that there is a small probability of catastrophic flooding, a magnitude 5 earthquake may seriously harm dykes that complied with existing technical requirements (Deltares 2013).

4.3.3. Feelings of Insecurity

Furthermore, the environmental impacts have historically led to the development of feelings of insecurity. The publication of the SodM report of 2013 along with severe earthquakes in that period KNMI, 2013b) can be seen as a starting point of insecurity (van der Voort and Vanclay, 2015). Feelings of insecurity can be reinforced by damage to property such as visible cracks in vital spots within a home (van der Voort and Vanclay, 2015).

van der Voort and Vanclay (2015) reveal the results of the RegioNoordPanel survey to demonstrate the feelings of insecurity that are felt throughout the community. Feelings of insecurity and uncertainty in one's own house have a particularly large social impact because it is intended to be a safe spot. The presence of fractures might reinforce the sense of insecurity, van der Voort and Vanclay (2015). The survey of the RegioNoordPanel reveals that people living in Loppersum, on average, rated their safety 5.8 out of 10 compared to 6.3 out of 10 for the RegioNoordPanel, this was in response to the question 'On a scale from 0 to 10, indicate how safe you feel concerning earthquakes'. However, earthquakes do not only cause physical health problems in terms of risks that arise with the damage to surface infrastructure but also in terms of mental health. Consequently, feelings of insecurity/anxiety can contribute to mental health problems.

4.3.4. Experiencing Earthquakes, Damages and Trust

Firstly, perceived safety is more heavily affected by damages than health issues. Multiple counts of damage make residents feel less safe compared to residents with singular damage and no damage at all. Experiencing an earthquake negatively influences the feelings of safety, the stronger the earthquake the less safe residents feel (Stroebe et al. 2021). This is consistent with the findings of Knuth et al. (2014), who demonstrated that exposure to an involuntary hazard increases the perceived risk that the same hazard and its effects may occur in the future. Perceived safety has little to do with the size of the earthquakes or the actual physical harm. According to the research of Stroebe et al. (2021), safety also involves the effects that home damage has on the lives of its occupants. These effects include increased anxiety about one's future, the long-term viability of one's residence, financial risks, and the unpleasant experience of an earthquake itself.

Slovic (1987) has found that fortified housing may influence risk perception, and can aid in understanding public responses to hazards and improving communication of risk information. In line with these findings, Stroebe et al. (2021) have found that; damage and earthquakes have an identical impact on people's perceived safety as they do on risks they perceive, such as the possibility of future earthquakes, property damage, or bodily harm. It is noteworthy that individuals who have sustained repeated damages typically assess 'daily' risks, such as needing to fix their home, to be far higher. A few individuals are truly terrified of a disaster, such as their house collapsing. However, many individuals worry all the time. This can be seen as chronic stress that is induced by earthquakes (Stroebe et al., 2021). Residents whose homes are fortified are more at risk: they have poorer health and feel less safe than those whose houses are not fortified. Additional analyses show that it matters which reinforcement phase residents are in, when residents enter the phase between assessment and planning, their health decreases and they feel less safe. (Stroebe et al., 2022).

Thirdly, Stroebe et al. (2021) confirm unambiguously that tumult with institutions and procedures residents are experiencing as a consequence of gas extraction negatively affects health, feelings of safety and trust. Reinforcement practices should be the solution to problems and damages associated with gas extraction, however in practice, this does not seem to be the case, it appears to be a stressor rather than a solution. Residents indicate that mainly indirect consequences (slow and perceived as unfair procedures, and long-term uncertainty) make them vulnerable to gas extraction challenges.

Findings in the research of Stroebe et al. (2021) continuously indicate that "consequences of gas extraction undermine the health of residents" (Stoebe et al. 2021, p.2). Compared to residents without any home damage, those with several damages had notably worse health. Respondents with numerous damages and lengthy damage claim processes are significantly less healthy Stroebe et al. (2021).

Institutions that are accountable for problems related to gas production are highly mistrusted. Particularly distrusted are the national government and the gas extraction firm, Nederlandse Aardolie Maatschappij (NAM). Individuals who have experienced several damages to their dwelling have significantly lower levels of trust in the entities handling damage claims and reinforcing in comparison to those who have experienced singular, or no damages. After experiencing an earthquake, people's trust drops, but gradually increases again. People feel less safe and perceive hazards as greater the less faith they have in governments. Condensing these findings of the relationship between experiencing an earthquake, the role of damages and, lack of trust, resulting in perceived unsafety and worsened health is illustrated in Figure 6. (Stroebe et al., 2021)

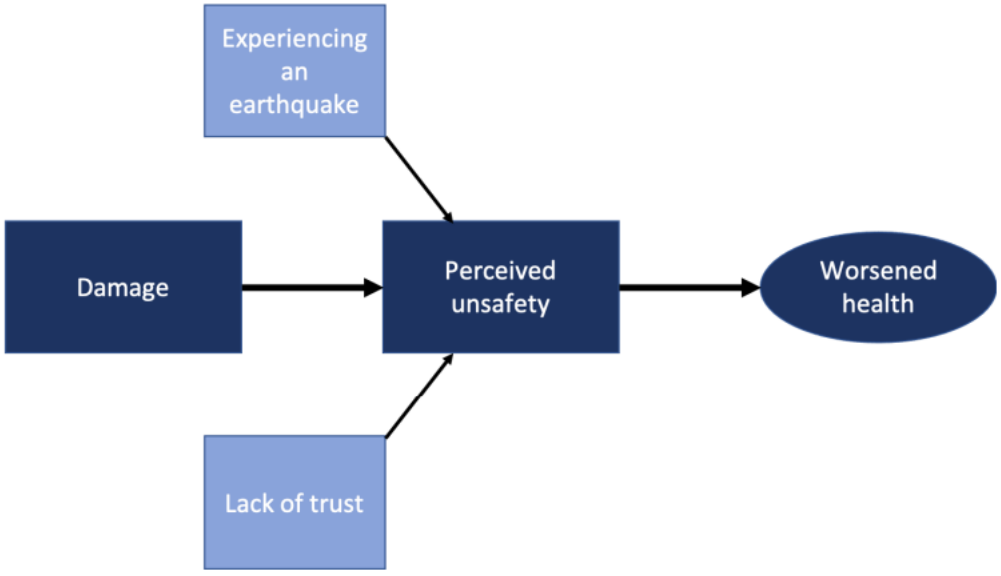

Figure 6: Contributing factors of earthquakes that influence health issues - Source: Overview Gronings Perspectief

4.4. Overview of Environmental and Societal Impacts

In the previous sections of the results, environmental and societal impacts associated with gas extraction in the Province of Groningen have been identified. Additionally, the causal relationship between certain environmental and societal impacts has been identified. The understanding and overview of the environmental and societal impacts and their relationship will subsequently aid in the following phase of research. To elaborate and integrate the graphical representations of the impact of gas extraction on environmental and societal impacts Figure 7 is developed.

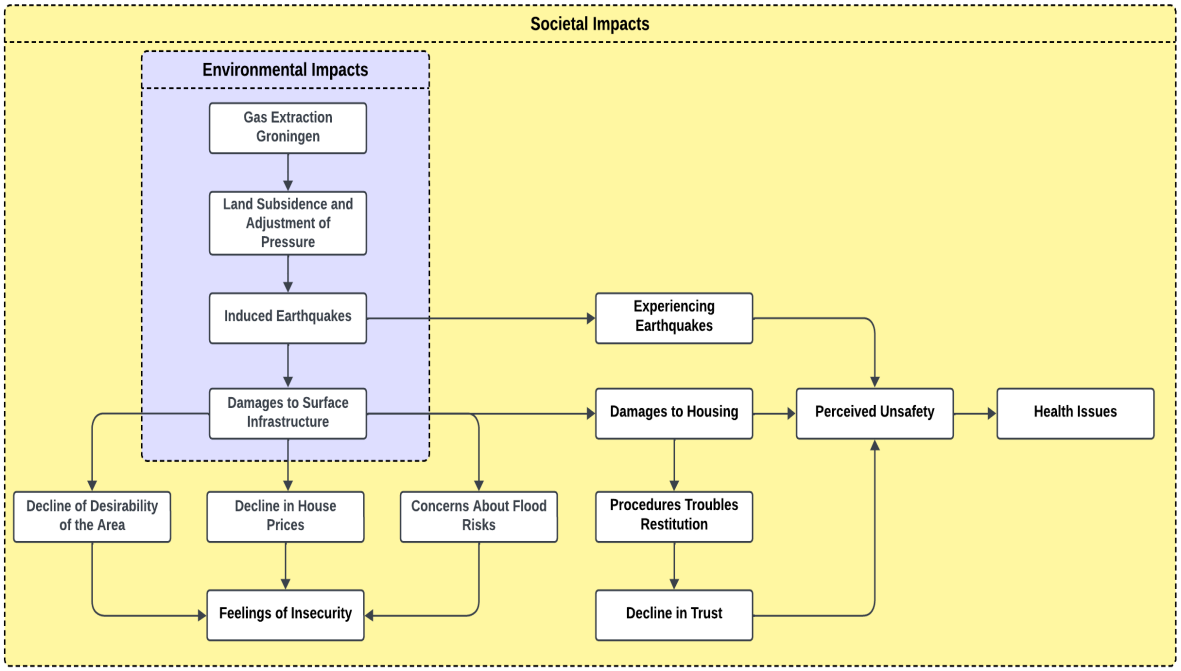

Figure 7: Relationship between Environmental and Societal Impacts

Societal and environmental impacts identified in the literature form the foundation of the survey. In order to compare the perception of the Oosterpoortbuurt compared to the literature, key indicators are used to indicate the perception of the residents of the Oosterpoortbuurt. The survey asks questions about the decline of desirability of the area, decline in house prices and concerns about flood risks that are mentioned in the literature, these questions will feed into the indicator of 'feelings of insecurity'. For the other indicator of societal impacts 'perceived unsafety' questions about the damage to housing, procedural troubles of restitution and decline in trust are asked. This is represented graphically in Figure 7. Furthermore this section will highlight the trends in perception in the Oosterpoortbuurt using the survey questions developed using the literature and Figure 7. Furthermore, in the following section results of survey will be discussed, to view respondent characteristics specific for the respondent answering open questions Appendix 2 can be consulted. Questions of survey are available in Appendix 1.

4.5. Environmental Impacts Survey

First an examination of how residents of the Oosterpoortbuurt perceive the environmental impacts associated with gas extraction. These environmental impacts are identified as land subsidence, induced earthquakes and, damage to housing as indicated in Figure 7.

First of all land subsidence is not an acceptable consequence of gas extraction according to the sample taken from the Oosterpoortbuurt. Furthermore, a similar pattern emerges concerning the acceptance of earthquakes as a consequence of gas extraction. Concerning earthquakes and land subsidence 21 out of 32 respondents indicate to disagree or strongly disagree with these environmental impacts as an acceptable consequence of gas extraction, this amounts to 65,6% percent of the respondents (Figure 8 and Figure 9). The questionnaire distinguished between earthquakes in general, light earthquakes and, heavy earthquakes as acceptable consequences of gas extraction. For light earthquakes 24 out of 32 respondents indicated to disagree or strongly disagree with light earthquakes as an acceptable consequence, which amounts to 75% of the sample. For heavy earthquakes these numbers where even higher, 29 out of 32 respondents indicated to disagree or strongly disagree with heavy earthquakes as an acceptable consequence, 90,6%.

Another environmental impact associated with gas extraction is damage to surface infrastructure. 30 out of 32 respondents indicated to disagree or strongly disagree with the statement that damage to housing is an acceptable consequence of gas extraction processes this amounts to 93,75%, however, an interesting pattern emerges with regards to visible damages and feelings of (un)safety, this will be discussed in the subsequent section that focusses on the societal impacts.

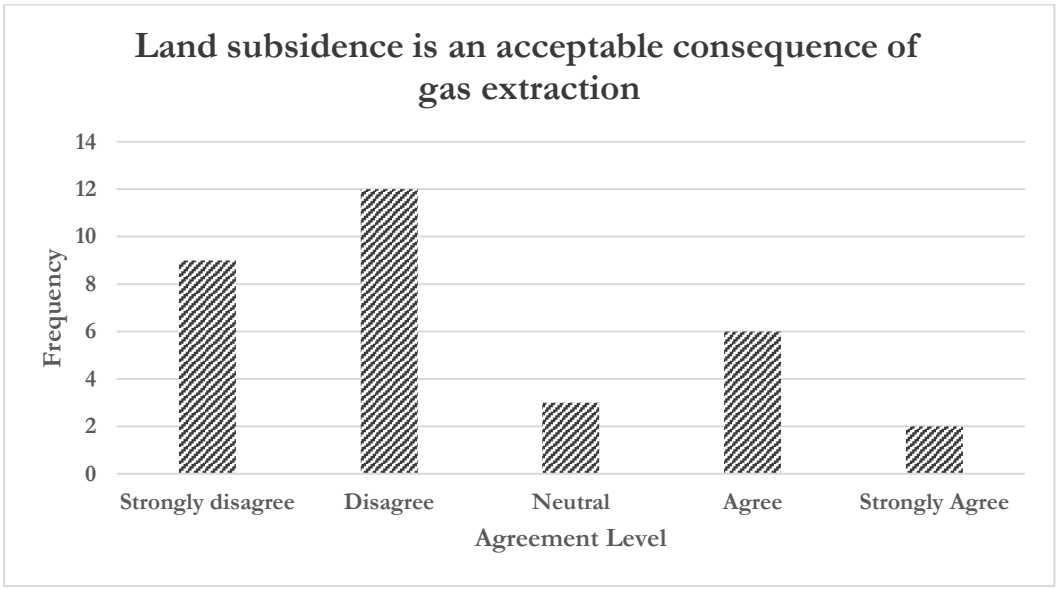

Figure 8: Land subsidence as an acceptable consequence of gas extraction

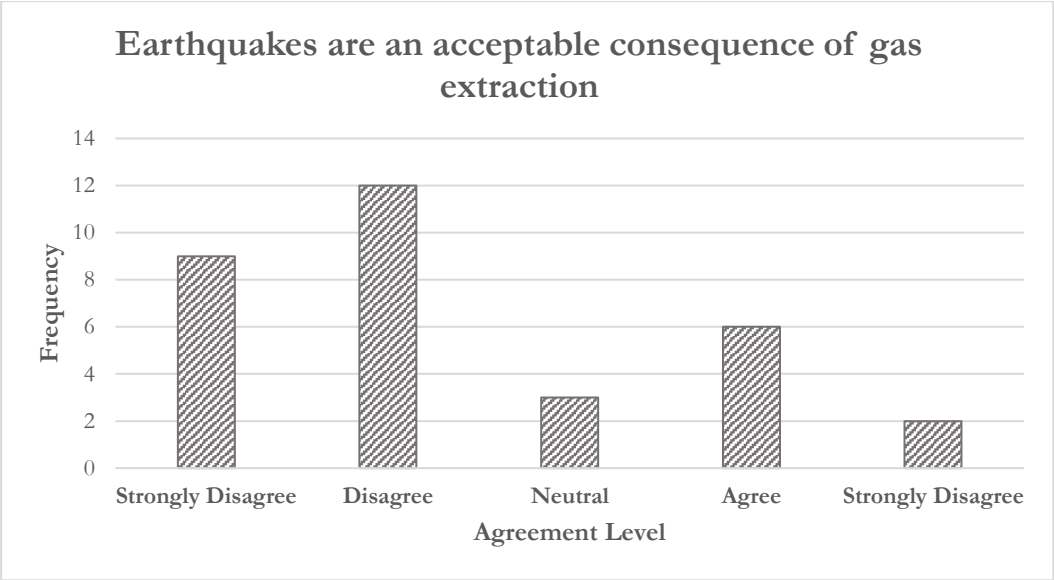

Figure 9: Earthquakes as an acceptable consequence of gas extraction

4.5.1. Relationship between Environmental Impacts and Benefits

Furthermore, the study focuses on the relationship between environmental impacts and the benefits gas extraction has provided for the Province of Groningen. Respondents indicate that they recognize the benefits of gas extraction for the country of the Netherlands as demonstrated in Figure 10. In total 24 out of 32 respondents agree or strongly agree with the statement that the Netherlands has benefitted from gas extraction practices, this amounts to 75%. However, only 5 respondents out of 32 agree or strongly agree with the statement when the statement is posed about the Province of Groningen, this amounts to 15,6%. With regard to the statement about the Province of Groningen most respondents strongly disagree; 11 out of 32 respondents or 34,4%. This is demonstrated in Figure 10 and Figure 11. On the basis of these results it can be inferred that this sample of the Oosterpoortbuurt feels that the Province of Groningen has not profited enough from gas extraction practices opposed to the country of the Netherlands.

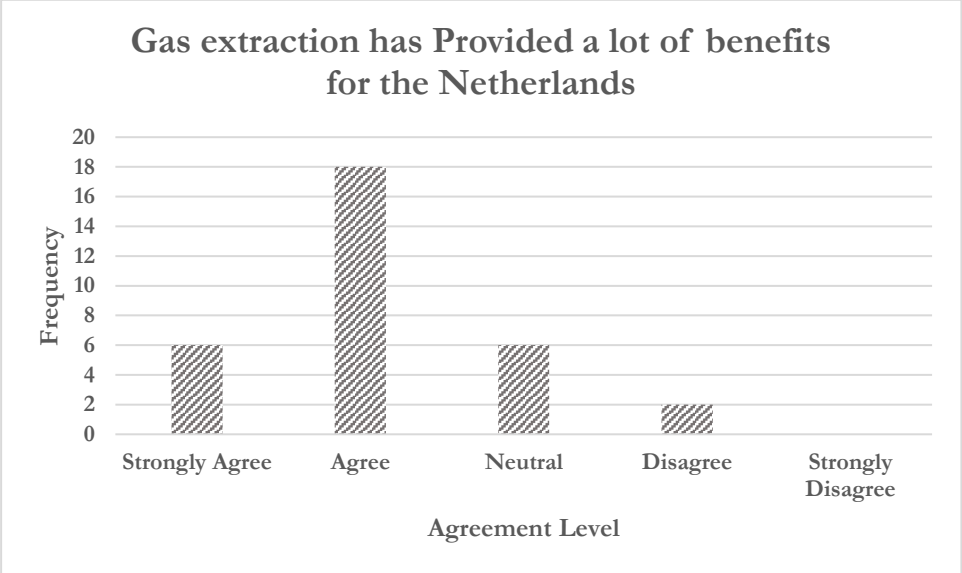

Figure 10: Benefits of gas extraction for the Netherlands

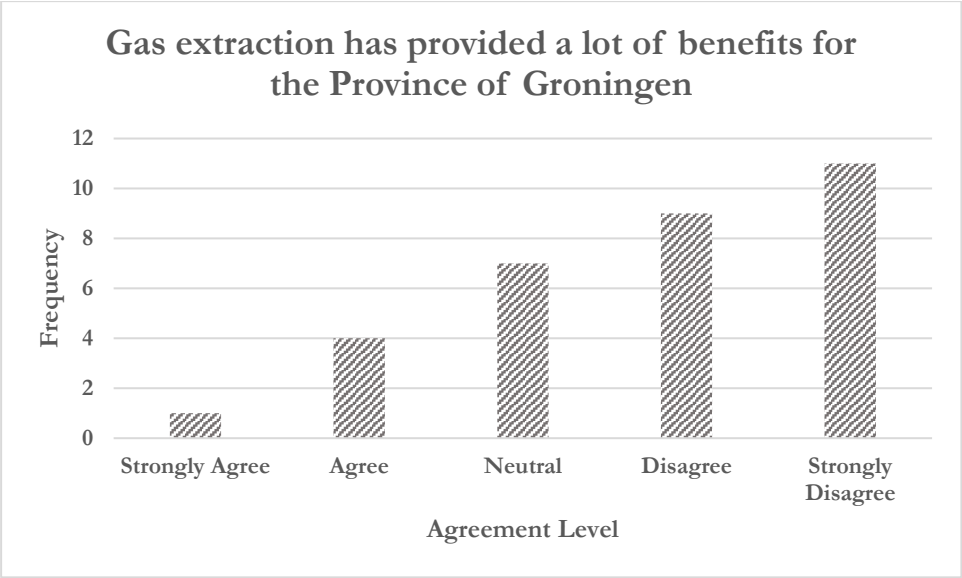

Figure 11: Benefits of gas extraction for Province of Groningen

4.5.2. Open-ended Questions Responses Environmental Impacts

In the section regarding the environmental impacts one open question is included; Could you elaborate on whether Groningen Province has profited enough from gas extraction practices to deal with the consequences? Which is answered by 25 of 32 respondents. Only one response indicates that the Province of Groningen has profited from the gas extraction:

> "In the technical sector, it is evident that NAM has yielded significant work in numerous (machine) factories. Not to mention all the jobs that it has created. Given that a transition does not happen all at once gas will continue to be used. The revenues (in every way) from our own gas outweigh the costs, as long as residents are generously compensated." (Respondent 1, 04-12-2023)

This response points out the benefits regarding the providing of jobs in the region. However this response also imposes the condition that this only adds to the benefits of the region if residents are generously compensated.

Further responses that stood out in the open questions:

> "As a 12-year-old boy, living on the northeast side of the city, I would see the evening sky turn orange; the roar of the gas flame from one of the world's largest natural gas reserves could be heard for kilometres! At that time, it was hardly comprehensible for "ordinary" people. Why consequences? The train had left the station, and societally (economically, politically, grappling with how a small country copes after losing a vast colonial empire?!) it was unstoppable. At most, you can say that, for example, Norway handled its oil discovery more cleverly— with a different (left-leaning) political climate and, smaller population." (Respondent 28, 12/12/2024)

> "Absolutely not. Groningen has repeatedly received nothing, no fast connection to the Randstad, no investments, and major national companies (PTT) disappeared. The money is extracted here and deployed elsewhere." (Respondent 26, 12/12/2024)

> "Groningen seems to have been an extraction are for the West Netherlands. I don't believe Groningen has benefitted. Regarding the negative consequences, Groningen is once again dependent on the goodwill of The Hague's politics. They are far away." (Respondent 21, 12/12/2023)

"For decades, the money has primarily been used for large national projects or general budget plans. Very little of it has been directed towards Groningen. The handling of severe damage cases caused by earthquakes makes it evident that there is hardly any notion of benefiting." (Respondent 22, 12/12/2023)

A pattern consistent with the findings of the multiple choice questions indicated previously arises from the open-ended questions; the Province of Groningen has not profited enough from the gas extraction to deal with its consequences. Revenues of gas extraction have been distributed over the Netherlands as a whole, the Province of Groningen has seen too little of the revenue of gas extraction practices is the conclusion that can be drawn from these open ended questions.

4.6. Societal impacts Survey

4.6.1. Decline in Desirability of the Area

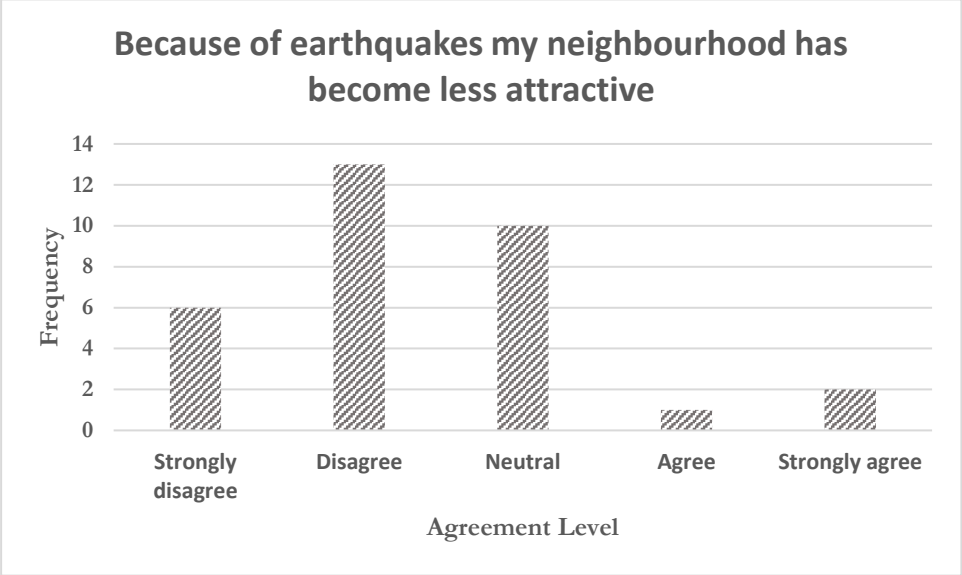

Figure 12: Neighbourhood has become less attractive

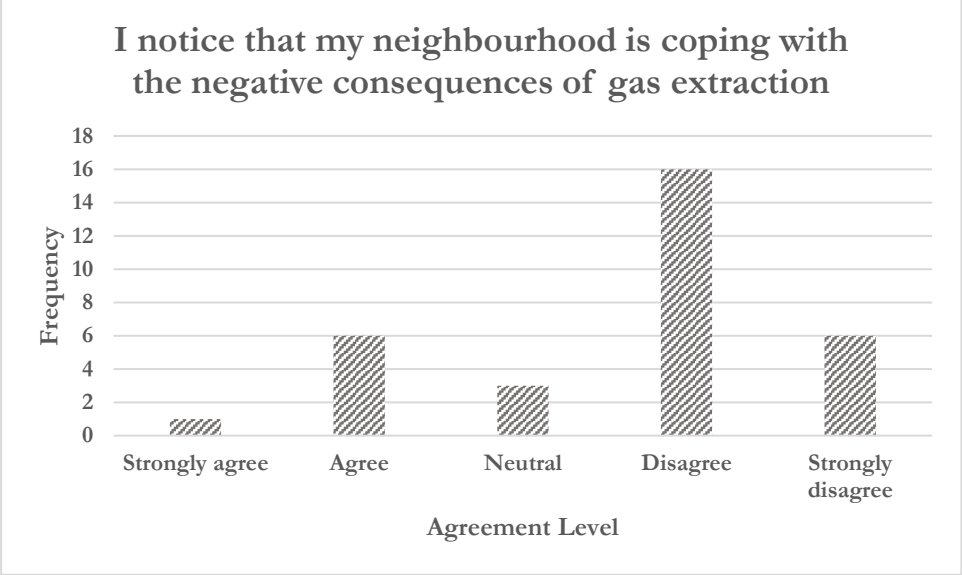

Figure 13: Neighbourhood and negative consequences gas extraction

Figure 12 indicates that 19 out 32 respondents or 59,4% strongly disagree or disagree with the statement that because of earthquakes their neighbourhood (Oosterpoortbuurt) has become less attractive. In this statement 10 of 32 respondents take a neutral position on this statement. These results mainly indicate that residents of the Oosterpoortbuurt do not think the attractiveness of their neighbourhood has been negatively influences by the consequences of gas extraction. This can also be seen in Figure 13, in which 22 out of 32 respondents or 68,75% indicate to disagree or strongly disagree with the statement: I notice that my neighbourhood is coping with the negative consequences of gas extraction. Utilizing the responses of these two questions and the trend in the open questions it is reasonable to say that within the sample the dominant perception is that there is little decline in the desirability of the area, although this was mentioned within the literature on the topic. Furthermore open ended question on the question: Could you elaborate on whether the attractiveness of your neighbourhood has changed as a result of the earthquakes?

> ‘’Earthquake damage seems to have little impact on the liveability or property prices in this neighbourhood” (Respondent 22, 12/12/2023)
>
> "In my house, there are indeed cracks; I can imagine that this is the case with other houses as well. As a result, the neighbourhood may become less attractive, but from the outside of the houses, there is little to see, so the liveability of the neighbourhood is fine!" (Respondent 29, 12/12/2023)
>
> "Damage to the houses is not always visible, but it is known that the neighbourhood has been affected." (Respondent 11. 07/12/203)
>
> "I study in Groningen. I never considered not living or studying here because of the earthquakes. My neighbourhood is not affected by earthquakes, so I believe the attractiveness has not been diminished by seismic activity." (Respondent 19, 10/12/2023)
>
> ‘’So far, I haven’t experienced anything from the earthquakes, and I’ve been living here for a year and a half now. I think the earthquakes are too mild to significantly impact the attractiveness of the neighbourhood.” (Respondent 20, 11/12/2023)

Looking at the data gathered, specifically at the indicator ‘feelings of insecurity’ the most striking result is in the category decline in desirability of the area. Residents of the Oosterpoortbuurt according to the sample are not as worried about the decline in the desirability of the area as indicated in the literature. In the open response to the open questions terms like ‘little impact’, ‘damage not visible’, ‘too mild to significantly impact’ and, ‘not affected’ are mentioned. This might be explained by the proximity of the neighbourhood to the earthquake area, or little visible damages. Nevertheless, 71,9% of the respondents have indicated to have experienced and earthquake in the Province of Groningen as will be discussed .

4.6.2. Experiencing an Earthquake

As demonstrated in Figure 14: 23 out of 32 respondents have experienced an earthquake in the Province of Groningen, which amounts to 71,9% of the respondents. In the literature, earthquakes influence perceived safety of people that have experienced them, this is useful to keep in mind while interpreting further results. Especially since Stroebe et al. 2021 have indicated that experiencing an earthquakes van influence the perceived safety of residents.

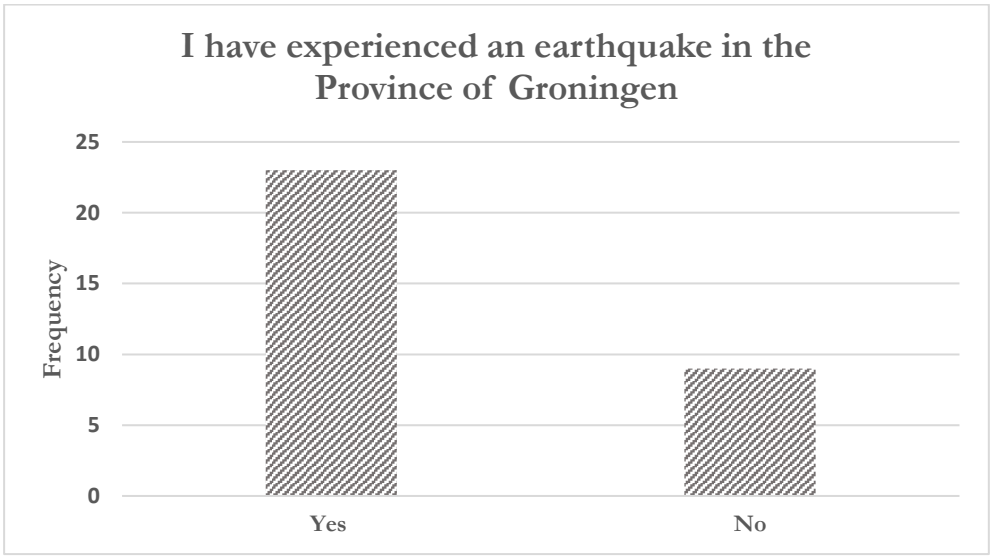

Figure 14: Experiencing earthquake

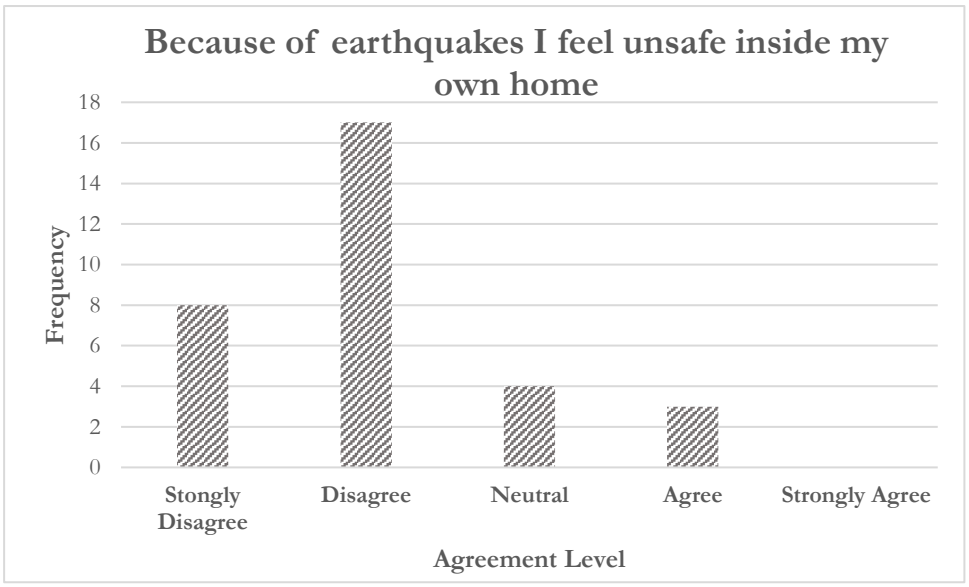

Figure 15: Safety inside own home

Looking at Figure 15 it is interesting to note that respondents feel safe inside their home with regards to earthquakes. 25 out of 32 respondents indicate that they disagree or strongly disagree with the statement: because of earthquakes I feel unsafe inside my own home, this amounts to 78,1%. Nevertheless 19 out of 32 respondents indicate that they strongly agree or agree with the statement: earthquakes are always a tangible threat which amounts to 59,375%. Utilizing the data it can be inferred that nearly 60 percent of respondents view earthquakes as a tangible threat at all times, regardless, nearly 80% percent of the respondents indicates that they feel safe inside their home in relation to earthquakes. This claim is backed up by the responses from the open ended question: Could you elaborate on how safe you feel in your own home in relation to earthquakes? Out of 18 responses on this question only three respondents indicate they are afraid of damages to their houses, 15 responses indicated that they feel safe inside their home.

> "I now think more than in the past that damage could occur to my house." (Respondent 13, 08/12/2023)
>
> "I feel moderately safe because my house dates back to 1899, and more than thirty cracks have already been found." (Respondent 17, 09/12/2023)
>
> "I'm afraid that more and larger earthquakes will also occur in the city. Not immediately, but in a few years. I believe we are far from done with the troubles." (Respondent 26, 12/12/2023)

4.6.3. Damage to Housing

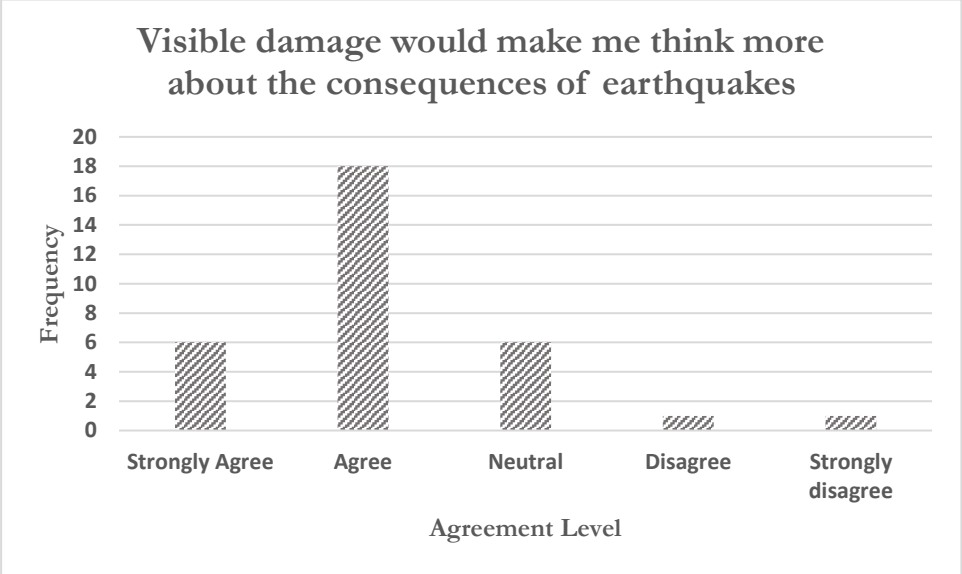

Figure 16: Visible damages and consequences earthquakes

In Figure 16 respondents indicate that if there would be visible damages it would make them think more about the consequences of earthquakes. 24 out of 32 respondents indicated this, 75%. However as demonstrated previously, respondents feel earthquakes in this area are not frequent and heavy enough. This is again demonstrated in the responses to the statement: in my direct living environment a lot of people are worried about visible damages because of earthquakes. 21 respondents out 32 disagree or strongly disagree with this statement, this amounts to 65,6%. Also this is seen in responses to the statement: in my direct living environment there is a lot of visible damage. 20 respondents out of 32 disagree or strongly disagree with the statement, which amount to 62,5%.

Linking these observations to the literature, feelings of insecurity can be reinforced by damage to property such as visible cracks in vital spots within a home (van der Voort and Vanclay, 2015). This is in line with the results demonstrated in Figure 17. However in this case respondents have indicated that little visible damages is present and is not worried about in their direct living environment.

4.6.3. Procedural Troubles Restitution

Figure 7 demonstrates that procedural troubles regarding restitution have a decline in trust as a consequence. Stroebe et al (2021) have also pointed out that a decline in trust, along with experiencing an earthquake and damage to housing feed into the indicator of perceived unsafety as can be seen Figure 6. As can be seen in Figure 17, in the sample 19 out of 32 respondents indicate that they disagree or strongly disagree with the statement: I have confidence in the government's role in the reinforcement operation, this amounts to 59,4%. Nearly 60% of the sample is not confident in the role of the national government in the reinforcement operation, this is a factor that contributes to the perceived unsafety.

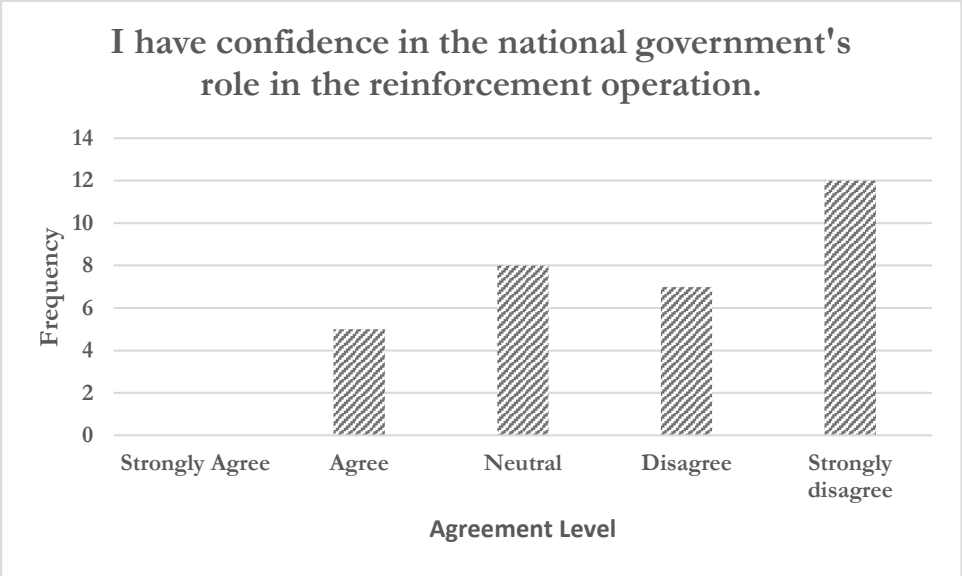

Figure 17: Confidence in government

Responses to the open ended question: Could you elaborate on your thoughts regarding the reinforcement operation and compensation schemes and procedures? Are they adequate? Practical? Is it sufficient for the victims?

> "Victims continue to suffer, waiting for compensation and reinforcement measures for years. I believe that slow bureaucracy and frequently changing regulations result in less progress than hoped for, and the constantly changing finances do not help either. Many victims are experiencing significant stress. I don't personally know anyone affected, but I hear about it in the news." (Respondent 29, 12/12/2023)

> "From reports I read in the press (I read NRC, Volkskrant, De Groene Amsterdammer, Dagblad v/h Noorden), see on TV (Argos, Zembla, etc.), it does not seem adequate or practical." (Respondent 28, 12/12/2023)

> "Only shutting off the gas tap and providing a 100% financial reimbursement would be sufficient. Everything takes too long, and the allocation of resources does not always seem transparent. This frustration potentially has a negative impact on communities." (Respondent 14, 08/12/2023)

> "It is a gross scandal how people are being treated in the province. The procedures are lengthy, cumbersome, and arbitrary. Whether it is sufficient remains to be seen because the compensation process is incredibly slow." (Respondent 2, 04/12/2023)

Key takeaways from these respondents is the indication that procedures are not adequate, to lengthy, and insufficient for the victims.

5. Conclusion and Discussion

This study aimed to understand how the perception of environmental and societal impacts of gas extraction in the Oosterpoortbuurt differentiated with regard to the literature, using quantitative and qualitative data. The theoretical framework has outlined that risk perception theory and perception theory could influence the perception of the respondents. Firstly, main environmental and societal impacts of gas extraction have been identified as well as their causal relationship; environmental impacts of gas extraction have societal implications. Utilizing these impacts a scheme was developed that outlines these impacts and allows for two main consequences that are simultaneously indicators of societal impacts; insecurity and uncertainty. Alongside the outline of environmental impacts.

Firstly environmental impacts in the literature have been examined in relation to the literature. Land subsidence, light and heavy earthquakes and, damage to surface infrastructure are indicated to be unacceptable consequences of gas extraction. Furthermore environmental impacts are related to the potential (economic) benefits of gas extraction. Within the sample is indicated that the Province of Groningen has not profited enough from gas extraction to deal with the consequences, whereas the sample recognizes that the country of the Netherlands has benefitted from gas extraction. Especially responses to the open question revealed resentment and frustration about the uneven distribution of the benefits of gas extraction.

Secondly relating to the indicator of feelings of insecurity the most notable result can be defined as respondents not observing a decline in the desirability of the area relating to earthquakes. This was explained by the respondents due to the lack of heavy earthquakes and visible damage in the area. This response could potentially be explained by the proximity of the neighbourhood to the earthquake area or little visible damage. However, 71,9% of the respondents have indicated to have experienced an earthquake in the Province of Groningen. Therefore this distance might be a psychological factor.

Thirdly, looking at the indicator of perceived unsafety, according to the literature experiencing an earthquake, damages to housing and, a decline in trust add to this indicator, it is important to note that these factors are all in some way present in the sample. Firstly 71,9% of the respondents have experienced an earthquake in the Province of Groningen. However, this does not lead to feelings of unsafety inside the home of respondents for the main part of the sample. For the factor of damage to housing, respondents indicate that visible damage in their neighbourhood is not prevalent. Nevertheless, in line with the literature, visible damage would make them think more about the consequences of earthquakes.

Concerning the factor of procedural troubles regarding restitution, respondents indicate that there is a low amount of trust in the national government's role in the reinforcement operation. This decline in trust in the role of the national government could influence the indicator of perceived insecurity as indicated by the literature.

Furthermore, the thesis yielded a limited sample size and the response rate might be increased. Increasing the response rate and the size of the sample could increase the representability of the sample in relation to the population of study. Additionally, this thesis limits its scope; it does not study the ´background characteristics´ e.g. income or education level, that might influence the perception of the sample. Improvements to reduce the limitations of study should focus on increasing sample size, response rate and, data regarding 'background characteristics'.

Nonetheless, perceived safety in relation to earthquakes is still to be better understood, as are potential regional differences, and therefore different populations. Future research may additionally expand on personal experiences, since this research allowed limited sharing of personal experiences through limited open questions that could not be followed up on directly, as is the case in interviews. Furthermore, the relationship between variables may be studied more in-depth again incorporating data from multiple populations. Additionally, the role of the media could be studied in relation to perception (changes) through analysis of newspapers or social media, especially since several respondents indicated to be influenced by the coverage of the media. Another alternative may be to study the changes in perception over time, certain events may impact the perception positively or negatively. For instance the perception of the role of (national) government regarding societal and environmental impacts might change by certain policy decisions.

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7. Appendices

Appendix 1: Survey Questions

Perceptie op de impact van gaswinning in Groningen op natuur, milieu en maatschappij

Deze studie doet onderzoek naar de perceptie van de inwoners van de gemeente Groningen en hun blik op de impact van gaswinning op natuur en milieu. In dit onderzoek kijken we specifiek naar inwoners van Oosterpoortbuur. U bijdrage aan dit onderzoek zal bestaan uit het antwoord geven op vragen over de impact op natuur, milieu en maatschappij. De hoofdvraag van het onderzoek is:

Wat zijn de verschillen tussen de percepties van de maatschappelijke en milieueffecten die gepaard gaan met gaswinning in de Oosterpoortbuurt en de belangrijkste maatschappelijke en milieueffecten effecten in de Provincie Groningen

Deze vragenlijst zal ongeveer 5-7 minuten van u tijd vragen.

Voor meer vragen over dit onderzoek kunt u contact opnemen met: j.f.lier@student.rug.nl

You are free to answer open questions in Dutch or English.

Ik geef toestemming voor het gebruik van mijn data in dit onderzoek over de impact van gaswinning op natuur, mileu en maatschappij. Tijdens het onderzoek blijft u anoniem en u neemt op vrijwillige basis deel aan dit onderzoek. Data verkregen uit dit onderzoek zal alleen door de onderzoeker gezien worden:

Ik geef toestemming	Ik geef geen toestemming

Leeftijd:	

Geslacht:	

Sectie 1: Impact op Natuur en Milieu

Bodemdaling/inklinking is een acceptabel gevolg van de gaswinning.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Lichte aardbevingen zijn een acceptabel gevolg van de gaswinning.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zware aardbevingen zijn een acceptabel gevolg van de gaswinning.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Aardbevingen zijn een acceptabel gevolg van de gaswinning zolang deze geen schade veroorzaken.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Schade aan huizen is een acceptabel gevolg van de gaswinning.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

De kosten van gaswinning zijn groter dan de baten.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

De opbrengsten/baten maken de gevolgen van gaswinning acceptabel zolang hier adequate compensatie tegenover staat.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Gaswinning heeft een grotere impact op mens en maatschappij dan op natuur en milieu.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Aardbevingen zijn pas een probleem geworden toen deze schade begonnen op te leveren.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Ik herken de bijdrage die de gaswinning heeft geleverd aan de bijdrage van de welvaart van Nederland

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Gaswinning heeft Nederland veel opgeleverd

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Gaswinning heeft de Provincie Groningen veel opgeleverd

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Gaswinning heeft de Provincie Groningen meer opgeleverd dan gekost

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zou u kunnen toelichten of Groningen genoeg geprofiteerd heeft van de gaswinning om met de consequenties om te gaan?

Open Answer

Sectie 2: Onzekerheid

Door de aardbevingen is mijn buurt minder aantrekkelijk geworden.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Door de aardbevingen zullen nieuwe bewoners van de gemeente deze buurt minder snel kiezen om in te wonen

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Ik merk dat mijn buurt te maken heeft met de negatieve gevolgen van de aardbevingen.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Mensen in mijn directe leefomgeving zijn over het algemeen bezorgd over de gevolgen van de aardbevingen

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zou u kunnen toelichten of de aantrekkelijkheid van uw buurt veranderd is als gevolg van de aardbevingen?

Open Answer

Sectie 3: Huisvesting

Ik voel me onzeker over de gevolgen die de aardbevingen kunnen hebben op mijn huidige woonsituatie.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Door de aardbeving is mijn huis minder waard geworden.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Door de aardbevingen loop ik financieel risico.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Ik maak me zorgen over het minder waard worden van mijn woning door de aardbevingen.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Ik maak me zorgen over het minder waard worden van huizen in mijn directe leefomgeving.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zou u kunnen toelichten hoe veilig u zich voelt in uw eigen huis met betrekking tot mogelijke aardbevingen

Open Anwer

Sectie 4: Overstromingen

Ik maak me zorgen over een dijkdoorbraak als gevolg van de aardbevingen.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Een overstroming zou kunnen plaatsvinden in mijn directe leefomgeving als gevolg van de aardbevingen.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Een sterke aardbeving zou een dijkdoorbraak kunnen veroorzaken

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zou u kunnen toelichten of u zich zorgen maakt over een mogelijke overstroming en waarom?

Open Answer

Sectie 5: Onveiligheid

Ik heb een aardbeving meegemaakt in de Provincie Groningen.

Ja	Nee

Door een aardbeving zou ik gewond kunnen raken.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Door de aardbevingen voel ik mij onveilig in mijn eigen huis.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Aardbevingen zijn te allen tijden een reële dreiging.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Aardbevingen zijn een reëel gevaar in mijn eigen woning.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

De dreiging van een aardbeving maakt mij angstig.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Ik denk regelmatig na over de gevolgen die aardbevingen voor mijn eigen woonsituatie zouden kunnen hebben.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Na een aardbeving in de Provincie maak ik me meer zorgen over de gevolgen voor mijn eigen woonsituatie.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Na een aardbeving in de Provincie maak ik me meer zorgen over mogelijke nieuwe aardbevingen.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zou u kunnen toelichten hoe veilig u zich voelt in uw eigen huis met betrekking tot de aardbevingen? Is dit mogelijk veranderd over de tijd?

Open Answer

Sectie 6: Schade aan huizen

Door de zichtbare schade aan mijn eigen huis zou ik mij minder veilig voelen in mijn eigen huis.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zichtbare schade aan mijn huis zou ervoor zorgen dat ik meer over de gevolgen van de aardbevingen zou nadenken.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zichtbare schade geeft mij soms een onveilig gevoel.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

In mijn directe leefomgeving is er veel zichtbare schade aan huizen

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

In mijn directe leefomgeving maken veel mensen zich zorgen over zichtbare schade door aardbevingen

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zou u kunnen toelichten hoe veilig u zich voelt met betrekking tot zichtbare schade in uw directe leefomgeving

Open Answer

Sectie 7: Procedures en vertrouwen

Ik heb schade aan mijn huis opgelopen door de aardbevingen

Geen schade	Eenmalige schade	Meer dan een keer schade

De versterkingsoperatie voor aardbevingsschade is adequaat.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

De versterkingsoperatie zorgt voor frustratie onder slachtoffers van aardbevingsschade.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

De versterkingsoperatie voldoet aan de wensen van slachtoffers van aardbevingsschade

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Slachtoffers van aardbevingsschade zijn tevreden met de procedures die in werking zijn gesteld voor de versterkingsoperatie

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Slachtoffers van de aardbevingsschade zijn tevreden met de compensatieprocedures die in werking zijn gesteld.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

De compensatiemaatregelen nemen stress weg bij slachtoffers van aardbevingsschade.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Ik heb vertrouwen in de rol van de Rijksoverheid in de versterkingsoperatie

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

De versterkingsoperatie en zijn procedures levert de slachtoffers van aardbevingsschade meer stress op dan de schade zelf.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Compensatieregelingen en zijn procedures levende slachtoffers van aardbevingsschade meer stress op dan de schade zelf.

Helemaal mee eens	Mee eens	Neutraal	Oneens	Helemaal mee oneens

Zou u kunnen toelichten hoe u denkt over de versterkingsoperatie en compensatieregelingen en procedures? Zijn ze adequaat? Praktisch? Is het genoeg voor de slachtoffers?

Open Answer

Appendix 2: Respondent Characteristics

Respondent Characteristics:

Respondent Number	Date	Age	Gender
Respondent 1	04-12-2024	31	Man
Respondent 2	04-12-2024	38	Woman
Respondent 3	05-12-2024	43	Man
Respondent 4	05-12-2024	67	Man
Respondent 5	05-12-2024	18	Woman
Respondent 6	05-12-2024	20	Man
Respondent 7	05-12-2024	23	Man
Respondent 8	05-12-2024	24	Man
Respondent 9	05-12-2024	27	Woman
Respondent 10	05-12-2024	33	Man
Respondent 11	07-12-2024	39	Man
Respondent 12	07-12-2024	51	Man
Respondent 13	08-12-2024	53	Woman
Respondent 14	08-12-2024	57	Woman
Respondent 15	09-12-2024	63	Woman
Respondent 16	09-12-2024	66	Woman
Respondent 17	09-12-2024	75	Man
Respondent 18	09-12-2024	34	Man
Respondent 19	10-12-2024	53	Woman
Respondent 20	11-12-2024	56	Woman
Respondent 21	12-12-2024	69	Woman
Respondent 22	12-12-2024	19	Woman
Respondent 23	12-12-2024	21	Woman
Respondent 24	12-12-2024	22	Woman
Respondent 25	12-12-2024	24	Woman
Respondent 26	12-12-2024	25	Woman
Respondent 27	12-12-2024	44	Woman
Respondent 28	12-12-2024	45	Man
Respondent 29	12-12-2024	59	Man
Respondent 30	13-12-2024	59	Woman
Respondent 31	13-12-2024	70	Man
Respondent 32	14-12-2024	77	Woman