From Policy to Action:

Residents' responses to a top-down rainwater retention policy in Groningen

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Abstract

The thesis explores the willingness of residents to implement rainwater retention measures on their property and the impact of Groningen's rainwater regulation on this willingness. The research explores which factors influence citizen participation in pluvial flood management through a survey and an additional expert interview with policymakers. Through a comparison in a quasi-experimental setting, the survey can compare two population groups: One that is not affected by the rainwater regulation, and one group who could be influenced by this regulation in the future. The study assesses residents' awareness of the rainwater regulation, comparing those affected and those not affected, and estimates the impact of being subject to a top-down policy on willingness to invest in water retention measures. In addition, a GIS analysis assesses the effectiveness of the regulation throughout the municipality and locations where the rainwater regulation is least likely to be effective are identified. The results indicate that the rainwater regulation has no significant impact on the willingness of residents to implement water retention measures. The awareness of the regulation was surprisingly low, whilst a substantial part of the municipality had already implemented water retention measures. Residents' lack of technical knowledge and financial restraints were reasons for not implementing measures. The binary logistic regression found that females, larger house types, higher perceived risk and trust in the government were positively associated with willingness, whilst income surprisingly had a negative association. The GIS analysis identified specific inflow areas and postal code areas where the regulation would be less effective due to a high percentage of parcels where the regulation is not applicable.

Keywords: pluvial flooding, flood risk management, citizen participation, municipal policies, urban planning

Word count: 21034

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1 Introduction

1.1 Background

Recently, the impacts of climate change have shifted from distant shores to our doorsteps. Events such as floods in Asia, droughts in Africa, and wildfires in Australia, once considered remote, are now paralleled by similar occurrences closer to home, including in the Netherlands. While perhaps not as severe, the trend of escalating extreme weather events—in terms of frequency and intensity—is unmistakable. Witnessing the unfolding climate crisis nearby underscores the urgent need to adapt our urban and rural landscapes, propelling us towards innovative solutions that enhance our living environment's resilience against yet unknown extremes(Houston et al., 2011).

One of the increasingly prevalent consequences of extreme weather is pluvial flooding, which poses a significant challenge in urban settings. Such floods occur when intense rainfall exceeds the soil's absorption capacity, leading to runoff that either remains on the surface or overwhelms the sewer system, causing overflow. Although coastal and fluvial flooding often have wider-reaching consequences and occur over large areas, the higher frequency and unpredictability of pluvial flooding creates a new challenge. One of the biggest challenges related to pluvial flooding is the high level of uncertainty. Hence, even though pluvial flooding typically manifests on a more local scale, its impact can be significant, highlighting the importance of addressing pluvial flooding through spatial planning and infrastructural resilience. The Netherlands, historically adept at water management, has plenty of experience with coastal and fluvial flooding, but is not very experienced with large-scale pluvial flooding, underscoring the need for innovative urban planning and infrastructural solutions to mitigate the adverse effects of increasingly common pluvial floods (Disco, 2002; Houston et al., 2011). The high population density and high degree of urbanization in the Netherlands require the participation of citizens for improving the climate-proofing of Dutch cities, of which rainwater retention is a vital part (CBS, 2024; Planbureau voor de Leefomgeving, 2019).

In this context, many Dutch municipalities have adopted new rainwater regulations. The city of Groningen stands out for its proactive approach to enhancing pluvial flood resilience (Gemeente Groningen, 2021a). Situated in the northern Netherlands, Groningen's municipality has adopted a rainwater regulation requiring not only new construction to implement water retention measures but also an option to appoint regions in the city where existing buildings will have to implement rainwater retention measures. This regulation has been met with mixed responses from the public and political parties, highlighting the complexities of enforcing urban resilience measures.

Nevertheless, it represents a critical step towards mitigating flood risks in urban environments (Gemeente Groningen, 2023b).

The development of public space has always been a prominent topic on the planning agenda in Groningen (Gemeente Groningen, 1977). In the past few years, the development plans of the municipality have focussed on creating a public space that is becoming increasingly more resilient, including green space and retention measures, and excluding motorised traffic. This does not, however, include privately owned space. The influence of policymakers on private space is limited due to Dutch law that describes the ownership rights of property owners (in Dutch: 'Eigendomsrecht')(Glimmen.net, 2023; Haren de Krant, 2024; Miskovic, 2023; Rijksoverheid, n.d.-a; Veenstra, 2019).

1.2 Research aim and research questions

The primary objective of this study is to understand how the rainwater regulation of the municipality of Groningen affects residents' willingness to implement water retention measures. The influence of the rainwater regulation on the willingness of residents is crucial, as these regulations are now implemented in a lot of Dutch municipalities and are likely to play a key role in municipal policies in the future. A high willingness of the population to participate in the climate-proofing of a city can contribute towards an easier process and less need for the policing, checking, and auditing of policies. Given the novelty of rainwater regulations, there is limited research on their effectiveness and the perception of the population to which they are applied. Research on other top-down spatial planning policies suggests that top-down policies, as opposed to more inclusive approaches, have a negative effect on willingness and participation. (Bąkowska-Waldmann, 2023; Horlings et al., 2021) What makes this research unique, is that rainwater retention measures are not only implemented because citizens would like to prevent pluvial flooding in their city but also because it influences them and their property directly, by flood-proofing their property and saving money on water. Therefore this research studies how a top-down policy influences people's perception of a problem that is not only about the climate and future-proofing of the city, but also about the floodproofing of their property.

To further understand what makes up the willingness of citizens to implement water retention measures, other factors such as socio-economic, personal, and perceptual factors are also included in this research.

The research question guiding this study is:
What is the effect of a top-down policy, in this case Groningen's new rainwater regulation, on the willingness of citizens to implement water retention measures on their property?

To answer this question, the following sub-questions are used:

1. *Which water retention measures are most suitable for private urban spaces?*

   This question will be answered in the theoretical framework, where the most relevant water retention measures will be analysed and grouped to compare their cost-effectiveness, ease of application and practical implementation. This section also acknowledges that the measures, especially within the different groups, show considerable overlap, but are also quite ambiguous in their application.

2. *Which factors influence the willingness of residents to implement water retention measures?*

   The relevant factors are identified in the theoretical framework, and addressed in the survey. In the theoretical framework, the most key factors are reviewed through other literature, to see what their effects were in other similar studies. The survey will attempt to find out if the factors show similar effects on the willingness of residents to implement water retention measures. On the one hand, these can be socio-economic factors, which will be investigated in the survey, but they can also be preferences, opinions or other reasons, which will also be questioned in the survey.

3. *How does the rainwater regulation influence the willingness of residents to implement measures on different parcel sizes (Group 1: 240-250m² parcel size, Group 2: 250-260m² parcel size)?*

   The rainwater regulation will be elaborated upon under the methodology section, and the results of the survey can be found in the results chapter. An expert interview with policymakers of the municipality is also included to further the understanding of the goals and the future of the rainwater regulation and to complement the survey.

4. Where in the municipality is the rainwater regulation likely to be less effective?

Through a GIS analysis, the percentage of houses that are smaller than 250m2 are calculated for each postal code area and inflow areas of urgent locations identified by the municipality. The total surface area of houses that are smaller than 250m2 is calculated as a percentage of the entire surface area of each postal code and inflow area.

5. Which lessons can be learned for Groningen and other Dutch cities designing their rainwater regulation?

This question will be answered by combining the results from the survey, the interview with policymakers of the municipality, and an ArcGIS analysis.

1.3 Research Design

This thesis uses a survey to gain an understanding of the implementation and effectiveness of water retention measures on private properties in the context of the Municipality of Groningen. The design is structured to systematically address the research questions outlined, employing a combination of quantitative methodologies, the survey and ArcGIS analysis, to gather comprehensive data and insights. The expert interview is complementary to both of these methods.

The survey will be performed throughout the entire city of Groningen, targeting citizens that live on properties between 240-260m2 parcels, aiming to gauge their willingness to implement water retention measures and their attitude towards the rainwater regulation of the municipality. The survey also seeks to identify perceived incentives and barriers related to these measures and aims to find out if citizens prefer specific water retention measures. The parcel size specification between 240-260m2 creates two groups, with group one between 240-249.9m2, and the second group of 250-260m2, as the rainwater regulation does not apply to properties below 250m2. As the group 1 households are unaffected by any forced implementation whilst group 2 might be forced to take retention measures in the future, the survey attempts to neutralise as many demographic factors as possible whilst still maintaining a survey population that is large enough to create statistically sound results.

To improve the survey and to complement the findings, an expert interview with policymakers from the municipality is also included in the research. The goal of this interview is two-sided, on the one hand, to gain an insight into the purpose and vision of the municipality for the rainwater regulation, and also to supplement the survey. The interview also attempts to gain an insight into how the rainwater regulation is related to other relevant policies of the municipality, and how the regulation might be used or changed in the future.

Data analysis combines statistical methods for survey responses with thematic analysis of interview transcripts, enabling a rich interpretation of the findings. This approach facilitates a comprehensive understanding of the factors influencing the adoption of water retention measures in Groningen, encompassing both individual property owner perspectives and broader policy implications.

1.4 Relevance

1.4.1 Scientific Relevance

This research endeavours to bridge a significant gap in the existing literature concerning urban flood resilience, specifically regarding the integration of private properties into broader flood risk management strategies. While extensive studies have focused on public space resilience, the role of private property remains underexplored. This thesis aims to extend the discourse by emphasizing the importance of water retention measures within private urban spaces. It draws upon recent literature, such as the work by Roest et al. (2023), Seebauer et al. (2019) and Linnekamp et al. (2011) which highlights both the potential and necessity of using private space for enhancing urban flood resilience. It expands on literature on property-level flood risk adaptation (PLFRA) measures (M. S. Attems et al., 2020; Dhonau & Rose, 2018; Joseph et al., 2015a; Seebauer et al., 2019; Yereseme et al., 2022) which is focused specifically on benefits for the property owner. This research takes a more holistic perspective, as water retention measures do not only provide benefits for the property owner, but the collective implementation of water retention measures improves the resiliency of an entire neighbourhood.

The rainwater regulation provides an opportunity to use a unique methodological approach, namely that of the quasi-experimental design, with the rainwater regulation of the municipality serving as an exogenous variable that influences residents' willingness to implement water retention measures. This creates a situation where the effect of a policy intervention in a non-controlled environment can be observed, by creating two groups just below and just above the threshold where the rainwater regulation becomes mandatory, namely at 250m2. This isolates the effect of the regulation from other factors that could otherwise greatly affect the willingness of residents to implement water retention measures. A similar methodological approach is used in the article by Angrist & Lavy (1999). In that article, the isolation of a specific factor through a size threshold can generate results that show a much more credible causal relationship. The specific isolation of the rainwater regulation through this methodology can be replicated for other Dutch cities as well, as rainwater regulations are quite new due to their necessity in the new Dutch Environmental and Planning Act (Vereniging van Nederlandse Gemeenten et al., 2023).

1.4.2 Societal Relevance

From a societal viewpoint, this research addresses a critical need for effective flood resilience strategies in urban areas, where the potential of private property to contribute to overall flood mitigation is often overlooked. The focus on Groningen and its implementation of the rainwater regulation provides a practical case study on the challenges and opportunities of enforcing water retention measures on private properties. This research is timely, given the increasing instances of pluvial flooding and the pressing need for cities to adapt to changing climate conditions and the new rainwater regulation. The findings offer valuable insights for policymakers and urban planners striving to improve policy tools for integrating water retention measures into urban development plans. Lastly, the municipality also attempts to identify areas in the city where the new regulation might not be as effective, which is beneficial for the policy-making of the municipality of Groningen, but this method can also be replicated in other municipalities.

1.5 Reader's Guide

This thesis will continue with its theoretical framework, starting with a brief history of Dutch water management, and how this has shaped local water management. Secondly, the concept of pluvial flooding is defined, how it happens and how it is likely to occur more often in the future. After this, water retention measures are also defined, focusing on measures that are applicable on private property in an urban setting, and setting them aside from flood resilience measures in general. The factors that are likely to influence willingness to implement water retention measures are identified and their effects in other literature are described, as well as their hypothesized effect on willingness to implement water retention measures.

In the methodology section, the methodology for the interview, survey and ArcGIS analysis are described, focussing on the survey as this is the main research method of the study, with the interview and ArcGIS analysis being complementary. The survey development and data methodology are described. Following, the results section has the same setup as the methodology chapter, starting with the results from the interview, followed by the survey results and ArcGIS results in the form of several maps.

In the discussion/conclusion section, the results are discussed and combined, and the sub-questions and main research question are answered. Lastly, in the reflective section, the flaws and methodological problems encountered during the research process are discussed.

2 Theoretical Framework

2.1 The evolution of Dutch water management: from a defensive stance to coexistence

In the face of climate change, the Netherlands has witnessed a paradigmatic shift in its approach to water management, transitioning from a combative stance against water to adopting strategies that emphasize coexistence and resilience. This change is driven by the recognition that climate change brings about increasingly frequent and severe weather events, such as pluvial floods, challenging the traditional 'fight against water' or 'command and control' ethos deeply ingrained in Dutch water management practices (Intergovernmental Panel on Climate Change, 2023).

Historically, the Dutch strategy was marked by engineering projects aimed at reclaiming land and protecting it against the sea. This development started back in the 11th century when the oldest Dutch, still existing, political entities came into being, the regional water authorities (in Dutch: waterschappen)(van Tielhof, 2021). Their focus on local collaboration and combined efforts gave them the power to turn water into land, and over the centuries more and more of the Netherlands became fertile land, playing a vital part in the development of the Dutch economy. The way that these authorities worked together with stakeholders and how they found consensus, is nowadays still referred to as 'polderen'(Vos et al., 2002), and is still quite typical for Dutch politics. The strong participatory approach that was used by the regional water authorities, has now again become a necessity given the new challenges faced today.

Iconic endeavours such as the Deltaworks have displayed the Netherlands' engineering prowess and its determination to control water. These projects were not just feats of hydraulic engineering but also symbols of national pride, centred on dominating natural water systems to secure dry land for habitation and agriculture (Jonkman & Vrijling, 2008). This important Dutch development turned tradition, cumulated in the Southern Sea Works, an enormous project which turned an entire sea into a freshwater lake and created a new province, visualized in Figure 1 below (Rijkswaterstaat, 1976; van Tielhof, 2021).

This culmination of Dutch technocratic power would eventually be cut short. The traumatic floods in 1953 would force Dutch water management to take a more defensive stance. This is best illustrated by the fact that the entire direction and most of the contractors that worked on the Southern Sea Works were directed to repair the damage in Zeeland and South Holland (Thijsse, 1972). What followed was another engineering marvel, but with an entirely different purpose: The Delta Works.

Again, a large saltwater body would be turned sweet, but the purpose of the Delta Works were vastly different. No longer was land reclamation the main purpose, but the safety of the inhabitants of the southern coastal provinces was at stake.

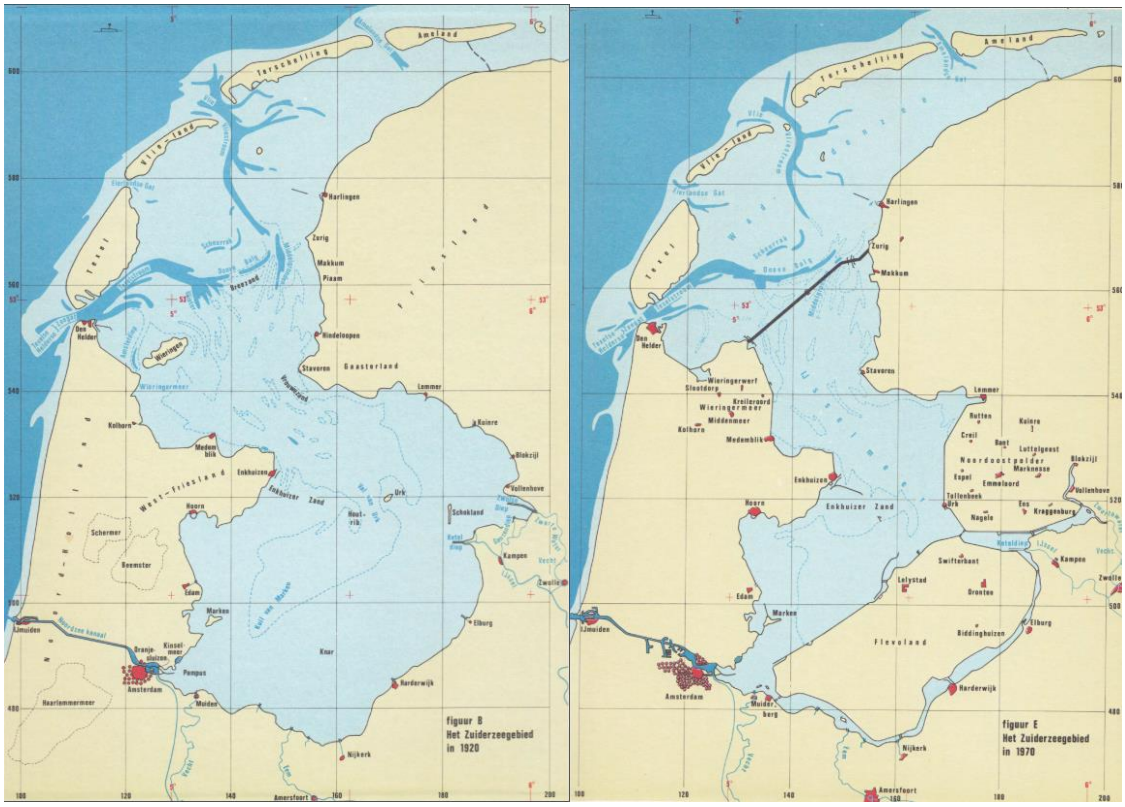

Figure 1 Illustration of the spatial impact of the Zuiderzeewerken (Source: Rijkswaterstaat, 1976)

Another period of technocracy followed, with concepts such as stakeholder participation, biodiversity and water retention having little priority. Expansion of the Dutch territory through land reclamation was declining, with Flevopolder being the last large land-reclamation project, and the rest of the Southern Sea works were cancelled (Van Der Brugge et al., 2005). However, the Dutch flood management paradigm would shift again. In 1993 and 1995, severe fluvial floods in the south of the country showed that Dutch water management was facing new challenges for which new strategies were required.

Recognizing the limitations of a solely defensive strategy, the Netherlands has begun to embrace a more holistic approach to water management. This approach, termed 'Adaptive Delta Management,' aims to build resilience by incorporating flexibility, foresight, and the active involvement of local communities in managing water risks. It marks a significant shift towards living with water rather than fighting it, acknowledging the need for adaptive strategies that can evolve in response to

changing climatic conditions and emerging insights into flood risk (Disco, 2002; Rijkswaterstaat, 1976, 2018; van Tielhof, 2021)

This new paradigm is reflective of a broader, global recognition of the need for integrated, adaptive strategies to manage water in an era of climate change. It underscores the importance of embracing uncertainty, engaging local stakeholders, and fostering resilience through innovation and collaboration. As such, the Dutch experience offers valuable lessons for other nations grappling with similar challenges, highlighting the potential of adaptive, community-focused approaches to enhance flood resilience in a changing world. In that regard, the initial principles on which the Water Authorities were founded as again implemented. Implementing measures at a much smaller scale, with a high degree of participation by all local stakeholders seems to be the way forward.

What makes this difficult, however, is that long, technocratic period, in which the responsibility for flood protection shifted increasingly towards the government, especially the national government. This was mostly because historically, coastal and fluvial floods were the main risks, and some sort of governmental approach was needed as there was not a lot that individuals could do about these risks. Coastal and fluvial flood risk is still the main responsibility of the government, but pluvial flood risk is not something that can be reduced by big, technocratic engineering projects (Disco, 2002). Creating urban areas that can withstand pluvial flooding is not a task that the government can do, due to both spatial constraints (as the government can directly plan and design public space) and legal constraints (as the government is not allowed to directly plan and design private space). Therefore, the involvement of citizens in this process is a vital aspect of creating pluvial flood-resilient urban areas.

2.2 Challenges in urban pluvial flood risk management

Urban areas are more vulnerable to pluvial flooding due to the low infiltration capacity of the urbanised land, making it difficult for rain to permeate into the ground. As the Netherlands can be considered a highly urbanised country, with more than 92% of the population living in cities, (United Nations, 2018) pluvial flooding is a substantial risk. Rainwater runs into a city's sewer system, which is often not able nor designed to deal with the amounts of rainwater that are increasingly more common due to extreme climate events. The Intergovernmental Panel on Climate Change (2023) has established that 'the projected increase in the intensity of extreme precipitation translates to an increase in the frequency and magnitude of pluvial floods – surface water and flash floods – as pluvial flooding results from precipitation intensity exceeding the capacity of natural and artificial drainage systems' (Intergovernmental Panel on Climate Change, 2023, p. 1518). The Dutch

Meteorological Institute defines more than 25 millimetres of rain as a 'downpour', and more than 50 millimetres in one day as a day with heavy rainfall. Double these values, so 50 millimetres in one hour, or 100 millimetres in one day, are supposed to occur only once in a hundred years, and these events are thus considered extreme (KNMI, 2019).

In urban settings, the natural drainage systems are nominal, and thus cities are reliant on their artificial drainage systems (sewer systems). These are incapable of handling both the sewage and peak discharges and thus will overflow quickly when extreme precipitation events occur(Jiang et al., 2017). Increasing the capacity of the sewer system or creating a separate rainwater system is very costly and unsustainable (Forrest et al., 2021) Even when municipalities would invest in a separate sewer system or a system with a high capacity, it remains very questionable if this would solve the issue. A good example of this is the TARP system in the city of Chicago, where the city has invested billions in a large-scale deep tunnel system to collect overflow from the sewer system in several large basins throughout the city, and whilst the basins are full, there is still a large amount of flooding throughout the city (Markus et al., 2012). Sewer systems, however high their capacity, are simply not the be-all-end-all solution for pluvial flooding.

Although recently more attention has been given to pluvial flooding, policies for this are not as rigorous and well-funded as coastal and riverine flood prevention policies in the Netherlands, with de Room for the River programme and the Dutch Delta works being examples of the capabilities of Dutch flood management (Rijkswaterstaat, n.d., 2018). The history that the Dutch state has with flood risk management, has also led to low-risk perception and awareness of Dutch citizens, with the responsibility for dealing with flooding thought to be with the national state (Forrest et al., 2021).

In the contemporary context of water management, the participation of citizens has become a cornerstone in the development of resilient urban cities (Forrest et al., 2021). This paradigm shift recognizes that pluvial flooding necessitates a collaborative approach, engaging not only with national and local governments but increasingly with a variety of stakeholders, including citizens on a local level. Pluvial flood risk adaptation requires change in land use, and because of the high density in cities, a lot of that land is private, and thus the collaboration of private citizens is required (Dai et al., 2020).However, pluvial flooding is 'less well known by the general public, and less well understood'(Houston et al., 2011, p.13). This presents policymakers with a set of challenges, ranging from increasing awareness to creating incentives such as subsidies and tax breaks. The complex governance and different contexts per municipality, require a different approach in every municipality, considering the different mix of stakeholders, geographical context and socio-economic context of the municipality.

Creating regulations such as the rainwater regulation in Groningen and other cities, in which there is a component that can legally 'force' citizens to increase water retention capacity on their property, is a new method of dealing with the complexity of the governance of pluvial flood risk management (Gemeente Amsterdam, 2021; Gemeente Groningen, 2023b; Gemeente Rotterdam, 2021; Vereniging van Nederlandse Gemeenten et al., 2023). The role of citizens in mitigating pluvial flood risks extends beyond mere participation in government-led initiatives. It involves active engagement in adopting and implementing water retention measures within their properties. This shift towards a more distributed model of flood risk management is reflective of a broader understanding that the resilience of urban water systems cannot solely be achieved by adapting public infrastructure but also relies on the cumulative effect of individual actions within private spaces (Seebauer et al., 2019).

The engagement of citizens in urban flood resilience is twofold: firstly, it empowers individuals to protect their properties through localized measures, thus contributing to their immediate safety and well-being. Secondly, and perhaps more critically, it fosters a sense of communal responsibility towards managing water resources, emphasizing that the sustainability of urban environments in the face of climate change is a shared concern. However influencing the behaviour of citizens by the municipality is not easy: Citizens should understand the risk of pluvial flood risk, the necessity of their involvement, and know how they can improve the retention capacity of their property. This is not always as straightforward: Certain building typologies do not lend themselves easily to water retention, and a lack of a garden might make citizens think that they are unable to take any actions themselves (Dai et al., 2020).

2.3 How can citizens contribute to managing pluvial flood risk

Cities such as Rotterdam, Amsterdam, and Groningen have developed extensive adaptation policy plans. These plans, however, focus primarily on the public space of these cities, excluding private property of these cities. The research by Roest et al., (2023) has however identified the potential of private property in improving the flood resiliency of cities. There are a multitude of measures that owners of private property can adopt.

The Green-blue Grids, manual for Resilient Cities by Pötz (2022) presents a multitude of measures that are applicable to private property. These measures include rainwater tanks, reservoirs, water bags, green roofs, water roofs, infiltration strips, ponds and bioswales(Pötz, 2022).

Defining all these measures together is quite difficult, as the nature of the measures is not always similar. Their sizes, cost and effectiveness are also widely different, and their purpose is often multi-

faceted. The article by Roest et al. (2023) defines ‘front- or backyard greening, extra trees, water-storage, decoupling, and green walls’ as ‘private greening.’

Another definition that is often used, especially in literature that is about risk communication, is property-level flood risk adaptation (PLFRA) measures (M.-S. Attems et al., 2020; Joseph et al., 2015b). PLFRA measures, however, also include measures that do not necessarily retain water, their common denominator is the fact that they protect private property from flooding. In that regard, all private property water retention measures are PLFRA measures, but not all PLFRA measures are private property water retention measures, such as flood-proving basements. PLFRA measures are also mostly focused on protecting private property, whilst water retention measures also focus on improving the flood resiliency of a larger area (M. S. Attems et al., 2020) (Joseph et al., 2015a). This is a significant difference because there is a significant difference in the mentality of implementing these measures. Except for some overlapping measures, water retention measures are often more expensive, but their purpose is then also not limited to the property itself. However, the increased cost still must be paid by the property owner. The owner might not feel the incentive to invest in these measures and stick to simpler measures designed to keep his own property dry.

Secondly, several measures from the Green-blue grids manual by Potz (2022) are excluded from the definition of ‘private greening’. The article of (Liang et al., 2019)uses ‘rainwater storage systems’ as a definition, but this excludes any specifically ‘green’ measures.

The issue of defining these measures thus remains. In the context of this thesis, the definition ‘water retention measures’ is used. This includes both specifically ‘blue’ and ‘green’ measures, as long as one of their appliances is the retention of rainwater, to a varying degree.

In the context of this thesis, the following measures are included as water retention measures:

- Changing pavement to green patches
- Porous paving materials (such as porous clinkers or gravel)
- Infiltration meadow/strip
- Rainwater pond
- Bioswale
- IT sewage system (?)
- Infiltration box
- Infiltration drain/well
- Water roof

- Green roof
- Rainwater tanks
- Water reservoir
- Water bags
- Rain garden
- Permeable gravel

Source: (Pötz, 2022)

Roof measures:

Roof measures often contribute not only to water retention but also increase biodiversity and mitigate heat. Their water retention can be quite substantial, but this depends on the amount of roof surface available. As these measures are mostly suited to flat roofs or roofs with a limited slope, they are mostly applicable to properties in the city centre where flat roofs are a lot more prevalent, although more recent housing developments do contain more flat roofs in their neighbourhoods. Their applicability is thus limited in large parts of the city, although their implementation is also possible on for example garage roofs.

Secondly, a more popular use for flat roofs is the application of solar panels, which are heavily subsidised and have a direct economic benefit for the owner. Although some roof measures also have economic benefits, their application is often more expensive and require more maintenance. Their economic benefit is also more indirect and not as high.

Garden measures:

Garden measures are often relatively cheap to implement, and their versatility makes them applicable to both front and back gardens. They do require space, and this is directly correlated to their retention capacity, and thus smaller gardens are limited in their retention capacity. They are, however, cheaper than most of the other measures, and people can maintain garden measures themselves, although for some, like rain gardens, some knowledge is required. Their aesthetic value and biodiversity benefits make garden measures quite popular (Pötz, 2022; Urban Green-Blue Grids, 2022). Their economic benefit is limited, as most of the measures do not allow for the retained water to be re-used.

Underground measures

Underground measures score high on construction cost and maintenance, whilst they do not add to biodiversity. Their retention capacity varies. Several underground measures do allow the reuse of water, which provides an economic benefit, although this does not yet weigh up against the high construction costs. They are suitable for properties that do not have a lot of open space or flat roofs, or for citizens that do not use their garden for water retention.

Other measures

The fourth group of 'other' measures consists of measures that are difficult to place in one of the other groups but are still effective and relevant measures.

Because of the overlap between the different measures, mostly within the four groups but also outside of it, a visualization of the overlap between measures is presented below in Figure 2

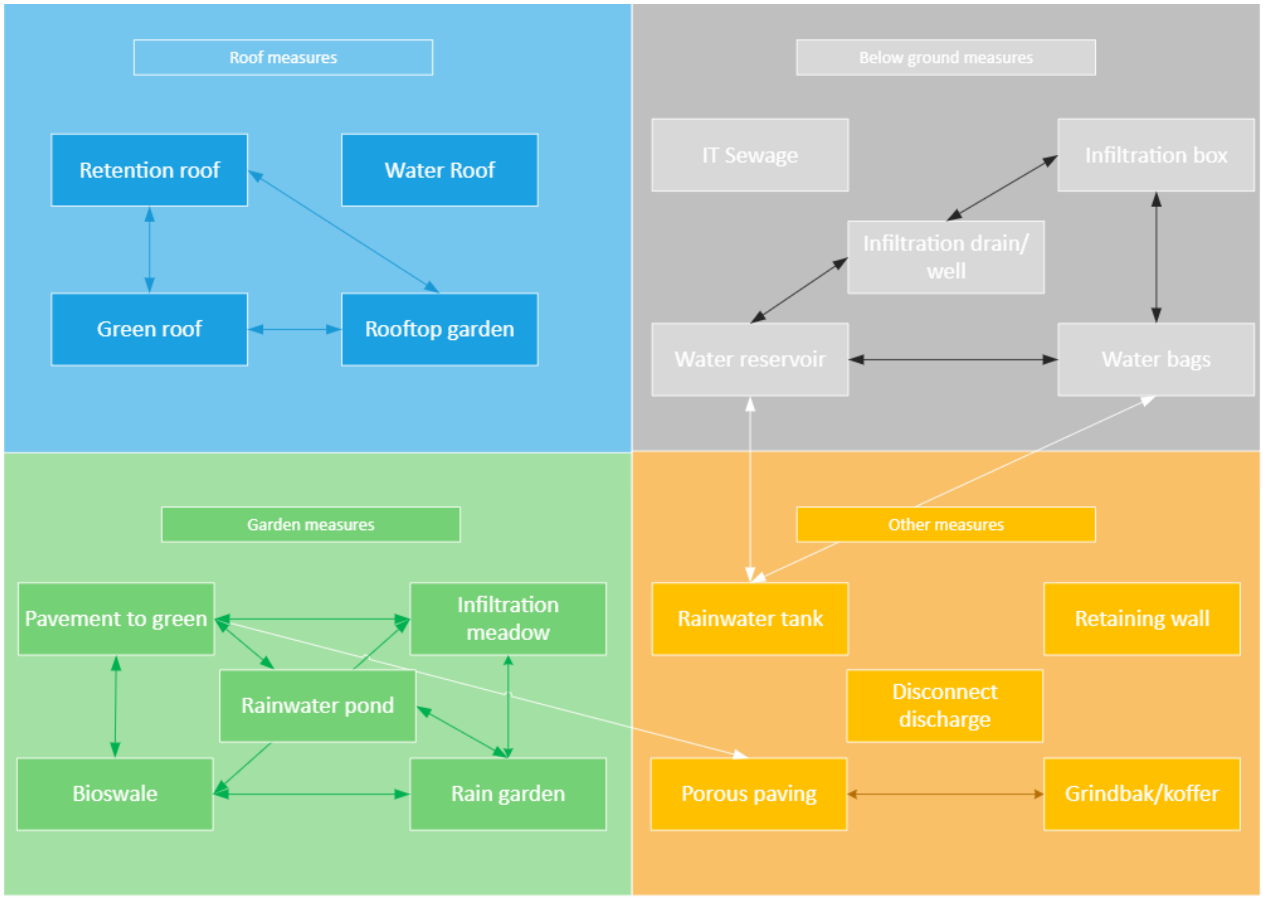

Figure 2: Four groups of measures and overlap between measures (Source: Author)

2.4 What are the factors that influence the willingness of citizens to contribute to pluvial flood risk?

Adoption of water retention measures on private property is still, despite regulations, dependent on the willingness of property owners to adopt these measures. Understanding this willingness is by recognizing which factors all influence this. When there is a sufficient understanding of these factors, the second question is how this willingness can be influenced by policies, regulations, or subsidies.

There is quite some literature on PLFRA measures and how citizens feel about implementing these, and which factors have an influence on this (M. S. Attems et al., 2020; Joseph et al., 2015a) There is also quite some overlap between these measures, especially in their application, although a bit less in their functionality, as discussed in chapter 2.3As water retention measures do also have the functionality of most PLFRA measures, a lot can be learned from these sources about which factors will influence the willingness of citizens to implement water retention measures.

However, as (M. S. Attems et al., 2020 p.13) states: 'In fact, the effects of each factor on individual behaviour are quite complex and sometimes hazardous; trigger mechanisms are often case study specific as different sociocultural and individual circumstances influence individual behaviours.''

This is an important thing to clear up before diving into the several factors that can influence the willingness of citizens to implement water retention measures; All previously identified factors in other studies are influenced by circumstances that are case-study specific. Especially the fact that although there is plenty of literature to be found, these all discuss climate mitigation measures or PLFRA measures. Water retention measures, specifically, are not researched as much as the other measures, and thus literary insights must be borrowed from these studies, but as considerable overlap can be expected, this should not lead to very different results.

2.4.1 Socio-economic factors

Age

Age is considered a significant socio-economic factor that can influence the willingness to adopt water retention measures. Age links directly to several other factors, such as income, whether somebody rents or has bought the property, and even their political preference(Koerth et al., 2017; van Valkengoed & Steg, 2019). According to Kullberg (2016), older people are often more willing to

spend time on their garden. This might also have a positive correlation with water retention measures, as these measures do require maintenance and are often green by nature, although not all. In the article by Molua, which is about flood protection measures in coastal areas, income is also a significant factor in deciding which protection measures are most likely to be implemented (Molua, 2009).

Although age is mentioned by several sources as a key factor, these sources do not conclusively explain what kind of effect age has on any kind of flood prevention measures or climate adaptation measures, just that it is a key factor (M. S. Attems et al., 2020; Joseph et al., 2015a). In the article by Attems et al, it is explained that on the one hand, elderly people might be more open to adaptation measures because they, relative to other ages, own more property and have more financial capacity. On the other hand, the elderly are also prone to invest less in their property, although it is not specified why this is the case. This could be because of the need to also perform physical activities themselves, which the elderly might feel more hesitant towards. The effect of age on the willingness of citizens is thus still unclear.

Income

Income is likely to be a significant factor, as it does not only just influence the willingness of citizens to implement water retention measures, but it can also influence the efficacy of a citizen to implement these measures. Water retention measures do not always come cheap, and as Attems et al. state: ''Individual risk behaviour relies on an active and financially robust household as homeowners have to fund and maintain the PLFRA measures' (M. S. Attems et al., 2020, p.14). In the article by Molua (2009) income is also found to positively impact the probability of a household to implement flood protection measures. Molua also identifies that income has an impact on what kind of flood protection measures citizens prefer. In the case of water retention measures, it is interesting to see which measures are preferred by citizens and how their income influences this. It should also be noted that income does not always decide how easy it is for someone to make ends meet, as income is only one of the variables that determines this.

Employed/unemployed

According to (Molua, 2009) unemployment will significantly reduce the implementation of flood protection measures. This is likely related to income as well.

However, as discussed in the report by Kullberg (2016) when the household is composed of more people, employment status changes considerably. When there is one adult with a job, and one without, there is a positive impact on the amount of time that is spent on a garden. This seems to do with the amount of time available, and as gardening and water retention measures are not directly

related, it is still to be seen if there is a comparable causal relationship for water retention measures, but it is an interesting result, that also shows the complexity of willingness in general. Somebody who is unemployed does not necessarily have a low income, as there are plenty of reasons why somebody is not currently having a job.

Gender

The impact that the factor of gender can have on the willingness of a resident, although often included in the literature, remains difficult to grasp. According to Höppner et al. (2010), in the context of risk communication and the responsiveness of people to hazards, it becomes clear that whilst some studies report that females are more likely to respond than males, other studies state otherwise. In the context of adaptation behaviour, the article by Koerth et al., (2017) does mention that gender does have an impact, but the article does not define which gender is more likely to take adaptation measures. In the article by Molua et al (2009) gender has a negative impact on the willingness to take flood adaptation measures, although the article does not specify why this is the case. However, the article by Molua et al. also shows a negative association between gender and income in the population, and thus the negative association between gender and implementation of adaptation measures might be influenced by this as well. This is less likely to be such an influencing factor in the Netherlands. In the context of gardening in the Netherlands, females are more likely to spend more time on their gardens compared to men(Kullberg, 2016). Looking at all these sources together, there is still considerable ambiguity, although the sources that discuss contexts that are most comparable to water retention measures do imply a positive impact, which would mean that females are more likely to take adaptation measures.

Educational level

The level of education is a factor that is often part of surveys, and its impact is often quite significant, as described in the articles of (M. S. Attems et al., 2020; Höppner et al., 2010; Koerth et al., 2017; Molua, 2009). A higher level of education will, in the case of PLFRA measures, have a positive impact on the level of implementation. These articles, do not, however, specify exactly how education influences the willingness of residents, they simply show that it has a positive impact. Höppner introduces the concept of risk education, which is the creation of awareness of risks in general. (Höppner et al., 2010) In that regard, being highly educated seems to increase risk awareness, which in turn leads to a higher willingness to implement PLFRA measures.

Renting/bought property

The distinction between owners living on their property versus renting it out is a key factor, especially in a student city like Groningen. Many properties are rented, often to students, possibly affecting the motivation to invest in water retention measures. The decision to implement measures rests with the owner, but their incentive to apply such measures might not be as high if they do not live on the property. A renter will also not be as motivated to invest in retention measures on the property if the owner allows them to do so, as they then must invest themselves to protect the property of someone else.

In Groningen, 38% of properties are owned by the person living on that property, with another third being owned by housing corporations (Gemeente Groningen, 2021b). Therefore this factor can be significant, although it might differ per rented property in what kind of rental rules apply.

Some people might rent the entire property, and for a long time, and thus are more willing and thus more likely to implement water retention measures. Although only 38% of properties are owned by the resident, this might be different for parcels that have a parcel size between 240-260m2, although there is no data available to confirm this.

2.4.2 Perceptual factors

Risk-perception

This brings us to the concept of risk. It is important to note that risk is not the same as perceived risk. Actual risk, or the chances of an event, in this case, a pluvial flooding event happening, might be quite different from what people think the chances are that these events will take place. Risk is one of the main factors that influence the willingness of property owners (Joseph et al., 2015b). For the purpose of this thesis, two concepts that deal with risk are included: Risk communication and risk ownership.

Starting with risk communication: This is defined by (Höppner et al., 2010, p. X)as: 'an approach to raise awareness, encourage adaptive behaviour, inform on hazards, risks and behaviours during an event, build trust, enable mutual dialogue and involve actors in decision-making.'

The way that both local and national authorities communicate the risk of pluvial flooding with residents, is likely to have a strong influence on the willingness of actors. The rainwater regulation is a good example of this, as it is an example of one-way communication. The responses in the media were negative and blamed the municipality for not wanting to invest in the sewer system, and it gives the water retention measures a negative annotation. In that regard, it seems like the rainwater

regulation has a negative effect on the willingness of residents to start implementing water retention measures. As stated by Attems et al., 'There needs to be a personal connection to the sender and a two-way communication which includes a mutual knowledge transfer from and to sender and receiver' (2020, p. 7). In that regard, the rainwater regulation takes a different approach and one that is, according to risk communication literature, not the most suitable to increase the willingness of residents. One-way communication often leads to disagreements.

Environmental values

The way that a citizen feels about the environment, is also mentioned as a factor that influences the willingness of citizens, in the case of the article by van Valkengoed & Steg, 2019), climate adaptation measures. The same article also states that: ''The strength of the relationship between climate change belief and adaptation may depend on the type of adaptive behaviour studied.''(van Valkengoed & Steg, 2019, p.159) It is therefore interesting how these values will influence the willingness of citizens to implement water retention measures in Groningen, and especially how these values compare throughout the city.

Previous flood experience

Any experiences that people have with pluvial flooding are highly likely to influence the risk perception. As experiencing a flood event often has a negative effect on how safe someone feels, this in turn can have a positive effect on the willingness of somebody to start implementing water retention measures on their soil (M.-S. Attems et al., 2020). In that regard, something must go wrong before anything is done to prevent it in the future. The same is true for flooding, as discussed in the introduction. Dutch spatial planning often takes big leaps after a big flooding event. On a smaller scale, flooding experience might make people aware of the risks that they face. SOURCE

What most of the literature does not include, is the different kinds of flooding. There is often a clear link with the same kind of flooding, but it is not yet known if experience with fluvial or coastal flooding also has an impact on how people feel about pluvial flooding, as both the causes and the effects of these floods are quite different. A much clearer link is to be found between the same kind of flooding. From this perspective, the pluvial flooding in Haren in 2021 is likely to have made an impact on the risk perception of inhabitants(NOS, 2021). This is also confirmed by Bamberg et al. (2017), as there is a positive association found between past flood experiences and the taking of flood prevention measures.

Responsibility

As already mentioned in the theoretical framework, the Netherlands has had an extensive history of flood management, with several Dutch institutions working tirelessly to prevent floods from

happening. What is still unknown, is how citizens feel about whose responsibility the preventing of floods is, when the flood is not fluvial or coastal, which are the causes that Dutch authorities have focussed on in the past.

2.4.3 Personal and regulatory influences

Self-efficacy

The concept of self-efficacy is a key factor in risk communication literature, but is a key factor, especially given the context described in chapter 2.1, which talks about whose responsibility flood risk management is. In the Netherlands, we have seen the shift in flood risk governance move from the central government towards multi-level governance, which understands that citizens play a vital role in creating a resilient city. The next step is to make citizens aware of this shared responsibility, but when citizens do realize that they have a part to play in the creation of a resilient urban fabric, self-efficacy becomes especially important. Self-efficacy is defined as ''the extent to which people believe they can engage in relevant adaptive actions, which may differ from an objective assessment of a person's actual capability of adapting.''(van Valkengoed & Steg, 2019', p.159)

A higher perception of self-efficacy has a positive impact on both climate change adaptation measures and PLFRA measures, (M. S. Attems et al., 2020; Joseph et al., 2015b; van Valkengoed & Steg, 2019), and it is thus quite likely that the same is true for water retention measures.

The article by Höppner et al. (2010) also discusses risk education, which is the level of knowledge that people have about the hazards and risks of flooding and possible measures that citizens can take. This is thus previously gained knowledge on the subject of flooding, which is highly likely to influence the willingness of citizens to implement water retention measures. It is also interesting to gain an insight into how this knowledge has been acquired, especially related to the rainwater regulation. The source of flood knowledge might tell a government where opportunities are for further risk education.

Garden size/purpose

Gardens play a vital role in water retention, as a lot of water retention measures require outside space. Although measures can also be placed on the roof or underground, a lot of the cheapest, easiest to implement and most well-known measures are garden measures (van Valkengoed & Steg, 2019). Also, underground measures can be both under the house but also under the garden. Thus, a larger garden provides more possibilities for implementing measures, which should at the very least improve the self-efficacy of the resident.

The purpose of a garden plays a significant role in this. People might not want to completely overhaul their gardens to start implementing water retention measures if they want to do so at all. In that case, a garden that is already green is much easier to adapt, whilst gardens with for example parking spaces provide fewer opportunities for water retention, although there are still some (less efficient) options available (Kullberg, 2016; Random Acts of Green, 2022). A large, green garden will thus be likely to have a positive impact on the willingness of residents to implement water retention measures.

Awareness of regulation

Although the purpose of the rainwater regulation had nothing to do with risk communication, it does affect how risk is perceived, next to how water retention measures are perceived. The rainwater regulation does not specify how the rainwater regulation will be applied to areas that have already existing structures (Gemeente Groningen, 2023b). It is unknown whether the rainwater regulation affects willingness to implement water retention measures, which this research will further dive into.

2.6 Conceptual model

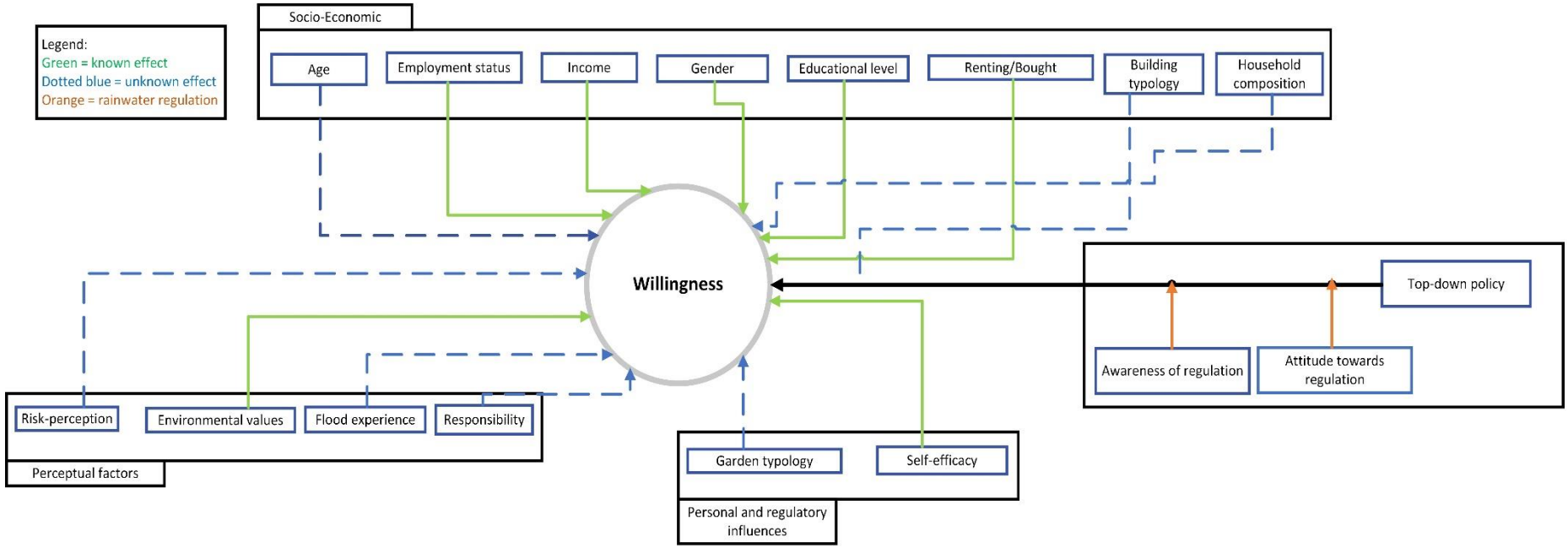

Figure 3 Conceptual Model

The conceptual model is a visualization of the different components that influence the willingness of residents to implement water retention measures. The factors are a collection of socio-economic, perceptual and physical factors that directly make up the willingness of the residents to implement water retention measures. The effect of some factors is already quite well-known in the literature, which is visualized by a green solid line. The effect of other factors on the willingness of citizens to implement rainwater regulation is still unknown, which is visualized by a blue dotted line. Two separate orange lines are used to identify the relation that the rainwater regulation has on the willingness of citizens to implement rainwater regulation, as these are the main factors being questioned.

3 Methodology

3.1 Research method(s)

The research will primarily utilize a quantitative method, employing a survey with 31 questions. The survey is used to gain an insight into the willingness of citizens throughout the entire city, gaining an insight into on the one hand the willingness of citizens to implement water retention measures, and on the other hand how this willingness is influenced by the rainwater regulation. To complement this, a semi-structured expert interview is used to gain insight into how the municipality has created the rainwater regulation and how they will use the rainwater regulation in the future.

The expert interview is also conducted before the commencing of data collection through the survey, allowing for extra questions to be added if the municipality has questions that are relevant to this research that can be included in the survey. Together, the survey and interview provide a comprehensive understanding of both the quantitative aspects of citizens' willingness and the qualitative insights from policy experts on the rainwater regulation.

Lastly, ArcGIS maps will be used to see if there are differences in the future effectiveness of the rainwater regulation in different parts of the municipality, using the data that was used to identify the relevant parcels for the survey, to complement the findings from both the survey and interview and see what the direct effects of the regulation might be.

3.2.1 Case selection survey

One of the biggest issues in designing flood resiliency policies in an urban context is that municipalities can only directly influence the design of public space, whilst their influence on private space is far more limited. However, as the amount of public space in cities is limited, this also means that water retention capacity is limited, and simply increasing the retention capacity in public space is not enough to withstand extreme precipitation. Thus, to improve water retention capacity, the inclusion of private space into water retention policies is a vital part of improving flood resiliency. Up until recently in the Netherlands, this has mostly been done by attempting to motivate and stimulate residents and companies by subsidies and informational campaigns. According to the Dutch 'Eigendomsrecht' or ownership Right, the influence of municipalities on private property is limited (Artikel 5:1 BW Eigendom, Wetboek Plus, 2021). This meant that previously, most of the policies on water retention focussed on the public space, although there were policies in place to at least

encourage the adoption of retention or green measures, such as the subsidy for Green Roofs in the municipality of Groningen (Gemeente Groningen, 2022). These policies are used to stimulate the implementation of green roofs and water retention measures, but up until recently, the municipality of Groningen refrained from forcing property owners to implement water retention measures.

This changed with the rainwater regulation (Dutch: Hemelwaterverordening) This regulation was put into force from November 2023 onwards. The regulation applies to new developments that are larger than 250m2 and specifies how much rainwater retention capacity a new development should have. However, the regulation can also be applied to areas that are appointed by the municipality that already have buildings on it. In that case, the amount of rainwater capacity that a parcel should have is to be determined later, but the regulation has encountered strong social and political opposition. Several local newspapers claim that the regulation goes against the Ownership's right(Glimmen.net, 2023; Haren de Krant, 2024; Miskovic, 2023; Veenstra, 2019). The influence of municipalities is limited, any parcel owner must make sure that he adheres to local regulations, and the introduction of the rainwater regulation is in that regard no different to other regulations. There therefore does not seem to be a breach of the ownership rights of parcel owners.

The rainwater regulation in Groningen is, however, not an isolated one. On the first of January 2024, the new 'Omgevingswet' or Environment and Planning Act came into effect. This law 'combines and modernises laws for spatial, housing, infrastructure, the environment, nature and water. It focuses on a healthy physical environment that meets the needs of society (Informatiepunt Leefomgeving, 2024). This new law specifies that municipalities must implement specific regulations into their local Environment and Planning Plan, and one of these regulations is the rainwater regulation. Therefore, a multitude of Dutch municipalities have already adopted their rainwater regulations to fit into their local Environment and Planning Plans, just like the city of Groningen. Rotterdam, Amsterdam and Haarlem are some of the cities that have a similar regulation in place (Gemeente Amsterdam, 2021; Gemeente Rotterdam, 2021). The degree to which already existing buildings are influenced is, however, different for each municipality, which is also the part that has been the catalyst for all the (negative) attention the rainwater regulation attracted in the local media. The Environment and Planning Act leaves room for individual municipalities to shape the regulation to fit into the local context, and therefore there are quite a few differences between the regulations of different cities. For example, the city of Nijmegen has no clauses on the implementation of measures for already existing buildings, whilst Groningen does (source: Interview, 2024).

It is important to note that the rainwater regulation specifies that only areas (with already existing buildings) appointed by the municipality will have to follow the regulation and that the specific

retention capacity for these areas and each parcel will be specified when an area is appointed. However, it remains unclear to what extent the municipality plans to start appointing areas, and how these areas are selected (Gemeente Groningen, 2023a).

Given the opposition that the regulation has encountered, the question remains how much political backing there is for the municipality to start to apply the rainwater regulation to large parts of the city. This thesis also attempts to find out if the regulation also influences parcels that do not fall under regulation. Because of the design of the regulation, only applying to parcels above 250m2, this creates a unique opportunity to investigate if there is a relationship between the existence of such a top-down regulation and the willingness of residents to implement water retention measures. The main research method of this research is a survey, but to hear the other side of the story, from the municipality, a semi-structured interview was also conducted with two of the municipalities' policymakers that deal with the rainwater regulation in their daily practice.

3.2.2 Participant characteristics survey

Participants in the survey live on a parcel between 240-260m2 in Groningen and preferably are the main resident. The survey is limited to households, so businesses, industries or other kinds of parcels that are not qualified as a home are not included in the survey. Only one inhabitant per parcel is allowed to fill in the survey. Respondents are over eighteen years old. As the survey is in Dutch, only Dutch respondents are able to fill in the survey.

3.2.2 Sampling procedures survey

The selection of participants is done through ArcGIS, using a parcel size file from the Dutch land registry (Kadaster), specifying all parcel sizes in the municipality of Groningen. Using a filter, two groups of parcels were identified. A group of 240-260m2 parcels is created, which is then split in two, creating a group for the parcel size of 240-249.9m2, and a second group for parcel sizes between 250-260m2. This gives a total amount of +- 2000 parcels, with the 240-249.9m2 group including around 1100 parcels and the second group including around 900 parcels. However, this includes parcels where nobody lives, such as parts of a street, stretches of water, etc. Because the dataset does not contain any address list or additional information, another dataset from the BAG was added and through a Spatial join in ArcGIS, both datasets were combined, linking the land registry file with the BAG file and thereby adding addresses and more data to the dataset.

With the extra BAG data, all parcels that did not have a living function (identified as households) were also able to be filtered out, reducing the dataset to 1661 relevant parcels. For apartment

complexes that had a total parcel size between 240-260m2, only one address was selected, so as not to overrepresent these parcels, although there were almost no apartment complexes included.

3.2.3 Sample size, power and precision survey

Individual invitations were delivered to each address in the sample. The municipality is, just like the rest of the Netherlands, divided into postal code areas. For the distribution of the survey invites, the four-digit postal code was used to designate the distribution zone for each surveying day, sometimes only distributing in one postal code zone, and on other days distributing in several postal code zones that were close to each other or had a small number of parcels. The distribution per day can be found in the appendix. Some postal code zones were distributed by friends of the author who lived in the postal code zone, to maintain the feasibility of the large-scale individual surveying strategy. There were 220 of the total distributed flyers distributed in this way, the total was 1555. Of the 1661 identified locations, 1555 were intended to be visited. 106 locations of the 1661 were not visited. 33 addresses were skipped because of their distant location and time constraints, 34 flyers were not distributed due to mistakes in the route mapping, and 39 were not visited because they were 'double' addresses or the same kind of parcel in an apartment complex.

Of the 1555, an unknown number of parcels were not visited due to the address not being found, being sent away by residents, the parcel being demolished, already sold, or empty. As there were a total of 1600 flyers printed, and 130 being left, resulting in 85 parcels not being available to receive a flyer. 1600 flyers minus 130 flyers means that 1470 flyers have been distributed. During the data collection, Qualtrics also recorded responses that were only partially filled in. These were mostly deleted during this phase. The first phase of the data collection resulted in 144 respondents, which gives a response rate of 9,8%.

3.2.5. Data collection survey

Citizens were asked to fill in the survey by scanning a QR code on a flyer, with two different flyers targeting the two different parcel size groups, which were distributed from the 14th of May until the 28th of May. The flyers were both identical, and the flyer design can be found in Appendix 8.3. The flyers were printed out by the university on an A4 and cut into A6 format flyers. As visible in Figure 4, the spatial distribution of the parcels is not equally distributed throughout the municipality, with some neighbourhoods having significantly more parcels in the relevant size than others. There does not appear to be a pattern to this distribution. On a smaller scale, parcels are also clustered, as exemplified in the Anna Blamantstreet in Figure 5. What is also visible in Figure 5 is the difference

between building size and parcel size, which is an important distinction, as parcels are a lot larger than the buildings most of the time. Some participants of the survey were confused about the difference and were not sure which one was used for the rainwater regulation.

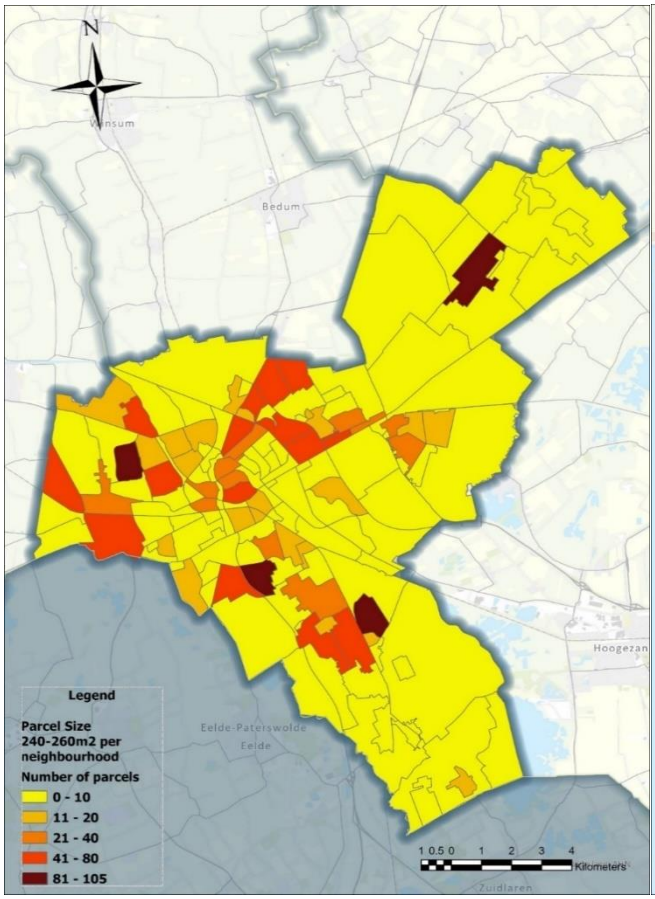

Figure 4 (left) Clustering of parcels relevant for survey within the municipality of Groningen

Figure 5 (right) Example of clustering of relevant parcels on the neighbourhood scale, with relevant parcels in green

3.2.6 Quality of measurements

The quality of measurements was influenced by the fact that the response rate was a lot higher when people were approached directly instead of seeing the flyer when they checked their mail. This is a common phenomenon but does influence the quality of measurements. As the data collection mostly occurred during the daytime, this meant that quite a few of the respondents were people who worked at home during the day, did not have a job, or had a day off. Although people were not approached actively, whenever people were outside of their homes, it would have been very odd to ignore them and put a flyer in the mailbox. As a result, an availability bias of unknown size may be apparent in the data.

In the second round of data collection, which was performed to improve the response rate, people were actively approached by ringing the doorbell instead of putting a flyer through the mailbox. As approaching people directly should improve the response rate, which was also seen during the first round of data collection, this is an effective way of improving the response rate. In this case, these are still people from the same selection, and to mitigate the daytime response issue, the second round of data collection was performed after 17:00 hours, which was also done because of the higher chance of people being home. Because of time restraints, the second round of data collection was not performed through the entirety of the municipality but was performed in postal area code 9721, because of its proximity to the author's residence and its high density of selected parcels. Given the limited size of the second round of data collection, it is unlikely that this will significantly influence results.

The quality of measurements might also be influenced by the fact that surveys are a very popular research tool and these are widely used in Groningen, with a lot of citizens of Groningen ignoring surveys due to the high number of participation requests they received, which was mentioned by several respondents encountered during the distribution. Especially during this time of the year, when a lot of students are in the data collection phase of their research in the city and try to approach respondents.

3.2.7 Masking

Although the rainwater regulation seems to be a controversial issue in local politics and some local newspapers, it was observed that a substantial part of the respondents was not aware of the existence of the regulation. To gauge the level of awareness, the question: ''Are you aware of regulations concerning rainwater such as the rainwater regulation? Bent u op de hoogte van lokale regelgeving omtrent regenwateropvang zoals de hemelwaterverordening?)''

It was observed that a substantial part of the respondents was not aware of the existence of the regulation. A key challenge in conducting the survey was that a detailed explanation of the rainwater regulation could not be provided to respondents. Doing so would have made the survey a source of information, which could have influenced their response, which would in turn compromise the objectiveness of the data collection process. The goal of the survey is not to educate respondents on the rainwater regulation, although several respondents suggested that the survey could have been improved by adding this explanation. Several potential respondents might have been discouraged from finishing the survey because they encountered questions about a subject that they were not familiar with.

3.2.8 Psychometrics

In this section, the reliability and validity of the psychological variables are discussed. In the context of this thesis, reliability is the consistency of the measure, as they are measured through several questions in the survey and then calculated into a mean score. To assess the reliability, the Cronbach Alpha's of the various scales are calculated. Questions 11, 12 and 13, dealing with Risk Perception, after being recomputed to a consistent scale, were checked on their Cronbach's Alpha score, which was .818. The mean of the three variables was calculated in a new variable, Riskperception_Mean. The questions combine both the experience with previous flooding, which has a strong impact on risk perception, with the actual perceived risk of a respondent.

Secondly, the self-efficacy mean score was calculated. For these questions, the self-efficacy Scale of Schwarzer et al. (2021) was used. As some of the questions from that scale are negative whilst others are positive, this required recomputing to make sure that the questions were compatible for the calculation of a mean score. After this recomputing, the Cronbach's Alpha score was calculated, and with a score of .728, this was deemed acceptable. Item-total correlations were examined, but none of the removal of the questions would significantly increase the Cronbach's Alpha, so no questions were removed. The relatively low score, although acceptable, might be explained by the fact that this scale is mostly applied in research from the medical field, which might not fully capture the constructs relevant to our study.

3.2.9 Data diagnostics

Data diagnostics started with the cleaning of the dataset, firstly by deleting all entries that were not completed in their entirety. Secondly, as the survey was Dutch, the SPSS labels were translated into English.

For the comparison of both parcel groups, the socio-economic statistics were checked for significant differences between the two groups. For the ordinal variables (age, ability to make ends meet and income) the Mann-Whitney Test was performed, whilst for the other nominal variables (gender, education, work and household composition, the Chi-square test was performed. As there were no significant differences between both groups, they can be assumed to be statistically comparable socio-economically. See Appendix 8.4 for the results of the Mann-Whitney U Test and the Chi-Square tests.

Also, for ease in further analysis, a summarising variable was computed out of the Q35 variable, which asked if a respondent had already implemented water retention measures and if yes, which ones. The new variable Water_Retention_Present summarises if there are no retention measures implemented (0) or if there are (1).

Several variables required computation due to too many answer categories relative to the number of respondents, resulting in zero cells in the regression.

For the willingness of citizens to implement water retention measures, Question 29 is used, which translates to: 'How likely is it that you will be implementing water retention measures in the next 5 years?' However, the impact of already implemented water retention measures on Q29 had to be checked first, through an Independent Sample T-Test. This test can be found under Chapter 4.2.4. As the result of this test was not significant, for the rest of the test, Q29 was used as the main indicator for willingness.

3.2.10 Analytic strategy

The analytic strategy is made out of two parts, as there are two sub-questions to answer with the survey. On the one hand, which factors influence the willingness of residents to implement water retention measures. In this case, the two parcel groups are not relevant, and the entire population (N=144) is used.

The second sub question '*Which factors influence the willingness of residents to implement water retention measures?*' cannot be answered through an ordinal regression, as the population is not normally distributed and relatively small. This causes zero cell entries to occur and makes the results of an ordinal regression unreliable. As an alternative, the dependent variable is recoded to include three values instead of five. The middle value 'neutral' is excluded, so a binary logistic regression is possible. The exclusion of the neutral respondents is necessary because there are no indications in which of the two categories these respondents would fit best. Including the neutral values greatly influences the results of the regression, but without a strong indication in which of the two categories the neutral respondents belong, the exclusion is necessary. For the regression, this study builds from a relatively simple model, with socio-economic variables, to increasingly more complex models, including household composition and building typology. This study then includes variables closely related to flood perceptions, starting with risk perception and previous flood experience. Finally, we add two sets of variables that describe an individual's self-perceived ability to act (self-efficacy), and the individual's trust in the government is added, as a proxy for the individual's

perception of the government's ability to act. Lastly, to check, the awareness of the regulation was also included to check if this had any impact, although it was not included in the theoretical framework.

For the answering to the second sub-question, I establish if there are any significant differences between both parcel groups in their socio-economic statistics. As this is not the case, the groups' willingness, knowledge and perception of the rainwater regulation are assessed through mean comparisons with Mann-Whitney tests. Another test is performed by comparing the awareness of the regulation against the willingness of citizens, but only for parcel group 2. This allows for testing to see if there is a treatment of the treated effect, and to estimate the impact of an intervention (the rainwater regulation) specifically on individuals who are aware of the regulation (the treatment) as opposed to the entire parcel group.

3.2.11 Survey development

The survey is designed to gain insight into two different questions: On the one hand, which factors influence the willingness of citizens to implement water retention measures, and on the other hand, how the rainwater regulation affects this willingness. As there is a very high number of factors that could influence this willingness, this can severely affect the strength of the conclusion to the second question, the influence of the rainwater regulation on willingness.

the survey targets a specific population, namely the citizens that live on a parcel between 240-260m2. This allows the analysis to compare two groups, namely that of citizens that live on a parcel size between 240-249.9m2, and a second group that lives on a parcel size between 250-260m2. Although in the data collection, the two groups were already specified, the survey also includes a question about the location of the respondent using their postal code and house number, so their location is also known, allowing for spatial analysis of the collected data. To increase the response rate, anonymous or partially anonymous entries were also allowed, so participants were also allowed to fill in only the four letters of their postal code and not their house number.

The first part of the survey includes socio-economic factors which were identified in the theoretical framework. These are age, employment status, income, gender, educational level, the status of the property (rental or bought property), the building typology, and the household composition. These factors were operationalised with questions that were mostly based on the Dutch Central Bureau for Statistics or CBS, which is the main data collection agency of the Netherlands.

The second part of the survey exists out of the perceptual factors, these being risk perception, environmental values, flood experience and responsibility.

Starting with experience with flooding, the survey asks if people have experienced flooding, what kind and how much the damage cost, and if the respondent thinks it is likely that they will experience flooding in the future, which is likely to be influenced by their previous flooding experience. After this, their environmental values are questioned by asking if they think that the climate is changing and what is the reason for this change (if the respondent believes there is any). Lastly, the respondent is asked if they trust the national government, the province, the water authorities and the municipality, and whose responsibility it is to prevent flooding, including the previously mentioned governmental bodies and themselves.

The third part of the survey focuses on the concept of self-efficacy and uses the General Self-Efficacy Scale of Schwarzer et al. (2021) for operationalisation. In this part, the respondent's knowledge and opinion about the rainwater regulation is also included, also questioning if respondents think the regulation is applicable on their property, which in the case of parcel group 1 is not the case.

The last part of the survey does not include factors from the theoretical framework but focuses specifically on water retention measures. As there is already data on the size of the parcels and the size of the buildings on them through the combination of the land registry and BAG datasets, the survey only questions what percentage of the respondents' garden is made of stone and thus is not permeable. The respondent's opinion about water retention measures is questioned by asking about which measures they would be likely to implement, what barriers they feel stop them from implementing measures, and if they already have implemented water retention measures.

3.3 Interview methodology

The interviewees were approached as they had already given interviews to a researcher at the Hanze University, who shared their contact details as they seemed to be interested in this research. They were approached for the interview and agreed to partake. In advance, an interview guide was made by reflecting on the theoretical framework and through discussion with a supervisor. A semi-structured approach was taken as there was little information on the rainwater regulation in advance, as it has not yet been published by the municipality on how the rainwater regulation will be used in the future.

The purpose of the interview is two-sided. On the one hand, the interview was used to gain further insights into how the rainwater regulation came to be, how it works exactly and how it will work in the future. The perspective of the municipality is an important part to include in this research, as there might be a discrepancy between the intended purpose of the rainwater regulation by the municipality, and how the rainwater regulation is perceived by the public and the media. On the other hand, the interview was also used to discuss the methodology of the survey, as both policymakers have a strong knowledge of Groningen and its inhabitants and have experience with comparable projects.

Before the interview started, the interviewees signed agreements to participate, in which they could indicate if they agreed with the survey and if they would want to stay anonymous.

The interview itself is divided into 7 categories. First, a brief introduction by the interviewer, followed by questions about who the interviewees are and what they do at the municipality. The third part contained questions about climate adaptation in Groningen and whether water issues were a big topic in the municipality and for its residents. The fourth part of the interview asked which incentives and barriers exist for residents to implement water retention measures on their property.

The fifth part of the interview focussed specifically on the rainwater regulation, the attention it has received in the media and how the regulation will be applied in the future. The seventh part of the interview focuses on the expected perception of the rainwater regulation by the municipality's citizens. The last part of the interview contained questions about the survey of this research and asked the policymakers which factors they assumed might influence the willingness of residents, and which parts of the city might be the most interesting to analyse.

3.4.1 ArcGIS data collection

Secondary data used in ArcGIS was provided by the Geodienst of the University of Groningen, both providing Kadaster data and BAG data, which was primarily used for the selection of the relevant parcels for the survey. However, this data was also useful to use for ArcGIS analysis, as it contained the parcel size data (relevant for the regulation) of all parcels in the municipality. The municipality of Groningen also provided data of the urgent locations and their catchment areas in the municipality. Urgent locations are further elaborated on in the results of the interview with the municipality's policymakers.

3.4.2 ArcGIS methodology

The rainwater regulation only counts for parcels of a size that are larger than 250m2. This means that for smaller parcels, the rainwater regulation does not apply, even if the municipality appoints a certain area as problematic and therefore parcels in that area have to implement measures to retain rainwater. That means that if there are a substantial number of parcels below 250m2 in a certain area, this can become an issue, as the effectiveness of the rainwater regulation in that area is lower. For example, an industrial area often has significantly larger parcels than the Oosterpoort neighbourhood, and thus much more effective rainwater retention can be forced by the municipality if this is required. Identifying the neighbourhoods or areas with a high percentage of small parcel sizes can therefore be quite useful. It is important to note that the parcels included in this analysis are more the same as the parcel selection for the survey. For the survey selection, two groups are distinguished (240-250m2 and 250-260m2) whilst for this analysis, the entire parcel data file is used, grouping them below 250m2 and above 250m2.

In ArcGIS, the parcel size data is split into two, with one part only showing parcels below 250m2, and the other only showing parcels above 250m2. The file with parcels below 250m2 is smaller, and thus easier to use in further analysis.

Map 1: Urgent locations and parcel size combination

The data provided by the municipality allows for an analysis of the 'toestroomgebieden,' which are, as stated during the interview with the municipality's policymakers, the areas from which more than 5 square meters of rainwater flows towards the urgent location. To floodproof the urgent locations, the 'toestroomgebieden' thus require significant water retention capacity improvements. However, if many parcels are below 250m2, the rainwater regulations effectiveness in these areas is likely to be lower, as fewer parcels are required to adhere to the standards of the regulation. The inflow areas are intersected with the parcel data of parcels below 250m2, and the attribute table of this intersected data is exported to Excel, where the total amount of square meters of these parcels is counted, and then calculated what kind of percentage it is of the total 'toestroomgebied' area. This data is then imported back into ArcGIS and visualized with colours for the different inflow areas.

Map 2: postal code areas and parcel size combination

As the data provided by the municipality is from a working document, and the inflow areas (Dutch: toestroomgebieden) are only based on online models, an alternative for mapping these possibly problematic locations is to do the same calculation through ArcGIS, but instead of the 'toestroomgebieden' the postal code areas are used. This way, neighbourhoods with a relatively high

density of below 250m2 parcels are identified, and thus it can be assumed that the rainwater regulation in those neighbourhoods is relatively less efficient than in other neighbourhoods. The data of parcels below 250m2 is intersected with the postal code areas, and this data is exported to Excel. In Excel, the total square m2 of these parcels is calculated as a percentage of the total area of the postal code area, and similarly to map 2, this is imported back into ArcGIS and visualized with colours for every postal code area.

4 Results

4.1 Interview

The interview with the municipality's policymakers provided, most of all, more insight into the purpose and the future of the rainwater regulation, and some additional information that was helpful for the survey design. Some insights were gained about which challenges the municipality faces, and how the rainwater regulation is only one of the tools the municipality uses to tackle these challenges.

The interview was structured along the following themes:

1. Introduction
2. Background
3. Climate adaptation issues in Groningen
4. Push and pull factors
5. The rainwater regulation
6. Inhabitants of the municipality
7. The research

The interview guide is attached and can be found under Appendix 8.4. The interview's transcript can be found under Appendix 8.7. The background of the interviewees is not included as the interviewees preferred to remain anonymous.

Theme 3: Climate adaptation issues in Groningen

To start, the interviewees explained that Groningen is a very compact city, especially the city centre. In the centre, several old waterways have been filled up, and the surrounding areas of these waterways are very densely populated. However, as they are still the lowest points, water flows towards these points and thus are likely to have flooding problems when heavy rainfall occurs. This is

a problematic issue in the city centre. Water retention should therefore happen in nearby areas, so that water is retained there, instead of flowing towards these problematic areas. A good example given in the interview is de Grote Markt, where water from the surrounding roofs is collected and stored below the Grote Markt, and also recycled for the new trees and fountains. The policymakers also explained that decreasing flood risk is not always the highest priority. The densely built city has limited space for the municipality to work in, and there are (almost) always several goals and ambitions to be achieved in that area. To decide which ambition is most important, the municipality uses the ambition web, see Figure 6 below.

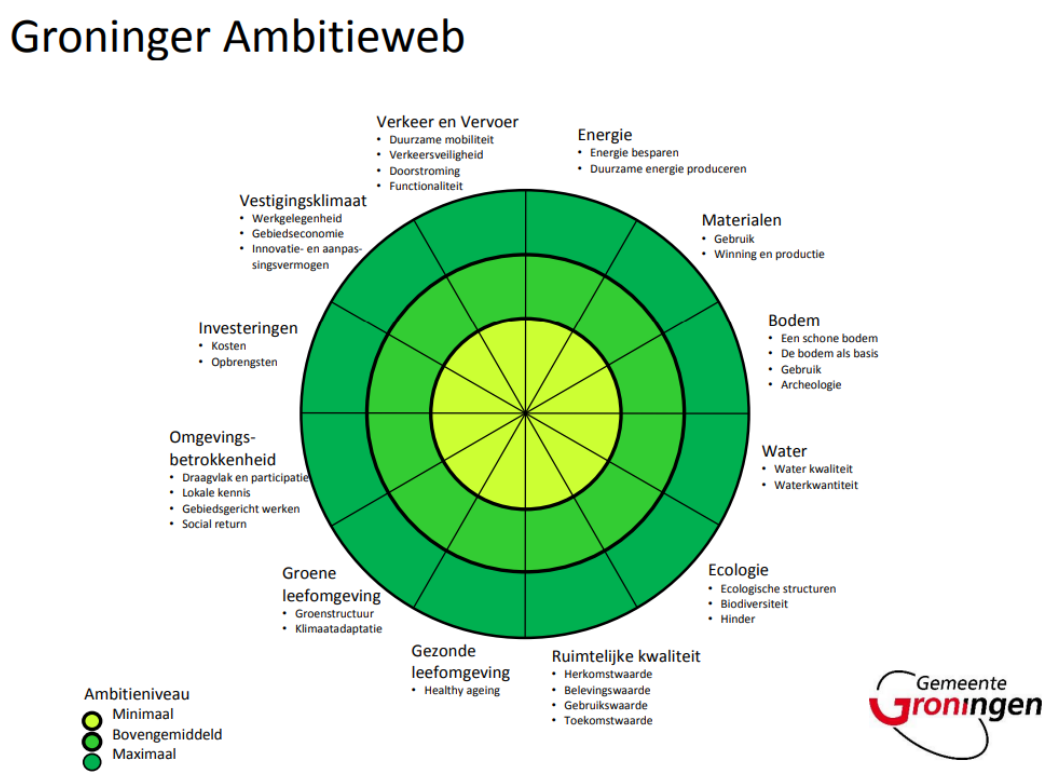

Figure 6, the municipality of Groningen's Ambitieweb Source: Gemeente Groningen, 2023

The municipality has identified problematic locations in the municipality by combining its models of rainwater flood risk with vital locations that are vulnerable. These locations are marked as 'urgent' and are part of a project to improve their climate adaptation, and although they are marked as urgent, this does not necessarily mean that making them climate adaptive, or at least able to withstand rainwater floods, is extremely difficult, as some locations only require small measures to make them safer. These urgent locations can be found under Chapter 4.3, where they are mapped and combined with parcel size data.

The policymakers also expected awareness among citizens to be quite low for rainwater floods specifically, although there is a growing awareness for climate adaptation in general. They do expect that events such as the flood in Haren in May 2023 will have a strong impact on people's awareness and possibly also on their willingness to implement water retention measures. The creation of awareness is, according to the two policymakers, probably the largest challenge for the municipality, although financial challenges are also deemed problematic.

Theme 4: Push and pull factors

Key factors that could negatively affect people's willingness to adopt water retention measures are likely to be financial. Therefore, the municipality also works with subsidies so people get financial aid in implementing water retention measures. People also often might be willing to adopt measures, but simply have other more important priorities, for example a place to park their car. Due to a lack of technical knowledge, inhabitants often assume that water retention measures are expensive, whilst there are quite a few very affordable measures. Creating awareness is one of the key factors that, according to the policymakers, could positively impact the willingness of residents to implement water retention measures.

Theme 5: The rainwater regulation

The policymakers explained that the rainwater regulation contains two distinct parts, whilst both serving the same purpose: Reducing floods caused by rainwater. Around 50% of the municipality is owned by the municipality and given that significant parts of that 50% already have a designated purpose, that area cannot be used to improve rainwater retention. Also, in some areas, the percentage of grounds that are owned by the municipality is far less. The municipality thus had no way of improving the rainwater retention capacity of those areas, and the purpose of the rainwater regulation is to improve that situation by implementing standards for new buildings or for buildings that are expanded more than 50m2. There are specific standards already clear for new buildings, which are as follows:

A parcel between 250 and 1000m2 has to retain 20L of water per m2.
A parcel between 1000 and 2000m2 has to retain 40L of water per m2.
A parcel larger than 2000m2 has to retain 70L of water per m2.

An important note here is that parcels smaller than 250m2 are excluded, as these parcels are deemed too small to be efficient. (Gemeente Groningen, 2023c, 2023a)

For existing buildings, the standards do not apply, as the municipality recognizes that this is simply not efficient. In the future, this regulation allows the municipality to appoint areas with already

existing buildings to adopt water retention measures. These areas have not been appointed yet, and it is unclear when they will be. Possible reasons for this are, according to the policymakers, a renewal of the sewer system, so it can be combined with an improved rainwater retention system in that specific area.

Several media outlets have, however, responded quite negatively to the regulation (Glimmen.net, 2023; Haren de Krant, 2024; Hoenders & de Jong, 2024; Veenstra, 2019). This is also further elaborated on in the theoretical framework. However, the policymakers explained that according to them, the negative attitude of the media outlets is understandable, but the rainwater regulation is unlikely to be forced upon people in the extent that the media outlets expect. The policymakers also mention the 'redelijkheidsbeginsel' or principle of reasonableness, which is an important legal principle that applies to the rainwater regulation. It is not reasonable to force people to suddenly pay thousands of euros to adapt their gardens. If the rainwater regulation is used to appoint certain areas, then the municipality will start talks with residents to see how the situation can be improved.

In the coming period, the focus of the regulation is on new construction, as the regulation still requires quite some work to be used as intended. At the end of 2024, the municipality hopes to adapt the regulation with the lessons learned during the year. During the interview, it became clear that the standards for new construction are often thought to be the standards for existing buildings as well, but the policymakers were able to confirm that this is not the case.

Theme 6: Residents

An important part of this research is the difference between parcels that might be influenced by the rainwater regulation, and parcels that will not be. Practically, that means parcels below 250m2. In the interview, the policymakers explained that they hope that there might be a spill-over effect, that if a lot of people in the neighbourhood start adopting greener gardens, others might follow. It is expected that in the beginning, the regulation might have a negative impact because of the initial negative response of inhabitants who feel they are being forced to do things and pay for expensive measures. However, they expect that this will improve as inhabitants learn that the regulation is not as invasive as they think or are told. Improving the regulation is also expected to improve the response of inhabitants.

The policymakers also explain that the lack of awareness of both the issue and the relatively easy solutions are the main barriers to the large-scale implementation of green gardens and climate adaptation. Efficacy is also mentioned to be an important aspect, and earlier research in Groningen has also identified this. Self-efficacy is also measured in the survey of this research.

Another interesting factor according to the policy makers, is responsibility. In earlier surveys, it was identified that inhabitants often saw the prevention of flooding as one of the responsibilities of the government, either the national or the local government, but not the responsibility of the inhabitants themselves. In a later survey, this seemed to have shifted slightly towards more responsibility for inhabitants.

Theme 7: The research

The last part of the interview focussed specifically on survey questions, areas of the city that were interesting for gathering extra data, and the factor of bought vs. rented properties. The policymakers also had some questions for the interviewer, especially on the perception of the rainwater regulation, and how invasive it was. The results of this part of the interview are integrated into the survey or are not relevant to the research and are thus not elaborated on here.

4.2 Survey results

4.2.1 Socio-economic statistics

The total survey response was 144, of which 74 were in parcel group 1 (240-250m2) and 70 were in parcel group 2 (250-260m2). The socio-economic statistics of the total population and both parcel groups can be found in Appendix 8.5. With an average age of 57 years, the average of the population is quite high, just as the level of education, with a vast majority of the population having a university degree (HBO+WO 77,8%). The average income is also quite high, with only 13,2% of the population earning less than 38.500 euros per year. The parcels are mostly corner houses/townhouses (47,2%) or semi-detached houses (44,4%). And lastly, only 4.9% of the population has trouble making ends meet.

The population is thus not an average sample of the population of Groningen, but that was to be expected, given that the selected houses have a parcel size between 240-260m2. To compare this to the average in the municipality, of which the median is 174, which is calculated in ArcGIS with the same data files as the population selection data. However, the mean is extremely skewed through extreme outliers, being 750m2. This means that the selected parcels are quite a bit larger than the average parcel size, and thus more expensive. The share of renters is also limited, with only 1,4% (N=2), and thus this variable is mostly excluded from further analysis. There was also a much higher number of male respondents compared to female respondents, as can be seen in Table 1 below.

Table 1: Descriptive statistics and frequencies of gender in the entire survey population

Variable	Group: Total	Percentage	Frequency	N and mean
Gender	**1** Male	64%	92	N = 144
	2 Female	36%	52	Mean = 1.36
	3 Other	0%	0	Std. dev =.482

The larger parcel size thus explains the relatively high age, education and income of the population, and could also be argued to explain the small number of rented properties. The statistics can be found in Appendix 8.4. This table also shows the socio-economic differences between both parcel groups. The socio-economic statistics will also be assessed on their impact on the willingness of residents to implement water retention measures, see chapter 4.2.3.

Important for Chapter 4.2.4, the impact of the rainwater regulation, is that the populations of both parcel groups are not significantly different socio-economically. This is important to isolate the effect of the rainwater regulation on their willingness.

4.2.2 Implementation of rainwater measures

The willingness of residents to implement water retention is, in this research, determined through several questions from the survey. Before diving into the willingness, some statistics on the implementation of rainwater measures in the population are interesting to see. There are limited statistics on the level of implementation of rainwater measures throughout the municipality or the Netherlands as a whole. As stated in Chapter 4.2.1, the results of the survey are skewed towards an older, wealthier population with larger parcel sizes than average in Groningen.

Table 2: Frequencies of the implementation of rainwater retention measures in the entire survey population

	Frequency	Percentage	Cumulative Percentage
Yes, green/water roof	9	6,3%	6,3%
Yes, rain barrel	38	26,4%	32,6%
Yes, permeable paving	9	6,3%	38,9%
Yes, extra green in garden	34	23,6%	62,5%
Yes, other:	4	2,8%	65,3%
No	50	34,7%	100%
Total	144		100%

Table 2 shows that far more than half (65,3%) of the population has already implemented water retention measures. The survey did not ask what kind of retention capacity people's water retention measures had. This can vary, not only between measures but also for the measures themselves, as there are various kinds of rain barrels, the capacity of a green/water roof is greatly dependent on the size of the roof, etc. Some people also have more than one measure implemented, which is not included in this graph. Lastly, the 'extra green in the garden' does not consider what kind of extra green this is, if it is suitable for water retention, and if water retention was the main reason to implement the extra green, if it was a reason at all. In that regard, the 65,3% could include some responses that might not result in extra water retention capacity.

4.2.3 Factors that influence willingness to implement water retention measures

First of all, it was asked of the respondents directly how the local government can help them in implementing water retention measures, of which the results can be found below in Table 3.

Table 3: Frequencies on which incentives the municipality could provide according to the entire survey population

	Frequency	Percentage	Cumulative Percentage
Yes, financially	23	16.0	16.0
Yes, technical	28	19.4	35.4
Yes, both	62	43.1	78.5
Neither	31	21.5	100.0
Total	144	100.0	

In this case, it should be considered that although there might be 'less' financial aid requested than technical, there is still a significant part of the population asking for financial help. As the survey population already has a relatively high income (86% makes more than the average income, see Table X in the appendix), but still would want more financial assistance. Given the high degree of already implemented measures in the municipality, stating that people are thus not willing to pay for water retention measures themselves would be false. However, given the fact that the municipality already provides financial assistance through different subsidies, maybe the survey's population is simply unaware of the possibilities provided by the municipality. The technical assistance required would be something where the municipality could step in, for example by offering advice on which measures are suitable for specific house typologies.

To further elaborate on the willingness, it is useful to look into the measures why somebody would, or already has, implemented water, of which the results can be found below in Table 4.

Table 4: Frequencies on reasons for considering the implementation of water retention measures in the entire survey population

Saving water	79
Reducing floods	86
Improve water quality	23
Neighbours also do it	4
Use the water during drought	93
It's pretty	51
Recommended by friends/family	2
I'm not considering measures	10

The two main reasons for implementing retention measures, according to the responses to this question, are thus for the saving of water, and for the reduction of floods. Spill-over effects, which were mentioned by the policymakers in the expert interview, do not seem to be a reason for citizens to implement water retention measures.

Respondents were also asked about the barriers they felt to implementation. This can be seen in Table 5 below.

Table 5: Frequencies on reasons for not implementing measures for the entire survey population

	Frequency	Percentage	Cumulative Percentage
Financially	25	17.4	17.4
Lack of technical information	33	22.9	40.3
Not sure about the effectiveness	16	11.1	51.4
Limitations due to rental	2	1.4	52.8
No interest or necessity	25	17.4	70.1
Other	43	29.9	100

Financial and lack of technical information are the main reasons given. For 'other' most of the answers were because people had already implemented measures. Again, the lack of technical information is a major issue clearly identified as one of the main barriers to implementing rainwater retention measures.

The relationship between the factors identified in the theoretical framework and the willingness to implement water retention measures is done by performing a binary logistic regression, of which the results can be found below in Table 6.

Table 6: Binary logistic regression models 1-6, showing score, S.E. within brackets, and significance (=10%, **=5%)*

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	0,002	0,007	0,017	0,017	0,022	0,023
	(0.028)	(0.030)	(0.033	(0.033)	(0.034)	(0.034)
Gender (1=male, 2=female 3=other)	1,027 **(0.611)***	1,088 **(0.639)***	1,137 **(0.683)***	1,250 **(0.709)***	1,756 **(0.815)****	1,761 **(0.819)****
Income	-1,437	-1,434	-1,418	-1,484	-1,354	-1,389
	(0.572)**	**(0.615)****	**(0.664)****	**(0.678)****	**(0.667)****	**(0.675)****
Ability to make ends meet	-0,022	-0,171	-0,037	-0,077	-0,552	-0,574
	(0,286)	(0,315)	(0.371)	(0.367)	(0.471)	(0.478)
Employment status	-0,689	-0,642	-1,164	-1,158	-1,186	-1,212
	(0.833)	(0.882)	(1.001)	(1.002)	(1.050)	(1.051)
Education	1,404	1,551	0,610	0,649	0,010	0,088
	(0.811)	**(0.824)***	(0.957)	(0.951)	(1.067)	(1.088)
Household composition		0,161	0,125	0,162	-0,060	-0,007
		(0.436)*	(0.459)	(0.461)	(0.498)	(0.510)
Building typology		0,662	0,553	0,610	0,984	0,992
		(0.376)	(0.418)	(0.430)	**(0.492)****	**(0.495)****
Risk perception			-1,065	-1,094	-1,244	-1,207
			(0.522)**	**(0.524)****	**(0.540)****	**(0.541)****
Previous flood experience			0,132	0,101	0,166	0,163
			(0.449)	(0.455)	(0.462)	(0.464)
Self-efficacy				0,396	0,497	0,470
				(0.566)	(0.605)	(0.610)
Trust in government					1,139	1,207
					(0.551)**	**(0.569)****
Aware of regulation						0,463
						(0.686)
Constant	2.690	0.199	4.476	2.942	0.576	-0.319
	(2.858)	(3.129)	(4.057)	(4.576)	(5.030)	(5.169)
Observations						
Nagelkerke R square	0,183	0,250	0,359	0,366	0,423	0,429

Although strictly speaking, comparisons across models are not possible when using a binary logistic regression, some qualitative trends across the models are observed. The effect of gender appears to

increase as more variables are added, especially when trust in government is included the effect of gender appears to become more pronounced. As women are more likely to have a higher willingness to implement water retention measures, just as people with a higher trust in government, it seems that the gender variable hides part of the effect by not accounting for the trust in government.

Income is negatively associated with willingness to adopt measures, which is quite opposite from the hypothesized outcome in the theoretical framework. However, it is important to note here that the income of the survey respondents is relatively high. It is thus within a group of relatively affluent individuals that the income negatively affects willingness to adopt measures.

The effect of education on willingness to adopt is positive when household composition and building typology are added, although this effect disappears when risk perception (significant) and previous flood experience are added. Household composition's positive effect also disappears when risk perception and previous flood experience are added, showing that these are more accurately modelled through risk perception.

Building typology also becomes significant when the trust in government variable is included in the model. This suggests that the type of building influences willingness to adopt water retention measures, but this effect is more accurately captured when adding the trust in government variable. Larger house types are associated with a higher willingness, possibly because owners of larger properties have more space to implement measures.

Gender, income, building typology, risk perception and trust in government are identified as the variables that significantly impact the willingness of residents to implement water retention measures. Surprisingly, income has a negative effect on the willingness to implement water retention measures. Females are also more likely to implement retention measures, and so does a larger type of house. Higher perceived risk also increases the willingness to implement water retention measures, and so does trust in the government.

The variables rent/bought property and environmental values are excluded from the regression. There are only 1.4% (N=2) responses with a rented house. The same is true for environmental values, with only 0.7% (N=1) not believing in climate change.

4.2.4 The influence of the rainwater regulation on willingness

Although several media outlets have given attention to the rainwater regulation, the results from the survey showed that quite a bit of the survey's population was unaware of the regulation. This means that measuring the effect of the rainwater regulation on willingness becomes difficult, given the

small number of responses that are left when the respondents who are unaware of the regulation are left out, especially when comparing both parcel groups.

Firstly, both parcel groups were compared on their socio-economic statistics. As seen in Table 7 below, the parcel groups show no significant differences in their socio-economic factors.

Table 7: Test results for differences between parcel groups for socio-economic variables included in the survey

Variable	Test	Score/value	Z	Significance
Age	Mann-Whitney	2401	-.614	.539
Income	Mann-Whitney	2391.5	-.844	.399
Able to make ends meet	Mann-Whitney	2177	-.094	.925
Gender	Chi-Square	.625		.489
Education	Chi-Square	7.699		.463
Work situation	Chi-square	6.203		.287
Household composition	Chi-square	2.949		.400
Type of house	Chi-square	4.462		.216

Table 8 shows that the awareness of the regulation is quite low, with only 39,6% being aware of the regulation, which is lower than expected given the amount of attention that the regulation has received in the media.

Table 8: Frequencies of awareness of the rainwater regulation for the entire survey population

	Frequency	Percentage	Cumulative percentage
Not at all	87	60.4	60.4
Somewhat	36	25.0	85.4
A little bit informed	18	12.5	97.9
Well informed	2	1.4	99.3
Very well informed	1	.7	100.0
	144	100.0	

Building an ordinal regression is not possible due to a relatively small number of respondents, therefore the variables are one by one checked on their relationship with willingness. The results of these tests can be found below under Table 9.

Although there is no significant difference between both groups, there is a comparable difference between the means for all variables. Especially the awareness of the regulation is a bit lower for parcel group 1, and whilst this is not statistically significant, over the entire group there does seem to be a mean difference, with parcel group 2 being more aware of the regulation, but also having a lower opinion and a lower willingness mean, which is interesting, but given that it is not statistically significant, no conclusions can be drawn from these statistics.

Table 9: Test results for differences in the willingness, awareness and opinion of the rainwater regulation between both parcel groups

	P1 mean	P2 mean	Mann-Whitney score	Significance
Willingness to implement rainwater retention measures	**76.44**	**68.34**	**2298.5**	**.227**
Aware of the rainwater regulation	**67.39**	**77.91**	**2211.5**	**.083**
Opinion about the regulation	**73.37**	**69.52**	**2382**	**.451**

Within parcel group 2, another check is performed to see if there is a treatment of the treated effect within this group, as the rainwater regulation could be applied on all of these parcels, of which the results can be found in Table 10 below. However, respondents do need to be aware (treatment) of the regulation to see if it has an effect. As the Chi-square test is not significant (Asymptotic significance =.320) there does not seem to be a treatment of the treated effect of the rainwater regulation within parcel group 2 (N=70).

Table 10: Crosstab on the awareness of the regulation (x-axis) vs the willingness to implement measures in the future (Y-axis) within parcel group 2

		Aware of regulation		
		No	**Yes**	**Total**
Q29	**Very unlikely**	**5**	**3**	**8**
	Unlikely	**7**	**2**	**9**
	Neutral	**9**	**14**	**23**
	Likely	**12**	**9**	**21**
	Very likely	**4**	**5**	**9**
Total		**37**	**33**	**N=70**
Chi-square	**Value = 4.691**	**Sig = .320**		

4.3 ArcGIS Maps

The first map shows the inflow areas for several urgent locations. The urgent locations are defined as locations that are essential for the city (such as the UMCG) and the inflow areas are the areas around those urgent locations from which rainwater flows in the case of a precipitation event. These inflow areas are calculated through a digital model, and the calculations are performed by the municipality.

The municipality wants to decrease the flood risk at these urgent locations. The municipality has multiple methods of decreasing flood risk in the public space, but the rainwater regulation is, as explained by the policymakers in the interview, seen as a backup to improve retention capacity if there is not enough retention capacity in the public domain. However, the rainwater regulation does not apply to parcels smaller than 250m2. If the percentage of parcels within an inflow area smaller than 250m2 is higher, the effectiveness of the rainwater regulation in that inflow area is also less likely to be high. If there are 200 buildings in an inflow area, and the regulation applies to only 20 houses, applying the regulation to that area will not greatly enhance the retention capacity of the inflow area. It should be noted that the inflow areas on the map are computed through models by the municipality, and until they are 'assessed' in an extreme precipitation event, it remains unclear whether the inflow areas are correct. Lastly, it should be noted that these areas are not the most at risk of flooding, they are the inflow areas where the regulation is the least effective.

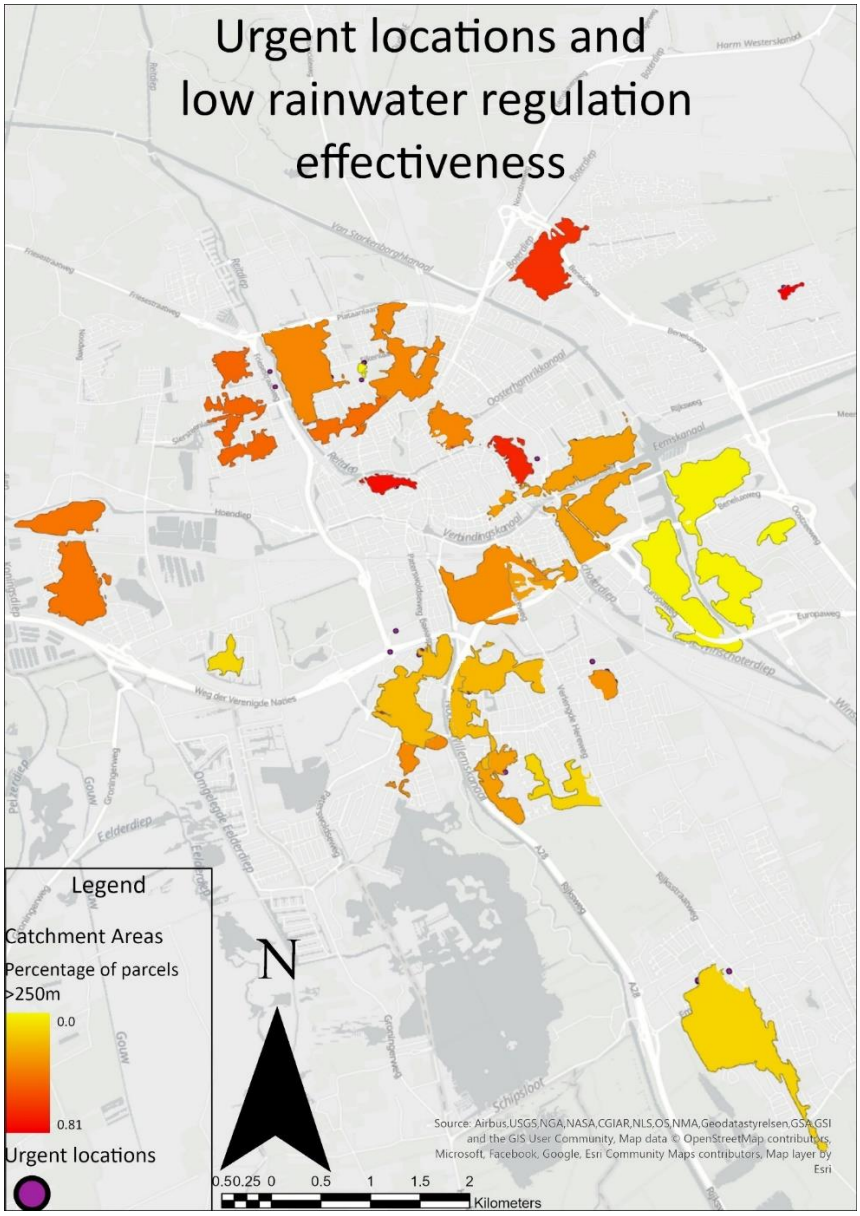

Figure 7 Map of catchment areas and percentage of parcels below 250m2 (Source: Author)

Table 11: Inflow areas/catchment areas with the percentage of parcels below 250m2 higher than 25%

Location	Inflow area number	
Lewenborg	21	80,70%
Schildersbuurt	12	43,00%
UMCG	7	38,09%
De Hunze	22	35,10%
Vinkhuizen	2	25,30%
Oranjebuurt	5	25,35%

Map 2 is an addition to map 1, showing a similar calculation, namely the percentage of parcels below 250m2, but here calculated per postal code instead of inflow area. Given that neighbourhoods and their accompanying postal code often have a similar neighbourhood typology, applying the regulation in those neighbourhoods is also not as effective as in neighbourhoods with a higher percentage of buildings above 250m2.

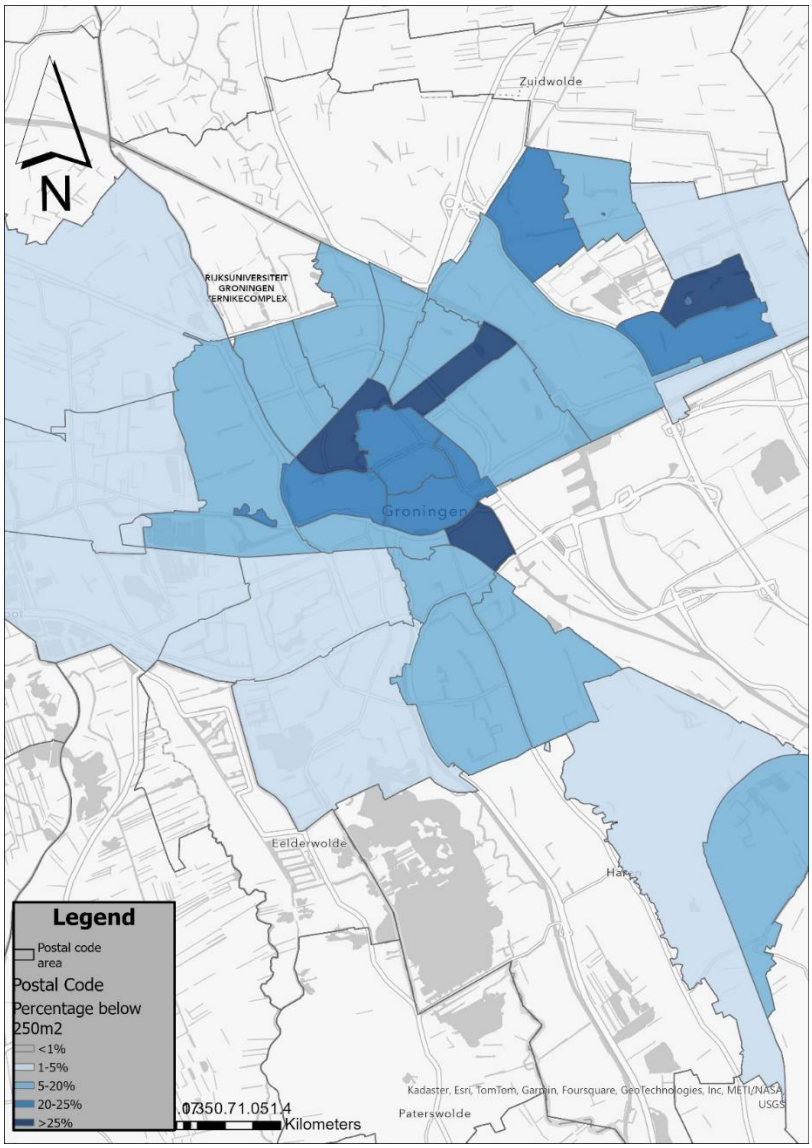

Figure 8 Map of postal codes and percentage of parcels below 250m2 (Source: Author)

Table 12: Top 4 postal code areas with parcels below 250m2

Postal code	Neighbourhood	Filled_Percentage
9724	Oosterpoort	31,26%
9714	Korrewegwijk	29,58%
9717	Noorderplantsoenbuurt	29,30%
9733	Lewenborg	26,26%

The third map shows all housing parcels within the city that are smaller than 250m2. Both maps 1 and 2 are calculations using the total area of either the inflow area or the postal code area, but sometimes that area includes large patches of open land or with another function, having a large influence on the calculation. A good example of this is postal code 9744, marked in yellow on map 3. The town of Hoogkerk is quite dense and there is a high percentage of parcels below 250m2, but the postal code is substantially larger than just the town, having a large influence on the calculation of the problematic postal codes.

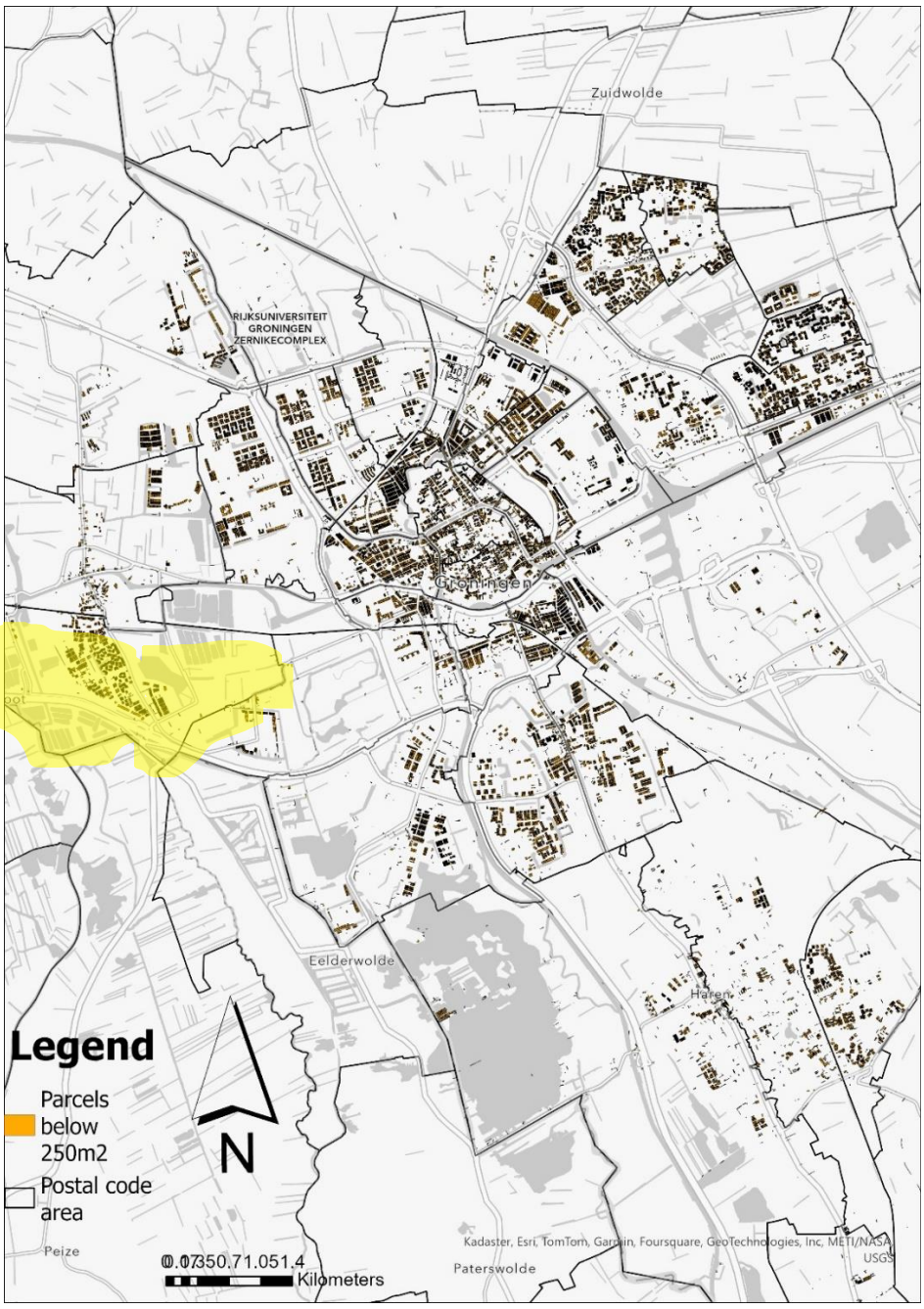

Figure 9 Map of parcels below 250m2

5 Discussion

5.1 Interview

The discussion will first discuss the results of the interview, survey and ArcGIS separately, before interpreting the results of the different methods together.

Firstly, the interview with the policymakers from the municipality of Groningen. The most substantial finding from the interview is that the reports from several media outlets about the rainwater regulation seem to be quite different from what the purpose and methods are according to the policymakers of the municipality. Several media outlets (Haren de Krant, 2024; Hoenders & de Jong, 2024) reported that the municipality will forcefully decide how people have to shape their gardens and roofs, which will cost residents thousands of euros. The interviewees explained that this is not the intention of the municipality. The rainwater regulation's part about already existing buildings, simply put, is not a finished product, and thus the negative responses are exaggerated if the policymakers are to be believed. The part of the rainwater regulation that discusses existing buildings has not yet been completed fully, and it is therefore not possible to know exactly how the regulation will be enforced. Therefore, it remains unclear what the claims in several media outlets are based on. That is not to say that this will not be the result of the regulation, as it could very well be what the regulation will turn out to be, as it does provide a legal framework to do so. The goal for the year 2024 is to finetune the regulation after seeing how the regulation will be applied to new construction. The policymakers clearly stated that areas that will be selected in the future for application of the regulation, will not simply be 'forced' to implement retention measures, but will be engaged by the municipality to see how they can help improve the retention capacity. The 'forceful' part of the regulation is the last step in a lengthy process, whilst media outlets, and through them residents, seem to think that the forceful part of the regulation is the first step. The future application of the rainwater regulation is thus still undecided, but clearing this up could potentially improve the reception of the regulation. Although having some room for future adaptation of the regulation is a good thing, the fact that there is still so much undecided is also the reason for the negative response of media outlets. Here lies a task for the municipality: Not only by further specifying the future goals and methods of the regulation but also by communicating them with media outlets and residents.

5.2 Survey

The results of the survey identify several factors that influence the willingness of residents to implement water retention measures, as seen in Table 13 below.

Table 13: All variables and their hypothesized influence and the survey's findings on the variables

Variable	Expected result Theoretical Framework	Survey result
Age	No significant effect	No significant effect
Employment	No significant effect	No significant effect
Income	Positive significant effect	**Negative significant effect**
Gender	Positive significant effect female	**Positive significant effect female**
Education	Positive significant effect	No significant finding
Rent	Positive effect when bought	Not enough responses
Building typology	No significant effect	**Positive Significant finding**
Household composition	No significant effect	No significant finding
Risk Perception	No significant effect	**Positive significant finding**
Environmental values	Positive significant finding	Not enough responses
Previous Flooding Experience	Positive significant finding	No significant finding
Self-Efficacy	Positive significant finding	No significant finding
Trust in Government	Requested by municipality	**Positive significant finding**
Responsibility	Unknown	Unknown
Already implemented retention measures	Not part of the conceptual model	No significant finding

The survey found that females are more likely to implement water retention measures, just as larger houses (building typology). The same is true for risk perception and trust in government, positively influencing the willingness of citizens to implement water retention measures. It was to be expected that the socio-economic variables would be different from the hypothesized outcomes in the theoretical framework as the survey population is quite different from the populations used in the studies that are used in the theoretical framework, and not a representation of the entire population of Groningen.

For the significant variables, the theoretical framework predicted that gender would have a significant impact, with females being more willing, which was confirmed in the survey. However, income showed a very different pattern, actually with higher incomes showing a decrease in willingness. This might be explained by the very low number of respondents that have a low income. It could be interpreted as willingness being higher in the middle incomes, and lower in the very high incomes, which is still an interesting finding, very different from the hypothesis from the theoretical framework. Future research could dive into this more explicitly, as this research is unable to point out exactly why this is the case.

Risk perception and environmental values were expected to be significant, but the low number of respondents that had 'low' environmental values might also influence this significance. Previous flooding experience was expected to be significant, especially given its strong relation with risk perception. However, the survey showed no significant result here, also diverging from the theoretical framework. Lastly, self-efficacy was also close to significant, which confirmed the hypothesis of the theoretical framework.

The survey results showed, first of all, that the rainwater regulation was surprisingly unknown by the survey's population, with only 36,9% of the population being at least somewhat informed. This is surprising given the negative media attention. It also leaves ample opportunity for the municipality to further inform their residents, especially when the regulation has been worked out further. And as 64.3% of the population has already implemented measures, this seems to show that quite a sizeable portion of the population already is aware of the issue and is working towards improving the retention capacity on their parcel. Given the socio-economic status of most of the respondents, it would be interesting to see how that differentiates from a more general population in the municipality. The low percentage of respondents being aware of the regulation makes it difficult to draw any conclusion on its impact on the willingness of residents to implement water retention measures. Purely looking at the differences in means between both parcel groups for willingness to implement measures and the awareness and opinion about the regulation, the survey does somewhat point in the direction of a negative effect of the regulation on the willingness of residents of parcel group 2, but as the differences are not statistically significant, it is difficult to draw conclusions.

5.3 ArcGIS

The maps created through ArcGIS, figures 7, 8 and 9, found in chapter 4.3, show that future application of the rainwater regulation is not as effective in all areas of the municipality of Groningen. The inflow area in Lewenborg has the highest percentage of parcels below 250m2, but given that it is also the smallest inflow area, it is unclear to what extent this could create a problem in the future. There is also ample green public space surrounding the inflow area, so this area might not be as problematic as the map makes it look.

The inflow area near the UMCG might be one of the most problematic areas. Loss of accessibility to the UMCG due to floods is an important reason to improve retention capacity in the area, but the part of the Oosterparkwijk that is within the inflow area is highly urbanised, the buildings are relatively old, and the parcels are often small. The amount of green space surrounding it is also limited. The municipality should thus not expect too much retention capacity increase in this area through the application of the rainwater regulation. The other two inflow areas, one in the city centre near the Kraneweg, and the other area in 'De Hunze' are also deemed problematic due to a low predicted effectiveness of the rainwater regulation, although the 'De Hunze' inflow area might have more options given the public spaces surrounding the inflow area. The ArcGIS results are especially interesting for answering sub-question 4: *Which lessons can be learned for Groningen and other Dutch cities designing their rainwater regulation?*

The largest lesson here is that limiting the regulation to 250m2 is, although logical due to limited retention options on small parcels, also a possible pitfall of the regulation. Highly urban areas, which are more prone to pluvial flooding, contain more smaller parcels. In that regard, the rainwater regulation can be more effective in areas where it might not be as relevant.

5.4 Combined discussion

Pluvial flood risk management continues to be a large challenge for municipalities in the Netherlands. With the coming of new rainwater regulations throughout the entire country, there seems to be an added sense of urgency to the implementation of pluvial flood risk management in Dutch municipalities, and a feeling that entrusting the rainproofing of cities is not possible by relying on the voluntary input of citizens, stimulated by subsidies. The rainwater regulation is a legal big stick, if in certain areas voluntary approaches of citizens are not deemed sufficient. Although the policymakers in the interview did state that this was not the most essential purpose of the regulation, it does seem to be the logical consequence of implementing the rainwater regulation. The survey's distribution makes for a population that is not a normally distributed sample of the

population of Groningen, so the generalizability of the findings is limited, especially the findings of the survey on the impact of socio-economic variables. The relatively small number of responses, combined with the low awareness of the regulation, gives for a small population sample that is already very specific in its socio-economic setup, and thus the impact of the regulation on willingness is also more difficult to interpret. On the other hand, the impact of the regulation is especially important for the part of the population to which the regulation could apply in the future, and thus the socio-economic setup of the population is, in that regard, also more appropriate.

6 Conclusion

To answer the research question, the sub-questions will first be answered:

1. *Which water retention measures are most suitable for private urban spaces?*

Highly dependent on building typology, although rain barrels and extra green in the garden are relatively easier to implement. Their capacity is, however, also much smaller compared to some of the other measures. In the case of urban spaces, roof measures are more suited for highly urban areas such as a city centre, whilst garden measures are more suitable for areas with a lower density. For the city centre, roof measures are often more suitable due to the lack of gardens, and might be especially interesting for roofs that are shielded by higher buildings and are thus not suitable for solar panels, which seems to be a more popular choice at the moment.

2. *Which factors influence the willingness of residents to implement water retention measures?*

Gender, income, risk perception, environmental values and self-efficacy are key factors that make up the willingness of residents to implement water retention measures. Just as was hypothesized in the theoretical framework, self-efficacy has a positive effect on willingness as well. For income, surprisingly, higher incomes are less willing, although this is greatly influenced by the relatively high income of the population. It seems that middle to high incomes have a higher willingness compared to very high incomes. Females are also more willing to implement water retention measures. Self-efficacy is a difficult concept to grasp, but given its relevance identified in other studies, is a very important factor.

3. *How does the rainwater regulation influence the willingness of residents to implement measures on different parcel sizes (Group 1: 240-250m² parcel size, Group 2: 250-260m² parcel size)?*

There is no effect of the rainwater regulation on the willingness of residents to implement water retention measures found in this survey. However, this effect was hypothesized by this research and by the interviewed policymakers of the municipality. This could be explained by the low number of respondents included in the survey, as there is a negative coefficient, but no significant effect. The main finding of this research about the rainwater regulation is, given the amount of attention it has received in media outlets, it is surprisingly unknown by residents of the municipality, especially given the fact that the survey's population seems to be highly involved in improving their property for rainwater retention. The rainwater regulation is unlikely to be applied to the entirety of the municipality in the future, and given that a large section of houses is excluded from the regulation, the municipality's policies will have to rely on the voluntary help of citizens in the future as well, and the rainwater regulation does not help towards improving the willingness. It is thus up to the municipality to approach and collaborate with its citizens to help them. It seems like although there is a high degree of willingness, the barriers that still exist for implementation are too high for quite a few people to do the practical implementation of any retention measures. In the survey, it was identified that willingness was already quite high, even though the regulation was still relatively unknown. The impact of the regulation is thus difficult to determine, although the results did seem to show a negative effect of the regulation on the willingness of citizens. In that regard, a forceful top-down regulation is a shift away from the previously 'smart' measures, focussing on collaboration and the provision of subsidies, and the lack of a collaborative approach in that regard does seem to cause a negative effect.

4. Where in the municipality is the rainwater regulation likely to be less effective?

Through the GIS analysis, several areas are identified where it is likely that the effectiveness of the rainwater regulation is relatively lower. There are five inflow areas near urgent locations identified where the percentage of buildings that are smaller than 250m2 is over 25%. Especially the UMCG inflow area could be problematic in the future due to the emergency facilities located in the UMCG.

Secondly, the four neighbourhoods Oosterpoort, part of the Korreweg neighbourhood, the Noorderplantsoenbuurt and Lewenborg have over 25% of the total surface area existing out of parcels that are smaller than 250m2.

It is thus these areas where, when the municipality decides to implement the rainwater regulation, the effectiveness of the regulation will turn out to be limited. However, it is important to note that problematic areas can be far smaller than a postal code area, for example, a specific street, and this is also influenced by the height profile of the city.

5. Which lessons can be learned for Groningen and other Dutch cities designing their rainwater regulation?

To increase willingness to implement water retention measures, municipalities should focus on increasing the risk perception and awareness of the issue, as these are the key variables that explain this willingness. Beyond that, residents require more technical support to implement water retention measures. Awareness should be created that retention measures on someone's property is not necessarily supposed to decrease flooding on their property, but on locations nearby that are vital for the society to function. The municipality of Groningen and other Dutch cities should also consider that, when appointing certain areas in the future for the implementation of the rainwater regulation on existing buildings, its effectiveness can be decreased by the fact that parcels below 250m2 are excluded. Spill-over effects are limited, which was something that the policymakers of the municipality were hoping for. Understanding the differences between different neighbourhoods can decrease the chances of overestimating the effectiveness of the regulation so that municipalities can look towards other solutions, or invest extra in the water retention of the public space in these areas. For Groningen specifically, given the possibility that the rainwater regulation has a negative effect on willingness, it would be better to first work out the specifics of the regulation before attempting to increase awareness about the regulation.

Thus, by answering the sub-questions, it is now possible to answer the main research question:

What is the effect of a top-down policy, in this case Groningen's new rainwater regulation, alongside other factors, on the willingness of citizens to implement water retention measures on their property?

There is no effect of the rainwater regulation on the willingness of residents to implement water retention measures. This is not the hypothesized effect of the regulation, as it was predicted in both the theoretical framework and in the interview with the municipality's policymakers that there would be a negative effect. However, it should be noted that the regulation at the moment is only in effect for new construction, and has not yet been applied to existing buildings. The low awareness of the regulation comes as a surprise given the attention the regulation has received in local media outlets. This is a surprising finding, and only the future will tell how the awareness and perception of the regulation will change when the regulation is implemented for existing buildings, and what kind of effect this has on the willingness.

This study focused on the impact of the top-down implementation of policy on willingness. As a result, it addresses only a specific subsection of the population. Future research into explanatory

factors of willingness to implement water retention measures could focus on a more general, representative population. Especially the inclusion of rental properties would be interesting, as a significant part of parcels that are smaller than 250m2 are rental properties. As these areas are not influenced by the rainwater regulation, the willingness of these people is very important, as the municipality cannot force these residents to implement water retention measures. For the rainwater regulation, although this focuses more on policymaking than an academic research gap, future research could see how the awareness and perception of the regulation will change when the regulation is improved and implemented for existing buildings. Lastly, other ArcGIS analyses could focus on different methods to determine in which areas the regulation is less effective, such as differences in height, or more specifically determining inflow areas and urgent locations.

7 Reflection

The research process started with a focus on rainwater problems, and when the rainwater regulation came into effect in January, it was obvious to choose that as an interesting research topic. However, before this focus, it was difficult to determine what exactly the topic of the research should be. Rainwater flooding is still a relatively broad subject, and an earlier definition of the problem statement would have had a positive impact on the timetable of the research.

The setup of the methodology seemed logical at first but proved to be quite a challenge for the data collection itself. Collecting survey responses is already quite a tricky thing to do but given the particular sample that the research focussed on, this was even more difficult. Survey distribution had to be done by hand and was extremely time-consuming, whilst the response rate was, although not dramatically low, still not as hoped. The first round of flyer distribution required almost 40 hours of cycling through Groningen and another 10 hours of preparing the flyers, data files, route making and distributing some flyers to friends. This, combined with a late start of data collection, caused that after the conclusion of the first round of flyer distribution, relatively little time was left for any extra rounds of data collection and little time for working out the results. In hindsight, the data collection should have started several weeks earlier. Given the specific population to which the survey was aimed, there were few methods to improve the response rate and even fewer methods that were not similar or even more time-consuming than the initial round of flyer distribution. There was no other way to deal with this, and although the response was acceptable, made the statistical analysis difficult. Losing some weight due to all the cycling in the municipality was an unexpected side benefit.

The choice for a quasi-experimental design was made because it allowed for a comparison of two groups regarding the rainwater regulation. It seems like the survey was done a few years too early, with the regulation being in such an early stage of development that it has not shown any results yet, not only physically but also psychologically. The quasi-experimental setup of the research is on the other hand somewhat of a disadvantage for sub-question X, regarding the factors that influence the willingness of residents in general. The survey population is not a representative sample of Groningen's population and was very skewed towards a certain population. This was the intention for the sub-question of comparing the two groups but was not as practical for analysing the factors that influence the willingness. Some socio-economic factors, which were expected to be significant, actually proved to be difficult to test due to the dataset being relatively old, highly educated and wealthy.

What went well, was the combination of a survey with a single expert interview. The interview provided many insights that were not only useful to improve the survey questions, but also clearly presented the viewpoint of the municipality itself. The addition of ArcGIS data analysis and mapping was also performed late into the research but eventually produced some interesting and useful results that are not only relevant to this research but also to the practical implementation of the rainwater regulation.

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9 Appendix

9.1 List of figures

9.2 List of Tables:

9.3 Flyer design

9.4 Syntax and SPSS Output

Syntax for identifying parcel group

In datafile 1: (240-250m2)

```
DATASET ACTIVATE DataSet1.
COMPUTE ParcelGroup=1.

EXECUTE.
```

In datafile 250-260m2)

```
DATASET ACTIVATE DataSet2.
COMPUTE ParcelGroup=2.

EXECUTE.
```

Syntax for merging separate data files

```
DATASET ACTIVATE DataSet1.

COMPUTE ParcelGroup=2.

EXECUTE.



ADD FILES /FILE=*

  /FILE='C:\Users\david\OneDrive\Documenten\RUG\Master EIP\Msc Thesis\SPSS\Waterretentie '+

 'Groningen 240-250_June 8, 2024_05.20.sav'.

EXECUTE.
```

Syntax for deleting unfinished responses

```
FILTER OFF.
USE ALL.
SELECT IF (Finished = 1).
EXECUTE.
```

Syntax frequencies and descriptives of socio-economic variables:

```
DESCRIPTIVES VARIABLES=Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10
  /STATISTICS=MEAN STDDEV MIN MAX.

FREQUENCIES VARIABLES=Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10
  /STATISTICS=STDDEV MEAN MEDIAN
  /ORDER=ANALYSIS.


USE ALL.
COMPUTE filter_$=(ParcelGroup = 1).
VARIABLE LABELS filter_$ 'ParcelGroup = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

DESCRIPTIVES VARIABLES=Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10
  /STATISTICS=MEAN STDDEV MIN MAX.

FREQUENCIES VARIABLES=Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10
  /STATISTICS=STDDEV MEAN MEDIAN
  /ORDER=ANALYSIS.

USE ALL.
COMPUTE filter_$=(ParcelGroup = 2).
VARIABLE LABELS filter_$ 'ParcelGroup = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

DESCRIPTIVES VARIABLES=Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10
  /STATISTICS=MEAN STDDEV MIN MAX.

FREQUENCIES VARIABLES=Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10
  /STATISTICS=STDDEV MEAN MEDIAN
  /ORDER=ANALYSIS.
```

Tables included in results and relevant Syntax

Syntax water retention measures

```
FREQUENCIES VARIABLES=Q35 Q35_5_TEXT
  /ORDER=ANALYSIS.

FREQUENCIES VARIABLES=Q35 Q35_5_TEXT
  /ORDER=ANALYSIS.

COMPUTE Water_Retention_Present=Q35 <= 5.
EXECUTE.
```

```
FREQUENCIES VARIABLES=Water_Retention_Present
  /ORDER=ANALYSIS.
```

Heeft u al waterretentiemaatregelen op uw terrein toegepast? - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja, een groen/regendak	9	6.3	6.3	6.3
	Ja, een regenton	38	26.4	26.4	32.6
	Ja, doorlaatbare bestrating	9	6.3	6.3	38.9
	Ja, extra groen in de tuin	34	23.6	23.6	62.5
	Ja, anders, namelijk:	4	2.8	2.8	65.3
	6	50	34.7	34.7	100.0
	Total	144	100.0	100.0	

Water Retention Measures Implemented

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	50	34.7	34.7	34.7
	Yes	94	65.3	65.3	100.0
	Total	144	100.0	100.0	

Syntax Q30; Support from the local government

```
FREQUENCIES VARIABLES=Q30
  /ORDER=ANALYSIS.
```

Zou u meer geneigd zijn om waterretentiemaatregelen toe te passen als u financiële of technische ondersteuning zou ontvangen van een lokale overheid?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja, financieel	23	16.0	16.0	16.0
	Ja, technisch	28	19.4	19.4	35.4
	Ja, beide	62	43.1	43.1	78.5
	Nee, geen van beide	31	21.5	21.5	100.0
	Total	144	100.0	100.0	

Reasons for implementing measures

Redenen implementeren

FREQUENCIES VARIABLES=Q27_1 Q27_2 Q27_3 Q27_4 Q27_5 Q27_6 Q27_7 Q27_8 Q28

/ORDER=ANALYSIS.

Wat zijn de belangrijkste redenen voor u om deze maatregelen te overwegen? (meerdere antwoorden mogelijk) Water besparen

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Water besparen	79	54.9	100.0	100.0
Missing	System	65	45.1		
Total		144	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Wateroverlast in de buurt voorkomen	86	59.7	100.0	100.0
Missing	System	58	40.3		
Total		144	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Buurtgenoten doen het ook	4	2.8	100.0	100.0
Missing	System	140	97.2		
Total		144	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik overweeg geen maatregelen	10	6.9	100.0	100.0
Missing	System	134	93.1		
Total		144	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Gebruiken tijdens droogte	93	64.6	100.0	100.0
Missing	System	51	35.4		
Total		144	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik vind het mooi	51	35.4	100.0	100.0
Missing	System	93	64.6		
Total		144	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Vrienden/familie hebben het aanbevolen	2	1.4	100.0	100.0
Missing	System	142	98.6		
Total		144	100.0		

Regression: Check for multicollinearity

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10) TOLERANCE(.0001)
  /NOORIGIN
  /DEPENDENT RiskPerception_Correct
  /METHOD=ENTER Q2 Q3 Income_excluded Q10 WorkSituation Education_Recode
Household_Composition Q7
    PreviousFlooding SelfEfficacy_Mean mean_trust_government AwareRWRYesNo.
```

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	4.357	1.049		4.151	<.001		
	Age	.003	.008	.046	.370	.712	.461	2.169
	Gender	.109	.165	.063	.657	.513	.761	1.315
	Income	-.004	.149	-.004	-.030	.976	.497	2.012
	Ability to make ends meet	-.050	.093	-.058	-.539	.591	.609	1.641
	Working	-.139	.226	-.076	-.614	.541	.459	2.179
	Education	-.576	.236	-.256	-2.435	.018	.629	1.589
	Household Composition	-.099	.118	-.085	-.837	.405	.677	1.477
	Building typology	-.075	.102	-.070	-.730	.468	.752	1.330
	Previous Flooding	-.458	.093	-.448	-4.902	<.001	.835	1.198
	Self Efficacy	.198	.142	.126	1.396	.167	.852	1.173
	Mean Trust in Government	.239	.117	.215	2.036	.046	.625	1.600
	Aware of Regulation	-.192	.155	-.110	-1.241	.219	.881	1.135
	Willingness	-.208	.089	-.224	-2.346	.022	.766	1.306

a. Dependent Variable: RiskPerception_Correct

Syntax and results differences parcelgroups P1 and P2

```
NPAR TESTS
  /M-W= Q2 BY ParcelGroup(1 2)
  /MISSING ANALYSIS.
```

Test Statistics[a]

	Wat is uw leeftijd?
Mann-Whitney U	2401.000
Wilcoxon W	4816.000
Z	-.614
Asymp. Sig. (2-tailed)	.539

a. Grouping Variable: ParcelGroup

```
NPAR TESTS
  /M-W= Q10 BY ParcelGroup(1 2)
  /MISSING ANALYSIS.
```

Test Statistics[a]

	Bent u in staat om rond te komen?
Mann-Whitney U	2391.500
Wilcoxon W	4876.500
Z	-.844
Asymp. Sig. (2-tailed)	.399

a. Grouping Variable: ParcelGroup

```
NPAR TESTS
  /M-W= Income_excluded BY ParcelGroup(1 2)
  /MISSING ANALYSIS.
```

Test Statistics[a]

	Income_excluded
Mann-Whitney U	2177.000
Wilcoxon W	4805.000
Z	-.094
Asymp. Sig. (2-tailed)	.925

a. Grouping Variable: ParcelGroup

```
CROSSTABS
  /TABLES=Q3 Q4 Q5 Q8 BY ParcelGroup
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.625[a]	1	.429		
Continuity Correction[b]	.381	1	.537		
Likelihood Ratio	.626	1	.429		
Fisher's Exact Test				.489	.269
Linear-by-Linear Association	.621	1	.431		
N of Valid Cases	144				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 25.28.

b. Computed only for a 2x2 table

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.699[a]	8	.463
Likelihood Ratio	9.041	8	.339
Linear-by-Linear Association	2.884	1	.089
N of Valid Cases	144		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .49.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.203[a]	5	.287
Likelihood Ratio	8.133	5	.149
Linear-by-Linear Association	.006	1	.938
N of Valid Cases	144		

a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .49.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.949[a]	3	.400
Likelihood Ratio	2.982	3	.394
Linear-by-Linear Association	.974	1	.324
N of Valid Cases	144		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.92.

```
CROSSTABS

 /TABLES=Q29 BY AwareRWRYesNo
 /FORMAT=AVALUE TABLES
 /STATISTICS=CHISQ
 /CELLS=COUNT
/COUNT ROUND CELL.
```

Hoe waarschijnlijk is het dat u in de komende vijf jaar waterretentiemaatregelen gaat implementeren? * AwareRWRYesNo Crosstabulation

Count

		AwareRWRYesNo		
		No	Yes	Total
Hoe waarschijnlijk is het dat u in de komende vijf jaar waterretentiemaatregelen gaat implementeren?	Zeer onwaarschijnlijk	5	3	8
	Onwaarschijnlijk	7	2	9
	Neutraal	9	14	23
	Waarschijnlijk	12	9	21
	Zeer waarschijnlijk	4	5	9
Total		37	33	70

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.691[a]	4	.320
Likelihood Ratio	4.856	4	.302
Linear-by-Linear Association	.804	1	.370
N of Valid Cases	70		

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is 3.77.

Syntax for computing of variables:

Syntax for computing self-efficacy variable

```
RECODE Q19_3 Q19_4 Q19_6 Q19_8 Q19_9 Q19_11 Q19_12 (1=5) (2=4) (3=3)
(4=2) (5=1) INTO Q13_3Positief
    Q19_4Positief Q19_6Positief Q19_8Positief Q19_9Positief Q19_11Positief
Q19_12Positief.
VARIABLE LABELS  Q13_3Positief 'Q13_3Positief' /Q19_4Positief 'Q19_4Positief'
/Q19_6Positief
    'Q19_6Positief' /Q19_8Positief 'Q19_Positief' /Q19_9Positief 'Q19_9Positief'
/Q19_11Positief
    'Q19_11Positief' /Q19_12Positief 'Q19_12Positief'.
EXECUTE.

RELIABILITY
  /VARIABLES=Q13_3Positief Q19_4Positief Q19_6Positief Q19_8Positief
Q19_9Positief Q19_11Positief
    Q19_12Positief Q19_1 Q19_2 Q19_5 Q19_7 Q19_10
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE SCALE
  /SUMMARY=TOTAL.
```

Reliability Statistics

Cronbach's Alpha	N of Items
.750	12

```
COMPUTE SelfEfficacy_Mean = MEAN(Q13_3Positief, Q19_4Positief, Q19_6Positief,
Q19_8Positief, Q19_9Positief, Q19_11Positief,
    Q19_12Positief, Q19_1, Q19_2, Q19_5, Q19_7, Q19_10).
EXECUTE.
```

Reliability Statistics

Cronbach's Alpha	N of Items
.747	3

```
COMPUTE RiskPerception_Mean = MEAN(Q11_Recode, Q12_Recode, Q13_Recode).
EXECUTE.
```

Syntax for computing trust in government variable

```
RELIABILITY
  /VARIABLES=Q17_1_1 Q17_1_2 Q17_1_3 Q17_1_4
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA.
```

Reliability Statistics

Cronbach's Alpha	N of Items
.835	4

```
COMPUTE mean_trust_government = MEAN(Q17_1_1, Q17_1_2, Q17_1_3,
Q17_1_4).
EXECUTE.
```

Syntax water retention measures

```
FREQUENCIES VARIABLES=Q35 Q35_5_TEXT
  /ORDER=ANALYSIS.

FREQUENCIES VARIABLES=Q35 Q35_5_TEXT
  /ORDER=ANALYSIS.

COMPUTE Water_Retention_Present=Q35 <= 5.
EXECUTE.

FREQUENCIES VARIABLES=Water_Retention_Present
  /ORDER=ANALYSIS.
```

Work situation (working or not working)

```
RECODE Q5 (1=1) (ELSE=2) INTO WorkSituation.

VARIABLE LABELS  WorkSituation 'WorkSituation'.

EXECUTE.
```

Income (Exclude ‘’I’d rather not say’’ responses)

```
CROSSTABSRECODE Q9 (1=1) (2=2) (3=3) (4=4) (5=SYSMIS) INTO
Income_excluded.

VARIABLE LABELS  Income_excluded 'Income_excluded'.

EXECUTE.

  /TABLES=Q29 BY Q8
 /FORMAT=AVALUE TABLES
  /CELLS=COUNT
/COUNT ROUND CELL.
```

Damage by flooding (yes or no)

```
RECODE Q11 (1=1) (4=3) (2 thru 3=2) INTO Damage_flooding.

VARIABLE LABELS  Damage_flooding 'Damage_flooding'.

EXECUTE.
```

Willingness into three options (Not willing, neutral, willing)

```
RECODE Q29 (3=2) (1 thru 2=1) (4 thru 5=3) INTO Willingness_Three_Options.
VARIABLE LABELS  Willingness_Three_Options 'Willingness_Three_Options'.
EXECUTE.
```

Believe in climate change (yes or no and exclude those who do not know)

```
RECODE Q15 (5=SYSMIS) (1 thru 2=1) (3 thru 4=2) INTO ClimateYesNo.
VARIABLE LABELS  ClimateYesNo 'ClimateYesNo'.
EXECUTE.
```

Aware of regulation

```
RECODE Q20 (1=1) (2 thru 5=2) INTO AwareRWRYesNo.
VARIABLE LABELS  AwareRWRYesNo 'AwareRWRYesNo'.
EXECUTE.
```

Previous flooding experienced (Yes or no)

```
RECODE Q11 (1=1) (4=2) (2 thru 3=3) INTO PreviousFlooding.
VARIABLE LABELS  PreviousFlooding 'PreviousFlooding'.
EXECUTE.
```

Risk perception with corrected questions

```
COMPUTE RiskPerception_Correct=(Q13_Excluded + Q14_Excluded) / 2.
EXECUTE.
```

9.5 Socio-economic statistics for both parcel groups

Variable	Values	Average/Percentages	Frequency	Mean (std.dev)	N and mean	Average/Percentage P1	Frequency P	Mean (std.dev)	N P1	Average/Percentage P2	Frequency P2	Mean (std. Dev)	N P2	Min	Max
Age		56,6 (13,68)			143	57,7 (13,2)			74	55,42 (14,2)			69	24	85
Gender				Mean:1.36				Mean:				Mean:1,33			
	1 Male	64%	92	(.482)	144	60,80%	45	1.39(.492)	74	67,10%	47	(.473)	70	1	3
	2 Female	36%	52			39,20%	29			32,90%	23				
	3 Other	0%	0			0%	0			0%	0				
Level of education				Mean:				Mean:8.1				Mean:7.76			
	1 Basisonderwijs	0,70%	1	7.98	144	0%	0	9(1.201)	74	1,40%	1	(1.789)	70	1	10
	2 Lbo, praktijkonderwijs, vso	1,40%	2			1,40%	1			1,40%	1				
	3 vmbo, lwoo	0%	0			0%	0			0%	0				
	4 mavo (ulo, mulo)	3,50%	5			1,40%	1			5,70%	4				
	5 havo (mms)	2,80%	4			1,40%	1			4,30%	3				
	6 vwo, gymnasium, atheneum (hbs, lyceum)	1,40%	2			0%	0			2,90%	2				
	7 mbo (mts, meao, middenstandsdiploma, pdb,	10,40%	15			10,80%	8			10%	7				
	8 hbo (hts, heao, kweekschool, associate	35,40%	51			40,50%	30			30%	21				
	9 universitaite opleiding (inclusief promotieonderzoek	42,40%	61			41,90%	31			42,90%	30				
	10 een andere (bedrijfs)opleiding of cursus	2,10%	3			2,70%	2			1,40%	1				
Work				1.75(1.068				Mean:1.7				Mean:1.76			
	1 Working	64,60%		)	144	67,60%	50	4(1.159)	74	61,40%	43	(.970)	70	1	6
	2 Unemployed	0,70%	1			0%	0			1,40%	1				
	3 Retired	31,90%	46			27,00%	20			37,10%	26				
	4 unable to work	1,40%	2			2,70%	2			0%	0				
	5 student	0,70%	1			1,40%	1			0%	0				
	6 housewife/househusband	0,70%	1			1,40%	1			0%	0				
Living				Mean:				Mean:1.0				Mean:1(.0			
	1 Bought	98,60%	142	1.01(.117)	144	97,30%	72	3(.163)	74	100%	70	)	70	1	2
	2 Rented	1,40%	2			2,70%	2			0%	0				
House				Mean:3.47				Mean:3.4				Mean:3.47			
	1 flat/appartment	3,50%	5	(.747)	144	4,30%	3	7(.815)	74	2,90%	2	(.647)	70	1	5
	2 student room	0%	0			0%	0			0%	0				
	3 cornerhouse/townhouse	47,20%	68			48,60%	36			45,70%	32				
	4 semi-detached house	44,40%	64			39,20%	29			50%	35				
	5 detached house	4,90%	7			8,10%	6			1,40%	1				
Household composition				Mean:2.29				Mean:2.2				Mean:2.36			
	1 living alone	15,30%	22	(.774)	144	18,90%	14	3(.820)	74	11,40%	8	(.723)	70	1	4
	2 cohabiting	44,40%	64			44,60%	33			44,30%	31				
	3 cohabiting with children	36,10%	52			31,10%	23			41,40%	29				
	4 only parents with children	4,20%	6			5,40%	4			2,90%	2				
Income				Mean:				Mean:3.2				Mean:3.44			
	1 less than 15.000 euros	0,70%	1	3.36(.825)	144	0%	0	8(.693)	74	1,40%	1	(.942)	70	1	5
	2 15.000 to 38.500 euros	12,50%	18			10,80%	8			14,30%	10				
	3 38.500 to 77.000 euros	44,40%	64			52,70%	39			35,70%	25				
	4 more than 77.000 euros	34,70%	50			33,80%	25			35,70%	25				
	5 Rather not say	7,60%	11			2,70%	2			12,90%	9				
Ability to make ends meet				Mean:4.99				Mean:5.0				Mean:4.93			
	1 very difficult	0,70%	1	(.901)	144	0,00%	0	4(.898)	74	1,40%	1	(.906)	70	1	6
	2 difficult	0,00%	0			0,00%	0			0%	0				
	3 a bit difficult	4,20%	6			6,80%	5			1,40%	1				
	4 quite easily	21,50%	31			17,60%	13			25,70%	18				
	5 easily	42,40%	61			40,50%	30			44,30%	31				
	6 very easily	31,40%	45			35,10%	26			27,10%	19				

9.6 Interview guide

1. Doel interview

- Doel van het Interview: Inzichten krijgen vanuit het perspectief van de gemeente over de hemelwaterverordening en waterretentie bij inwoners van de stad Groningen
- Inzichten krijgen voor het enquete ontwerp bij bewoners
- Kijken wat we wederzijds voor elkaar kunnen betekenen

2. Expert (s)

- Interviewee: Klaas Homans, beleidsmedewerker Gemeente Groningen

3. Vragen

Het interview zal een semi-gestructureerde benadering volgen, die diepgang en detail mogelijk maakt, en flexibiliteit tijdens het interview toelaat. Dit is vanwege het doel om een complex beleid, de hemelwaterverordening, te verkennen, waarover nog veel onduidelijk is, en het interview zal waarschijnlijk zaken ophelderen, wat waarschijnlijk de behoefte aan vervolgvragen zal openen.

1. Introductie

Mijn naam is David Kruijning, en ik ben student aan de Rijksuniversiteit Groningen, waar ik de Msc Environmental and Infrastructure volg. Voor mijn masterscriptie doe ik onderzoek naar de bereidheid van bewoners om waterretentiemaatregelen te nemen op hun eigen terrein in de stad Groningen.

Ten eerste bedankt voor uw tijd! Het interview zal ongeveer 60 minuten duren. Is dat voor u okay?
Het doel van dit interview is om meer inzichten te krijgen over de hemelwaterverordening in de Gemeente Groningen, vanuit het perspectief van de gemeente.

Met uw toestemming zou ik graag dit interview willen opnemen. Dit helpt mij om ervoor te zorgen dat ik uw inzichten nauwkeurig kan vastleggen en analyseren. Alle informatie die tijdens dit interview wordt verzameld, zal strikt vertrouwelijk worden behandeld. Uw identiteit en de informatie die u deelt, zullen alleen worden gebruikt voor academische doeleinden binnen mijn scriptie. Indien u dat wenst, kunnen de resultaten van dit interview worden geanonimiseerd. De opnames en transcripties zullen veilig worden opgeslagen en alleen toegankelijk zijn voor mij en mijn begeleiders. Indien u wenst, kan ik u het transcript opsturen. Ook kan ik u een samenvatting van het onderzoek sturen.

Voordat we beginnen, zou ik graag bevestigen dat u akkoord gaat met de opname van dit gesprek en dat u begrijpt hoe de verzamelde informatie zal worden gebruikt. Heeft u vragen of zorgen voordat we beginnen?

We zullen beginnen met enkele algemene vragen over uw ervaring en achtergrond. Vervolgens zullen we overgaan op specifieke thema's gerelateerd aan wateroverlast in Groningen, de betrokkenheid van inwoners, en de Hemelwaterverordening. Uiteraard is er ruimte voor enige flexibiliteit, en ik sta open voor eventuele aanvullende onderwerpen of inzichten die u belangrijk vindt om te delen.

2. Achtergrond en algemene perceptie

Achtergrond van de expert:

- Zou u kort willen vertellen wie u bent, wat voor functie u heeft bij de gemeente Groningen en wat voor werkzaamheden daarbij horen, en hoe dit gerelateerd is aan de Hemelwaterverordening?

3. Het probleem

Inzichten uitdagingen in stedelijke setting, specifiek Groningen:

- Wat zijn voor de stad Groningen de grootste uitdagingen wat betreft klimaatverandering, en specifiek wateroverlast?
- Welke maatregelen neemt de gemeente allemaal om wateroverlast te voorkomen?
- Hoe groot schat u het bewustzijn van bewoners voor het thema wateroverlast, en in hoeverre weet u van bewoners of ze al eigen maatregelen tegen wateroverlast nemen?
- Welke bewoners nemen nu met name al maatregelen op het eigen perceel? (Profiel van de proactieve bewoners, wie zijn het, waar wonen ze, en heeft gemeente daar zich op/contact mee)

4. Aanmoedigen en tegenhouden

- *Stimulansen*: Wat kan de gemeente doen om het implementeren van waterrretentiemaatregelen op het eigen terrein van inwoners aan te moedigen?

- *Barrières:* Wat zijn de grootste uitdagingen voor de gemeente om inwoners waterretentiemaatregelen te laten implementeren op hun eigen terrein? Waar lopen jullie tegenaan?

5. De Hemelwaterverordening

- Zou u kort kunnen vertellen wat de Hemelwaterverordening precies inhoudt?
- Wat was de aanleiding van de Hemelwaterverordening? Was het meer vanwege de juridische noodzaak vanuit de Omgevingswet, of is dit een proactieve actie van de gemeente?

- In hoeverre hebben jullie bij het maken van de Hemelwaterverordening gekeken naar andere steden of samengewerkt? Is Groningen hierin een trendsetter of een trendvolger?
- Er is best wel veel ophef over de Hemelwaterverordening in lokale media. Hoe kijkt u tegen deze ophef aan?
- De Hemelwaterverordening is verdeeld in een stuk over nieuwbouw en een stuk over bestaande bouw. Voor mijn onderzoek is vooral het deel over bestaande bouw relevant, en daar heb ik dan ook een aantal specifiekere vragen over.
- In hoeverre gaan jullie controleren of bewoners in bestaande bouw zich aan de HWV houden? Welke instrumenten hebben jullie hiervoor in huis?
- In hoeverre zullen de regels voor bestaande bouw nog verder uitgewerkt worden? Welke ideeën gaan hierover rond?
- Zo ja; Wat zijn de consequenties als percelen niet aan de eisen voldoen?

7. Inwoners

- Verwacht u dat de Hemelwaterverordening invloed gaat hebben op bewoners van Groningen die niet persé onder de regelgeving vallen? Bijvoorbeeld Eigenaren van een kleiner perceel?
- Verwacht u een positief effect op de bereidheid van mensen om waterretentiemaatregelen te nemen door de hemelwaterverordening?
- Wat zijn, volgens u, de grootste factoren die de bereidheid van mensen om waterretentiemaatregelen te nemen beïnvloeden?

7. Onderzoek

Voor mijn scriptie ben ik van plan om een enquete af te nemen onder bewoners van Groningen, bij percelen tussen de 240-260m2, om te kijken of de Hemelwaterverordening effect heeft op de bereidheid van inwoners om waterretentiemaatregelen te nemen.

- Wat voor informatie zou u interessant vinden om opgenomen te zien worden in deze enquete?
- Welke stadsdelen zijn naar uw mening het meest interessant om mee te nemen in de enquete?

9. Opgekomen vragen

10. Einde

Nu we dit interview afronden, wil ik u allereerst ontzettend bedanken voor uw deelname en waardevolle inzichten. Voordat we officieel afsluiten, wil ik een paar belangrijke punten herhalen en bevestigen:

Ik wil graag uw toestemming voor het opnemen van dit gesprek bevestigen en herinneren aan hoe deze opnames gebruikt zullen worden, uitsluitend voor academische doeleinden. Uw privacy is voor ons van het grootste belang, en ik verzeker

u dat uw gegevens vertrouwelijk worden behandeld en dat uw anonimiteit wordt gewaarborgd in de publicatie van mijn scriptie.

Mocht u interesse hebben in de resultaten van dit onderzoek of in de definitieve scriptie, dan deel ik deze graag met u. Laat me alstublieft weten hoe ik deze informatie het beste aan u kan verstrekken.

Het is mogelijk dat ik in de toekomst nog aanvullende vragen heb of verdere informatie nodig heb. Staat u open voor eventueel verder contact hierover? Staat u ervoor open om later te resultaten van de enquete of het resultaat van mijn onderzoek nog met elkaar te bespreken?

Nogmaals, dank voor uw tijd en bijdrage aan mijn onderzoek. Uw perspectieven zijn onmisbaar geweest. Mocht u feedback hebben over het interviewproces of suggesties voor verbeteringen, dan sta ik daarvoor open. Uw input is waardevol voor het verfijnen van mijn onderzoeksmethoden.

Tot slot, hier zijn mijn contactgegevens voor eventuele vragen of opmerkingen die u na vandaag nog mocht hebben. Voel u vrij om op elk moment contact met mij op te nemen.

Dank u wel voor uw betrokkenheid en medewerking. Ik kijk uit naar de mogelijkheid om onze inzichten en bevindingen te delen en verder bij te dragen aan het gesprek over dit belangrijke onderwerp.

Dankuwel!

9.7 Data Management Plan

1. **Administration**	
1.1 Name of the student/researcher	*Add your s-number (MSc students) or p-number (PhD students & staff).* * Name: David Kruijning * S/P-number: s-3378055
1.2 Name of the research group	* Research group: Click here to enter text.
1.3 Name of the project	* Project title: MSc Thesis: The impact of top-down policies on the willingness of citizens to implement water retention measures on their own property
1.4 Description of the project	*Briefly (3-5 sentences) describe the project and its expected results.* * Project description: The purpose of the research is to see what factors influence the willingness of citizens in the city of Groningen to implement water retention measures on their own property, and specifically how the new municipal rainwater regulation influences this willingness
1.5 Funding agency	*For 2nd or 3rd money flow projects: indicate the funding agency and grant number.* * Funding agency: Click here to enter text. * Grant number: Click here to enter text.
1.6 Institute project code	*If applicable:* * Project code: Click here to enter text.
1.7 Project duration	* Start date: 07-11-2023 * Expected end date: 01-07-2024 Extended end date: Click here to enter a date.
1.8 DMP version	* Version 1.0: 01-05-2024 Last updated: Click here to enter a date. Version 2.0: Click here to enter a date.
1.9 Project data manager(s)	*Indicate all persons responsible for the project's data management. Also include daily supervisors if different from the primary PI.* * (First) promotor/PI responsible for the project: Richard Rijnks * Daily supervisor(s) if other than PI: Britta Restemeyer
1.10 External collaboration	*In case of joint projects: indicate which external institutes/organizations are involved and who (PI) is responsible for data management at the external institute.* * Institute/organization: Click here to enter text. * PI(s) responsible for externally collected data: Click here to enter text.
2. Data collection	
2.1 Legal issues	*For (legally) sensitive or confidential project data: indicate which special procedures, permits and/or licenses are required.* * Project data that require specific legal procedures, permits and/or licenses: ☒ Human subjects: add license(s) ☐ Animal lab and/or field experiments: add license(s) ☐ Imported plant or animal specimen: add license(s) ☐ Genetically modified organisms (GMO): add license(s) ☐ Radioactive chemicals/isotopes: add license(s) ☒ Other confidential/sensitive data: Personal data recorded through survey ☐ No confidential/sensitive data collected

2.2 GDPR registration	*Studies with human subjects require registration to be compliant with the EU General Data Protection Regulation (GDPR) since 25 May 2018. The UG manages a central register with 13 standard, legally approved questions that have to be answered for each study processing sensitive data from human subjects.* *** NOTE: This section is obligatory for all studies processing data from human subjects** 1. Data processing activity: The data will be analysed through spatially mapping the data with ArcGIS and by comparing the personal data in two different groups based on parcel size 2a. Responsible faculty/institute: **FSE-GELIFES** 2b. Local process owner: **Senior PI responsible for the project** 2c. People with access to the data: ☒ 1-5 ☐ 5-10 ☐ 10-100 ☐ > 100 3. Intended use of the data: indicate for which purpose(s) the personal data is collected, recorded and/or processed, e.g. administration (payment of test subjects), communication (providing feedback of results), research (including personal details in statistic analysis) 4. Legal basis for processing personal data: **To be filled in by Legal Department** 5a. Human subject category: ☐ Staff ☐ Students ☒ External research subjects ☐ Patients ☐ Clients ☐ Other, specify: Click here to enter text. 5b. Estimated number of subjects: ☐ 1-10 ☐ 10-100 ☒ 100-1000 ☐ 1000-10,000 ☐ 10,000 - 100,000 ☐ > 100,000 6. Personal data collected: ☒ Name and address details ☐ Unlisted address ('secret' address, not in Dutch Personal Records Database (BRP)) ☐ Nationality ☐ Date of birth ☐ Place of birth ☐ Health information ☐ Religion ☐ Criminal record ☐ Biometric information (e.g. fingerprints/iris scan) ☐ Photo/video ☐ Telephone number ☐ BSN (Dutch Citizen Service Number)/V-number (Foreigner registration number) ☐ Email address ☒ Location information ☐ IP address ☐ Other, specify: Income, household composition, employment, gender, education 7a. Secure storage of personal data: **Select the appropriate options in section 3.1** 7b. Retention period for personal data: **Standard archiving conditions apply unless indicated otherwise in section 3.2** 8. External third party providing personal data: ☒ no ☐ yes, specify: Click here to enter text. 9. External third-party processing/storing personal data: ☒ no ☐ yes, specify: Click here to enter text. 10. Data sharing with countries outside the EER (EU, Norway, Iceland, Liechtenstein): ☒ no ☐ yes, specify: Click here to enter text. 11. Privacy Impact Assessment (PIA) for data sharing outside EER available: ☒ no ☐ yes ☐ unknown 12. Automated sharing of personal data with other systems: ☐ no ☒ yes, specify: ArcGIS 13. Technical and/or organizational security measures taken to protect the personal data: ☒ Encryption

	☐ Pseudonymization ☐ Anonymization ☒ Access limited to specific user groups ☐ Other, specify: Click here to enter text.
2.3 Description of the raw (primary) data	*Indicate what type of data will be collected and whether a very large amount of data is expected (> 500 GB). Also indicate where the data will be collected (own/external institute), and whether the data is new or re-used from another project.* * Primary data collected: ☒ Scanned or electronic field logs & score forms ☐ Scanned or electronic lab journals & score forms ☐ Pictures of gels or microscopic observations ☐ Output from data loggers ☐ Video & audio recordings ☐ Webcam/photo identification files ☐ Satellite/aerial imagery ☐ Sequencing & genotyping data ☐ Micro array & hi throughput data ☐ Other, specify: Click here to enter text. ☐ No primary data * Expected amount of data: ☒ < 10 GB ☐ 10-200 GB ☐ > 200 GB Additional remarks: Click here to enter text.
2.4 Description of the processed (secondary) data	*Indicate whether & how the raw data will be processed: what software, algorithms, workflows will be used?* * Secondary data produced: ☒ Spreadsheets, databases & graphics ☒ Output from statistical packages ☒ Output from geographic information systems ☒ Simulated datasets ☐ Program code (e.g., C/C++, NetLogo, Matlab, Maple, Mathematica) ☐ Batch scripts (R, Python) ☐ Associated parameter files used to produce or process primary data ☐ Other, specify: Click here to enter text. ☐ No secondary data * Expected amount of data: ☒ < 10 GB ☐ 10-200 GB ☐ > 200 GB Additional remarks: Click here to enter text.
3. Data storage	
3.1 Data storage	*Indicate how & where primary and secondary data are stored during the project: how often are stored data backed-up; how is version control realized? If relevant: indicate how the privacy of test subjects is guaranteed.* * Long-term storage with automated back-up: ☒ **RUG servers (wiki, iRODS, low-cost storage, eLabjournal)** ☐ **UMCG servers (Lifelines or similar)** ☐ **DANS DataverseNL (open access)** ☐ Other, specify: Click here to enter text. ☐ None * Cloud-based storage & sharing: ☐ **RUG-Unishare** ☐ GitHub ☐ Google Drive ☐ MS OneDrive ☐ DropBox ☐ WeTransfer ☐ Other, specify: Click here to enter text. ☐ None * Short-term storage: ☐ **RUG PCs**

	☒ NAS/external HD ☒ Laptop ☐ Flash memory ☐ Other, specify: Click here to enter text. ☐ None Special storage facilities: Click here to enter text.

3.2 Data archiving	*Indicate how, where & for how long primary and secondary data will be archived, including specific software that is used or other relevant information needed to verify the research results.* **All primary and secondary data are archived in a single zip-file, also including the final report, thesis or publication of the project and one or more metadata files that document the data archive. The archive is stored in the institute repository; archives will be stored for at least 10 years.** Additional archiving requirements/agreements: Click here to enter text.
4. Data ownership	
	If applicable: Indicate whether specific agreements apply with regard to data ownership or access, e.g. contractual obligations to third parties (commercial or other), embargo requirements for publication, etc. **The research institute acts as the legal representative of the University of Groningen and holds ownership of all research data collected, generated or otherwise acquired within the institute unless different arrangements are clearly documented and approved by the institute director.** **The purpose of the institute data repository is archive-only; access to archive files is restricted to senior staff members ultimately responsible for the corresponding research projects.** Additional agreements on data ownership and/or access: Click here to enter text.
5. Data documentation	
5.1 Metadata	*Indicate how & for whom metadata (data documentation) is organized.* **The data archive includes a standard metadata file (read_me_first.txt) that is set up according to the guidelines in the institute data archiving procedure; for archives consisting of multiple folders a read_me_first.txt metadata file is included for each folder**. Additional remarks: Click here to enter text.
5.2 File formats & naming standards	*Indicate which data formats will be used in the project; if non-standard data formats are used: explain how these formats can be read (include the appropriate software or a link to its source).* **The project aims to use the preferred or acceptable data formats listed in the guidelines in the institute data archiving procedure. All file names, metadata and other description files and comment lines in code are in English. The data archive follows the naming standards provided in the institute data archiving procedure.** Non-standard data formats used: Click here to enter text.

9.8 Interview Transcript

Onderzoeker: David Kruijning (D)
Geïnterviewden: [redacted]
Datum: 17-4-2024 14:00
Locatie: Gemeente Groningen Zuiderdiep

D: Ik ben David. Ik doe nu de master Infrastructure en Environmental Infrastructure Planning. En ik doe mijn master scriptie over de invloed van de hemelwaterverordening op de bereidheid van bewoners om zelf ook maatregelen te nemen. En ook een stukje over de bereidheid in het algemeen. Daar ben ik eigenlijk mee begonnen maar toen kwam in januari natuurlijk de hemelwaterverordening uit en toen samen met mijn begeleider besloten van dit is eigenlijk wel heel interessant om eraan toe te voegen.

H: Doe je dan beide alsnog of doe je het vooral in relatie tot de hemelwaterverordening?

D: Ja dat is ook even kijken hoe de resultaten zijn. Ik ga een enquête afnemen onder bewoners. Ik dacht van ja, ik wil in principe ook de hele waterverordening doen, maar misschien dat ook veel mensen er niks van weten of dat het toch een beetje abstract is. Dus daarom heb ik ook al veel algemene vragen over bereidheid in het algemeen gedaan. Dus dat lijkt me ook wel een goede toevoeging. Het doel van het interview is eigenlijk een beetje om tegenover de enquête ook een beetje de inzichten van de gemeente te krijgen. Wat bedoelen jullie er precies mee? Want mensen hebben natuurlijk heel erg een perceptie van de hemelwaterverordening, maar dat is misschien wel heel anders dan wat jullie ermee bedoelen of wat jullie ermee willen bereiken. Dus daar ben ik erg benieuwd naar. Ik ben ook nog niet begonnen met de enquête. Dus daar wil ik het ook even met jullie over hebben. Van, hé, zijn er dingen die jullie graag misschien willen weten of daar toevoegingen op hebben? En misschien of we elkaar ergens wederzijds mee kunnen helpen. Als jullie het interessante data vinden, dan kunnen we daar natuurlijk iets mee doen. Nou, ten eerste nog bedankt voor jullie tijd. Ongeveer een uurtje. Hebben jullie nog vragen voordat we verder beginnen?

M: Op dit moment niet. Ik denk dat we daar gaandeweg wel achter komen.

D: Ja, super. Ja, dat was de eerste vraag. Mooi. Ja, zouden jullie willen vertellen wie je bent, wat de functie is bij de gemeente en vooral hoe het in verband staat met de hemelwaterverordening?

H: Ja, zal ik beginnen? Nou, ik ben [redacted] Ik ben beleidsmedewerker water en bodem. Sinds 1 januari dit jaar. Je moet beleidsmedewerker water en bodem dan zien als in water en bodem sturend. Er was eigenlijk behoefte aan een beleidsmedewerker water. Nou vanwege die rijksbrief van eind 2022 werd ook hier bij de gemeente wel het verband gezien tussen water en bodem en hoe dat dan invloed heeft op elkaar en op het systeem in totaal. Nou dat heeft in ieder geval heel veel betrekking dus op klimaatverandering, klimaatadaptatie. En dat heb ik in mijn vorige functie, was ik daar ook heel nauw bij betrokken. Toen was ik, ik ben een tijdje coördinator beheer geweest. En toen was ik betrokken bij het project Urgente Wateroverlastlocaties. Dus de plekken in de gemeente Groningen waar wateroverlast is en waar dan ook nog een kwetsbare functie is. En die combinatie maakt dan dat we hem urgent noemen. En daarvoor was ik technisch specialist water. En toen zat ik ook al in de klimaatadaptatiehoek. Deze hemelwaterverordening heeft ook wel betrekking op de problemen. Die we bij die opgaves waar ik eerder mee bezig ben geweest tegenaan liepen. Ik heb hem alleen niet zelf geschreven. De collega die geschreven heeft is inmiddels vertrokken naar een ander bedrijf. Maar ik ben nu wel aanspreekpunt. En degene die moet zorgen samen met mijn collega's dat die hemelwaterverordening goed landt.

D: Druk mee?

H: Nu momenteel is er wel wat te doen ja.

D: Super, dankjewel.

M: Mijn naam [redacted], ik ben beleidsmedewerker klimaatadaptatie hier sinds [redacted] heeft natuurlijk al het gras voor de voeten weggemaaid. Met de hele uitleg waarom ook zo'n verordening nodig is. Wat ik daarin kan toevoegen is dat wij als gemeente vooral invloed hebben op de openbare ruimte. Maar dat dat niet overal genoeg is om wateroverlast situaties te voorkomen. Dus dat je daar ook op een of andere manier particulier bezit in mee moet nemen om tot een gedegen oplossing te komen. Ja, ik denk ook dat het daarin een stukje, het is natuurlijk je dwingt hiermee wel maatregelen af. Daarnaast is het ook een stuk

bewustwording. Je zet het wel op de kaart voor mensen en bedrijven en iedereen die ermee te maken heeft eigenlijk. Dus het zit misschien wat meer tussen de oren op deze manier.

D: Oké, super. Dank je wel. Ik hoor het geval zo meteen al uitkomt.

H: Ik sta vast mijn laptop even op.

D: Ja, dat zou super zijn. Wat denken jullie dat, om even wat breder te beginnen, wat de grootste uitdagingen voor Groningen zijn? Eigenlijk wat betreft klimaatverandering, maar dan heel specifiek wateroverlast.

H: Dat is een hele brede vraag.

D: Ja, we duiken er zo in hoor.

H: Deze kun je heel technisch beantwoorden en wat meer algemeen.

M: Ja, ik zit heel erg in de ruimtelijke zin te denken. Als je gaat kijken naar Groningen als gemeente, hebben we natuurlijk een heel groot deel Stad. En het is een hele compacte stad, Groningen. Dat betekent ook dat je gewoon heel weinig ruimte hebt om aanpassingen te doen aan je buitenruimte. Dat maakt het best een uitdaging om ook oplossingen te vinden voor waterproblemen.

D: En daar komt ook de noodzaak voor particuliere grond vandaan.

M: Dat is één ding inderdaad, denk ik. Daarnaast heb je ook te maken met ontzettend veel verschillende partijen, die inderdaad ook, wat je aangeeft, niet alle grond is in ons beheer. Dus je zult er ook heel veel met partijen moeten samenwerken. En je gaat je daarbij eigenlijk inmengen in dingen die toch privébezit of particulier bezit in ieder geval zijn. En dat is erg lastig. Daar heb ik ze eigenlijk een beetje gecombineerd, De sociale en de technische.

D: Duidelijk antwoord:

H: Ja, ik denk dat hoe de stad gemaakt is. Wat we bijvoorbeeld zien is dat we hebben een aantal gedempte diepen. Het gedempte zuiderdiep komt wel vaak voorbij. We zitten hier nu aan het gedempte zuiderdiep. Maar zo heb je ook het boterdiep bijvoorbeeld, of het damsterdiep. Dat zijn plekken waar het water vroeger natuurlijk heen liep. Zo is de stad gebouwd. En dat zijn ook plekken die redelijk dichtbebouwd zijn. Dus je hebt weinig ruimte om iets te doen. En als het water eenmaal op dat onderste punt is, dan kun je er ook niet zo veel mee. Behalve heel snel afvoeren. Maar dan verplaats je eigenlijk het probleem weer. Dus het past ook niet allemaal in buizen.

D: En ook aan buizen is het wel druk natuurlijk aan de grond.

H: Ja, die ruimte moet er ook nog maar zijn inderdaad. En daarmee los je het dan dus ook niet eens op en misschien creëer je wel andere problemen. En wat je dan ook nog ziet als uitdaging is denk ik, in die ruimte die we hebben, hebben we ook heel veel andere doelen en ambities. En die zijn soms ook niet zo goed met elkaar te verenigen. Dus je moet dan ook keuzes maken. En als je dan keuzes moet maken tussen verkeersveiligheid bijvoorbeeld en water afvoeren of bergen, dan kan het niet altijd samen. Op de ene plek valt het kwartje de ene kant op en op de andere kant op. En soms kun je van bijna een beetje doen.

D: Het is niet zo dat wateroverlast heel hoog op het lijstje staat of heel laag?

H: Afhankelijk van de locatie. Eigenlijk proberen we alle projecten te doen aan de hand van de duurzame GWW-aanpak. Dus dan weeg je de ambities tegen elkaar af binnen die cirkel van 12. We

hebben ons eigen web ook daarvoor gemaakt. Nou, op de ene plek komt klimaatadaptatie heel hoog uit, en heb je ook veel handelingsperspectief. En op de andere plek is verkeer of mobiliteit bijvoorbeeld heel belangrijk voorgroen of ecologie, en niet altijd dat in een vierde meter past.

D: Duidelijk. Welke maatregelen neemt de gemeente naast de hemelwaterverordening allemaal om wateroverlast te voorkomen? Dat mogen jullie heel breed beantwoorden hoor.

H: We hebben in ieder geval een aanpak wateroverlastlocaties, in een programmatisch plan. Dus we hebben 126 locaties aangewezen die urgent zijn. We hebben met stresstesten ook laten zien waar overal wateroverlast voorkomt. Volgens de modellen dan in dit geval. De modellen zijn natuurlijk zo goed als de data die je erin stopt.

D: Dat is wel voor regenwater of ook voor andere soorten?

H: Ook voor overstromingen is die wel gedaan. Dus voor dijkdoorbraken bijvoorbeeld.

M: Ja, daar hebben we een aparte voor laten doen.

H: Maar daar zijn we eigenlijk niet zo veel mee bezig geweest. De aanpak heeft vooral gezeten op die overlast [van regenwater].

H: Maar daar kunnen we in de praktijk ook het meeste mee. Een dijkdoorbraak is natuurlijk zodanige calamiteit, daar kun je je ruimte niet op inrichten eigenlijk. Dan is het echt een kwestie van calamiteit. Hoe ga je daarmee om? Maar die wateroverlastlocaties kunnen we natuurlijk waar mogelijk wel verhelpen. Door gewoon aanpassingen te doen.

D: En dijken zijn ook in beheer van waterschappen en niet van gemeenten.

H: Ja, meestal wel. In ieder geval die primaire en secundaire. Ik denk dat de gemeente wel een deel van de kleinere dijkjes wel heeft.

M: Weet ik eigenlijk niet.

D: Geen hoofdonderwerp in ieder geval?

H: Nee. Die aanpak van wateroverlast bij buien, die doen we deels door zelf actie te ondernemen op plekken waar het kan. We proberen dat zoveel mogelijk te combineren met projecten die toch al gaan spelen in de openbare ruimte. Soms is die wateroverlast ook op plekken waar we niks aan kunnen doen. Dan gaan we in gesprek met partijen, bijvoorbeeld Enexis of provincie of scholen, ziekenhuizen. En maatregelen kunnen overal bestaan uit Groen-blauwe maatregelen, wadi's, de drempel wat hoger of lager. Soms zijn hele kleine maaiveldaanpassingen voldoende om grote problemen te verhelpen. Dat zijn meestal de technische denklijnen.

D: En ook dingen als bijvoorbeeld de grote markt, waar die opnieuw wordt ingericht. Dat je daar allemaal maatregelen bij treft.

H: Ja, daar gebruiken we het water van het dak. Dus dat is een mooie win-win situatie.

D: Oké, duidelijk. Hoe groot schatten jullie het bewustzijn van bewoners voor dit thema, voor wateroverlast? En daar komt nog een volgvraag op, maar die kan beter even apart worden getrokken. Zijn mensen er veel mee bezig?

M: Nou, dit is echt een onderwerp wat denk ik vooral bij mensen leeft op het moment dat ze er zelf mee te maken krijgen. En niet eerder. Dus ik denk niet dat het bewustzijn op dit onderwerp heel hoog is. En ik denk ook dat mensen het heel erg als een soort van lokaal probleem beschouwen. Kijk, wij zijn hier natuurlijk heel erg bezig met gemeente breed in kaart brengen. En dan zie je ook dat locaties met elkaar in verbinding staan. En wateroverlast is ook een probleem dat zich niet alleen lokaal voordoet, maar ook gewoon een grotere aanpak behoeft. Maar voor bewoners, op het moment dat die plassen in hun tuin of dat water over de drempel terecht te komen, dan wordt het voor jou een probleem. Maar ik denk niet dat zij de verdere aanleiding, oorzaak en dergelijke dat dat heel goed of heel erg leeft.

D: Dus zo'n wondbreuk in haren in 2020, uit mijn hoofd? Dat kan wel heel veel invloed daarbij hebben.

H: Ja, die was vorig jaar, dat was nog 23 mei. Ja, toen zagen we ook wel veel meldingen. We hebben toen ook een snelle site in de lucht geslingerd. Waar mensen fotootjes konden uploaden. Waar heb je overlast en wat zie je. Zodat wij er ook van konden leren en ook konden kijken of onze modellen klopten. Ja, dat daar merk je dan ineens wel dat mensen een soort van, ja, wakker worden wil ik niet meer zeggen, maar dat ze dan realiseren van, hé, dit gaat niet vanzelf over. Gaat mij ook aan.

D: Oké. In hoeverre weten jullie van bewoners die zelf mee bezig zijn, echt maatregelen treffen om wateroverlast op hun eigen terrein tegen te gaan?

M: We hebben hier wel enquêtes over gehad, niet specifiek over wateroverlast, maar eigenlijk over klimaat adaptieve maatregelen in het algemeen. Dus ook droogte, hitte, dat soort dingen. Mensen zijn er wel mee bezig op zich. We proberen ook heel erg op te communiceren. Op bijvoorbeeld het hele Steenbreek. Dat soort initiatieven. Ik heb het idee dat dat wel leeft bij mensen. Of dat puur en alleen voor wateroverlast is, dat vraag ik me af. Want we hebben bijvoorbeeld ook de regentonnenactie. En het zijn allemaal dingen die een beetje bijdragen aan een stukje bewustwording. Maar al met al denk ik dat er ook heel veel andere waarden komen kijken bij mensen om dat soort dingen aan te pakken. En niet zo zeer specifiek alleen op wateroverlast gericht.

H: Ik zou geen percentage ervan noemen, maar er zijn wel mensen die zelf aankloppen inderdaad voor subsidies bijvoorbeeld. En die verstrekken wij. En dan weten we dus ook zeker dat die mensen daar zelf mee komen. Nou, toevallig gisteren kreeg ik nog een vraag of een tip van iemand van waarom zou je niet landelijk verplicht maken dat we regentonnen bij nieuwbouwen gaan doen. Nou, dat kwam gewoon als tip vanuit de bewoner. Dus die was er duidelijk wel mee bezig. Maar of dat breed is, wij zitten een beetje in zo'n tunneltje dan.

M: Ik heb wel het idee dat het de laatste jaren wel meer steeds onder de aandacht is. Ook het vergroenen van je tuin, minder verharding, dat soort dingen. Maar percentages eraan koppelen, dat vind ik heel lastig.

D: Ja, jij noemde ook al kort subsidies. En de vraag was, wat kan de gemeente doen om het implementeren van die maatregelen op eigen terrein aan te moedigen? Zijn er naast subsidies nog andere dingen die jullie heel actief doen? Het communiceren noemde je ook al.

H: Nou, richting in ieder geval de woningcoöperaties wordt wel heel actief gecommuniceerd en hebben we ook samenwerkingsovereenkomsten mee. En ik weet niet precies wat er uit gebiedsteams bijvoorbeeld ook gebeurt. Er zijn wel hele structuren binnen de gemeente waar wij ook niet altijd overal zicht op hebben. Maar ik heb wel het idee dat daar wel actie in is hè?

M: Ja, ik heb het idee dat dat zijn wel vaak van die incidentele en hele specifieke gevallen. Dat het echt een bepaalde locatie is waar ze dan iets mee willen of iets mee kunnen. Daar hebben we verder geen specifiek beleid of zo. Dat is dan een vraag die vanuit zo'n gebiedsteam komt. Maar ja, ik denk wel ook dat het daar, intern bij de andere afdelingen ook wat meer begint te leven, zo'n onderwerp, dat ze ons wel weten te vinden.

D: Duidelijk. En wat zijn dan de grote uitdagingen om bewoners ver te krijgen om maatregelen te implementeren?

M: Ik denk dat het enerzijds een stukje bewustwording is. Dat mensen eigenlijk niet weten wat de omvang van het probleem is en dat zij zelf daar ook iets aan kunnen bijdragen. En anderzijds is het daar ook een samenspel van belangen. We willen eigenlijk liefst dat mensen regentonnen in hun tuin zetten, en groen bijvoorbeeld. Maar ik heb ook lang in Groningen gewoond. En toen bij mij in de wijk betaald parkeren bijvoorbeeld werd ingevoerd, zag je dat mensen massaal hun voortuinen gingen betegelen. Omdat ze dan hun auto daar konden neerzetten, gratis. Dat zijn ook allemaal belangen.

H: Een tuin vol tegels is ook lekker makkelijk in het onderhoud.

M: Super makkelijk in het onderhoud, ja.

H: Je moet ook je scootertje ergens kunnen parkeren. Ja ik denk dat er ook wel gewoon een geldkwestie in is. Dus als je inderdaad kratten in de grond wil of een regenton of wat dan ook dan denken mensen in ieder geval al snel dat het ook wel in de papieren gaat lopen. Terwijl er soms ook heel makkelijk maatregelen die heel laagdrempelig en goedkoop zijn.

M: Dat is ook een van de dingen die we met de woningcorporaties willen gaan afspreken. Dat zij bij nieuwe bewoners de woningen met tuin dan ook gewoon [met] een groene tuin aanleveren. En dan ook de afspraak maken met bewoners dat die dan ook weer in de oorspronkelijke staat opgeleverd moet worden. Dat dat gewoon een beetje de status quo wordt om een groene tuin te hebben in plaats van betegelde. Want dat gewoon een beetje de status quo wordt, om een groene tuin te hebben. In plaats van betegelen.

D: Want nu levert een woningcoöperatie vaak een betegelde tegel.

M: Ja, maar net wat de toestand is van de tuin op dat moment. Er worden niet echt veel eisen aangesteld. Maar het is mooi als jij al kan beginnen met een bepaald uitgangspunt.

D: Dan wat specifieker op de hemelwaterverordening. Zou één van jullie heel kort willen vertellen wat het kort en bondig inhoudt. Wat is de bedoeling daarvan?

H: Zal ik die doen? De hemelwaterverordening bestaat eigenlijk uit twee delen. En allebei hebben als doel om te zorgen dat wateroverlast voorkomen gaat worden. Eigenlijk is maar de helft van de gemeente eigendom van de gemeente. Sommige gebieden hebben wat meer eigendom, andere gebieden wat minder. Bijvoorbeeld industrieterreinen, daar hebben we een weg en een berm, en vervolgens heb je hectares vol met bedrijventerreinen. En dan komt er weer een weg en een berm en vervolgens heb je hectares vol met bedrijventerrein en dan komt er weer een weg in een berm. Je kan je wel voorstellen dat als een bui van 80 mm valt en die valt op 1 m2 en je probeert die te bergen op een halve m2, dan zit je al op 160 mm. En als je maar 10% hebt van het eigendom, dan moet je dus zo'n bui vermenigvuldigen met 10. Nou, eigenlijk zit je dan heel snel met een probleem. En je ziet ook dat water gaat van hoog naar laag. Dus het blijft ook niet op één plek staan. Dus water hoogt zich op sommige plekken op en dan is onze doelstelling vaak, we moeten dan proberen het water vast te houden waar de druk valt om te zorgen dat het niet te snel naar het punt gaat waar het

vervolgens overlast creëert. Nou en dan kom je dus op het punt van ja die drup die valt ook niet alleen bij ons op het terrein. En als je dan het simpele rekensommetje met x2 doet dan kom je erop uit, dan kun je ongeveer uitrekenen hoeveel wij dan vervolgens in de openbare ruimte zouden moeten doen. En op sommige plekken is dat gewoon niet genoeg. Dus die hemelwaterverordening die richt zich op dat bij nieuwbouw en bij een toename van 50, meter verharding, waarbij je dan een vergunning aanvraag moet doen binnen de omgevingswet, dus een omgevingsvergunning moet je aanvragen, dat je dan vervolgens ook lozingseisen meekrijgt. Of lozingsverbod eigenlijk. Dus eigenlijk geldt die alleen voor nieuwbouw. Nou, en dan zit er een staffeling in, stel je hebt een perceel van 250 vierkante meter, dan moet je een x-aantal millimeters van zo'n bui op je eigen terrein vast kunnen houden. Nou, als je perceel dan groter wordt boven de 1000 vierkante meter moet je iets meer opvangen. En boven de 1500 vierkante meter moet je geloof ik 70 millimeter opvangen. Nou, en dan is er nog de mogelijkheid om in de toekomst ook gebieden aan te wijzen waar we dat gaan verplichten bij bestaande situaties.

Die gebieden hebben we nog niet bedacht, maar een aanleiding kan bijvoorbeeld zijn dat we een riool moeten vervangen in een wijk of in een straat en dat je dat dan ook meteen aangrijpt om te zorgen dat je een regenwaterstelsel aanlegt en dan met de omwonenden gaat kijken van hoe kunnen we de hele waterhuishouding in het gebied verbeteren. En dat is wel een traject dat je dan samen met het gebied ook en de omwonenden oppakt om te kijken wat kunnen we doen en hoe zou het eruit kunnen zien.

D: Dat is natuurlijk wel een beetje een andere invalshoek dan wat er veel in de media wordt gezien.

H: In de media wordt nu eigenlijk vooral gezegd van de gemeente gaat overal verplichten dat we dit gaan doen. Zo heet wordt die soep helemaal niet gegeten. Dat is wel één ding. We gaan dat in de toekomst vast en zeker wel op plekken aanwijzen. En dan is er altijd nog een redelijkheidsbeginsel bij. Dat je als je daar redelijkerwijze niet aan kan voldoen. We gaan bijvoorbeeld niet vragen om alle zonnepanelen van je dak te laten halen, zodat je een waterbergend dak kan doen, en vervolgens moet je iets met die zonnepanelen van je dak te laten hangen, zodat je een waterbergend dak kan doen. En vervolgens moet je iets met die zonnepanelen. Dat zijn gigantische investeringen. Terwijl die zonnepanelen ook heel waardevol zijn. En dan moet je misschien je dak nog zien te verstevigen. Anders past het dak er niet op.

D: Dat zijn grote sommen geld.

H: Dat zouden wij zelf ook niet van ons eigen gebouw verwachten. En dat doen we dus ook niet bij omwonenden. Of bij bewoners.

D: Duidelijk. Wat was de aanleiding voor de gemeente om de hemelwaterverordening op te stellen? Want het is natuurlijk een beetje een noodzaak vanuit de omgevingswet. Maar is het ook een beetje proactief vanuit de gemeente geweest? Misschien vergeleken met andere steden?

H: Ja, we hadden al een hemelwaterverordening, maar er zaten niet dit soort eisen in nog. Dus het moment was nu dan wel daar om er wat aan te doen. Maar we hadden al wel die wens om dit soort regels te gaan vaststellen. En dat is in andere steden ook al wel gedaan. Nou, en dit is eigenlijk een juridische methode om te borgen dat wat je niet aan de voorkant kan doen door mensen te motiveren. Dus eigenlijk is het doel sowieso mensen met subsidies bijvoorbeeld te motiveren, goede voorbeelden laten zien. Dus vooral door stimuleren dit soort dingen te bereiken. Nou en op plekken waar het dan echt nodig is, dan heb je dan dit soort houvast, En bij nieuwbouw. We moeten toch in 2050 klimaat adaptief zijn. En dan geldt dat eigenlijk voor het hele gemeentelijke grondgebied. En niet alleen de gemeente zelf.

D: Duidelijk. Hebben jullie veel naar gekeken bij het maken van de hemelraadverordening naar andere steden? Of ook samengewerkt met andere steden?

M: Goeie vraag. Ik ben er niet bij betrokken geweest. Ik ben in het proces van de totstandkoming. Dus ik weet er verder ook helemaal niks over.

H: Er zijn wel externe partijen die ons geholpen hebben. En die hebben ook wel met andere gemeentes dit traject doorlopen. Er is ook wel contact geweest met andere steden, maar ik zou zo niet weten hoe intensief en met welke steden. Maar sowieso is er wel naar gekeken en geprobeerd van elkaar te leren. Je ziet ook dat verschillende steden het anders aanpakken. Of verschillende gemeentes moet ik eigenlijk zeggen. En dat is op zich ook wel logisch, want situaties verschillen landschappelijk of geohydrologisch. Het is hier heel anders dan op de Hoge Hondsrug. Maar ook weer totaal anders dan in de hele lage, diepe polders bij de kust. En de bevolking kan ook gewoon verschillen. Als je een hele landschappelijke gemeente hebt, dan heb je ook mensen met een andere mentaliteit. Die gaan misschien makkelijker in hun tuin aan de slag... dan wanneer je heel erg binnenstedelijk bezig bent met heel veel studenten vooral.

D: Ja, die zijn misschien niet zo snel van de klimaatadaptatie.

H: Die zitten misschien ook niet vaak op de begane grond trouwens.

M: Maar die hebben natuurlijk ook veel minder mogelijkheden. Ja. De demografie is ook wel heel belangrijk daarin.

D: Dus je ziet wel dat veel verordeningen ook wel redelijk op de context zijn gemaakt?

H: Ja. Ik zag van de week een artikel, bijvoorbeeld Nijmegen, die was heel duidelijk in 80% van hun inwoners, die is daar zelf heel proactief in. En dat hadden ze ook via een enquête achterhaald. Dus dat is een plek waar ze nou juist niet met de stok erachter willen. Vooral dus mensen willen stimuleren en mogelijkheden geven. Nou, dat werkt dan waarschijnlijk ook wel beter dan wanneer je dat gaat verplichten. Maar nogmaals, het uitgangspunt is hier ook vooral motiveren en voor een deel daar dan een juridische stok achter de deur te hebben.

D: Er is best wel een beetje ophef over geweest, over die verordening. Hoe kijken jullie daar tegenaan?

M: Ik vind dat lastig. Ik snap het wel. Jij noemde het net ook al, toen [redacted] de uitleg gaf over de hemelwaterverordening, zei je ook al van de soep wordt niet zo heet gegeten als opgediend. En ik denk dat veel bewoners dat inzicht ook nog niet helemaal hebben wat die hemelwaterverordening nou eigenlijk precies inhoudt, en wat voor consequenties dat voor hen heeft. Dat ze meteen bang zijn van; oh, de gemeente gaat mij dingen opleggen, wat ik in mijn eigen tuin moet doen, wat mij ook nog heel veel geld gaat kosten ook. En dan krijg je een soort van weerstand. Maar ik denk dat als mensen eenmaal doorhebben wat het nou eigenlijk precies inhoudt ook voor hen, wat de consequenties zijn dat dat wel meevalt maar dat is vaak wel gewoon de initiële reactie van inwoners van oh hé er gaat iets gebeuren wat consequenties voor mij kan hebben en nou daar zijn we tegen zeg maar ik denk dat dat wel heel erg meespeelt, gewoon die beeldvorming

H: Wat ik merk in gesprekken is inderdaad ook nou zoals jouw reactie eigenlijk, van het is veel minder streng dan mensen dus meekrijgen in de media bijvoorbeeld. Nou en aan de ene kant is het ook wel goed dat die gewoon goed in het nieuws is, denk ik. Dat dan wel, ook al is het negatief, maar alleen moeten we hopen dat we daar niet te ver op achterstand komen.

D: Het gaat tegen het doel natuurlijk, want je wilt mensen er ook een beetje bewuster van maken.

H: Ja, dit is wel een manier waarop mensen er bewust van willen.

M: Tegelijkertijd verandering, dat roept altijd weerstand op, gewoon in meer of mindere mate. Dus ik denk dat je dat ook gewoon als gemeente een beetje moet incalculeren. Het is niet voor niets dat zo'n heel waterverordening dan gewoon opeens tevoorschijn komt, want het is gewoon wel een manier om in zekere zin af te dwingen dat er iets gaat gebeuren. Dus dat het nooit gaat zonder slag of stoot, ik denk dat je er altijd rekening mee moet houden.

H: En een argument is ook wel dat het inging tegen privacy recht, volgens mij.

D: Eigendomsrecht, zag ik voorbijkomen.

H: Ja, dat mensen het vervelend vinden dat de gemeente dus invloed wil uitoefenen wat ze in hun tuin doen. Maar aan de ene kant snap ik dat wel. Maar tegelijkertijd doen we dat ook niet. Want wij schrijven geen maatregelen voor, van je moet een regenton. Of je moet iets. We stimuleren wel de groenblauwe oplossingen. Dus inderdaad meer vergroening. Maar dat is op zich ook heel logisch, omdat mensen daar zelf ook baat bij hebben op de lange termijn, alhoewel, niet qua schoonmaken. En werken in de tuin. Hoewel dat ook wel goed is. Want dan kom je buiten. Maar je vermindert ook hittestress en daarnaast heb je ook je directe buur ermee als je je hele tuin in de tegels legt.

M: Bovendien denk ik ook, wat ik ervan heb begrepen, is dat die eisen die worden gesteld, dat dat in de praktijk helemaal niet om gigantische veranderingen hoeft te gaan in je tuin. Maar dat het vaak gewoon kleine dingen zijn die ervoor zorgen dat je wel aan die vereisten voldoet. Dat bewoners in hun hoofd hebben dat ze hele installaties moeten gaan aanleggen of zo. Of hun hele dak inderdaad moeten gaan verstevigen om allemaal dingen erop te kunnen doen, groene daken en zo. Maar dat dat in de praktijk ook echt niet altijd hoeft of nodig is.

D: De eisen die bij nieuwbouw staan, die worden heel snel, dat zag ik in heel veel artikelen, die worden heel snel op bestaande bouw geplakt. Dat zijn de eisen die wij ook moeten volgen. Maar dat is natuurlijk niet zo, denk ik.

H: Nee, nou ik weet zo even niet aan mijn hoofd of daar al eisen staan. eerlijk gezegd, in die verordening.

D: Toen die [de hemelwaterverordening] uitkwam niet, in ieder geval.

H: Nee hè? Die kunnen inderdaad ook verschillen per gebied. Maakt het ook wel weer lastig, dat je dan in Helpman bijvoorbeeld andere eisen gaat hebben dan als je in Beijum woont. Maar aan de andere kant, de problemen zijn er ook anders. Dus we kunnen ook moeilijk meer opleggen in Beijum dan dat daar nodig is.

D: Duidelijk. Dan nog een paar specifieke vragen over dat stukje over de bestaande bouw. In hoeverre gaan jullie controleren of bewoners in de bestaande bouw zich aan de verordening houden? Hebben jullie daar, zodra dat eenmaal als een gebied wordt aangewezen, hebben jullie daar al bepaalde manieren voor? Of daar zo ver zijn we dan niet?

H: Zo ver zijn we nog niet, nee.

D: Duidelijk. Hebben jullie een beetje zicht op wat jullie met die bestaande bouw met dat stukje van de verordening willen gaan doen? Wat voor termijnen? Of zeggen jullie laten we eerst even op nieuwbouw focussen?

H: We gaan nu eerst op nieuwbouw focussen want we hebben nu een verordening die eigenlijk dus nog niet, die is eigenlijk net vastgesteld voor de omgevingswet inging. Dus hij is nu van rechtswege

overgegaan in het omgevingsplan. Maar we moeten hem nog wel weer zodanig ombouwen dat hij ook echt onderdeel wordt van het omgevingsplan. En de eerstvolgende kans daarvoor is eind dit jaar. We gaan nu dit jaar ook leren hoe initiatiefnemers van bebouwingen, dus de ontwikkelaars daarmee omgaan. Wat voor vragen wij dan tegenkomen. Hoe zit het met vergunningverlening, handhaving en toezicht? Dat soort vragen gaan we nu dan eerst dit jaar mee leren en zorgen dat we eind van het jaar misschien een betere verordening zelfs nog kunnen maken, of betere regels kunnen vaststellen in het omgevingsplan. En pas vanaf daar kunnen we gaan kijken wat we er ook mee bereiken. En waar we dan nog extra moeten. Ik heb eigenlijk geen termijn. Ik zou me kunnen voorstellen dat vooral met rioleringsprojecten dat je daar dan op inhaakt. Of op plekken waar je zegt van we hebben hier echt een heel gigantisch groot waterprobleem potentieel omdat een ziekenhuis compleet blank komt te staan.

D: Zijn er al wel plekken waarvan jullie echt weten waarvan als daar een goeie bui valt, dan…

H: Ja, we hebben wel helemaal compleet inzichtelijk waar naar verwachting volgens modellen heel veel water komt te staan.

D: Zuiderdiep, toch?

H: Ja, dat is in de binnenstad ook wel het grootste probleem. Zuiderdiep. Ik kan je wel een plaatje laten zien.

D: Ja, kunnen we zo doen. Zeker. Dan een paar vragen over de inwoners. Het gaat natuurlijk om percelen vanaf 250 vierkante meter. Denken jullie dat die verordening misschien ook wel invloed gaat hebben op bewoners die niet daar onder vallen? Dus eigenlijk met kleinere percelen, dat het misschien ook wel een beetje... Dat je er iets mee kan?

H: Dat is het psychologische deel.

M: Ja, ik denk dat... Kijk, de verordening schrijft daar natuurlijk niks voor, voor kleinere percelen. Maar ik denk dat je hier wel een soort van Spill-over effect kan gaan krijgen. Dat als je ziet dat je buren of mensen in de buurt bepaalde dingen gaan doen met hun tuin of met hun dak, of wat dan ook, dat dat wel een soort voorbeeldfunctie kan hebben. Dus dat andere mensen daardoor misschien ook eerder geneigd zijn om daar iets mee te doen of überhaupt over na te denken. Het gesprek zal er misschien ook wat vaker over gaan, dus ik denk dat er puur qua psychologisch effect wel wat in zit.

H: Ik hoop niet dat ontwikkelaars nu gaan denken van, goh, ik ga allemaal per cent 249 meter maken. En kan ik me ook niet voorstellen, want die kosten staan natuurlijk helemaal niet in verhouding om dat soort dingen te gaan verzinnen om onder de regels uit te komen.

D: Waarom hebben jullie specifiek gekozen voor 250 vierkante meter? Is daar een reden voor?

H: Nou, dat weet ik niet exact, ik denk dat het dus te maken heeft met dat je inderdaad onder de 250m2 niet zo veel speelmogelijkheid hebt op je eigen terrein. En daarboven lukt het wel, en dan hoe meer ruimte je hebt des te beter je water kan bergen. En dat zit ook weer zo in elkaar dat stel dat je hebt 100 m2 verharding, gaat leggen of een uitbouw aan je ook hebt, hoe beter je kan water gaan bergen. En daar zit ook zo in elkaar, dat stel dat je 100 vierkante meter verharding aan gaat leggen of een uitbouw aan je terrein. En dan bepaal je dus het oppervlak van die extra verharding of dat extra nieuwbouwgedeelte. Dat is dan dus 100 vierkante meter. Maar dat mag je dan verdelen over je hele perceel van 1000 vierkante meter bijvoorbeeld. Dus je hoeft dan niet overal meteen, als

het oppervlak 1000 vierkante meter is, overal 60 millimeter te bergen maar dat kun je dan, die aantal kubieke meter kun je dan verdelen over je hele perceel.

D: oké, duidelijk.

H: en die ruimte heb je gewoon ook als je een wat groter perceel hebt.

D: jullie een positief effect op de bereidheid van mensen om maatregelen te treffen, door die verordening?

H: Ik hoop het wel.

M: Ik denk initieel eigenlijk niet, omdat je gewoon weerstand gaat krijgen. Maar als je eenmaal over die initiële horde bent, wel, denk ik. Dan wordt het toch iets wat gewoner is. Dat het wat normaler is voor mensen om zich daarmee bezig te houden. Maar initieel is het gewoon iets wat, ja, het is een regel die je oplegt. Dus mensen die gaan wat niet willen of die... Ja, daar verwacht ik wel wat weerstand.

H: Ik verwacht aan de andere kant niet dat mensen hun tuin dus niet meer vol gaan leggen met tegels, omdat deze [verordening] er is. En er zullen altijd wel mensen zijn die toch denken van, nou ja, hier moet ik aan voldoen, dus dat doe ik. Dus, het zal van het begin wel een positief effect zijn, vermoed ik, Maar dat het niet zo'n groot effect is als dat we eigenlijk zouden hopen. Maar dat het, naarmate deze regel langer geldt, ook een groter effect zal worden.

D: Als er ook meer duidelijkheid is in de verordening zelf, helpt dat natuurlijk ook voor mensen.

H: Ja, en dan weten mensen misschien ook op een gegeven moment wat beter en wat goed helpt en wat echt kosteneffectief is of waar je misschien zelfs kostenbesparingen mee kan realiseren, als je je wc gaat doorspoelen met drinkwater.

D: Dat zou leuk zijn. Naast die verordening, wat zijn volgens jullie de grootste factoren die die bereidheid kunnen beïnvloeden? Want we hebben het over het inkomen al even gehad.

M: Ik denk ook dat het een stukje bewustwording is. En dan niet alleen over de problemen en de oplossingen die je kan aandragen. Maar ook gewoon hoe je het moet doen en wat je kan doen. Ik denk dat veel mensen daar ook niet helemaal van op de hoogte zijn, van wat er allemaal kan. Wat ik zei van mensen die hebben hele ideeën over installaties die ze moeten gaan aansluiten. Terwijl dat helemaal niet hoeft. En het hoeft ook niet altijd heel veel te kosten, om hiermee aan de slag te gaan. En ook dat wij als gemeente daar ook nog echt wel een rol in kunnen spelen. In uitdragen, voorbeelden geven, faciliteren in zekere zin.

H: Wat we nog van plan zijn is om een soort klein filmpje te maken. Een heel kort filmpje waar we laten zien van als er een grote bui valt, dan is het dit. En als iedereen in zijn tuin nou een waterregenton doet, dan gebeurt er dit. Nou, dan zie je dat het water lager wordt of zo. Dus dat is gewoon puur ter voorlichting. We zijn ook van plan om een soort handboek te maken nog, waarin we wat maatregelen op een rijtje zetten. En als het lukt ook iets met volumes water die je kan bergen en een richting van wat voor prijs kom je tegen. Ik weet niet of we bedragen kunnen noemen of dat je het goedkope of hele dure [maatregelen] gaat noemen, met de bijkomende effecten bijvoorbeeld zodat mensen ook een beetje naslagwerk hebben van wat kun je nou doen. Een belemmering kan ook zijn dat je te veel zelf moet nadenken en niet zo goed weet hoe het moet. Mensen zitten natuurlijk in hun eigen tuin. Het is niet hun core business. Dus als ze gewoon goede ideeën krijgen, dan is het misschien makkelijker om wat mee te doen.

D: Ja, dat vind ik ook in de literatuur. Dat er wel een soort inventarisaties zijn gemaakt van wat kan je allemaal doen, alleen dat dat qua prijzen en qua effectiviteit [onduidelijk blijft], dat is natuurlijk heel breed, het ligt maar net aan je tuin en wat je zelf kan en waar je woont. Dat het nog wel een beetje vaag blijft eigenlijk.

H: Wat we ook bij Euvelgunne doen, ik weet niet of je dat project kent, ik denk het wel?

H: Daar hebben we ook wel eens een onderzoek gedaan. Door een student ook trouwens, van de RUG, Een psychologiestudent. Wat zijn nou de factoren waardoor mensen aan de slag gaan met dit soort dingen. En wat blijkt is dat je als je het beeld hebt dat je veel handelingsperspectief hebt, dat je er echt zelf wat aan kan doen, dat helpt heel erg om mensen in beweging te krijgen.

D: Ja, dat ben ik ook veel tegengekomen, ik heb dit onderzoek ook gelezen.

H: Dus als je inderdaad kan laten zien met een filmpje, als je niks doet dan gebeurt dit. En als je iedereen samen met z'n allen het schouders eronder krijgt, dan lossen we een groot deel van het probleem samen op. In de praktijk werkt het ook zo, ik spreek ook vaak met mensen van stadsbeheer. Daar hebben wij ook beide gewerkt. En daar komen dus ook de wateroverlastklachten binnen. Nou, gisteren kwam er nog een melding binnen van iemand die had dus nu sinds kort heel veel wateroverlast, sinds dat zijn buurman zijn hele tuin, een zeer groot perceel in het beton had gelegd. Dus daar heb je eigenlijk vooral je eigen buren ermee. Dat zijn ook de mensen die je als overheid op deze manier kan beschermen. Dat is ook denk ik waar een overheid voor is, om te zorgen dat je de rechten van elkaar ook beschermt.

D: Oké, duidelijk. Ik woon zelf ook aan de Herebinnensingel, dus ik heb ook genoeg wateroverlast gehad. Ik ben van plan om een enquête af te nemen bij bewoners die wonen op een perceel tussen 240 en 260 m2. Dan heb je eigenlijk twee groepen, dus eigenlijk een groepje die net onder die verordening valt, dus waar het niet wordt toegepast, eentje waar het mogelijk in de toekomst wel gaat gebeuren. Om eigenlijk al die andere factoren dus een beetje te isoleren. Want we hebben natuurlijk [een hoop factoren], grootte van perceel is natuurlijk heel belangrijk, hebben we het over gehad, maar ook inkomen, opleidingsniveau, er zijn superveel dingen die je kan bedenken. En het idee is om door zo'n klein mogelijk groepje aan perceelgrootte te pakken, dat je bij al die factoren zo min mogelijk spelingen hebt. Ja, dat is ook niet mijn idee hoor. Maar, van mijn begeleider.

H: Anders moet je wel een veel grotere groep...

M: Ja, dan heb je al die variabelen inderdaad.

D: Ja, dus dat was een beetje de vraag.

H: Zo vertrouwbaar mogelijk maken.

D: Hoe isoleren we dat inderdaad? En ik hoop dat op deze manier te doen. Ik heb ook nog wel wat om interessant is om te laten zien. ***Laat kaart zien van perceelgroottes per buurt in Groningen*** Om te laten zien waar die perceelgrootte het meest voorkomt.

H: Dat is interessant om te weten trouwens.

M: Eigenlijk best wel. Dat hebben wij denk ik niet gedaan eerlijk gezegd.

D: Ik kan jullie nog wel wat doorsturen.

H: Ja graag. Ja sowieso ben ik wel heel benieuwd naar de voortgang van je onderzoek.

D: Ja daar kom ik ook nog op terug hoor. Maar dit laat inderdaad zien, dit is dus eigenlijk de kaart van het kadaster met perceelgrootte, met daar dan een laag met buurten overheen gelegd, met een optelsommetje, waar komt deze perceelgrootte het meeste voor. Je ziet dat Haren bijvoorbeeld best wel een punt is waar je dat wat meer hebt. Ten Boer is een lastige denk ik, omdat het ook wel een hele andere situatie is dan de rest van de stad, maar dat is ook juist wel heel interessant. Hoe anders wordt er daartegen aangekeken? In Haren heb je natuurlijk die eerdere ervaring met overstromingen, en dat komt ook al uit veel literatuur naar voren, als je inderdaad al iets hebt meegemaakt met wateroverlast, dan hebben mensen opeens het idee van, wacht eens even, moet ik hier niet wat mee doen? Dus het wordt wel heel interessant om te kijken naar een verschil tussen Haren en het centrum?

H: Ja, ik merkte trouwens ook wel dat mensen juist dan denken van, nou, de gemeente heeft de waterhuishouding niet goed op orde.

D: Ja, dat kan natuurlijk ook.

H: Nou, en dan kom je vervolgens met het verhaal dat het niet past in de riolering. Of sterker nog, al krijg je het er wel in, dan schiet op andere plekken de putten eraf. Water op straat, uit het riool.

M: Volgens mij zit dat ook heel erg in Haren, juist. Die discussie.

H: Maar dat is dan wel weer te technisch en dat kun je mensen niet eens echt uitleggen. Je stopt maar gewoon een grote buis in de grond.

D: Wat ook al naar voren kwam, en nu wordt het ook heel technisch hoor, maar in Nederland heb je natuurlijk, historisch gezien, altijd de overheid geweest die heel erg met overstromingen bezig was, met bijvoorbeeld delta werken en dat soort dingen. En daardoor hebben mensen heel erg de perceptie van overstromingen = overheid. En dat is nu natuurlijk een heel andere manier van waar komen die overstromingen vandaan. Maar mensen hebben nog steeds wel het idee overstromingen horen bij de overheid. Maar dat kan nu eigenlijk helemaal niet meer, want nou ja, als de helft van de stad niet van de gemeente is, dan

H: Nee.

M: Die vraag hebben we ook in die klimaatadaptatie-enquête uitgezet. Niet specifiek dan over water, maar van wie is hierin verantwoordelijk. En dat bewoners daarin, zeker de eerste enquête, ook echt aangaven van... nou, gemeente of het Rijk, in ieder geval overheid, is daar verantwoordelijk voor. En bewoners eigenlijk niet. Volgens mij is dat toen met die tweede enquête, die was vier jaar later nog een keer herhaald, wel een beetje verschoven, ook richting bewoners hebben ook wel wat invloed en verantwoordelijkheid daarmee. Maar het blijft wel inderdaad gewoon; iedereen kijkt wel naar de overheid, die moet het oplossen.

D: Duidelijk. Wat voor informatie zouden jullie heel interessant vinden om uit zo'n enquête terug te krijgen?

M: Ik ben ook heel benieuwd naar als je hier [perceelgroottekaart] bijvoorbeeld de wateroverlastkaart overheen zou leggen. Of een correlatie tussen hoe mensen wateroverlast ervaren. Want het hoeft natuurlijk ook niet overeen te komen met onze kaart. Want of je iets ervaart als een probleem is anders dan het probleem op papier constateren. Of er een correlatie is tussen het ervaren van overlast en de welwillendheid om iets te doen. Dat zou ik wel interessant vinden.

H: Ik zou in ieder geval wel graag willen weten... wat zou mensen tegen kunnen houden? Of wat zou ze over de streep kunnen trekken? Dus als dat in vragen zou kunnen... Ik denk dat dat een soort open vraag wordt.

D: Dat staat er ook al een beetje in inderdaad.

M: Ik ben ook wel heel benieuwd naar die sociale norm. Laten mensen zich hierin beïnvloeden door wat er in hun buurt gebeurt? Ja of nee? Of wat geeft hierin de doorslag?

D: Speelt dit bij u [bewoners] in de buurt? Of kent u mensen die hiermee bezig zijn? Die staat er wel niet in inderdaad. Maar dat is wel een interessante inderdaad. En zijn er specifieke delen van de stad waarvan jullie zeggen van 'ga daar nou echt naar kijken'. Dat daar zijn inderdaad de vraagstukken het grootst. Of daar lopen we nu ergens tegenaan.

H: Zou het interessant zijn om dit bijvoorbeeld op die noordelijke wijken te richten?

M: Daar is wel heel veel aandacht voor op dit moment.

H: dus de wijkverbetering van de noordelijke wijken gaat het om, dan wordt nu extra focus opgelegd om die leefbaarder te maken. En daar zitten ook vaak wel participatietrajecten aan vast. Deels vanuit sociaal en deels vanuit de technische en ruimtelijke ordening. Nou, een andere ding, daar wordt al zoveel op gericht nu.

D: Ja, het is natuurlijk ook wel interessant om het juist stadsbreed te doen, zodat je dan kan kijken of er dus een gebieden of verschil tussen zit. Dit zijn uit mijn hoofd 1100 percelen totaal die ertussen vallen. Je kan natuurlijk ook nog schuiven in de grootte van die groepen. Maar het wordt wel even de grote vraag voor mij eigenlijk: hoe ga je die allemaal te pakken krijgen? Dat is natuurlijk heel lastig. Ik heb wel natuurlijk de kaart van het kadaster. Dus dat wordt denk ik maar met een adreslijst en flyertjes. Dat is toch iets ouderwets.

H: ik denk dat je wel ziet dat op sommige plekken heb je echt veel kans op wateroverlast en op andere plekken juist helemaal niet eigenlijk, en op sommige plekken hebben mensen ook wel het idee dat ze geen wateroverlast hebben, mensen in Haren die denken: ''nou we zitten op het hoge zandgronden, ondertussen wil het water daar juist heel slecht weg en licht er ook een spoorlijn waardoor het water de bult niet af kan stromen en ik ben benieuwd of daar dan ook verschil in zit. Dus boven op de verlengde Hereweg bijvoorbeeld, de Lohmanlaan, ken je die?

D: nee

H: In Helpman, vanaf de Helperzoom, dat is de onderkant, als je dan richting de andere kant van het kanaal fiets, dan moet je best wel een bult op, 6 meter hoog, de ene kant van de wijk is helemaal droog want het water stroomt daar gewoon weg ja en de andere kant van de wijk de stroomt al het water is heen. Dat is wel een essentieel verschil. Maar de oplossing zit dan juist in die gebieden waar geen wateroverlast verwacht wordt, om te zorgen dat je daar meer water vasthoudt. Dus ik zou juist denken dat daar dan eventueel het eerste ook gebieden aangewezen zouden worden. Ja, waar mensen het misschien juist niet verwachten, dat ze aangewezen zullen gaan worden.

M: Ik ben ook wel benieuwd, het is sowieso eigenlijk een vraag die ik heb, want jij richt hier natuurlijk gewoon op de verschillende percelen, maar de verantwoordelijkheid ligt natuurlijk bij de eigenaar van zo'n perceel. Heel veel mensen huren natuurlijk, ook particulier bijvoorbeeld. Zitten daar nog bepaalde verschillen, of je er woont versus of het alleen je bezit is en je het verhuurt, en of daar ook nog verschillen in zitten in bijvoorbeeld de welwillendheid. Mensen die er wonen zijn

misschien eerder geneigd om eraan te voldoen. Omdat zij ook daadwerkelijk elke dag het voordeel hebben van het wonen in zo'n aangepaste woning. Misschien ligt dat bij woningeigenaren weer anders. Of mensen die inderdaad alleen maar hun woning verhuren maar wel bezitten. Dat soort dingen.

D: Ja, koop of huur is denk ik een van de factoren die best wel veel invloed heeft. Ik geloof dat of 30 of 38 procent van de woningen in de gemeente, dat is echt koop, dat mensen daar ook daadwerkelijk wonen. Maar ik ben al wel benieuwd of dat bij deze perceelgrootte hetzelfde is.

M: Ja, dat is natuurlijk wel zo. Ik denk dat het aandeel koop groter is [voor deze perceelgrootte.

H: Leeftijdsgroepen is vast een analyse die je gaat doen. Dat is niet echt een vraag die we daarop kunnen richten. Mogen we er ook even over nadenken?

D: Ja tuurlijk, ja zeker.

H: Nu zo uit mijn blote hoofd…

M: ik heb het zelfde hoor, ik denk dat er nog veel dingen zijn die we kunnen meegeven of die interessant zouden kunnen zijn.

H: we hebben ook meer medewerkers die zich ook specifiek met die hemelwaterverordening bezighouden, we hebben een kernteam klimaatadaptatie, daar hebben we zo meteen nog een afspraak mee. Op dit moment zijn we met z'n vieren. We hebben een klimaatbeleid vastgesteld tot en met 2024. Dus we gaan nu evalueren en ook weer start maken met nieuw klimaatbeleid voor de volgende periode. Dus daar gaan we zo meteen over vergaderen. Daar is dit ook wel interessant voor.

M: Ik vind het heel interessant om dit soort dingen ook mee te nemen. Ook bijvoorbeeld wat uit enquêtes is gekomen en dit soort dingen. Gewoon om dat stukje bewoners, om dat daar beter bij te betrekken.

H: Want je gaat dan eerst naar probleemanalyse. Wat zijn onze uitdagingen, zoals we ze nu zien dan voor de komende zoveel jaar. Maar op een gegeven moment moet je ook bedenken van hoe gaan we die dan aanpakken. En dan is dit misschien wel belangrijk om mee te nemen.

M: Ja, het geeft heel veel inzicht in ieder geval.

H: Dus tot wanneer kunnen we input leveren? Ja, ik wil toch eigenlijk wel redelijk snel gaan beginnen. Vooral omdat het toch wel een beetje onduidelijk is hoeveel respons je hierop gaat krijgen. En hoe makkelijk is het überhaupt om mensen te bereiken. Wat is denk je waarschijnlijk de makkelijkste manier om dit doen. Want ja, als je maar 20% respons krijgt en je doet alle adressen, wat al een hele kluif wordt, dan is je groep toch niet heel groot.

H: Nee, jullie willen zo lang mogelijk die vraag uitzetten.

D: Ja.

H: Is het goed dat we volgende week daar een reactie geven dan?

D: ja dat is zeker goed

M: Even de tijd om rustig te laten bezinken even over na te denken en eventueel met collega's inderdaad even te bespreken

D: duidelijk ik zie een mooie kaart. Hebben jullie nog vragen hierover? Of dingen die jullie nog graag willen benoemen?

H: Nee, ik vind het heel mooi dat je dit onderzoek doet.

M: Ik ook, ja. Ik ben heel benieuwd naar de uitkomsten, ja. Ik ook. Vandaar dat ik inderdaad vroeg op de hoogte kon blijven.

D: Ja, zeker.

H: Fijn dat we ook wat input kunnen leveren op de vragen die we kunnen stellen.

Ja. Ja, er is altijd een bepaalde mate van, daar werd ik van tevoren op gewezen, dat je natuurlijk wel onafhankelijk moet blijven als onderzoeker. Dus, geen voorgekauwde vragen erin [de enquete zetten] die er persé in willen zien. Maar het zijn de factoren die jullie noemen, als een huur of koop, dat waren ook dingen waar ik al heel snel tegenaan liep, dat zijn natuurlijk wel belangrijke punten. Dus ik denk dat daar ook heel veel overlap in zit.

H: En ik was nou benieuwd hoe jij dit dan zag. Had jij eerst ook het beeld wat in de media was van wat probeert de gemeente ons nu te verplichten? Had je al wel sneller en wat genuanceerder beeld? En hoe kijk je er tegenaan?

D: Ik denk best wel snel wel al een redelijk genuanceerder beeld. Ik denk dat lokale krantjes misschien ook al wel snel denken van, we hebben even iets waar we over kunnen losgaan en we maken er een punt van. Maar ik heb eerst die veroordeling gelezen en daarna de mediaberichten. En dan zie je ook al best wel snel puur in hoe het is uitgewerkt, bij nieuwbouw is er superveel duidelijk. En je ziet ook wel, bij bestaande bouw is het eigenlijk nog best wel een beetje vaag. Dus daar kan de gemeente ook nog niet zoveel mee, dus daar gaan ze waarschijnlijk niet zoveel mee doen. Maar dat komt misschien omdat ik er ook al een beetje ervaring mee heb natuurlijk. Dus ik had ook al een beetje een idee, het zal zo'n vaart niet lopen. Maar ja, ik heb ook geen woning waar dat misschien het geval is. Dus dat is ook een andere kant.

H: Nee, inderdaad. Dan ben je ook niet zo snel dat je je bedreigd voelt.

D: Ja. Mocht dat kunnen gebeuren. Ja. Dus bij mij viel het op zich wel mee. En daarom is het juist interessant. Het is misschien nog allemaal best wel vaag. Wat heeft dat dan juist voor invloed?

H: Ja. Op zich denk ik dat we daar trouwens nog wel wat werk te verzetten hebben. Qua voorlichting.

M: Ja, zeker.

D: Het is een risico.

H: Dit [kaart van overstromingsrisico in Gemeente Groningen] is een van onze stresstesten die we bekijken. Vroeger moesten we die dingen opdrachten geven en dan draaien. Heel moeilijk en zo. Inmiddels hebben we het zo goed staan dat het gewoon met een druk op de knop [werkt]. Het is wel best wel ingewikkeld. Er zit ook een rioolstelsel in verwerkt, De gemalen. Dus alles wat we kunnen bedenken dat invloed heeft op of significant invloed heeft kunnen we nu gewoon elke dag zeg maar draaien. Nou dan zie je dus de blauwe vlekken zijn echt heel veel water. Vaak zijn het ook wel slootjes, maar je ziet hier bijvoorbeeld in de rivierenbuurt, echt wel een probleem. Dat is een van de grootste problemen van de hele stad eigenlijk. Nou, je ziet hier, Vinkhuizen is een mooi voorbeeldje van platte pannenkoek. Overal een beetje wateroverlast. En het probleem, dat zijn die blauwe bolletjes, dat zijn voornamelijk die ontsluitingswegen. Dus in principe heb je overal wateroverlast. Wij vinden het vooral erg dat een ambulance niet deze ontsluitingsweg kan gebruiken. Daarom willen

we hier extra aandacht aan besteden. Waar we dus nu achterkomen is, om dit te verhelpen moet je eigenlijk in heel Vinkhuizen water opvangen Anders zet het geen zoden aan de dijk. Wat ook opvalt, hier heb je de uitlopers van de Hondsrug, en je ziet heel mooi; droog, en op de flanken zie je juist heel veel problemen en dat zie je ook in Haren terugkomen, dit hebben we ook gezien bij die bui vorig jaar. Dat hier heel veel water staat en aan deze kant van de bult [Hondsrug]. En in het midden heeft men nergens last van. En deze ontstaat eigenlijk, dat is wel nog leuk. Hier loopt dus die Hondsrug. Water wat hier valt gaat dus daarheen. Hier hebben we een kanaal, maar dat is best wel hoog. Je krijgt niet water uit deze wij, in vrij verval in ieder geval, dat kanaal in. Dus dat moet je pompen, maar daar is het veel te veel voor. Aan de zuidkant loopt er een grote ringweg langs en aan de noordkant hebben we een station. Dus dit is echt een badkuipje. Waarvan ik hoop dat we nog wat kunnen doen voor de bui valt.

D: Die [de Rivierenbuurt] valt qua hoeveelheden percelen [tussen de 240-260m2 wel mee, maar zou wel een hele interessante zijn om toch even goed te bekijken.

H: Ja, ik denk dan wel vooral in dit gebied juist, in plaats van in dit gebied. Want als je al dit water hier al hebt, en ik weet niet of de schaal hierin staat, dan kun je lekker water bergen, maar als je een meter water in je tuin hebt staan, dan helpt een regenton niet meer.

D: Is deze kaart openbaar?

H: Nee, deze niet. We hebben wel stresstesten online staan. Maar dit is eigenlijk een werkkaart. Hier staan dus ook die puntjes in. En vervolgens hebben we die ook weer meer uitgewerkt naar... Hier een project met wateroverlast. Locaties urgent. Clusteruitwerking. Toestroomgebieden. En wat ons systeem ook kan is het bepalen van… We hebben hier een punt. Hoeveel water komt er vanuit het omliggende gebied heen. En overal waar meer dan 5 kuub water langskomt, naar dat punt kan die berekenen. En dan zie je dit soort plaatjes. Wat ik net al zei, om dit puntje in Vinkhuizen op te lossen, moet je dit hele gebied als maatregel doen. En in feite zijn dit soort gebieden, nou dit zijn dan gebieden waarvan ik me zou kunnen voorstellen dat dat één van de zoekgebieden zijn waar ze zo'n gebied aan gaan wijzen. En je ziet hier ook de industrieterreinen, bijvoorbeeld Euvelgunne terugkomen.

D: Oké, duidelijk. Dankjewel. Super, we zitten op tijd, jullie moeten naar een vergadering denk ik. Ten eerste heel erg bedankt.

M: Ja, jij ook bedankt.

D: Super, heel veel geleerd.

H: Ja, heel interessant.

D: We houden nog contact, sowieso. Jullie hebben aangegeven of jullie het transcript ook willen?

M: Nee. Ik hoef het transcript verder zelf niet.

D: Ik kan wel even een samenvatting sturen.

M: Ja, dat is prima. Ik geloof wel dat je gewoon nauwkeurig een realistische weergave van het gesprek geeft. Maar ik ben vooral heel erg benieuwd naar de resultaten.

D: Ja.

H: Ja. En wij sturen dan volgende week uiterlijk even [onze aanmerkingen].

D: Ik kan ook even een mail sturen met de vraag, heel duidelijk dat jullie er makkelijk op kunnen antwoorden. Dat is misschien ook voor jullie het makkelijkst.

M: Ja. En inderdaad, mochten wij nog hele nieuwe ideeën of dingen hebben, dan weten we jou te vinden.

D: Ja. Super. We kunnen ook natuurlijk als de scriptie een keer helemaal rond is, dan kunnen we ook eerder een keer weer met elkaar zitten om het even goed te bekijken dat is misschien ook wel voor jullie wel nuttig.

M: Ik vind het heel interessant.

D: Super, top, dat was het wat mij betreft, bedankt!