

Mainstreaming climate adaptation into urban planning

*An in-depth study into Dutch urban planning in relation to the impact
of climate change*



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Preface

This master thesis was written to complete the master Spatial Planning: Cities, Water and Climate Change at Radboud University in Nijmegen. This research presents the process of climate adaptation into the development of a new urban planning project.

The flooding from July 2021 in Limburg increased my interest in the occurrence of flooding in urban environments. As climate is changing and urban environments are increasing in the Netherlands, the question for me rose what influence climate change and climate adaptation will have on cities, towns and inhabitants. The goal of the research was to investigate how a project for the urban development of a new town in a low-lying polder handles climate change effects. Also, climate adaptation is a relatively new concept in the field of urban planning. For that reason, this research tried to understand how climate adaptation emerges and is involved within urban planning. To understand the relation between climate adaptation and urban planning, insights will be provided into limiting factors of climate adaptation and how climate adaptation can be improved into the Dutch urban planning system.

This thesis was not completed without the help of people that guided and helped me along the thesis process. First, I would like to thank Sander Meijerink for the helpful feedback, guidance, pleasant meetings and contact information about Sweco and the possibility for an internship. Also, I would like to thank the Radboud University, all staff members from the Master programme Spatial Planning and my fellow students for the enjoyable, but most importantly educational year of studying at Radboud University.

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Last, I want to thank all the respondents who participated during my thesis. Overall, the respondents were accessible and cooperative. Without their availability this thesis was not completed as well.

I hope that you will enjoy reading this thesis!

Kars Barkmeijer

Nijmegen, 10-10-2022

Abstract

This research presents an examination of mainstreaming climate adaptation into urban planning. This study is performed in an era that is confronted by the long-term impacts of climate change. The rising sea level, due to the increasing melting process of ice sheets in Greenland and Antarctica, will challenge low-lying areas in the world. Furthermore, adaptation to pluvial and fluvial flooding will become more important, as a result of increasing events of heavier precipitation. Due to the current housing shortage, new houses and relating urban planning are needed to cope with the current pressure on the housing market. Adaptation to sea level rise, pluvial and fluvial flooding in relation to urban planning requires flexibility and adaptability in order to be sustainable and adaptive. In this research, the analytical framework of mainstreaming climate adaptation has provided knowledge and understanding to what extent climate adaptation is mainstreamed into urban planning.

Furthermore, mainstreaming climate adaptation provided a framework to identify barriers and opportunities throughout the understanding, planning and managing phase. Based on these insights, the factors that influence the urban planning have been identified and resulted in recommendations to advance mainstreaming of climate adaptation. By investigating the low-lying area of the Zuidplaspolder, the mainstreaming of climate adaptation into urban planning is investigated.

Within this study, mainstreaming of climate adaptation in the Zuidplaspolder have been identified by a qualitative methodological approach. First, an analysis of policy documents about the urban planning of the 'Vijfde Dorp' in the Zuidplaspolder and semi-structured interviews were carried out with key stakeholders, such as the municipality Zuidplas, the province Zuid-Holland and the waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard. The collected data was analysed and tested by executing three focus group sessions. One session was held with stakeholders that are involved in the 'Vijfde Dorp' and two sessions were carried out with water and urban planning experts from Sweco. Furthermore, the other respondents from the semi-structured interviews that did not participate during the focus group were emailed in order to test and validate the collected data.

From this research, it can be concluded that the extent of mainstreaming varies along the different phases of mainstreaming climate adaptation. Various mainstreaming barriers and opportunities did emerge during the understanding, planning and managing phase. Overall, a set of predominant factors influence the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder. The limited financial resources from stakeholders for climate adaptation, lack of laws and regulations, limited knowledge on climate impact matters, the individual and collective awareness and the communication between stakeholders turned out to be the dominant factors that influence the mainstreaming of climate adaptation into urban planning.

Keywords: Climate adaptation – Mainstreaming – Urban planning – Zuidplaspolder – Vijfde Dorp

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List of abbreviations

EPI	Environmental Policy Integration
IenW	Ministerie van Infrastructuur en Waterstaat
ISP	Intergemeentelijke structuurplan Zuidplas
ISV	Interregionale structuurvisie 2010-2030
KNMI	Koninklijke Nederlandse Meteorologisch Instituut
MER	Milieu Effect Rapportage (Environmental impact assessment)
MRA	Metropoolregio Amsterdam
NAP	Normaal Amsterdams Peil
ROZ	Regionale Ontwikkelingsorganisatie

1. Introduction

1.1 Context of the research

The Netherlands is a country which is well known for its history with water and delta management. After the flood disaster of 1953, the Netherlands undertook a large cooperation in order to prevent Dutch coastal areas from similar hazards in the future. As a result, coastal defences were installed. These structures were built under the assumption that the sea level would rise at a maximal continuous pace of 10-20 cm per century. However, the current acceleration in sea level rise was not anticipated at that time (Van Koningsveld, Mulder, Stive, Van Der Valk, & Van Der Weck, 2008). In the past several decades, sea level rise has played an increasingly significant role in climate change debates. The main consequences of sea level rise are on the one hand economically based, such as decreasing supplies of fresh water at coastal areas. On the other hand, environmental impact such as wetland deterioration and the deprivation of nature conservations dominates the public debate as well (Bosello, Nicholls, Richards, Roson, & Tol, 2012).

In the process of planning against sea level rise in the long-term, some difficulties may arise during the phase of implementation. The lifetime of an existing or planned adaptation policy may reduce drastically when future sea level rise magnitudes develop quicker over time (Haasnoot et al., 2020). In the current adaptive plan of the Netherlands, sea level rise predictions as from 2050 onwards are not adopted. Due to the rapid loss of the Antarctic ice sheet, the sea level rise may accelerate after 2050 (see figure 1.1), which could decrease the functional lifespan of various adaptive measures that are currently active and planned for in the Netherlands (Haasnoot et al., 2020).

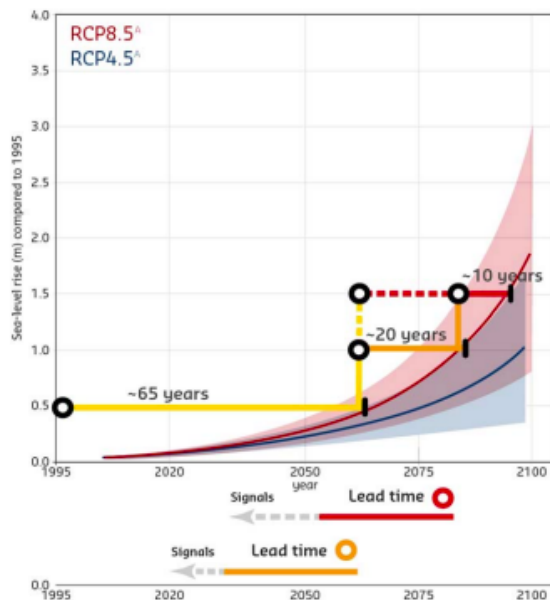


Figure 1.1: Global mean sea level rise from 1995 to 2100 (Haasnoot et al., 2020).

Additionally to sea level rise adaptation, adaptive measures to fluvial flooding from rivers in combination with water safety and adaptation to pluvial flooding is the common goal of climate change adaptation in the Netherlands (Mees, Uittenbroek, Hegger, & Driessen, 2019). Note that 59% of the Netherlands is flood prone. Due to urbanisation, the economic value at risk will increase by 2,5 times (100% to 250%) in 2040 compared to 2000. The mean yearly precipitation experienced an increase of 18% during the past century. The number of days with precipitation rose as well (Runhaar, Mees, Wardekker, van der Sluijs, & Driessen, 2012). The risk of intense precipitation involves the unpredictability and uncertainty of the estimation and amount of the intensified precipitation. Based on estimations of KNMI, Rijkswaterstaat and Deltares, the intense precipitation events will increase by 27% in 2050. A possible outcome of more intensified precipitation is pluvial flooding (Bles et al., 2012).

Rivers, lakes and the sea will reach higher water levels due to sea level rise, river discharges and heavier precipitation. For rivers, which continuously discharge water to sea, sea level rise will directly influence inland water levels (Booister et al., 2021). Peak discharges and extreme water levels in main water systems and regional water systems are an important element for flood prevention in the Netherlands. Higher water levels in rivers and corresponding water systems will become more common due to higher peak of river discharges (Ministerie IenW, 2018). As a result of climate change, up to 2100 river discharges of the Rhine and Maas will increase by 10-15% and 10-20% respectively (Booister et al., 2021).

The three water related climate effects will influence urban planning in the coming decades. The climate change effects in the Netherlands do raise the question where new houses need to be built in order to realise sustainable and cost-effective new dwellings (Deltares, BoschSlabbers, & Sweco, 2021). The potential impact of the ongoing sea level rise, pluvial and fluvial flooding is therefore an increasing topic in the Netherlands (Van Klaveren, De Koeijer, Miner, & Mobron, 2020; Booister et al., 2021). In this sense, implementation of climate adaptation into Dutch cities and regions is a form of response to address the current issue. The climate adaptive planning of urbanised areas demonstrates to be a complicating factor in coping with the large housing deficit in the Netherlands. On average, yearly 75.000 new houses need to be built in order to resolve the pressure on the housing market (Van Klaveren et al., 2020).

In addition to the realisation of new houses in the Netherlands, it is important to acknowledge the consequences of sea level rise, heavy precipitation and flooding to existing urban areas. Urban delta areas across the country are especially confronted with the flood risk of sea level rise, heavier precipitation and flooding (Stead, 2014).

1.2 Introduction to the research: Mainstreaming climate adaptation

To cope with climate change effects, the integration of adaptation objectives into policies and decision-making processes has been considered as a useful approach. This integration of climate adaptation is called mainstreaming. Mainstreaming climate adaptation into other policy and sectoral domains can increase the effectiveness, efficiency and opportunity for innovations in policy- and decision making (Uittenbroek, Janssen-Jansen, & Runhaar, 2013). Mainstreaming consists of several benefits for a sustainable adaptation to climate change. First, mainstreaming of climate adaptation can contribute to synergy effects. Also, adaptation objectives of mainstreaming in sectoral policies are more resource efficient in both financial and administrative ways. Next, mainstreaming may increase the effectiveness of climate adaptation measures in sectoral policies. Lastly, mainstreaming may create new innovations in sectoral policies (Runhaar, Wilk, Persson, Uittenbroek, & Wamsler, 2018). Mainstreaming climate adaptation into urban planning consists of three phases that conceptualise the process of adaptation. These are the understanding, planning and the managing phase. The phase of 'understanding' contains the problem detection and the understanding of the planning issue. The 'planning' phase refers to the process of policymaking and planning options. The phase of 'managing' is based on the implementation of the selected planning option(s) (Moser & Ekstrom, 2010). The three phases of the adaptation process have a central role in this research as it constructs the mainstreaming of climate adaptation into urban planning.

Mainstreaming research and policies predominantly focus on governmental actors, with less attention for private actors. However, private actors play a large role in developing (urban) real estate and new urban planning. For this reason, it is important to understand if and how private actors integrate climate adaptation issues in their long-term investments and practices. This is key in examining the progress of climate adaptation and related adaptation barriers (Boezeman & de Vries, 2019). Additionally, municipalities play a crucial role in mainstreaming climate adaptation into urban areas as well, such as actor networks and the facilitation of adaptation measures (Uittenbroek, 2016; Measham et al., 2011). Moreover, municipalities possess a central role in climate adaptation because climate change effects are experienced locally. The geographical variation in effects of climate change request for a local and place-based approach to climate adaptation. Local governmental agencies are often the responsible actors for managing climate change impacts (Measham et al., 2011).

Deltacommissaris Peter Glas stated that flexibility is key. This encompasses the allocation of functions, choice of location, area design and in construction methods. In his memo, Glas (2021) states that this is an important principle that will need to be a leading element for new investments in the housing sector. Then, the chance of a lock-in situation in the housing sector will be reduced (Glas, 2021). Booister et al. (2021) mention that flexibility and adaptability in urban planning can be realised by building temporary houses, such as modular residents and flex housing. Relocation for this type of housing is possible. Also, temporary facilities, such as greenery and holiday homes can be seen as a flexible option for urban planning. In addition, flexibility in housing can be understood in terms of floating houses and liftable buildings (Booister et al., 2021).

Flexibility in urban planning is important in order to guarantee the adaptability of policy measures. This can be achieved by increasing the attention and importance of soil- and water systems in urban planning, but also rethinking the spatial planning and locational options of urban planning. The choices about new locations of houses are an important element, because of the strengthening of primary flood control systems, dikes will need more room in the future. In both financial and social points of view it is crucial to adopt more flexibility and adaptability in urban planning. In that way, rising costs (for future generations) will be prevented and a safe living environment for citizens will be guaranteed (Glas, 2021).

In this research sea level rise, pluvial and fluvial flooding related policies and measures will be analysed. Any related climate issues relating the rising temperature, heat stress and droughts are out of the scope of this research. In the following sections and chapters of this research, the climate change effects of sea level rise, pluvial and fluvial flooding will be assembled into the word climate change, unless it specifically applies to one of the three climate change effects. This will ensure consistency and clarity throughout the sections. Furthermore, in this research mainstreaming of climate adaptation refers to the adaptation to the three climate change effects of sea level rise, pluvial and fluvial flooding.

1.3 Research problem statement

The impact of sea level rise, pluvial and fluvial flooding are uncertain and unpredictable, due to the complex environmental systems and hence require adaptive decision-making by governmental actors. Because of these uncertainties, information and knowledge about flexibility and adaptive strategies are required in order to build new houses strategically in the longer term. Until 2030, 820.000 houses will be newly built in the Netherlands in vulnerable areas that cope with sensitive, wet and floodable (in- and outside the dykes) soil. These 820.000 houses that will be built in vulnerable areas, constitutes 85% of the total housing programme for the current shortage in the Netherlands. Newly developed houses are meant to last for a mean lifetime of fifty to hundred years. Also new infrastructural networks surrounding new dwellings do possess an even longer lifetime (Booister et al., 2021). So far, new building schemes do not take the long-term impact of sea level rise and the future peaks in river discharges into account. Heavier precipitation will increasingly demand temporary storage of excess precipitation in the regional water systems where drainage results in higher costs. This is especially the case for low-lying polders in the Netherlands (Glas, 2021). Also, municipalities in the Netherlands still lack awareness on the problem of flooding, due to its complexity and uncertainty (Runhaar et al., 2012). Rauken, Mydske, & Winsvold (2015) found that under the pressure of an increasing housing demand, new houses were built densely in cooperation with project developers. These houses were located in flood prone municipalities which were aware of future climate risks. This finding illustrates the challenging conflicts of mainstreaming climate adaptation into other sectoral policies, such as urban planning (Rauken et al., 2015). With a rising sea level, higher water levels in rivers and heavier precipitation in mind, land will ultimately experience an increasing vulnerability (Glas, 2021). Due to the uncertainty of climate impacts beyond 2050, flexibility in the spatial design will be a key principle for urban planning in the Netherlands. This flexibility will ensure possibilities in the future to adapt spatially with respect to sea level rise, pluvial and fluvial flooding (Booister et al., 2021).

1.4 Research aim

This research aims to investigate the urban planning in the Zuidplaspolder in relation with the future impact of sea level rise, heavier precipitation and river discharges. The municipality will face the impact of sea level rise indirectly, especially after 2050. This climate related issue will impact the area and the related housing development. For that reason, this research aims to understand the mainstreaming of climate adaptation into the urban planning in the Zuidplaspolder. By understanding and examining the theory on mainstreaming of climate adaptation, including the extent of mainstreaming and mainstreaming barriers and opportunities, this research aims to identify the factors that influence mainstreaming of climate adaptation. After that, policy recommendations regarding mainstreaming of climate adaptation could be provided in order to stimulate mainstreaming of climate adaptation into urban planning. This research ultimately strives for a contribution to the existing literature on mainstreaming climate adaptation.

1.5 Research questions

The research question of this study is:

Which factors do influence the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder?

To answer the main research question, the following research sub-questions are defined.

Sub-questions

1. How can the extent of mainstreaming climate adaptation be assessed?
2. What are barriers and opportunities to mainstreaming in the understanding phase?
3. What are barriers and opportunities to mainstreaming in the planning phase?
4. What are barriers and opportunities to mainstreaming in the managing phase?
5. What possible policy measures and instruments may improve the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder?

1.6 Relevance

1.6.1 Societal relevance

For decades, climate change has clearly shown that it is increasingly unpredictable and uncertain. The consequences that emerge from climate change threats have exposed the increasing need for more adaptive strategies in order to cope with these uncertainties (McClymont, Morrison, Beevers, & Carmen, 2020). As mentioned earlier, the projected sea level rise has large uncertainty after 2050. Due to rapid loss of ice sheets of Antarctica and Greenland, sea level rise will increase rapidly after 2050. Adaptation measures and policies of low-lying coastal areas in the Netherlands will experience less effectiveness. This increases the urgency of more adaptive measures for coastal defences and buildings (Haasnoot et al., 2020). Furthermore, Dutch polder systems in relation to heavier precipitation are not broadly investigated (Hoes, 2007). Hence, the housing deficit and climate change possess a crucial role on the political agenda during the coming decades in the Netherlands (Van Klaveren et al., 2020). Sea level rise, heavier precipitation and river discharges will increasingly influence the living environment in the Netherlands. With the combination of housing shortage and water related climate change effects in mind, this research tries to be relevant for society in the Netherlands. According to Glas (2021), urban planning needs to take into account the long-term impact of sea level rise, pluvial and fluvial flooding. Due to the lifespan of newly built houses, urgency of sea level rise, pluvial and fluvial flooding need to be considered in order to maintain a safe and sustainable living environment for citizens in the Netherlands (Booister et al., 2021). This research contributes by providing an understanding what factors influence the consideration of water related adaptation measures into the urban planning of newly built houses.

Moreover, policy domains in the Netherlands do not have a legal obligation to apply mainstreaming of climate adaptation. Even so, less information is known about how organisational values between policy departments within one municipality affect the mainstreaming of climate adaptation into urban planning within the area of that municipality (Uittenbroek, Janssen-Jansen, Spit, & Runhaar, 2014). This study can be societal relevant by investigating if the absence of a legal obligation barriers or advance mainstreaming of climate adaptation into urban planning. Consequently, this research on mainstreaming climate adaptation into urban planning can be relevant for urban planners, policy- and decisionmakers, project developers, waterboards and inhabitants.

1.6.2 Scientific relevance

The scientific relevance of this research lies within the understanding of mainstreaming climate adaptation. A scientific understanding on the process of mainstreaming climate adaptation into the sector of urban planning has rarely been studied directly (Uittenbroek et al., 2013). By investigating mainstreaming of climate adaptation into urban planning, this research aims to contribute to the understanding of climate adaptation into the sector of urban planning and which factors do influence the mainstreaming of climate adaptation. Academic knowledge on the effectiveness of mainstreaming climate adaptation is fragmented and limited (Runhaar et al., 2018). Rauken et al. (2015) point out that mainstreaming climate adaptation at a local policy level has been investigated insignificantly. This research tries to be scientific relevant by investigating mainstreaming climate adaptation in one specific low-lying polder at a local level.

Furthermore, only few studies have examined the relation between organisational arrangements and mainstreaming climate adaptation. This creates a knowledge gap within the field of mainstreaming climate adaptation into sectoral policies regarding the overall implementation and effectiveness (Runhaar et al., 2018; Rauken et al., 2015). To overcome this knowledge gap, this research aims to examine mainstreaming climate adaptation into the sectoral policy of urban planning regarding the impact of climate change effects. Thereafter, the extent of mainstreaming, together with the barriers and opportunities, into the sector of urban planning will be examined.

1.7 Reading guide

This research contains five separate chapters. The next chapter consists of an overview of existing academic literature and an analytical framework that will be helpful throughout the research. The analytical framework of mainstreaming climate adaptation provides a theoretical background for examining the mainstreaming process into urban planning in the Zuidplaspolder. This is demonstrated under the section 'conceptual framework'. The operationalisation of this framework follows in the next section of this thesis. The next chapter provides the methodology of this research. A paragraph on the reliability, validity, ethical considerations and case study selection do include this chapter as well. After that, the case study Zuidplaspolder will be provided, including the analysis and results of the research. Finally, the conclusion, discussion and recommendations will be described.

2. Theories on mainstreaming climate adaptation

In this section, the literature review, relevant theories and concepts will be discussed. The concepts in this chapter will structure and guide the research by providing fundamental knowledge in order to answer the research questions.

2.1 Origin of mainstreaming climate adaptation

Mainstreaming finds its origins in the concept of Environmental Policy Integration (EPI). Within the EPI, environmental issues were moved from the periphery to the centre of decision-making, whereby environmental issues are reflected in sector policies. What distinguishes mainstreaming from EPI is its primary focus on climate change adaptation (Rauken et al., 2015). Bouwer and Aerts (2006) describe mainstreaming as “the integration of climate adaptation policies and measures into ongoing (national) sectoral planning and decision-making processes” (Bouwer & Aerts, 2006, p.58). By mainstreaming, long-term sustainability of investments can be ensured (Uittenbroek et al., 2013). Klein et al. (2007) adds to this definition by introducing another explanation of mainstreaming climate adaptation. This definition indicates that mainstreaming can ensure that future strategies of policy processes structurally aim to reduce the vulnerability of climate change effects (Klein et al., 2007). In addition, mainstreaming expresses the integration of awareness of future climate change impacts in current and future policies (Schipper & Pelling, 2006). Furthermore, mainstreaming of climate adaptation into sectoral policies can contribute to an increasing flexibility into adaptation policy. By mainstreaming flexible approaches in sectoral policies, a higher degree of overall robustness in climate adaptation can be accomplished (Metzger et al., 2021).

On the other hand, Persson, Eckerberg, and Nilsson (2016) critique mainstreaming due to the risk of decreasing attention and visibility for (other) political issues. Furthermore, Reckien et al. (2019) refer to the dedicated approach, which counteracts the mainstreaming approach. The dedicated approach is based on direct political involvement in climate adaptation. This implies a structure of policy objectives, resource allocation and a political agenda which includes implementation of climate adaptation. The dedicated approach to climate adaptation is a stand alone policy objective, whereas the approach of mainstreaming relies on indirect political commitment and integration is relevant policy domains (Reckien et al., 2019).

Still, academic literature reports that mainstreaming climate adaptation includes a more effective and efficient use of social and financial resources than a separated climate policy domain, which is known as the dedicated approach (Klein et al., 2007). Uittenbroek et al. (2013) address that climate adaptation and maintaining sustainable urban development has led to an integrative way that increased the effectiveness of policy making. The factors that are fundamental for this increased effectiveness are a more efficient use of resources both financial and social, synergies between policy objectives and long-term sustainable investments (Uittenbroek et al., 2013).

2.1.1 Technological-based view vs. development-based view

Mainstreaming climate adaptation holds two different forms. Firstly, mainstreaming climate adaptation into the technological-based view refers to the policy process in decision-making of governmental agencies and stakeholders where technologies are chosen in order to adapt to climate change. An example of this form of mainstreaming is a drainage system that is capable of adapting to intensive rainfall. This form of mainstreaming climate adaptation has also been referred to as 'climateproofing' (Klein, 2010).

The development-based view indicates climate adaptation as a comprehensive approach to create synergies with development. This form of mainstreaming points out that the development of climate adaptation is based on reducing the climate change effects that are likely candidates for successful climate adaptation. For example, water norms for societal groups that are exposed to water scarcity. Mainstreaming climate adaptation into a development-based view involves the interaction between various stakeholders from local to national level. An environment needs to be created that ensures the adaptation to climate change among each involved stakeholder. This includes the strengthening of capacity and knowledge of people and organisations (Klein, 2010).

In this research, a development-based view on mainstreaming climate adaptation is used for examining the mainstreaming of climate adaptation among all involved stakeholders into urban planning of the Zuidplaspolder.

2.2 Mainstreaming framework

The mainstreaming approach to climate adaptation into sectoral policies will have a central position in the theoretical framework of this research. The theory about mainstreaming of climate adaptation serves as a helpful framework to analyse the integration of climate adaptation into sectoral policies. Mainstreaming climate adaptation can be taken into account during current and future plans in the built environment. The mainstreaming approach may promote innovation in sectoral policies as well (Runhaar et al., 2018). Also, the amount of climate adaptation that is integrated in policy documents and processes, indicates how climate adaptive a society is (Uittenbroek et al., 2013).

As described above, mainstreaming relies on the integration of climate adaptation into sectoral policies. Mainstreaming climate adaptation can be distinguished into two forms of integration. On the one hand, horizontal integration of mainstreaming is based on a cross-sectoral integration of climate adaptation. This form of integration aims to mainstream climate adaptation into a set of public policy domains within the government. On the other hand, vertical integration of mainstreaming focuses on the integration of climate adaptation into one specific sector throughout different levels of government. This includes a sector specific integration on a regional and local level with aid from the ministry. This form of policy integration is similar to the multi-level governance approach (Mickwitz et al, 2009). For this research, both the horizontal and vertical integration of mainstreaming are suitable. This study examines the integration of climate adaptation policies into the sector of urban planning. This relates to the horizontal integration of mainstreaming. In addition, this research investigates the urban planning between different governmental layers in relation with mainstreaming of climate adaptation. This fits with the form of vertical integration of climate adaptation.

2.2.1 Barriers and opportunities of mainstreaming

Mainstreaming of climate adaptation consists of barriers and opportunities that can stimulate or impede the policy process of climate adaptation. Uittenbroek et al. (2013) mention the opportunities that mainstreaming of climate adaptation are political and public support, financial subsidies, innovative actor collaboration, the availability of resources and past climate calamities. These all can function as opportunities to improve mainstreaming of climate adaptation into the policy process (Uittenbroek et al., 2013). Nkiaka and Lovett (2018) add to this by noting that institutions play a key role in mainstreaming climate adaptation. Nkiaka and Lovett (2018) describe this as follows: “understanding the institutional dimensions of climate change adaptation is crucial to mainstreaming climate adaptation into sectoral policies” (Nkiaka and Lovett, 2018, p. 50). Also, mainstreaming of climate adaptation improves the coherence between different sectors in order to achieve climate adaptation. The costs of climate adaptation and contradiction between policies do reduce due to mainstreaming climate adaptation (Nkiaka & Lovett, 2018).

Adger et al. (2007) and Uittenbroek et al. (2013) describe limits and barriers of the integration and implementation of climate adaptation. The limits and barriers influence the progress of mainstreaming climate adaptation into sectoral policies. The limits and barriers of mainstreaming encompass five different forms (Adger et al., 2007):

1. *Physical and ecological limits*: This type refers to the incapability of ecosystems to adapt to changing climate conditions. Rapid sea level rise in coastal areas limits the possibilities and potential of adaptation.
2. *Technological barriers*: Feasible technological adaptation can be economically and culturally undesirable for society. Technological adaptation to for example sea level rise is possible, but limited by the social context of decision-making processes. Also, technological and engineering adaptation measures to sea level rise can turn out to be very costly. At last technological adaptation measures can be very location and context specific and can affect or create new vulnerabilities for other areas or groups.
3. *Financial barriers*: This type specifies the lack of adequate financial resources, which results in a lack of climate adapting facilities. At a local level, municipalities or communities can lack the financial capacity to implement climate adaptation into policies.
4. *Informational and cognitive barriers*: This barrier relates to the lack of public understanding of climate change, individual behaviour regarding climate change and to the individual uncertainty of climate risks. If understanding and awareness is present this does not necessarily turn into action. This is known as the ‘value-action’ gap. Additionally, the difference between the perceived and actual adaptive capacity of individuals or institutes is a barrier to adapting to climate change.
5. *Social and cultural barriers*: This barrier demonstrates the different interpretation of individuals and societal groups. Groups and individuals, influenced by values, worldviews and beliefs, can lead to different preferences regarding adaptation measures. (Adger et al., 2007; Uittenbroek et al., 2013).

Uittenbroek et al. (2013) add to the barriers of mainstreaming climate adaptation from Adger et al. (2007) by providing a sixth barrier. This barrier is the *institutional and organisational barrier* and refers to the incompetence of leadership, the lack of political support and the lack of coordination. This barrier incorporates the competition of other policy objectives in the policy process, the lack of public pressure and the lack of organisational cultures as well (Uittenbroek et al., 2013).

In the given limits and barriers on mainstreaming climate adaptation, Moser and Ekstrom (2010) reveal that limits and barriers are based on different characteristics. On the one hand, limits refer to an absolute margin where further activities among ecosystems and physical environments cannot be sustained. On the other hand, barriers relate to obstacles that can be surmount by prioritisation, a change of institutions, land uses and resources. In other words, barriers can be overcome with increasing effort, social support and political effort (Moser & Ekstrom, 2010). Uittenbroek et al. (2013) adds to this by mentioning that barriers could turn out to be opportunities as well and vice versa, e.g. leadership could turn out to be in favour or against climate adaptation (Uittenbroek et al., 2013). Furthermore, the physical and ecological limit can sometimes be overcome with technological innovations, which changes physical and ecological limits into barriers (Moser & Ekstrom, 2010). The physical and ecological limit will be categorised as a barrier throughout this research, unless it applies as a limitation. In this sense, consistency among barriers and opportunities will be sustained.

2.2.2 The extent of mainstreaming climate adaptation

Kivimaa and Mickwitz (2006) describe four indicators that are key in analysing the extent of mainstreaming climate adaptation into policy domains or sectoral policies. The first indicator is *inclusion* and refers to the extent of the climate related issue being included in the policy processes by referring to the issue and the related risks. Important here, *inclusion* of mainstreaming climate adaptation can be executed independently of national programmes or strategies on climate adaptation. The second indicator is *consistency*, which is based on the shared understanding of the climate issue among the stakeholders. Third, *weighting* means that the climate related issue experiences priority and dominance in relation to other objectives and issues in policy documents. At last, the indicator of *reporting* refers to the specifications and strategies that include the implementation of climate adaptation. This indicator is subdivided into two types. First, *ex ante reporting* refers to strategies to distribute resources and responsibilities for climate adaptation. Second, *ex post reporting* indicates the evaluation among stakeholders in the form of feedback to improve knowledge on climate adaptation (Kivimaa & Mickwitz, 2006; Uittenbroek et al., 2013). The four indicators of mainstreaming of Kivimaa and Mickwitz (2006) will be further operationalised for this research, because they do analyse the extent of mainstreaming into sectoral policies.

The extent of mainstreaming with corresponding indicators will be handled as important element for interview questions. The mainstreaming barriers and opportunities will be included as well during the data collection process. These aspects have a central position in answering the research question and sub-questions.

Moser and Ekstrom (2010) categorised three planning process phases that include the limits, barriers and opportunities on mainstreaming climate adaptation. The three phases are understanding, planning and managing and each phase contains three subprocesses. This framework is visualised in figure 2.1. The phase of understanding is subdivided by (1) problem detection, raising awareness and framing the initial problem, (2) acquiring information, which deepens the understanding of the issue and (3) the problem (re)definition. The planning phase includes the (4) development of adaptation options, (5) assessment of these adaptation options and (6) the selection of adaptation option(s). The phase of managing contains (7) the implementation of the selected adaptation option(s), (8) monitoring the environment and outcome of the implemented option and (9) an evaluation of the selected adaptation option (Moser & Ekstrom, 2010).

Moser and Ekstrom (2010) point out that processes of decision-making for adaptation is less linear in practice. Reality sometimes works out differently than ideal and neat models of adaptation planning and decision-making. However, the phases for adaptation are a helpful method to order the structure of the process (Moser & Ekstrom, 2010).



Figure 2.1: A framework that conceptualises the three phases and sub processes of climate adaptation processes (Moser and Ekstrom, 2010).

In line with the framework of Moser and Ekstrom (2010), Uittenbroek et al. (2013) developed a framework to test and examine the mainstreaming integration of climate adaptation into sectoral policies. In this framework (figure 2.2), the barriers and opportunities of mainstreaming climate adaptation are combined with the conceptual framework of Moser and Ekstrom (2010).

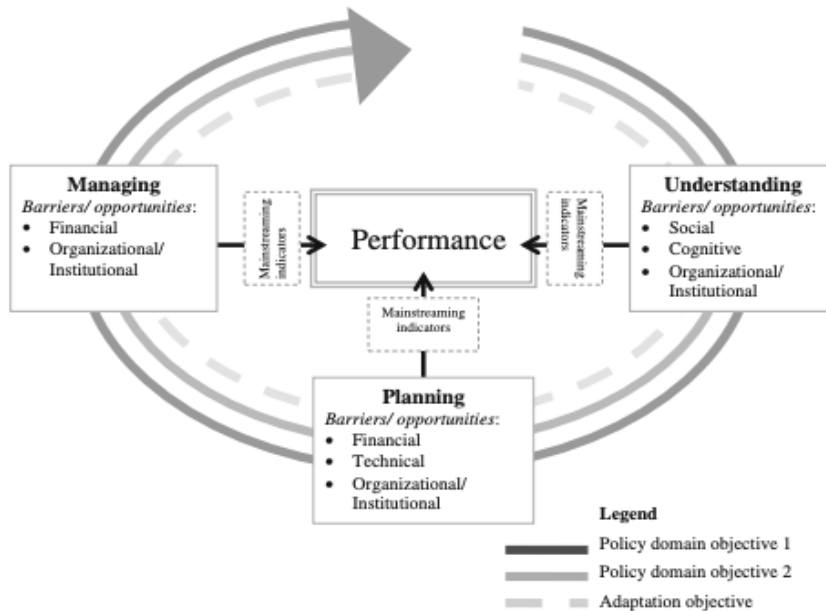


Figure 2.2: Conceptual framework of policy phases, barriers and opportunities for mainstreaming climate adaptation (Uittenbroek et al., 2013).

The conceptual framework in figure 2.2 is developed with in mind the hypothesis that climate adaptation is intertwined with one or more policy objectives (Uittenbroek et al., 2013). On the one hand, barriers are included in the framework, because it is assumed that other objectives of a policy domain can lead to a delay or exclusion of climate adaptation measures. On the other hand, opportunities are added to the framework, because objectives of a policy domain can be linked with climate adaptation into the policy processes. The barriers and opportunities in each policy phase are linked with the mainstreaming indicators that influence the extent of mainstreaming climate adaptation (Uittenbroek et al., 2013). The mainstreaming indicators presented by Kivimaa and Mickwitz (2006) will determine the extent of mainstreaming climate adaptation into sectoral policies during each phase of mainstreaming. In each phase of mainstreaming climate adaptation, one or more mainstreaming indicators can be present and will measure the extent of mainstreaming climate adaptation integrated in one or more sectoral policies (Uittenbroek et al., 2013).

The given theoretical background about mainstreaming the integration of climate adaptation policies can serve as a theoretical framework that supports the analysis on long-term adaptation to climate change for future urban planning. By investigating urban planning in the Zuidplaspolder, limits, barriers and opportunities of mainstreaming can be analysed. Also, the afore mentioned mainstreaming phases will be examined. By the analysis of future urban planning in the low-lying Zuidplaspolder, the theoretical framework of mainstreaming can support the research and could ultimately identify potential barriers or opportunities, for urban planning in the Zuidplaspolder or similar areas in the Netherlands.

2.3 Conceptual framework

In this section relevant theories and concepts will be utilised to operationalise the theoretical review into a framework that will be further applied throughout the research.

This conceptual framework demonstrates the process of examining mainstreaming to climate adaptation into relation with long-term flexibility of urban planning for the Zuidplaspolder. First of all, the three phases understanding, planning and managing of policy processes of Moser and Ekstrom (2010) include this framework. This because mainstreaming of climate adaptation into urban planning is an ongoing process where each phase contributes to the integration of climate adaptation (Uittenbroek et al., 2013). Then, the barriers and opportunities are clustered underneath each phase of the planning process (Adger et al., 2007; Uittenbroek et al., 2013). Barriers and opportunities that arise during the understanding phase of a policy process are generally social and cultural, informational and cognitive, institutional and organisational by nature. In the phase of planning, the barriers and opportunities based on physical and ecological, financial, technological and institutional and organisational occur. In the managing phase, financial and institutional and organisational barriers and opportunities emerge. The phases with corresponding barriers and opportunities related to mainstreaming climate adaptation are based on urban planning, which fits well within the conceptual framework of this research (Uittenbroek et al., 2013; Moser & Ekstrom, 2010). It will be investigated to the mainstreaming indicators to what extent mainstreaming climate adaptation, during each phase, is mainstreamed in urban planning of the Zuidplaspolder (Kivimaa & Mickwitz, 2006). The extent of mainstreaming is based on the four mainstreaming indicators that are demonstrated in the theoretical framework (Kivimaa & Mickwitz, 2006).

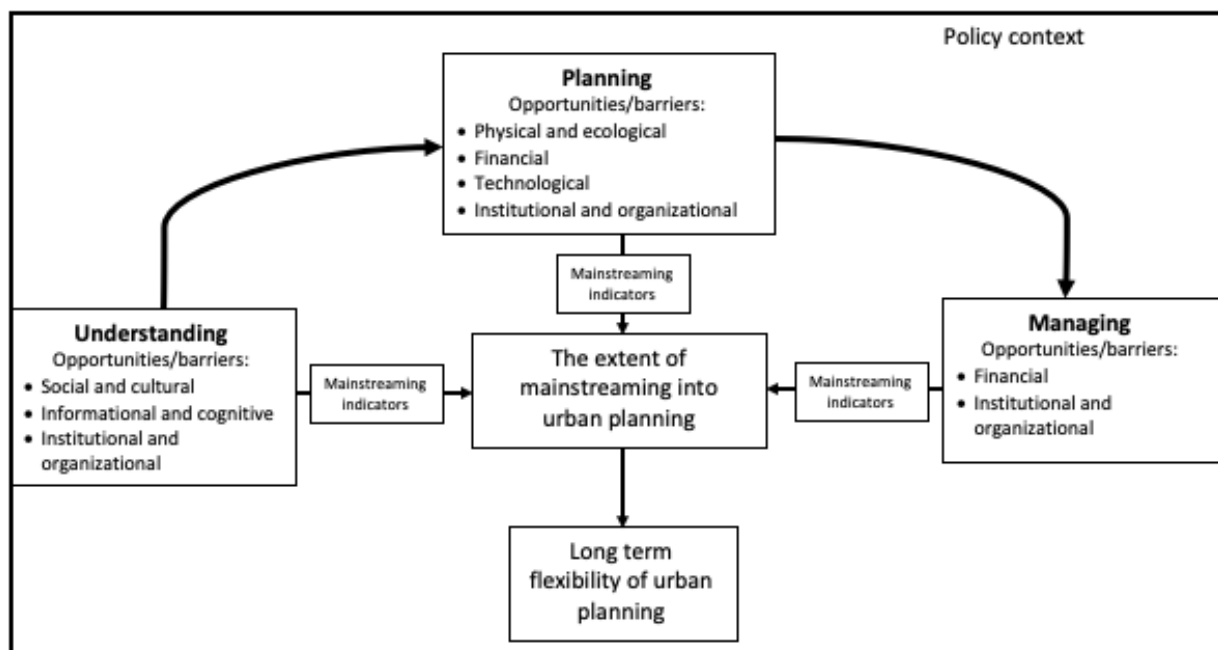


Figure 2.3: Conceptual framework adjusted from Moser and Ekstrom (2010) and Uittenbroek et al. (2013) (Researcher, 2022).

Based on the presence of mainstreaming, recommendations can be formulated given the current state of the climate integration into urban planning in the Zuidplaspolder. The findings about the mainstreaming of climate adaptation will be based on the regional level of the Zuidplaspolder and thus will provide information that could contribute to answering the research- and sub-questions.

2.4 Operationalisation of the conceptual framework

This section provides the operationalisation of the conceptual framework as enclosed in figure 2.3. The process of operationalisation characterises the transformation of theory originating from the theoretical framework into measurements and indicators. This process consists of three steps, which are (i) the definitions of theoretical concepts, (ii) the determination of different ways in which theoretical constructs can express itself in the real world setting and (iii) for each variable a value or score will be provided. Also, the relation between different variables is important to be considered as well (Van Thiel, 2014).

The operationalisation is based on the theoretical concepts of the barriers and opportunities of mainstreaming climate adaptation, which are demonstrated in the conceptual framework. In table 2.1 below, the concepts of barriers and opportunities are listed. As the theoretical concepts are not directly measurable into the real world of this study, the concepts will be further categorised into variables and indicators. These indicators will serve as measurable notes that will create the structure of the interview questions and to code each interview transcript within the programme of Atlas.ti.

2.4.1 The understanding, planning and managing phase

The phases of understanding, planning and managing have a central position within the conceptual framework of this research. The three phases encompass the policy process of climate adaptation. The understanding phase involves the problem detection and understanding. During the phase of planning, the planning of adaptation activities is present. Within the process of this phase potential options for adaptation to climate change effects will be drafted and conceptualised. Then, the phase of managing commenced. This phase is characterised by the management of the selected adaptation option(s). The implementation of the selected climate adaptation measures take place during this phase as well. Throughout each phase of the policy process, governance, individual stakeholder perception and capacity (e.g. resources, permits and social norms) play an important role (Moser & Ekstrom, 2010).

2.4.2 Mainstreaming barriers and opportunities

Barriers and opportunities influence the process of mainstreaming climate adaptation into other policy objectives. They position a fundamental role to analyse the process of mainstreaming climate adaptation. Each mainstreaming barrier/opportunity will be operationalised below in separate sections.

Physical and ecological

The first aspect of mainstreaming is based on physical and ecological conditions. This aspect refers to all the possible barriers or opportunities related to the adaptive capacity of natural systems (Uittenbroek et al., 2013). Furthermore, communities and economies that are directly related and dependent on ecosystems such as agricultural activities are likely to be more limited by sudden changes in ecosystems (Adger et al., 2007). Institutions lack the experience and knowledge to manage significant challenges and shifts in ecosystems (Folke, Hahn, Olsson, & Norberg, 2005). On the other hand, the urgency of potential shifts in physical and ecological systems might function as an opportunity for mainstreaming climate adaptation into sectoral policies (Adger et al., 2007). The condition of physical and ecological systems is obtained in the planning phase of the mainstreaming process, because during this phase, policy making will be influenced by the physical and ecological condition of the area (Moser & Ekstrom, 2010).

Technological

New technologies can be created in order to adapt more efficiently to climate change. The technological barrier of mainstreaming climate adaptation consists of different elements. The decision-making processes for climate change adaptation might be uncertain, which could constrain the application of technological solutions to climate change adaptation (Adger et al., 2007). However, technological opportunities are able to occur as well. Technological resources might be available, which could function as an opportunity for mainstreaming climate adaptation (Moser & Ekstrom, 2010). Additionally, funding and investments in technology could increase the opportunity to apply newly developed technological measures (Mace, 2006). The technological condition is integrated in the planning phase, because during this phase technological resources are needed to plan and implement climate adaptation measures (Moser & Ekstrom, 2010).

Financial

In financial terms, barriers can emerge due to the lack of financial capacity. Especially on municipality and community level financial resources can be scarce, which constrains the implementation of new adaptation measures and adaptation facilities. Furthermore, low-income households can face financial difficulties when adapting to newly developed climate objectives (Adger et al., 2007). Financial opportunities might be embedded in the subsidy from higher level governments. These (additional) financial resources could provide an opportunity to strengthen the mainstreaming of climate adaptation (Uittenbroek et al., 2013). The financial aspect of mainstreaming is situated in the planning and managing phase, because both phases require financial resources in order to plan and manage the mainstreaming of climate adaptation (Moser & Ekstrom, 2010).

Informational and cognitive

This barrier is characterised by individual and social perceptions of climate change uncertainty, risk and values in relation to decision-making processes concerning climate change. It has become clear that the risks of climate change are context specific. For this research, three elements are extracted. These are the level of awareness among stakeholders, the level of (individual) behaviour regarding climate change behaviour and the presence of a 'value-action' gap. The last element is based on the occurrence that awareness does not lead to action by an individual or stakeholder (Adger et al., 2007). On the other hand, opportunities might arise regarding the informational and cognitive aspects of mainstreaming. Examples are public support by society and framing which impacts the mainstreaming process in a positive way (Uittenbroek et al., 2013; Runhaar et al., 2018). This dimension is positioned in the understanding phase due to the presence of (public) understanding and action taking at this dimension.

Social and cultural

The social and cultural barriers refer to the different preferences and experiences of individuals and societal groups. Different understanding of adaptation policies and measures can impede and limit the effectiveness of an adaptation objective (Adger et al., 2007). Thus, the multiple interpretations of people among future climate change and adaptation to climate change is seen as an important indicator to investigate the social and cultural barriers to mainstreaming. This condition is present in the phase of understanding, because the understanding of mainstreaming climate adaptation could be influenced by social and cultural norms (Moser & Ekstrom, 2010).

Institutional and organisational

The last barrier of mainstreaming climate adaptation has its origin in the institutional and organisational domain of mainstreaming climate adaptation. A lack of political support from each governmental level and the competition between other policy objectives can barrier the adaptation to climate change. Also, the extent of coordination and actor collaboration for climate adaptation lies within this factor of mainstreaming. The institutional and organisational dimension is present during each phase of mainstreaming climate adaptation, because this element is based on an ongoing process of coordination and policy development within the mainstreaming process of climate adaptation (Uittenbroek et al., 2013).

2.4.3 The extent of mainstreaming

Mainstreaming indicators contribute to the understanding to what extent climate adaptation is mainstreamed into sectoral policies. This will serve as a basis for examining to what extent mainstreaming is present in each phase of the mainstreaming process of climate adaptation into the sectoral policy of urban planning. The four mainstreaming indicators of Kivimaa and Mickwitz (2006) function as a tool to analyse the extent climate adaptation is mainstreamed. The first indicator is *inclusion* and refers to the extent adaptation aspects are included in policy documents, either highlighted in specific climate adaptation challenges or more generally expressed. *Consistency* is the second indicator and focuses on the assessment of climate adaptation in a consistent and shared manner among stakeholders, policy documents and policies. Third, *weighting* indicates that priority is given for climate adaptation in relation to other policy objectives.

Finally, *reporting* is based on strategies for the implementation of climate adaptation. This is both expressed in *ex ante* and *ex post reporting*. *Ex ante reporting* contains strategies for the distribution of resources and responsibilities, while *ex post reporting* includes the evaluation of mainstreaming, which could stimulate the learning process of climate adaptation. *Inclusion* is required for the other three mainstreaming indicators to exist. As mentioned earlier, the four mainstreaming indicators are used to analyse the extent of mainstreaming into urban planning (Uittenbroek et al., 2013; Kivimaa & Mickwitz, 2006). As mentioned earlier, the four mainstreaming specify whether and to what extent adaptation is mainstreamed during each phase of the mainstreaming process.

In order to operationalise the extent of mainstreaming, a distinction between the four indicators need to be formulated. First of all, *inclusion* will concentrate on the awareness among stakeholders related to urban planning and how the awareness and the issue of climate adaptation is reflected in the decision-making process. The second indicator, *consistency* will be operationalised by investigating the extent to how each stakeholder together addresses the issue and shared understanding of climate adaptation and how these stakeholders jointly design policy for climate adaptation into the sectoral policy. Third, weighting will be operationalised by investigating how and if climate adaptation policy is prioritised into the policy domain of urban planning. *Ex ante reporting* will be examined through the allocation of resources for climate adaptation and responsibilities among stakeholders. The *ex post reporting* will be operationalised by exploring the evaluation on mainstreaming of climate adaptation in the different phases (Uittenbroek et al., 2013; Kivimaa & Mickwitz, 2006).

After all, the indicators of mainstreaming will determine the extent of mainstreaming climate adaptation into urban planning in the Zuidplaspolder.

The operationalisation table at the end of this section illustrates the theoretical concepts mainstreaming barriers and opportunities and the extent of mainstreaming, including the mainstreaming indicators. The concepts are further elaborated in variables and indicators in order to measure the theoretical concepts.

Table 2.1: Operationalisation table of the conceptual framework (Researcher, 2022).

Concepts	Variables	Indicator	Data collection
Mainstreaming barriers and opportunities	Physical and ecological	<ul style="list-style-type: none"> - The incapability of an ecosystem to changing climate conditions (Uittenbroek et al., 2013) - Institutions lack the experience and knowledge to manage challenges in the ecosystem (Folke et al., 2005) - Institutions do not lack the experience and knowledge to manage challenges in the ecosystem (Folke et al., 2005) 	<ul style="list-style-type: none"> - Interview questions - Document analysis - Focus groups

		<ul style="list-style-type: none"> - The urgency of the shift in the ecosystem functions as a opportunity for mainstreaming climate adaptation (Adger et al., 2007) - The ecosystem is able and capable to adapt to the changing climate conditions (Uittenbroek et al., 2013) 	
	Technological	<ul style="list-style-type: none"> - The costs of new technological adaptation measures are too costly to implement in the case study area (Adger et al., 2007) - Decision-making uncertainty about climate adaptation barriers technological innovations (Adger et al., 2007) - The available technological measures can be location specific and can create vulnerabilities for other areas - Technological resources are available to apply climate adaptation measures (Moser & Ekstrom, 2010) - New funding and investments in technology boost new technological measures (Mace, 2006) 	<ul style="list-style-type: none"> - Interview questions - Document analysis - Focus groups
	Financial	<ul style="list-style-type: none"> - The extent of financial capacity for the implementation of climate adaptation (Adger et al., 2007) - Low-income households that might lack financial capacity to adapt to climate adaptation (Adger et al., 2007) - Subsidy from higher level creates financial resources that strengthen climate adaptation (Uittenbroek et al., 2013) 	<ul style="list-style-type: none"> - Interview questions - Document analysis - Focus groups

	Informational and cognitive	<ul style="list-style-type: none"> - The extent of awareness among stakeholders regarding climate change effects (Adger et al., 2007) - The extent of individual behaviour to adapt to climate change uncertainty (Adger et al., 2007) - The presence of the 'value-action' gap, which barriers the adaptation to climate change (Adger et al., 2007) - The framing of climate change effects impacts the mainstreaming positively or negatively (Uittenbroek et al., 2013; Runhaar et al., 2018) - The presence of public support for climate adaptation (Uittenbroek et al., 2013) 	<ul style="list-style-type: none"> - Interview questions - Document analysis - Focus groups
	Social and cultural	<ul style="list-style-type: none"> - Multiple interpretations by individuals and societal groups regarding climate adaptation measures (Adger et al., 2007) - Different understanding about climate adaptation measures may impede the climate adaptation (Adger et al., 2007) 	<ul style="list-style-type: none"> - Interview questions - Document analysis - Focus groups
	Institutional and organisational	<ul style="list-style-type: none"> - The extent of political support from one or multiple governmental levels for climate adaptation (Uittenbroek et al., 2013) - Competition of other policy objectives (Uittenbroek et al., 2013) - The extent of public pressure for climate adaptation (Uittenbroek et al., 2013) - The extent of organisational culture and aspiration for adaptation measures (Uittenbroek et al., 2013) 	<ul style="list-style-type: none"> - Interview questions - Document analysis - Focus groups

		- The extent of coordination and collaboration between stakeholders for climate adaptation (Uittenbroek et al., 2013)	
The extent of mainstreaming	Inclusion	- The extent of climate adaptation includes the policy processes (Kivimaa & Mickwitz, 2006)	- Interview questions - Document analysis - Focus groups
	Consistency	- The shared understanding of climate adaptation among stakeholders, policy documents and policies (Kivimaa & Mickwitz, 2006)	- Interview questions - Document analysis - Focus groups
	Weighting	- Climate adaptation experiences priority and dominance in policy documents and policy domain (Kivimaa & Mickwitz, 2006)	- Interview questions - Document analysis - Focus groups
	Reporting	- Strategies are made to distribute resources and responsibilities (<i>ex ante</i>) (Kivimaa & Mickwitz, 2006) - Climate adaptation is evaluated among stakeholders to improve knowledge about climate adaptation (<i>ex post</i>) (Kivimaa & Mickwitz, 2006)	- Interview questions - Document analysis - Focus groups

As a result of the operationalisation table, the interview guides have been created (Appendices 1 and 2). The interview guides with corresponding interview questions are written in English and Dutch. Due to the background of the respondents, which are engaged in the Zuidplaspolder and the 'Vijfde Dorp', the interviews were executed in Dutch. All respondents from the interviews and focus group sessions were acquainted with the Dutch language. This resulted in a Dutch interview guide for this research. However, an English version of each interview guide has been designed for this research as well (Appendices 1 and 2). The focus group guide was formed after conducting the interviews. The focus group sessions were carried out in Dutch as well, due to the mother tongue of the participants. The focus group guide has been produced both in a Dutch as well as in an English version (Appendix 3).

3. Methodology

In this section the methodology of the research is explained. First of all, the research philosophy will be explained, followed by a description of the research design and strategy. After that, the method of the research with the data collection and analysis will be illustrated. Thirdly, the validity and reliability of the research will be elaborated upon. This part justifies the methodology and the data collection method of the research. Then, the ethics of the research are discussed. Finally, the case study selection is elaborated upon.

3.1 Research philosophy

The research philosophy characterises the research paradigm of the research and the researcher. From a research paradigm, the research design for this research can be determined. Plack (2005) defines a research paradigm as “a set of basic beliefs that represent a worldview, defines the nature of the world and the individual’s place in it” (Plack, 2005, p. 223). Guba and Lincoln (1994) developed four research paradigms. The research paradigms are positivism, post-positivism, critical theory and constructivism (Guba & Lincoln, 1994). In this research, constructivism applies to the research paradigm of the researcher. The paradigm of constructivism involves the vision that human behaviour in society must be interpreted by an individual's intentions, motives, values and norms. In this paradigm, no objective truth of the societal context in the world exists. The world is constructed in a reality that changes over time, due to social and context specific conditions (Plack, 2005).

As mainstreaming of climate adaptation is a process that entails multiple phases and different barriers and opportunities shaped by various stakeholders. It is important to realise that human behaviour, interests, combined with different interests, values and norms, are an important element within mainstreaming. This study aims to understand the different meanings and values of stakeholders. By examining this, each finding about this research can be regarded seen as subjective and no factual reality is present (Plack, 2005). For that reason, the research paradigm constructivism suited this research and the vision of the researcher.

3.2 Research design and strategy

The research design is a central element in the methodology section of academic research. It consisted of the research strategy, method and techniques that were utilised along the research (Van Thiel, 2014).

Firstly, more details on the research design will be given. The design of this research started by the focus of this research, including the aim, problem and questions. Then, an exploration of literature and a theoretical background of mainstreaming climate adaptation was conducted. Following the theoretical concepts of mainstreaming, the conceptual framework together with the operationalisation table was designed. This was the central guidance during the process of this specific study, because these guided the document analysis as first part of the data collection. Based on the conceptual framework, operationalisation table and findings from the document analysis, the interview guides were designed. These had a guiding role during the interviews. The focus group sessions were carried out based on the preliminary outcomes of the document analysis and interviews. These sessions verified and strengthened the data collection and analysis in order to answer the sub-questions and main research question. Finally, conclusions of this research are presented, including the answer on each sub-question and main research question.

For this research, a deductive type of research was held. A deductive approach is based on research that is examined on the basis of the conceptual framework and the operationalisation of that theoretical framework (Van Thiel, 2014). The five sub-questions and main research question were deductive in nature, because they were all designed based on the existing literature of mainstreaming climate adaptation.

According to Bryman (2016), five different types of research strategies exist. These are experimental design, cross-sectional design, comparative design, case study design and longitudinal design (Bryman, 2016). The research strategy for this research was case study research. A case study research is based on the study where a case in a 'real world setting' is examined. Also, case study research provides comprehensive and in-depth research into one specific unit of analysis (Harrison, Birks, Franklin, & Mills, 2017). However, disadvantages on case study research are present as well. Case study research is hard to generalise, it mostly requires a lot of time and outcomes can be too lengthy and detailed (Krusenvik, 2016). However, case study research as research strategy was considered the most suitable for this research. In executing a case study research, qualitative methods are often used to investigate a comprehensive and in-depth issue. The case study is analysed by a set of different qualitative techniques, which were document analysis, semi-structured interviews and focus groups. This combination of qualitative methods ensures more synergy and coherence between the data that has been collected (Harrison et al., 2017). Hence, case study research has been an adequate research strategy that suited the aim of this research. In this research, the case that was examined is the Zuidplaspolder. The qualitative methods and the case are specified later in this chapter.

Finally, case study research relies on three different purposes: exploratory, descriptive and explanatory (Yin, 1981). Exploratory research intends to examine a topic which has minor or no theoretical knowledge available. The research question often has an open-ended structure, due to the lack of pre-existing theories. The descriptive approach aims to describe and understand a phenomenon and its characteristics as well as its factors. Explanatory research has the purpose to investigate why an issue have resulted in specific conditions or behaviours. Often the causes and circumstances are analysis in explanatory research (Van Thiel, 2014). This case study research consists of a descriptive purpose, because mainstreaming with its characteristics, including barriers, opportunities and the extent of mainstreaming will be described and investigated, which is mainly based on the theoretical knowledge and concepts of mainstreaming climate adaptation into urban planning.

3.3 Data collection

Empirical data for the research was collected by a set of qualitative techniques and methods. The empirical data was collected by document analysis, semi-structured interviews and focus groups. The use of the three qualitative methods will be explained in the following paragraphs.

3.3.1 Document analysis

Document analysis entails a systematic approach for reviewing documents, such as policy documents. Some advantages of document analysis indicate that it is an important method for analysing a case. First of all, document analysis is a cost-effectiveness method due to the availability of the data. Also, the broad coverage of relevant information that can be used as data is an advantage of document analysis for case study research (Bowen, 2009). Two main disadvantages of document analysis as a method of data collection are the insufficient details for answering a research question and the biased selectivity of documents, which can be caused by an incomplete collection of (policy) documents (Bowen, 2009; Owen, 2014). In this research, document analysis was an appropriate tool for this case study research, due to examination of mainstreaming climate adaptation into urban planning. In this research, spatial and policy documents about urban planning and climate adaptation in the Zuidplaspolder have been analysed. The policy documents were collected via websites of the municipality Zuidplas, the province Zuid-Holland, the national government and other relevant stakeholders.

The following policy documents have been analysed and coded in this research:

- Bidboek: Integrale ontwikkeling Zuidplas (Gemeente Zuidplas, 2017)
- Convenant Klimaatadaptief Bouwen (Provincie Zuid-Holland, 2018)
- Bestuurlijke Overeenkomst (Gemeente Zuidplas, Provincie Zuid-Holland, & Grondbank RZG Zuidplas, 2021)
- Masterplan Middengebied (Gemeente Zuidplas, 2021b)
- MER Herziening provinciaal omgevingsbeleid: Middengebied Zuidplaspolder (Witteveen+Bos, 2022)

3.3.2 Semi-structured interviews

An interview is a suitable method for case study research. By a case study, two forms of interviewing are applicable. First of all, by an *open interview* the researcher asks for the respondents' vision on a particular topic. This is based on an open conversation between the researcher and respondent. An open interview is suitable for an inductive and exploratory research, or if the research has a small number of respondents. Secondly, a *semi-structured interview* is characterised by a topic list or a set of questions that the researcher would like to ask to the respondent (Van Thiel, 2014). Furthermore, semi-structured interviews can produce rich and detailed data that offers accurate insights into the characteristics of stakeholders and the phenomenon that is investigated (Fallon, 2008). Also, this form of interviewing can show and highlight different drivers of a phenomenon (O'Keeffe, Buytaert, Mijic, Brozović, & Sinha, 2016).

For this research, semi-structured interviews have been employed, because the outline of a semi-structured interview was an appropriate type of interview for this deductive research. The form of semi-structured interviews provided guidance to ask respondents specific and in-depth question in order to collect sufficient data that was useful for answering the sub-questions and the main research question. Furthermore, the possibility and flexibility for asking in-depth questions by semi-structured interviews to respondents underlined the appropriateness of this type of interviewing for this study. Thus, open interviews did not suit this deductive research (Van Thiel, 2014).

The semi-structured interviews followed after the document analysis. The interviews guided the research into more in-depth information about the case study. This was an extension of the gathered data from the document analysis. The interview guide of the semi-structured interviews, that was applied in order to create a guideline, was based on the operationalisation of the theoretical framework (table 2.1).

For the semi-structured interviews, various experts and policymakers have been interviewed. The semi-structured interviews that were carried out during this research were carried out via Microsoft teams, except for one interview with the respondent from Woonpartners (respondent 6). This interview was held physically at the office of Woonpartners. All interviews have been recorded with permission in advance. The interviews via Microsoft Teams have been video recorded and the physical interview with the respondent from Woonpartners have been audio recorded via the researcher's mobile phone. Ultimately, the recordings have been transcribed.

The transcripts of the semi-structured interviews have been used as empirical data in order to answer the main research question and sub-questions. These transcripts are numbered from 1 to 12 as visualised below in table 3.1. In chapter 4 on the case study, the transcript numbers are used in the same order when a respondent is referenced.

One respondent (respondent 7) is a senior policy officer of climate adaptation from the ministry of 'Infrastructuur en Waterstaat' (IenW), and this respondent gave insight into a broader view on mainstreaming climate adaptation throughout the Netherlands. During this interview, a different interview guide was used which was related to indirect stakeholders in the case study (Appendix 2). Data that has been derived from this respondent is discussed with separate paragraphs during each phase within chapter 4, the case study.

Table 3.1: List of respondents

Interview	Organisation	Function	Location	Date	Duration
1.	Regio Midden-Holland	Programme secretary spatial planning	Microsoft Teams	19-05-2022	60 min
2.	Provincie Zuid- Holland	Strategic policy advisor spatial development	Microsoft Teams	20-05-2022	60 min
3.	Provincie Zuid-Holland	Senior advisor climate adaptation and 3D planning	Microsoft Teams	27-05-2022	50 min
4.	Provincie Zuid-Holland	Regional account holder of Midden-Holland	Microsoft Teams	27-05-2022	60 min
5.	Hoogheemraadschap van Schieland en de Krimpenerwaard	Area manager	Microsoft Teams	31-05-2022	60 min
6.	Woonpartners	Manager of development, realisation and new real estate	Office of Woonpartners	01-06-2022	60 min
7.	Ministerie van Infrastructuur en Waterstaat	Senior policy officer of climate adaptation	Microsoft Teams	03-06-2022	60 min
8.	Gemeente Zuidplas	Programme manager sustainability & climate adaptation, and innovation manager	Microsoft Teams	09-06-2022	60 min
9.	Gemeente Zuidplas	Assistant project manager	Microsoft Teams	15-06-2022	60 min
10.	KuiperCompagnons	Urban development engineer, and project leader for policy document Masterplan Middengebied	Microsoft Teams	16-06-2022	50 min
11.	Gemeente Zuidplas	Coordinator directing team	Microsoft Teams	23-06-2022	60 min
12.	Mozaïek Wonen	Teamleader real estate development	Microsoft Teams	30-06-2022	60 min

3.3.3 Focus groups

The last qualitative method examined for this research was the use of focus groups. A focus group is an open discussion with a number of respondents (Van Thiel, 2014). The method of a focus group is a useful approach in order to investigate how the data collection, research results or a new policy will be experienced by experts or stakeholders (Breen, 2006; Van Thiel, 2014). Also, focus groups are a convenient method for generating new ideas and information. In focus groups different perspectives and experiences of respondents are formed together, which contributes to the data collection of a study (Breen, 2006). The different perspectives of respondents influence the dynamic of a conversation during a focus group. However, the respondents are mostly people with a similar background or expertise (Van Thiel, 2014). As well as the semi-structured interviews, the focus groups were executed via Microsoft Teams. Each focus group session has been recorded by video, with permission of the participants. This guaranteed that all conversations during the focus group were stored in order to transcribe and analyse the focus groups properly.

As mentioned earlier, focus groups can be used as a qualitative method to verify or improve the collected data originated from the document analysis and semi-structured interviews. This will provide triangulation and will strengthen the quality and validity of the collected empirical data (Van Thiel, 2014; Onwuegbuzie, Dickinson, Leech, & Zoran, 2009). Furthermore, triangulation is highly important in counteracting potential problems regarding the validity and reliability of a study, especially for a single case study research. In this manner, a diversified approach towards data collection has been selected, where a set of techniques have been applied (Van Thiel, 2014). As mentioned earlier, these qualitative techniques were document analysis, semi-structured interviews and focus groups.

During this research, three focus groups were held in order to validate and examine the preliminary data derived from the document analysis and semi-structured interviews. The attended participants of each focus group are schematically visible in table 3.2, 3.3 and 3.4. The first focus group was composed of two participants from the interviews and one expert from Sweco. The second focus group was carried out with attendance of three experts of Sweco, who are active within the domain of water and climate change. The last focus group was held with two experts of Sweco, who work within the field of urban planning.

In chapter 4 on the case study Zuidplaspolder, the transcripts of the focus groups as data source for this research are numbered in the following order of 13, 14 and 15. Transcript 13 refers to the focus group session with the participants with involved experts in the Zuidplaspolder (table 3.2). Transcript 14 indicates the focus group with the participants with water experts from Sweco, as visible in table 3.3. Transcript 15 refers to the focus group session with the participants with the urban planning experts from Sweco (table 3.4).

Furthermore, the listed questions including the powerpoint presentation with the preliminary analysis of the data were sent by email to the other respondents who attended the semi-structured interviews. These questions were sent to the respondents who did not participate in the focus group in order to increase data validity. The questions that were sent were four questions from the focus group guide (questions 2a, 2b, 3a and 3b), as shown in Appendix 3. These four questions of the focus group guide were the most relevant questions for answering the sub-questions and main research questions of the research. For that reason, these questions were sent to the respondents.

The information collected through this way was added to the collected information and data that was derived from the three focus groups. The responses by email from the respondents were collected in one document and analysed as well. The transcript number of this document is 16.

Table 3.2: Participants of the focus group with involved experts in the Zuidplaspolder

	Organisation	Function
1.	Sweco	Research intern
2.	Provincie Zuid-Holland	Regional account holder of Midden-Holland
3.	Mozaïek Wonen	Teamleader real estate development
4.	Sweco	Consultant water safety and climate adaptation

Table 3.3: Participants of the focus group with water experts from Sweco

	Organisation	Function
1.	Sweco	Research intern
2.	Sweco	Senior consultant water safety and planning
3.	Sweco	Consultant water and climate
4.	Sweco	Consultant water

Table 3.4: Participants of the focus group with urban planning experts from Sweco

	Organisation	Function
1.	Sweco	Research intern
2.	Sweco	Assistant project manager in urban development
3.	Sweco	Consultant urban planning and sustainability

3.4 Data analysis

3.4.1 Document analysis

In order to analyse the collected data from the various qualitative methods adequately, a transparent method of analysing was required. The document analysis was performed by highlighting and clustering the most relevant data that has been selected by the elements of the conceptual framework and operationalisation table. The operationalisation table (table 2.1) formed as the analysis framework for the document analysis as well as for the transcripts of the interviews and focus groups. These documents were analysed through the programme of Atlas.ti. This programme is a tool for coding and analysing texts as well as transcripts of interviews and focus groups (Smit, 2002). Also, the selected data originated from the documents were used to produce in-depth questions for the semi-structured interviews. This created more focused and specific questions for the semi-structured interviews and focus groups, which contributed to answering the main research questions and sub-questions.

3.4.2 Semi-structured interviews

The analysis of the transcripts from the semi-structured interviews were conducted through Atlas.ti as well. Within this programme, the transcripts were coded. Coding involves the process of subdividing and categorising collected data. Codes can ensure meaningful value of the transcribed data, due to the combination of coded data, which create synergies (Basit, 2003). The techniques of open, axial and selective coding have been performed in order to analyse and combine data together. Open coding refers to the step of conceptualising the data. In this step the data was broken up in smaller parts of the transcripts and were analysed in detail (Vollstedt & Rezat, 2019).

Then, axial coding includes the creation of relationships of concepts and categories. At last, the selective coding process is based on the theory making of all different concepts and categories that are constructed during the process of axial coding. The results from axial coding have been further investigated and elaborated upon. Finally, grounded data and theory retrieved from coding was used for this research. Grounded theory functions as a contribution to the reliability and validity of a qualitative research (Vollstedt & Rezat, 2019).

3.4.3 Focus groups

The data analysis of focus groups was based on the transcripts of each corresponding focus group. Each transcript of the focus group was coded by the software Atlas.ti as well. The focus groups were coded by the same analysis framework originating from the operationalisation table (table 2.1). Furthermore, all other respondents of the semi-structured interviews, who did not participate in the focus groups were emailed with the four questions regarding the first outcomes of the document analysis and semi-structured interviews. The collected mail replies were analysed as well with the programme Atlas.ti. This data was a useful source in addition to the focus groups. Especially important quotes, feedback, suggestions and confirmation, based on the powerpoint presentation with the preliminary findings from the document analysis and interviews, were highlighted and analysed. The data analysis of the focus groups resulted in an extension of the collected data from the document analysis and the semi-structured interviews.

3.5 Reliability and validity

Validity and reliability are two inseparable elements that verify the quality of the research. Reliability refers to the stability of a research. If a research has been repeated, stable outcomes and measures determine the reliability of the research. This is important in order to qualify the internal consistency of the research which has been repeated (Golafshani, 2003). In order to ensure a high reliability and stability for this research, full transparency with respect to the methodology and data results has been given towards each person who was involved in this research. The researcher has discussed the conceptual framework, the operationalisation table, the interview and focus group guides with the supervisors from the Radboud University and Sweco. Also, each step that was taken during the process of the research has been documented on paper and by audio or video if needed (e.g. in case of an interview). Finally, multiple research methods were used to strengthen the data. Data triangulation was applied in this single case study research in order to enhance research findings. In this way, reliability was tried to ensure by the researcher.

The validity of this research is another important aspect that ensures a higher quality and transparency of this study. Validity can be subdivided into two types. First of all, internal validity is based on the ability of the researcher to secure that the observed results are causal (Roe & Just, 2009). The empirical results in this research have been collected based on the conceptual framework and operationalisation table. Also, the researcher has presented their preliminary findings to experts in the focus group sessions. Furthermore, the remaining experts, who did not participate during the focus group sessions have been emailed with four questions regarding the preliminary findings. Both methods contributed to a higher internal validity (Van Thiel, 2014). Secondly, external validity refers to interaction between the results of the study compared to external factors, such as persons, times and settings. This is important, because the overall validity needs to be determined by the context in which the research outcomes has been applied (Roe & Just, 2009). According to Van Thiel (2014), the small number of cases in case studies can decrease the internal and external validity of case study research. To counter this issue, different methods have been applied to collect qualitative data. This has resulted in data triangulation. Data triangulation is achieved when different data sources, methods or operationalisations have been used (Van Thiel, 2014). The diversified approach of collecting data by executing document analysis, semi-structured interviews and focus group sessions helped to increase the external validity of the research.

3.6 Ethics of the research

During the process of this research, respondents have been interviewed in order to collect valuable data for the research. The data from the selected respondents is personal. For that reason, an ethical outline was given to cope with ethical challenges during the research. On ethical basis, the norm for this research was to secure anonymity and confidentiality. Confidentiality is based on two key principles. First, all information that is provided by a respondent will not be shared or discussed with others outside the research. Secondly, the presented results shall not lead to the identification of respondents. Anonymisation of respondents can contribute to the confidentiality of a research (Wiles, Crow, Heath, & Charles, 2008). During the process of this research, the transcripts, video and audio recordings were stored safely in a map on the laptop of the researcher. These data sources and documents will be shared confidential with the Radboud University and Sweco only, which was also mentioned during the beginning of each interview and focus group session.

Furthermore, the respondents have been kept anonymous throughout the whole process of this study, because this information was not relevant for the research. Also, the anonymity contributed to the confidentiality of the research, because the respondents felt more comfortable during the interviews and focus groups. For this reason, all respondents that were involved in this research have been referred by only their function or organisation in order to secure anonymity and confidentiality.

3.7 Case study selection

This research was based on a single case study research. A single case study research is based on the investigation of one specific context, group or phenomenon (Gustafsson, 2017). The lack of generalisation of the findings for a whole population is the most common critical note for conducting a single case study research (Mariotto, Zanni, & Moraes, 2014). Nevertheless, a single case study provides a better and more in-depth understanding, which contributes to a more extensive knowledge and theory production (Gustafsson, 2017). Hence, a single case study research can improve the solution for a collective problem that is situated in a social context (Barzelay, 1993). Also, single case studies are a valuable method to test a theory or to trace a process. A single case study research provides insights and substance for causal explanations that can be examined through the process-tracing of a new policy (Ulriksen & Dadalauri, 2016). Furthermore, single case study research offers a more precise understanding of the outcomes where a phenomenon occurred. Ultimately, this results in a higher reliability than a multiple case study (Mariotto et al., 2014). By applying different and multiple types of data collection and analysis, triangulation of the single case data can be ensured (van Thiel, 2014). At the end, the main goal of a single case study research is to contribute and strengthen the theoretical understanding of causal relations and explanations as well as to expand the knowledge about a specific case (Ulriksen & Dadalauri, 2016).

Eisenhardt and Graebner (2007) describe the importance of conducting a single case study research. They stress this by the following citation:

“Somewhat surprisingly, single cases can enable the creation of more complicated theories than multiple cases, because single-case researchers can fit their theory exactly to the many details of a particular case. In contrast, multiple-case researchers retain only the relationships that are replicated across most or all of the cases.” (Eisenhardt & Graebner, 2007, p. 30)

4. Case study Zuidplaspolder

4.1 Introduction

In this section, the case study area will be described. First, the history of the Zuidplaspolder will be outlined. This is followed by presenting the spatial context of the case area. Finally, the current situation of the case area in relation to climate adaptation will be discussed.

As mentioned earlier, the case that is investigated throughout this research is the Zuidplaspolder. The polder is located below sea level (6.76 below NAP) (Gemeente Zuidplas, 2012). The corresponding municipality is the municipality Zuidplas and the municipal office is located in Nieuwekerk aan den IJssel. Within the geographical area of the municipality Moerkapelle, Zevenhuizen, Nieuwekerk aan den IJssel and Moordrecht are located. The geographical area of the municipality Zuidplas is visible in figure 4.1.

In the Zuidplaspolder, the 'Middengebied' will be developed for urban planning in the Zuidplaspolder. This area is visualised in figure 4.2. The total surface of the 'Middengebied', which is located within the Zuidplaspolder, is 1100 hectares (Gemeente Zuidplas, 2021b). More details on the location of the 'Middengebied' are given in this chapter.



Figure 4.1: The geographical area of the municipality Zuidplas (Gemeente Zuidplas, 2021a).



Figure 4.2: The location of the 'Middengebied' (black line) in the Zuidplaspolder (Gemeente Zuidplas, 2021b).

Also, more detail will be given on the Zuidplaspolder in connection with the urban planning development the 'Vijfde Dorp'. This in order to provide an informational background about the case study.

4.2 History

The first local residents in the vicinity of the Zuidplaspolder lived along the riverbanks of 'de Hollandse IJssel' and 'de Rotte'. During the 15th century the local population grew and wet surfaces turned into soil subsidence. Due to changing conditions of the land, agriculture was not possible anymore in the 16th century. Livestock breeding replaced the industry in the Zuidplaspolder (Gemeente Zuidplas, 2021b).

The Zuidplaspolder is a relatively new reclaimed land surface. By the lead of Willem I, the Dutch government financed the reclamation of the Zuidplaspolder. The reclamation was primarily financed by the profit on coffee, tea, sugar and indigo. This financial support from the state made the Zuidplaspolder the first reclaimed polder which was financed nationally. In 1825, King Willem I assigned a commission to coordinate the reclamation. The 'Commissie van Beheer en Toezigt' was coordinated by the engineer Jan Anne Beijerinck. Due to the Belgian Revolution, the reclamation was put on hold between 1830 and 1835. Finally, by 1839 the Zuidplaspolder was established through the process of impoldering the lake into new developed land. The reclamation of the Zuidplaspolder is illustrated in figure 4.3. The Zuidplaspolder turned into a new piece of land with a total surface of 4200 acres (Gemeente Zuidplas, 2010).

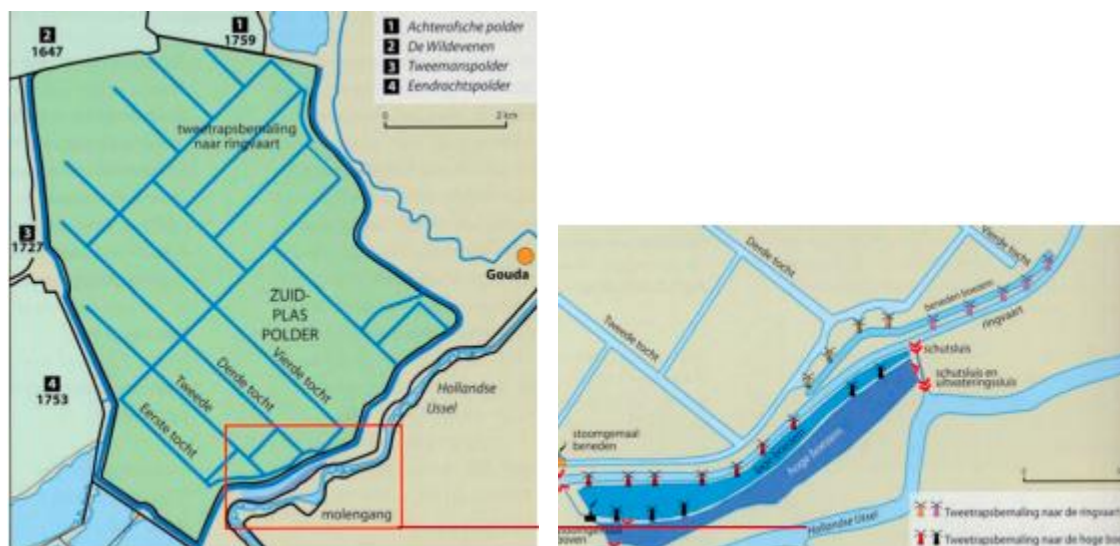


Figure 4.3: A schematic map of the reclamation of the Zuidplaspolder (Gemeente Zuidplas, 2010).

During the 19th and 20th century population, welfare and mobility rose regionally. First, the railway track between Utrecht-Gouda-Rotterdam was placed through the Zuidplaspolder. Then, the railway track between Gouda and The Hague was built in the Zuidplaspolder. At last, the highways A12 and A20 and the railway track between Gouda and Alphen aan den Rijn were constructed and run through the Zuidplaspolder. The Zuidplaspolder functions as an important infrastructural junction for the Randstad (figure 4.4). At the end of the 20th century, business areas start to appear and the greenhouse cultivation industry emerges (Gemeente Zuidplas, 2021b).

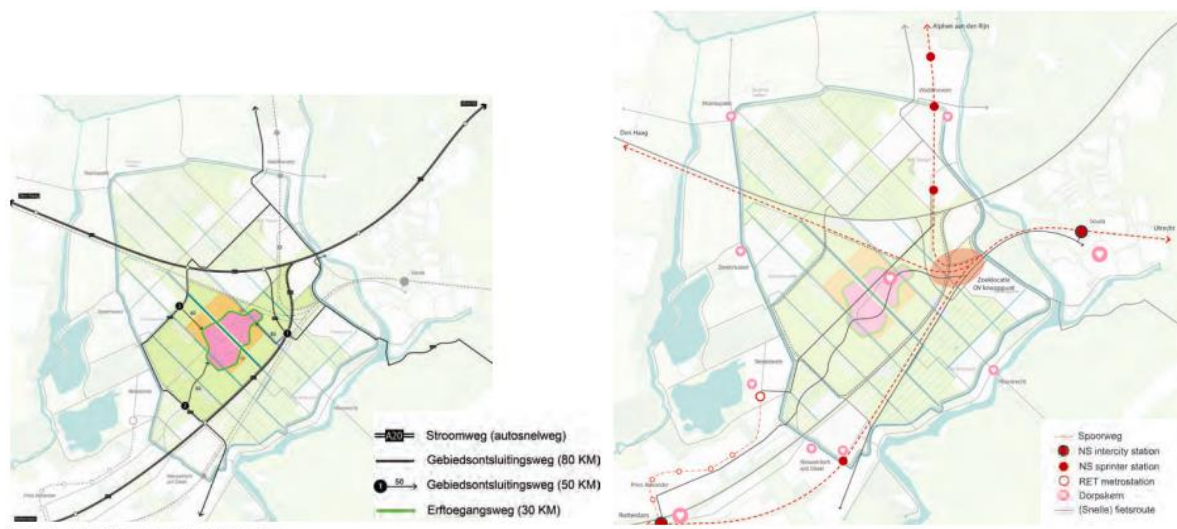


Figure 4.4: The roadway and railway network in the Zuidplaspolder (Gemeente Zuidplas, 2021b).

4.3 Policy context of the Zuidplaspolder

Since 2004, the Zuidplaspolder has been selected as a new location for housing in the ‘Nota Ruimte’ (Provincie Zuid-Holland, 2009; Gemeente Zuidplas, 2017). This was planned due to expected urbanisation in the south part of the Randstad. Between 2008 and 2010, the municipality of Nieuwekerk aan den IJssel, Zevenhuizen-Moerkapelle and Moordrecht drafted multiple zoning plans for the Zuidplaspolder, relating to the development of housing, business areas and horticulture. Most of these plans for residential use have been nullified by the division of administrative jurisdiction of the Council of State (Gemeente Zuidplas, 2017; Witteveen+Bos, 2022). Due to this event and the financial crisis, plans for housing development in the Zuidplaspolder stagnated. In 2010, the municipality Zuidplas emerged from assembling the three former municipalities (Gemeente Zuidplas, 2017). A new possibility to proceed with a plan for the new area development in the Zuidplaspolder was one of the reasons for this consolidation (Witteveen+Bos, 2022).

Between 2006 and 2011, the Grondbank RZG Zuidplas bought 300 acres of land for the urban development (Gemeente Zuidplas, 2017). The Grondbank RZG Zuidplas is a public cooperation between the province Zuid-Holland, the waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard, the municipality of Rotterdam, Zoetermeer, Gouda and Zuidplas (Provincie Zuid-Holland, 2009; Gemeente Zuidplas, 2021b). Another cooperation that has been established in order to boost the development of the Zuidplaspolder was the ‘Regionale Ontwikkelingsorganisatie (ROZ)’. The ROZ was responsible for the quality and the costs and benefits of the area development in the Zuidplas. However, this cooperation was dissolved in 2016 (Gemeente Zuidplas, 2021b).

The urbanisation strategy for the cooperation RZG Zuidplas in the ‘Nota Ruimte’ has been developed in the ‘Interregionale Structuurvisie 2010-2030’ (ISV). The ISV contains decisions and agreements on urban development. The ‘Intergemeentelijk Structuurplan Zuidplas’ (ISP) is an extension of the ISV and includes all developments in the Zuidplaspolder, with a particular focus on the urban development between 2010-2020 (Provincie Zuid-Holland, 2009).

In the policy document ‘Bestuurlijke Overeenkomst: Ontwikkeling Middengebied Zuidplaspolder’ the coordination between the municipality Zuidplas, province of Zuid-Holland and ‘Grondbank’ RZG Zuidplas regarding public proceedings and agreements for the Zuidplaspolder, is specified. In this document the municipality Zuidplas is assigned as responsible organisation to realise the new houses in the Zuidplaspolder. The ‘Vijfde Dorp’ is the new town that is intended for the urban planning development in the Zuidplaspolder. Agreed here is that 4.260 houses will be constructed by 2031. These 4.260 houses will be built in the centre of the ‘Vijfde Dorp’, which is called the ‘Kreekrugdorp’ (figure 4.5 & figure 4.6). The remaining houses will be built after 2031, in the surrounding areas ‘watertuinen’ of the ‘Kreekrugdorp’, which is visualised in figure 4.6.



Figure 4.5: The Zuidplaspolder (green), location of the ‘Middengebied’ (red) and the ‘Kreekrugdorp’ (blue) (Bayer, 2021).



Figure 4.6: The 'Middengebied', with the 'Vijfde Dorp' in the municipality Zuidplas (Gemeente Zuidplas, 2021b).

In total, 8.000 houses will be realised by support from the municipality and other relevant stakeholders. Of these 8.000 new houses 30% of the houses will be built for rent in the social housing segment (low-income segment). And 50% of the 8.000 houses will be constructed in the sector of affordable housing. This affordable housing sector constitutes rental housing for the medium-income segment. The affordable housing is limited by a rate of 325.000 euro. The rest of the newly built houses will be reserved for the free housing market (Gemeente Zuidplas et al., 2021).

Within the Zuidplaspolder, the area called the 'Middengebied' is reserved as an area for the new urban planning project. This 'Middengebied' is located between Nieuwekerk aan den IJssel, Moordrecht, Zevenhuizen and Moerkappele. Also, the location of the 'Middengebied' is surrounded by the highways A20 and A12, provincial road N219 and the railway Gouda – Den Haag. As mentioned earlier, the lowest point in this polder is of 6.76 below NAP. This area, however, is not included in the 'Middengebied' as a new development area, due to the weaker soil structure based on peat (Commissie voor de MER, 2021).

4.4 Underground layer

The underground layer of the Zuidplaspolder is under pressure due to soil subsidence and salty water seepage. This process has increased through the impact of climate change. Higher water levels in the Zuidplaspolder are required to prevent further subsidence and more seepage in the polder (Gemeente Zuidplas, 2021b). The municipality, in cooperation with the waterboard and province, has chosen to locate the new urban development of the 'Vijfde Dorp', on the 'Kreekrug' (figure 4.7 & figure 4.8). This area of the Zuidplaspolder is qualified as the strongest underground layer in order to cope with (future) soil subsidence and water seepage [2,5,10]. Characteristically, this 'Kreekrug' is located on a higher soil system than the lowest point of this polder of 6.76 below NAP, which is located closely. The underground layer, in combination with the water system, in the Zuidplaspolder and the corresponding 'Middengebied' is playing a crucial role for the spatial planning of the area (Gemeente Zuidplas, 2019).

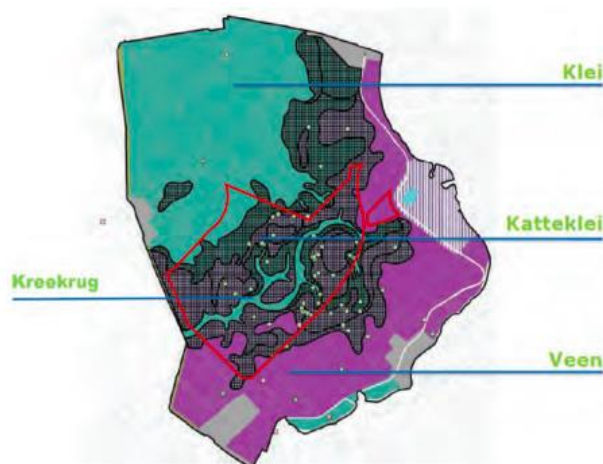


Figure 4.7: The underground layer of the Zuidplaspolder (Gemeente Zuidplas, 2021b).



Figure 4.8: The 'Kreekrug' (green) in the Zuidplaspolder (Gemeente Zuidplas, 2019).

4.5 Current situation in the Zuidplaspolder

The 'Kreekrug' has a central position throughout the location of the town. However, the Zuidplaspolder is a vulnerable polder that is exposed by soil subsidence, salinisation, salt water seepage and sea level rise (Gemeente Zuidplas, 2021b). Currently, the municipality and involved stakeholders, such as the province Zuid-Holland, Hoogheemraadschap van Schieland en de Krimpenerwaard and third parties are working on the environmental impact assessment (milieueffectrapportage) of the 'Vijfde Dorp' on the area. During this environmental impact assessment, a suitable environmental impact report will be selected and developed for the 'Vijfde Dorp'. This report is a prelude to the zoning plan of the 'Vijfde Dorp'.

4.6 Understanding phase (Q4 2017 – Q2 2021)

In the following sections 4.6, 4.7 and 4.8, the results from this research will be presented. The three phases of mainstreaming climate adaptation will be discussed separately. The three phases are the understanding, planning and managing phase (Moser & Ekstrom, 2010). These phases conform to the conceptual framework and designed operationalisation of this research. At each phase in this section, a brief introduction with informational background is presented. After that, the extent of mainstreaming is expressed by the four mainstreaming indicators of Kivimaa and Mickwitz (2006). Then, the mainstreaming barriers and opportunities will be highlighted, which will give a more detailed overview of mainstreaming throughout that corresponding phase. Furthermore, one respondent (respondent 7) is a senior policy advisor from the ministry of IenW, who answered also in a broader context on mainstreaming climate adaptation into urban planning in the Netherlands. This additional data gave insight into mainstreaming barriers and opportunities as well. As mentioned earlier, data from respondent 7 has been highlighted into a separate paragraph throughout the different mainstreaming phases. Next, other identified mainstreaming barriers and opportunities within a phase are discussed. The other identified mainstreaming barriers and opportunities are followed up by the outcomes of the focus groups. These focus groups have been used in order to strengthen the quality of the empirical data and create a more in depth understanding of the data. Finally, a summary, together with a table of the corresponding barriers and opportunities in the Zuidplaspolder, is presented at the end of each phase on mainstreaming climate adaptation.

In the understanding phase of the 'Vijfde Dorp', different stakeholders have played a role in discussing and initiating the development of the new town. In 2017, the municipality Zuidplas published the 'bidboek: Integrale ontwikkeling Zuidplas'. This document focused on the future development of the Zuidplaspolder. The province Zuid-Holland agreed upon the proposed vision of the municipality and initiating dialogues between the municipality and the province started to unroll (Witteveen+Bos, 2022). From June to October 2017, meetings and collaborations began to evolve between the municipality Zuidplas, the province Zuid-Holland and the municipality Rotterdam. To create a larger understanding for the ambition of the municipality Zuidplas, workshops were held with the municipal council. Additionally, conferences took place during October and November 2017 for inhabitants, entrepreneurs and social organisations. All meetings between stakeholders served as contributions for the ambition and the vision document 'bidboek' of the municipality (Gemeente Zuidplas, 2017). As an extension on the 'bidboek Integrale ontwikkeling Zuidplas', the 'concept-ontwikkelingsvisie' for the Zuidplaspolder was designed by the municipal board. During the process of the 'concept-ontwikkelingsvisie' the content of the vision document has been discussed with different stakeholders, varying from the province Zuid-Holland to a participating session with all inhabitants of within the municipality Zuidplas. Themes as soil subsidence and climate adaptation were present both within this document as well as at workshops. Since then, the waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard began to discuss the urban development of the Zuidplaspolder with the municipality (Gemeente Zuidplas, 2019).

The 'concept-ontwikkelingsvisie' was designed and made available in June 2019 by the municipal council. Since then, the 'Masterplan Middengebied' started to develop. The masterplan has been written and composed by KuiperCompagnons and the municipality Zuidplas, together with administrative stakeholders. The administrative stakeholders were: Province of Zuid-Holland, municipality Rotterdam, municipality Gouda, municipality Waddinxveen, waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard and Grondbank RZG Zuidplas. In the masterplan, visions, ambitions and input of stakeholders have been integrated in order to develop an extensive plan for the development of the 'Vijfde Dorp'. During the process of the masterplan, three consecutive workshops were organised. The first workshop was centred around collective ideas and ambitions between the stakeholders. Discussions about the vision and structure of the masterplan characterised the second workshop. During the third workshop, the concept version of the masterplan was revised. In the three workshops, ambitions of stakeholders were discussed interactively. Climate adaptation was one of these ambitions that has been discussed. After this process the masterplan was developed and published and agreed by the municipal council (19th May 2021) (Gemeente Zuidplas, 2021b; Gemeente Zuidplas, 2021c). From this moment onwards, the understanding phase of this research developed into the planning phase. This is because the masterplan encompasses the first agreed norms and framework for the development of the 'Vijfde Dorp', including the adaptation to climate change (Gemeente Zuidplas, 2021c). In other words, agreements were made based on the adaptations options that were provided (Moser & Ekstrom, 2010). After the completion of the 'Masterplan Middengebied', a new phase of planning emerged where the process of the 'Milieueffectrapportage' (MER) started.

4.6.1 The extent of mainstreaming

During the understanding phase, the extent of mainstreaming climate adaptation can be assessed by the four mainstreaming indicators (Uittenbroek et al., 2013; Kivimaa & Mickwitz, 2006). In this phase of the Zuidplaspolder, *inclusion* was found during the first initiating steps in the policy processes of the development. The participation and collaboration of different stakeholders created synergies and shared knowledge about the vision of urban planning with climate adaptation in the Zuidplaspolder. However, fragmentation and conflicting arguments by experts about the best possible future for the polder regarding climate change did exist during this phase.

Multiple studies by external and independent organisations and research institutes, such as Deltares, Witteveen+Bos and KuiperCompagnons were fulfilled in order to analyse the condition and status of the polder in relation to the future town the 'Vijfde Dorp' including climate change. The agreements that were designed to address climate adaptation into the new housing development shows that *consistency* is present among involved stakeholders within the domain of the Zuidplaspolder. The engaged stakeholder put *weight* on climate adaptation by prioritising the underground layer, soil- and water system for the urban planning of the 'Vijfde Dorp'. Based on the extent of mainstreaming climate adaptation, it has been assessed.

4.6.2 Social and cultural

The collaboration between the municipality Zuidplas, the province Zuid-Holland and the waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard played a crucial role in developing a well-thought-out understanding about the area of the Zuidplaspolder in relation to climate adaptation for the 'Vijfde Dorp'. The collective understanding about the position of the Zuidplaspolder within the polder system and on the local underground layer system formed the starting point for the development of the polder [2,5,8]. The understanding among these involved stakeholders has been based on trust, shared knowledge and proactive collaboration from the start of 2017. The municipality Rotterdam, province Zuid-Holland together with the municipality Zuidplas intensively cooperated to create a renovating understanding and perspective about the Zuidplaspolder (Gemeente Zuidplas, 2017). Additionally, the municipality is expecting a formal agreement on collaboration and commitment during the planning phase of the urban development [8,10]. All in all, the commitment and collaboration in the early stage of this phase can be seen as a *social and cultural opportunity* for mainstreaming climate adaptation.

Nevertheless, the exchange of ideas on the future view of the polder has not resulted in a unanimous understanding and interpretation among internal and external stakeholders. The development of a new town in the low-lying polder in the Netherlands resulted in internal and external conflicting discussions between experts. Each organisation experienced diverse opinions about the idea and thoughts of a new town located in the Zuidplaspolder [4]. This quote shows the existence of multiple visions on the Zuidplaspolder: *"It is true that the discussions between the proponents and opponents are becoming fiercer, there has never been an undivided unity in terms of thinking about the Zuidplaspolder"* [4]. Water experts at the waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard held discussions internally about the future for the Zuidplaspolder, based on the water system, soil subsidence, ecological quality and water safety [11]. Furthermore, within the province of Zuid-Holland, many debates were held about the Zuidplaspolder in terms of climate change and new possible locations for new housing stocks. These discussions are important to acknowledge the different visions and thoughts about climate adaptation, a polder system, urban planning and mainstreaming climate adaptation. On the one hand, experts at the province Zuid-Holland advocated the development as it is the shared financial holder of the development area. On the other hand, part of the province was against the development, due to the current quality of the polder, including the soil subsidence and water safety [10]. This *social and cultural barrier* continued during the planning phase as well, but mostly influenced the understanding phase.

4.6.3 Informational and cognitive

Since the beginning of the understanding phase with respect to the urban development of the 8,000 houses in the 'Vijfde Dorp', awareness on climate adaptation has played a crucial role. During this phase, climate adaptation had a fundamental position during the first discussions and meetings between stakeholders, such as the municipality and the province [4]. Especially, awareness for climate adaptation increased when the development restarted after the economic crisis. Climate change effects became more apparent than before, which has increased awareness among stakeholders. Also, the growth in awareness for climate adaptation was based on the variety of studies and analysis done by different parties. For example, water quality, flooding prognoses and soil subsidence studies resulted in more awareness among stakeholders.

The studies were carried out by the waterboard Hoogheemraadschap Schieland en de Krimpenerwaard, Deltares and KuiperCompagnons respectively (Gemeente Zuidplas, 2021b). A shift in understanding and awareness about climate adaptation did evolve as well. People are willing to pay more for a more sustainable house now [6]. The municipality is aware of this shift and seeks to improve the extent of awareness of people by questioning what kind of houses and towns are currently demanded [11]. This shift is highlighted by the following quote:

“Yes, and it perhaps applies more to our generation, than to the slightly older generation, but it did lead to the conversation regarding that houses probably will be sold from seven metres below sea level now. But will a younger person in such a place that is so deep still dare make such an investment in 10 years’ time. We have conversations like that as well regarding the changing awareness of people.” [11]

In this research, this is an *informational and cognitive opportunity* during the understanding phase of mainstreaming. The awareness has positioned climate adaptation as an important component within the urban development process of the ‘Vijfde Dorp’.

Besides that, the extent of individual behaviour for climate adaptation varies across the case study and the stakeholders. For example, a distinction between public and private parties on climate change became noticeable. Dike strengthening, such as ‘Dijkkring’ 14, for sea level rise and fluvial flooding is seen as an issue for the Netherlands, but not for the Zuidplaspolder. Private stakeholders foresee a gap between the understanding and future implementation of sustainable methods for new housing [6]. Public stakeholders, such as the municipality and the waterboard are convinced that adaptation in the Zuidplaspolder and in the ‘Vijfde Dorp’ is mandatory in order to adapt to climate change impacts over time [5,8]. This variety in opinions about climate change in the case study is an *informational and cognitive barrier* for mainstreaming climate adaptation.

4.6.4 Institutional and organisational

The involved partners for the Zuidplaspolder and the ‘Vijfde Dorp’ experienced a lot of media and public attention, due to the location in the lowest polder of the Netherlands. The media attention fluctuates from academic experts to media platforms that have written about the Zuidplaspolder as a polder which cannot handle urban planning due the rising climate change effects and soil subsidence. The public and media attention on the Zuidplaspolder has functioned as a boost to spend more attention to climate adaptation [3,9]. On the other hand, the attention from media and external stakeholders was experienced as a barrier. Respondents mentioned that the media and public attention hindered internal stakeholders from their work due to media interviews and discussions [8]. This time was not spent on the internal development of the ‘Vijfde Dorp’, which ultimately barriered the process of the development. The public and media attention can be seen as an *institutional and organisational opportunity* as well as *barrier* for the understanding phase.

The governmental stakeholders, the province, municipality and the waterboard have cooperated along the first workshops and meetings in 2017. This clearly indicates that climate change related impacts have been an important theme along the process of the understanding phase [4,8]. Respondents even made clear that a development without climate adaptation is no option for the Zuidplaspolder and the 'Vijfde Dorp' [8]. This continuous collaboration between the involved partners points out how important a well understood vision on climate adaptation has been an *institutional and organisational opportunity* for the Zuidplaspolder during the understanding phase.

During the collaboration, the soil- and water system has been a guiding principle throughout the understanding phase. Between the involved partners, the soil- and water system has been experienced as a dominant theme during the conversations, workshops and vision documents. In the beginning of this phase analysis and studies have been performed about the underground layer system of the Zuidplaspolder. Also, the water system currently is not sustainable for future climate change effects. These physical elements of the Zuidplaspolder have been important on institutional and ecological level in order to build a collective understanding about building a new town based on the quality of the soil- and water system [2,4,5,6,8]. This resulted in an *institutional and organisational/physical and ecological opportunity* to incorporate climate adaptation throughout the first phase of the development. This indicates that the physical and ecological part of mainstreaming already existed during the understanding phase of the case study. The following quote illustrates this:

"In the sense that if you're going to build here, you must do it at the right place. Because also in such a polder as this one variation exist, because of the soil and the underground water system. The soil is certainly not homogenous here, so it is slightly different everywhere. You must take a good look at the soil structure and take that as a starting point for this development. That has always been the basis of the story." [5]

During this first phase, some important agreements were signed between stakeholders. In October 2018, the 'Covenant Klimaatadaptief Bouwen' was signed between multiple stakeholders within the Province of Zuid-Holland, including the municipality, corporations, waterboards, nature organisations and project developers. On a formal basis, this agreement has been a first step on institutional level to cooperate for climate adaptation in the urban planning of Zuid-Holland (Provincie Zuid-Holland, 2018). The signing of the municipality Zuidplas for this agreement means that confirmation to it is strictly desired [2,8,12]. This is an *institutional and organisational opportunity* for mainstreaming climate adaptation in the understanding phase of the 'Vijfde Dorp'.

The respondent from the ministry IenW, who primarily focuses on climate adaptation into the urban planning sector of the Netherlands argues that awareness for climate adaptation has increased during the past five years. As urgency and awareness for climate adaptation was an issue and underestimated element, nowadays a shift has emerged towards the domestic domain. Awareness has been more institutionalised in different programmes and projects, such as 'Deltaprogramma Ruimtelijke Adaptatie' [7]. This is an *informational and cognitive* as well as an *institutional and organisational opportunity* for mainstreaming climate adaptation into urban planning on national level.

The respondent also explained that climate adaptation is still a new theme within urban planning. As the 'Convenant Klimaatadaptief Bouwen' has been signed by stakeholders within the province of Zuid-Holland, the province Utrecht and 'Metropoolregio Amsterdam' (MRA) designed similar agreements. These agreements do not include any form of law and regulation in order to strengthen the mainstreaming of climate adaptation on a regulatory basis. The respondent states that if climate adaptation is still based on agreements and voluntary commitment, climate adaptation will be an uncertain objective throughout the planning and managing phase of an urban planning project. Otherwise, climate adaptation will not experience priority compared to other objectives which are binded by norms, values and obligations [7]. This can be seen as an *institutional and organisational barrier* for mainstreaming climate adaptation into urban planning.

4.6.5 Other identified mainstreaming barriers and opportunities

As mentioned earlier, the 'Convenant Klimaatadaptief Bouwen' was signed between stakeholders during the understanding phase. The agreement does not hold any form law and regulation for climate adaptation into urban planning. During the understanding phase, climate adaptation has been discussed, initiated and secured based on a set of conditions. These conditions are not bounded on legal norms. No further use and implementation of (a part of) the conditions during the planning and managing phase is legally possible (Provincie Zuid-Holland, 2018) [5,10]. As mentioned earlier, this mainstreaming *barrier* might be a crucial and uncertain issue regarding the planning and managing phase.

4.6.6 Focus groups

The focus group sessions gave a clear insight into the mainstreaming barriers and opportunities as well. The focus groups were held to test the outcomes from the document analysis and interviews. The results from these sessions will enlighten mainstreaming climate adaptation on local level about the Zuidplaspolder and a broader, national level as well.

A dominant mainstreaming barrier that was given and discussed during each focus group was awareness for climate adaptation. Based on the focus group sessions, awareness is not at the level that will be sufficient to constantly mainstream climate adaptation during the understanding phase of an urban planning project [13,14,15]. Due to the uncertainty of climate change effects, the respondents clearly indicated that the inclusion of climate adaptation in the understanding phase is sometimes lacking.

On an individual level, a lacking awareness and knowledge about climate change effects and climate adaptation barriers the mainstreaming of climate adaptation during the understanding phase as well. In the focus group with experts from the case area Zuidplaspolder, responsibility from individuals is an important element to mainstream climate adaptation. The respondents clarified that climate adaptation on an individual level could have an impact on reducing the effect of climate change. One respondent suggested that people could better choose a garden with grass instead of a paved garden to increase water infiltration [13].

To advance mainstreaming climate adaptation on informational and cognitive terms, an improvement on knowledge about climate adaptation during the understanding phase can enhance mainstreaming [14,15]. Especially in smaller municipalities, knowledge on climate adaptation from experts that are willing to take an initiating and promoting role regarding climate adaptation into urban planning could strengthen mainstreaming climate adaptation during the understanding phase [15].

The focus group sessions clarified and amplified the need for policy and regulation during the understanding phase, where initiating and first communication about climate adaptation into urban planning unfolds. Based on the focus group session with experts from the case study, ambition and attention are present among the municipality Zuidplaspolder and the 'Vijfde Dorp'. However, without law and regulation for climate adaptation into urban planning from the start, certainty that climate adaptation will be mainstreamed into the planning and managing phase is not guaranteed. Based on the focus group sessions, law and regulation on climate adaptation into urban planning will increase the value of climate change effects during the understanding phase [13,14]. Furthermore, during the focus group sessions it was mentioned the 'Convenant Klimaatadaptief Bouwen' is not legally binding for stakeholders. This agreement as well as general regulation for climate adaptation, could obstruct the realisation and implementation of climate adaptation in a later phase during the planning process [13,15].

4.6.7 Conclusion understanding phase

The understanding phase of mainstreaming climate adaptation into the urban planning of the 'Vijfde Dorp' in the Zuidplaspolder has been characterised by different barriers and opportunities which evolved during this phase. Since the start of this development, different understandings and perspectives between experts have been present. Between stakeholders and internally at different stakeholders, questions and discussions were at place. During the understanding phase, media and public attention did unfold, due to the combination between the low-lying polder with interrelating soil and water conditions, and the increasing knowledge and impact of climate change. This attention and discussion developed through this phase on a contemporary basis. Stakeholders who were directly involved in the development of the 'Vijfde Dorp' in the Zuidplaspolder contributed to a collaborative understanding and commitment of the development in combination with climate adaptation. Also, awareness for climate adaptation rose hand in hand with the collaboration between the partners of the 'Vijfde Dorp'. The parties that are engaged in the development are aware of the (future) conditions, due to existing research and analysis by multiple research institutions and organisations. However, on an individual level, inhabitants might lack awareness of climate change and adaptation measures, due to a lack of interest.

Throughout the understanding phase, soil and water have been a guiding principle. This theme had a central position during workshops, discussions, initiating projects and policy documents, such as the 'bidboek'. In the 'Masterplan Middengebied', the soil- and water system had a central position for the development. Furthermore, the current soil- and water system were not capable to respond to future climate change. A shift in the ecosystem is required, based on the respondents. Due to the overall outcome, mainstreaming climate adaptation was *consistent*, because a shared understanding was found among involved stakeholders based on the collective commitment to plan for an urban area that is climate adaptive towards climate change impacts of sea level rise, pluvial and fluvial flooding.

In table 4.1 an overview is provided on the mainstreaming barriers and opportunities that appeared during the understanding phase in the Zuidplaspolder.

Table 4.1: An overview of mainstreaming barriers and opportunities during the understanding phase in the Zuidplaspolder.

Mainstreaming barriers	<u>Social and cultural</u>	Different perspectives from stakeholders on the Zuidplaspolder
	<u>Informational and cognitive</u>	Individual behaviour for climate adaptation lacks
		Distinction between private and public stakeholders regarding climate adaptation
	<u>Institutional and organisational</u>	Media and public attention
	<u>Other identified barriers</u>	A lack of law and regulation for climate adaptation and related agreements
Mainstreaming opportunities	<u>Social and cultural</u>	Collective understanding and commitment among involved stakeholders
	<u>Informational cognitive</u>	Awareness and analysis about the area
	<u>Institutional and organisational</u>	Media and public attention
		Collaboration between province Zuid-Holland, municipality Zuidplas and Hoogheemraadschap van Schieland en de Krimpenerwaard
		‘Convenant Klimaatadaptief Bouwen’
		Soil- and water guiding principle (<i>physical and ecological too</i>)

4.7 Planning phase (Q2 2021 – Q1 2024)

The planning phase started in May 2021 and will continue through Q1 2024. In May 2021, the municipal council signed the masterplan of KuiperCompagnons and the municipality Zuidplas. This event is a form of decision-making, which characterises the phase of planning. In July 2021, the document 'Bestuurlijke Overeenkomst' was signed between the municipality Zuidplas, province Zuid-Holland and the 'Grondbank RZG Zuidplas'. This document entails all agreements on the 8.000 houses, business, facilities, greenery and infrastructure (Witteveen+Bos, 2022).

These developments function as the start of the planning phase, which is represented by policy- and decision making (Moser & Ekstrom, 2010). On October 20th 2021, the 'Commissie voor de MER' published their environmental impact assessment about the Zuidplaspolder, specifically focused on the 'Vijfde Dorp'. An environmental impact assessment is an obligatory aspect for the development of a zoning plan (Commissie voor de MER, 2021). The MER for the 'Vijfde Dorp' has been extended into four different themes. These four themes are currently being investigated by the municipality Zuidplas and involved stakeholders. The four different themes are: completely climate adaptive, green- and blue structure, sustainable mobility, and circular and energy neutral (Witteveen+Bos, 2022). Two of the four themes are climate change related, which are the themes of completely climate adaptive and green- and blue structure. This clearly indicates the influence of climate change throughout the planning phase and this development of the 'Vijfde Dorp' as a whole [15]. After each theme of the MER is investigated and analysed, the four themes will be analysed together and set up into one applicable MER document (*voorkeursalternatief*). During this process, meetings, discussions and decision-making takes place within the municipality on the MER documents and themes as well as on the future zoning plan of the 'Vijfde Dorp'. The suitable MER document will function as a fundamental basis for the design and development of the zoning plan for the 'Vijfde Dorp' (Gemeente Zuidplas, 2022).

After the completion of the MER, the zoning plan will be further exploited by the municipality. Based on the planning of the municipality, the zoning plan will be developed from Q3 2022 until Q3 2023. Afterwards, the final zoning plan will be reported. Then, the municipality will discuss it and concluding decisions will be made. In Q4 2023 the zoning plan will be finished, which will result in a new phase of the 'Vijfde Dorp'. In 2024 the first constructions, such as pre-loading and first foundations activities, are planned for the implementation of the 'Vijfde Dorp' by the municipality Zuidplas (Gemeente Zuidplas, 2022). For that reason, the planning phase of this research ends in Q1 2024, and the managing phase will proceed.

4.7.1 The extent of mainstreaming

During the planning phase climate adaptation is mainstreamed in a *consistent* way, because the involved stakeholders show a shared understanding and ambition on climate adaptation within policy documents. This shared understanding and perspective on climate adaptation is expressed during the planning phase, because the polder area including the planned houses will be built upon the standards of water robustness and water quality along the whole Zuidplaspolder area.

In the planning phase, minor *weighting* was found based on institutional and organisational level, because climate adaptation does experience competition from other policy domains, which results in a more uniformly divided policy making process in the planning phase. This corresponds more with a *consistent* way of mainstreaming in this field. However, some dominance was mentioned and highlighted due to the characteristics of the polder and water system in combination with increasing climate change effects [3,8].

In a physical and ecological manner, mainstreaming experienced *weighting* during the planning phase. As in the understanding phase, the soil- and water system has been a very important aspect of the 'Vijfde Dorp' during the planning phase. The municipality Zuidplas has a more central role during this phase, where policy- and decision making takes place. Based on the development, the municipality does not plan and decide upon the development, without any discussion and advice from the waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard [8]. This expresses the importance of water and soil related knowledge and information for the spatial planning of the 'Vijfde Dorp'.

In the planning phase, *ex ante reporting* was found as different institutions and stakeholders are collaboratively working on policy making for climate adaptation in the 'Vijfde Dorp'. The Hoogheemraadschap van Schieland en de Krimpenerwaard advises the municipality Zuidplas on climate adaptation in relation with the soil- and water structure [8]. Furthermore, Deltares applied a flood analysis during a dike failure. These different responsibilities in order to mainstream climate adaptation into the urban planning of the 'Vijfde Dorp' are present in the planning phase [10].

4.7.2 Physical and ecological

As mentioned earlier, the polder system is an important aspect of the planning process for the urban development within the Zuidplaspolder. Within the planning phase, the soil- and water system are a crucial element for the development of the 'Vijfde Dorp'. From the data, it is clear that the best underground layer has been selected for urban development. The underground layer 'Kreekrug' is the location where urban planning will be concentrated during the managing phase. The current status of the polder is incapable of adapting to changing climate conditions, but the new urban development will ensure a stable water level, which reduces current soil subsidence as well (*physical and ecological opportunity*).

Also, the quality of the polder system is decreasing. Agricultural companies have moved due to soil subsidence and the multiple water levels [5]. The current functions and value of the polder demands a shift into a more sustainable and adaptive level [2,11]. The following sentence mentions this:

"If we say that urban planning cannot be realised here, we are kind of giving up this polder, because the functions that take place are not sustainable right now. Currently, all kinds of climate-related issues, like seepage, subsidence, do exist in the polder." [11]

The lacking functions and elements of the Zuidplaspolder has created a new starting point to improve the polder by selecting the best underground layer for urban planning and the weaker areas for recreation, nature conservation and water storage [10]. In this light, this is a *physical and ecological opportunity* for mainstreaming climate adaptation into urban planning.

The ‘Vijfde Dorp’ will be built adaptively against sea level rise, fluvial and pluvial adaptation. This will be accomplished by designing water storages, such as wadi’s in the town. Also, the water level and the corresponding soil level of the ‘Vijfde Dorp’ will be lifted up, which will increase resilience against water seepage and potential flooding (Gemeente Zuidplas, 2021b). Furthermore, adaptation requirements regarding sea level rise, pluvial and fluvial adaptation have been discussed and obtained within the planning phase. Ground level of the ‘Vijfde Dorp’ will be developed on a specific floor level. This relates to the prevention of a flood and to secure the safety of the inhabitants, which is directly linked to the rising sea level, heavier precipitation and river discharges. Hoogheemraadschap van Schieland en de Krimpenerwaard set conditions and requirements for the ‘Vijfde Dorp’ and the involved stakeholders to comply with the effects of climate change for this area [5]. With these preconditions, climate adaptation is mainstreamed on a physical basis during the planning phase. This is a *physical and ecological opportunity* for this development. Not every stakeholder is convinced though that sea level rise and fluvial flooding will result in large difficulties for the Zuidplaspolder, due to existence of Dijkkring 14, which protects a larger area in the Randstad, including Rotterdam and The Hague [6]. This conflict about the impact of climate change in relation to Dijkkring 14 and the physical condition of the dike in the future could be seen as a *physical and ecological barrier*.

The respondent from the ministry of IenW emphasizes that urban planning and the planning phase needs to start with an analysis per region. This will clarify which locations are best suited for a new urban development project. Important here is to acknowledge which location could cope with climate change effects in the long-term. At the moment, short-term demand for new houses compared to long-term attention for climate change impact experiences the upper hand in the Dutch urban planning [7]. This implies a *physical and ecological barrier* for mainstreaming climate adaptation during the planning phase on a national scale.

4.7.3 Financial

The financial aspect within the planning phase in the case study Zuidplaspolder focuses on the tension between the affordability of newly built houses and climate adaptive houses. The latter will be more costly, based on the investment costs for adaptation measures. The municipality Zuidplas experiences tension regarding the costs of new houses that will be built from 2024 onwards. First of all, at this moment it is not yet clear who will pay for the additional investment costs for climate adaptation. The first brief meetings and discussions between corporations, project developers and the municipality are held. At this moment no clear measures and agreements have been developed. The financial capacity of the municipality is limited and climate adaptation measures in addition to other measures, such as the energy transition, mobility and nature will be too costly for the municipality Zuidplas [8,11]. The municipality mentioned: *“Just financially, every euro from the land exploitation (Grondexploitatie) that we spend on adaptation, we cannot spend on circularity. So, on financial terms it competes already.”* [11]

This obstructs the opportunity to completely integrate and finance adaptive measures for climate change into new houses. The lack of financial capacity to plan and implement climate adaptation is a *financial barrier* for mainstreaming climate adaptation into urban planning.

Not only the municipality has to cope with this limitation regarding climate adaptation into the urban planning of houses. Also housing corporations show that the development of new houses not only is guided by on climate adaptation. For housing corporations, circularity, energy transition and affordability play an important role for new houses as well. Moreover, the energy transition is embedded in law and regulation. This is not the case for climate adaptation [6,12]. At the moment, financial budgets of housing corporations experience tension as well, due to uncertainty about the rising investment costs and the responsibility for financing climate adaptive measures. During the planning phase this is a *financial barrier* as well that will last until a (potential) financial agreement is made between the municipality and housing corporations.

Nevertheless, the province Zuid-Holland has set up a subsidy for the development of the 'Middengebied', which includes the 'Vijfde Dorp'. This is an agreement amounting to 3 million euros for the planning of climate adaptation in the 'Vijfde Dorp' [2,4]. Furthermore, financial investments for climate adaptation are reserved in other policy domains, such as greenery and soil increment [11]. This combination of funds from various domains, where climate adaptation plays a role, suggests that climate adaptation is included within the planning phase of the 'Vijfde Dorp'. This shows a *financial opportunity* for mainstreaming climate adaptation during the planning phase.

4.7.4 Technological

The municipality Zuidplas has started a collaboration with the TU Delft to experiment with different forms of sustainable housing methods to gain shared knowledge on building in a low-lying polder. This innovation programme can create a boost for new technological measures against the climate change effects for the Zuidplaspolder. Furthermore, the town centre which is located on the best soil in the polder, the 'Kreekrug', can be built in a more conventional way of planning. This creates less expenditure and could accelerate the building process as well [10]. The houses that will be completed on the neighbouring and more soft parts of the future 'Vijfde Dorp' will be realised during a later stage, which is about 10 to 15 years. This distinction in phases creates an opportunity to develop better understanding and knowledge about innovative and sustainable housing methods [8]. These separate time frames create a *technological opportunity*, because new technologies and innovations could be available in ten years. And climate adaptive technologies could be more cost friendly and cheaper to produce on a larger scale. The municipality Zuidplas plans to build these houses on the softer soils more climate adaptive than the houses located in the centre of the 'Vijfde Dorp' (Gemeente Zuidplas, 2021b).

Still, the municipality Zuidplas experiences the risk carried by developing innovative housing methods. For example, the implementation of floating houses will lead to higher investment costs. In addition, the costs of construction materials are currently rising, due to the war in Ukraine which creates uncertainty on resources and inflation rates for construction materials [2,9]. At the moment, sustainable housing is a new concept, which has been carried out on a small scale only. Due to additional risks associated with sustainable housing, such as floating houses or housing on stilts, the option for technological and innovative measures experience barriers along the planning phase. The empirical data shows that an analysis of the underground structure and layers in combination with sustainable housing methods has not been favourable for the polder [11]. This implicates a *technological barrier* for mainstreaming climate adaptation into the urban planning of the 'Vijfde Dorp' in the Zuidplaspolder.

4.7.5 Institutional and organisational

Policy- and decision making during the planning phase of a new urban development is a complex and dynamic field where different interests intersect. As the awareness and collective commitment for collaboration of stakeholders for climate adaptation during the understanding phase was powerful, climate adaptation during the planning phase on institutional level experienced more competition with regard to other policy domains. Due to the presence of other policy domains, such as mobility, economy, circularity and sustainability, climate adaptation experiences competition from other policy objectives. The main factor for this competition with other policy objectives is the limited capacity of financial resources of the municipality Zuidplas [8,9,11]. The data suggests that this hinders climate adaptation during the phase of policy making (*institutional and organisational/financial barrier*). The results show that housing corporations do not experience climate adaptation as their main and dominant objective:

"I do not think it is leading. No. In the 'Vijfde Dorp', in the masterplan, you do see that it is very explicitly mentioned now. And we are going through new colleges and new coalition agreements. I wonder what the result of these agreements will be. Up until now, the energy transition in particular has been very much the leading theme. Of course, there was a deadline and last year, I believe, a transition vision for heat had to be drawn up. That must now be rolled out further." [6]

The analysis of the data led to the appearance of an extended barrier on the existing competition between policy domains, including climate adaptation. The public and private sector experiences capacity and knowledge shortage relating to climate adaptive and innovative measures for new urban planning. The municipality Zuidplas mentioned that a department on climate adaptation does not exist within their organisation. This directly influences the capacity and knowledge on climate adaptation during internal discussion, policy- and decision-making processes. Due to the novelty of climate adaptation into urban planning, climate adaptation has not yet been institutionalised in a department or expert group within the municipality Zuidplas [11]. This might demonstrate an *institutional and organisational barrier* to mainstreaming climate adaptation into the urban planning of the 'Vijfde Dorp'.

However, the data suggest that climate adaptation is seen as one of the most influential policy domains within the phase of policy making. Within each domain, some sort of climate adaptation is included, e.g. sustainable mobility and the energy transition. Furthermore, respondents reported on climate adaptation as an underlying objective for other policy domains in the 'Vijfde Dorp'. The Zuidplaspolder will be developed based on the water safety and water robustness of the area [2,8,10]. This suggests an *institutional and organisational opportunity* to mainstream climate adaptation during the planning phase of the 'Vijfde Dorp'.

Another document that was signed between involved stakeholders was the 'Bestuurlijke Overeenkomst' (Gemeente Zuidplas et al., 2021). This agreement is based on the site exploitation and policy regarding the planning of the 'Vijfde Dorp'. Contrary to the 'Convenant Klimaatadaptief Bouwen' this form is legally binding, especially for project developers and corporations, who will develop houses in a later stage. The municipality Zuidplas uses the form of active land policy (*actief grondbeleid*), which results in a stronger (financial) position to force private parties, such as a corporation to build the houses climate adaptive regarding the designed norms [10,11].

4.7.6 Other identified mainstreaming barriers and opportunities

The empirical data produced by this research argue that other barriers as well as opportunities of mainstreaming climate adaptation arise during the planning phase. First of all, for the case 'Vijfde Dorp' and the municipality Zuidplas there is the opportunity to develop a new town in the lowest area of the Netherlands. As the municipality is planning to start the implementation and construction of houses by the beginning of 2024, the time component in the planning phase towards the final realisation of the 'Vijfde Dorp' is an element that *barriers* the quality and attention for mainstreaming climate adaptation [1].

Another element that influences mainstreaming of climate adaptation into urban planning is that local politicians and developers do not regard adaptation to climate change effects as an important topic. Due to other tasks and objectives local politicians still give priority to the development of houses in the short term in order to serve the high demand from their local population. Nevertheless, the respondent from IenW made clear that this trend is decreasing throughout the Netherlands [7].

The respondent from IenW suggests that any form of obligation regarding climate adaptation is desired in the Netherlands. Especially, policy and regulation for climate adaptation that is obligated within an urban development will maintain as important as other tasks that are normed and compulsory, such as the energy transition. However, the respondent IenW did not mention any specific plans to design law and regulation for climate adaptation at the moment [7].

Also, a barrier that has been identified in this research for mainstreaming climate adaptation is the absence of law and regulation for climate adaptation. As many stakeholders, including the municipality Zuidplas, signed the 'Convenant Klimaatadaptief Bouwen' during the understanding phase, this agreement did not hold any form of law and regulation for climate adaptation into urban planning (Province Zuid-Holland, 2018). The data confirms that the lack of policies, laws and regulations in combination with the voluntary policies regarding climate adaptation is a *barrier* for mainstreaming climate adaptation that appears during the planning phase [2].

As the energy transition is based on law and regulation, climate adaptation still experiences soft values regarding the implementation phase. Hence, climate adaptation can be seen as a more uncertain and 'softer' objective, due to the existing competition between policy domains, financial pressure and time component of the development [5,8,10,11]. This barrier will further seep into the managing phase as well, because measures will be implemented regarding the urban planning in the 'Vijfde Dorp'.

4.7.7 Focus groups

During the focus group sessions, tension about financial capacity did arise as one of the most crucial arguments along the planning phase. The municipality and housing corporations are experiencing tension and difficulty in deciding on what measures on climate adaptation will be incorporated into urban planning, and what measures will be left out due to a limited financial capacity [13,15,16]. The tension about who takes responsibility for which climate adaptive measure is an important aspect regarding the development of new houses. respondents see this as a challenge for the remaining planning and managing phase, because no agreements have been made yet between stakeholders about to what extent houses will need to be built climate adaptive in relation to the affordability of the houses [16].

Additionally, the focus group sessions highlighted and confirmed the *financial barrier* regarding financial tension between different policy domains [13,15]. The challenge to perform well for each policy domain creates another *financial barrier* for the municipality Zuidplas to mainstream climate adaptation into urban planning. Investments in each domain is an unrealistic task:

"In my opinion, the big challenge is that in addition to climate adaptation, there are other big tasks that cost money, such as mobility, social and affordable housing, greenery, nature, energy, etc. If you want to achieve high marks in all those areas, it will not be financially feasible. So you will have to make choices." [16]

From the focus group session with urban planning experts from Sweco, the participants mentioned that the continuity from local politicians influence the mainstreaming of climate adaptation. Every four years, municipal elections take place in the Netherlands. According to participants of this focus group, political continuity can result in a barrier for mainstreaming climate adaptation. After a round of new municipal elections, other political parties could emerge as municipal councillors and governors, which could influence the mainstreaming of climate adaptation positively or negatively. Nevertheless, the participants mentioned that elections for every four years are at odds with a long-term approach adaptation to climate change effects [15,16].

In addition, the focus group sessions made clear that an initiating expert of department of climate adaptation could enhance the mainstreaming of climate adaptation. Currently, no policy advisor or expert team on climate adaptation does exist within the municipality Zuidplas, which influences the attention for climate adaptation in the planning phase. An advisor or department climate adaptation could support the mainstreaming of climate adaptation by aiming to ensure that climate adaptation agreements and goals could be secured. This could be helpful for mainstreaming climate adaptation throughout the planning and managing phase [15,16].

During the focus group session with urban planning experts from Sweco it was confirmed that the time component and pressure is a mainstreaming barrier of climate adaptation in this case study. Due to the remaining years of the planning phase towards the managing phase, the time could turn into a barrier for mainstreaming climate adaptation. Quality and attention for climate adaptation might decrease during the planning phase [15]. This has been highlighted in the following quote: *“There is a really high time pressure, so it is truly a barrier in this project.”* [15]

A mainstreaming opportunity that will be an important element for the urban planning of the ‘Vijfde Dorp’ in the Zuidplaspolder is communication. A respondent mentioned that communication between internal and external stakeholders is the most important aspect for mainstreaming climate adaptation into the urban planning of the ‘Vijfde Dorp’. The cooperation between the province Zuid-Holland, the municipality Zuidplas and third parties is very important to enhance mainstreaming. Communication and trust play a key role within these three elements in order to strengthen the mainstreaming [15,16]. Also, communication towards (future) inhabitants of the ‘Vijfde Dorp’ in relation to future conditions of the polder in combination to climate change effects plays a crucial role to keep vision on climate adaptation and adaptive planning [15,16]. This mainstreaming opportunity is addressed below:

“I think the most important aspect here is communication. Actually, there is a pretty good playing field now between the province, the municipality and third parties, and I think it should stay that way. So actually the playing field of project management is, the triangle of time, money and quality. And I think you have to keep communicating in order to stay as close as possible to the middle of that triangle.” [15]

4.7.8 Conclusion planning phase

The planning phase consists of a variety of mainstreaming barriers and opportunities for mainstreaming climate adaptation. The physical condition of the polder has created an opportunity to mainstream climate adaptation. The required shift the polder in this is needed to enable sustainable solutions for the future. This implies a better soil- and water system of the polder. This opportunity has been present during this phase for mainstreaming climate adaptation. Furthermore, collaboration between the involved partners is based on trust, cooperation and communication during the planning phase as well.

Nevertheless, barriers emerged during this phase, as climate adaptation is not the dominant policy objective which experiences priority over other domains. However, as the polder will be developed with the guiding principle of soil and water, climate adaptation is regarded as an important policy domain during the phase of policy- and decision making. Competition between policy domains results in limited financial resources for the involved stakeholders. As a consequence, the municipality is faced by a reduced financial capacity which limits the municipality to invest on each policy domain that involves urban planning. The absence of law and regulation for climate adaptation might reduce the importance during the planning phase. Up to this moment, no legal agreements have been made regarding the planning and implementation of climate adaptation in the ‘Vijfde Dorp’.

Also, pressure on the time schedule is felt as a barrier for the municipality and involved partners during the planning phase. As the municipality has decided and agreed upon to develop and build the first houses in 2024, the municipality is experiencing time pressure during the planning phase, which could barrier the quality for urban planning, including the quality of climate adaptation into urban planning.

For the technological part of mainstreaming during the planning phase, no crucial barriers or opportunities appeared. Up to this moment, it has not yet been clear how the houses will be built.

In the table below (table 4.2), the mainstreaming barriers and opportunities of the planning phase in the Zuidplaspolder are listed.

Table 4.2: An overview of mainstreaming barriers and opportunities during the planning phase in the Zuidplaspolder.

Mainstreaming barriers	<u>Physical and ecological barrier</u>	Not every stakeholder convinced and aware of climate change effects for the area
	<u>Financial</u>	Limited financial capacity for climate adaptation
		Tension between affordability and climate adaptation for houses (higher investment costs)
	<u>Technological</u>	Uncertainty and risks associated with sustainable housing methods
	<u>Institutional and organisational</u>	Competition with other policy objectives (<i>financial barrier too</i>)
		Knowledge and capacity shortage on climate adaptation into urban planning
	<u>Other identified barriers</u>	Lack of law and regulation
		Time pressure on the development
		Municipal elections each four years
Mainstreaming opportunities	<u>Physical and ecological</u>	Soil and water guiding principle
		Urgency to shift the polder into a new ecosystem
		Requirements for climate adaptation towards sea level rise, pluvial and fluvial flooding

	<u>Financial</u>	Financial investments for climate adaptation into policy objectives
	<u>Technological</u>	Innovative methods for climate adaptation (due to time frames)
	<u>Institutional and organisational</u>	Climate adaptation is important in policy domains
		'Bestuurlijke Overeenkomst' and active land policy (<i>actief grondbeleid</i>) from the municipality Zuidplas

4.8 Managing phase (Q1 2024 - onwards)

The managing phase will start after the zoning plan is approved by the municipal council. As mentioned in the section on the planning phase, the phase of managing entails the designing and implementation of the 'Vijfde Dorp', including the 8,000 newly built houses. The implementation of houses in the Zuidplaspolder will be handled in two phases. Firstly, from 2024 to 2031 4,260 houses will be built on the 'Kreekrug'. This will be the centre of the town. After this phase, the remaining houses will be built after 2031 on the surrounding areas of the centre. No end date has been stipulated for to this phase within the managing phase (Gemeente Zuidplas, 2021b; Gemeente Zuidplas et al., 2021).

4.8.1 The extent of mainstreaming

In the managing phase mainstreaming climate adaptation is mostly based on financial, institutional and organisational level (Uittenbroek et al., 2013). *Inclusion* was found based on the institutional and organisational form of mainstreaming. This is because the ambition of the municipality in signing the 'Convenant Klimaatadaptief Bouwen' for the implementation of climate adaptive houses, is characteristic for including climate adaptation in the urban planning process. However, a minor *consistency* was found according to financial and institutional mainstreaming, because no agreement was made between developers and the municipality with respect to the implementation and realisation of urban planning so far. Furthermore, the 'Convenant Klimaatadaptief Bouwen' is not legally binding for end developers of houses, which creates uncertainty on mainstreaming climate adaptation during the managing phase. This might reduce the *ex ante reporting* of mainstreaming climate adaptation, because no definite strategies to distribute resources and responsibilities for climate adaptation have been made yet (Kivimaa & Mickwitz, 2006).

4.8.2 Financial

For the implementation of newly built houses in the Zuidplaspolder, the tension between affordable and climate adaptive houses, as described in the planning phase, will be present during this phase as well. During this phase, housing corporations and project developers will be more dominant stakeholders as they are responsible for the building process of the new houses. Housing corporations have the ambition to create climate adaptive houses in the Zuidplaspolder. But they serve as suppliers of social housing as well and as such cannot calculate extra investment costs for their housing rents [6,12]. This challenge could emerge during this phase and manifest as a *financial barrier* for mainstreaming climate adaptation during the implementation of adaptive measures. Hence, as argued in the empirical data, housing corporations are hoping to achieve arrangements and comprises with the municipality about investment costs on circularity, sustainability and climate adaptation [6,12].

4.8.3 Institutional and organisational

On an institutional and organisational level, a couple of barriers and opportunities can be identified. As mentioned earlier, the agreement 'Convenant Klimaatadaptief Bouwen' is based on 'softs' rules and norms (Provincie Zuid-Holland, 2018). This creates the possibility that climate adaptive measures that could have been created during the understanding and planning phase could be lifted, due to time pressure or limited financial capacity. This is an *institutional and organisational barrier* for mainstreaming climate adaptation during the managing phase [1].

The ambition for climate adaptation, that the municipality Zuidplas for each phase has, is an *institutional and organisational opportunity* for mainstreaming climate adaptation during the managing phase. The ambition and attention for climate adaptation regarding the implementation and managing phase is large at the municipality [8,9]. The following quote shows this:

“Obviously, it is clear for us to take into account the current condition of the climate. There is no other way, and we also want to show that if it cannot be done here, it cannot be done anywhere else, so let’s just show that it can be done. And set a new precedent for the future.”
[9]

Another *institutional and organisational opportunity* for the municipality Zuidplas is that they, together with the province Zuid-Holland and the Grondbank RZG, own the developmental sites in the Zuidplaspolder. This creates an opportunity for the public stakeholders to demand for climate adaptive measures when sites will be sold or given to private stakeholders during the phase of constructing and managing in the ‘Vijfde Dorp’ [1,10].

4.8.4 Other identified mainstreaming barriers and opportunities

The data emphasizes a shortage of knowledge, which could create limitations regarding the managing phase. According to a respondent, ideas, plans and policy on climate adaptation are always possible during an urban planning process. However, the implementation of climate adaptation is more difficult for stakeholders [6]. Also, knowledge on innovative ways to implement sustainable and climate adaptive housing is a bottleneck for the municipality [11]. This is a *barrier* that might arise for the municipality Zuidplas during the managing phase of mainstreaming climate adaptation.

4.8.5 Focus groups

For the managing phase of mainstreaming climate adaptation, tension on financial capacity will appear here as well. According to participants from the focus groups, the management expenses of houses could be challenging when new houses are built in the Zuidplaspolder. This could experience an exponential growth when climate change effects emerge over time and costs to implement adaptive measures become more expensive [14].

Another participant mentioned that law and regulation could be helpful for new houses that will be sold to the inhabitants. According to this participant, a developer or housing corporation should be held responsible to inform future inhabitants of the ‘Vijfde Dorp’ about the flooding risks or other related climate effects in this area. This might influence the awareness of people about climate change and climate adaptation positively. In Belgium, this has been institutionalised in law and regulation [14].

The ambition of the municipality Zuidplas has been discussed as a chance to show a way to develop climate adaptation. This managing phase could be an opportunity to present a form of housing and living, as it is getting much media and public attention in the Netherlands. As the respondent suggests:

“For, yes, all eyes are focused on the ‘Middengebied’ of the Zuidplas at this moment. So I think we can be very happy with that and also may consider this an opportunity.” [13]

Law and regulation could secure climate adaptive measures during the implementation phase of this new development [13,14,15]. During the managing phase, law and regulation could stimulate and help the municipality and involved stakeholders to reach a level of climate adaptation that is needed for the climate change effects. A helpful method to mainstream climate adaptation through the managing phase, is to embed this in law and regulation, as a respondent argues: *“Therefore, following the ‘maatlat’ climate adaptation set by the government, a certain degree of hard guarantees of the ‘soft’ importance of climate adaptation is necessary.”* [16]

As noted before in this paragraph, knowledge on climate adaptation and innovative measures to develop houses in a climate adaptive way will be a bottleneck for the remaining stages during the development of the ‘Vijfde Dorp’. The following sentence shows this bottleneck: *“We need knowledge and resources to incorporate new and innovative ways of dealing with climate adaptation during the course of the development.”* [16]

4.8.6 Conclusion managing phase

The managing phase, which has not yet been reached in this case study, shows different mainstreaming barriers and opportunities that might ensue from 2024 and onwards. First of all, financial capacity that is a mainstreaming barrier in the planning phase, might continue in the managing phase. In the managing phase, the challenge between the municipality, housing corporations and developers about the (investments) costs, benefits and goals regarding climate adaptation measures is an important aspect.

On the other hand, an important opportunity for the municipality Zuidplas relates to the active land policy (*actief grondbeleid*) that is present in this case study. The public partners can have a strong position towards the managing phase when private partners will develop houses on public sites in the Zuidplaspolder. Climate adaptation measures could be enforced by the public stakeholders. Together with the active land policy (*actief grondbeleid*), the ambition from the municipality Zuidplas is significant regarding the implementation of climate adaptation into the ‘Vijfde Dorp’. However, law and regulation, knowledge and financial capacity might lack the implementation of climate adaptation in the managing phase.

The mainstreaming barriers and opportunities during the managing phase in the ‘Vijfde Dorp’ are listed below (table 4.3).

Table 4.3: An overview of mainstreaming barriers and opportunities during the managing phase in the Zuidplaspolder.

Mainstreaming barriers	<u>Financial</u>	Tension between stakeholders about the costs for the implementation of climate adaptation
	<u>Institutional and organisational</u>	Climate adaptation measures might be released in managing phase due to lack of law and regulation
	<u>Other identified barriers</u>	Knowledge shortage on the implementation of climate adaptation
Mainstreaming opportunities	<u>Institutional and organisational</u>	The ambition from the municipality Zuidplas
		Public stakeholders own the sites for the development of the 'Vijfde Dorp'

5. Conclusion, discussion and recommendations

5.1 Conclusion

This section presents the conclusion of the research, including answers to the research questions, discussion on the research, reflections, limitations and policy recommendations.

This research has provided information and insights into mainstreaming climate adaptation into urban planning. The extent of mainstreaming as well as mainstreaming barriers and opportunities contributed to the examination of the most important factors that influence mainstreaming into the urban planning of the Zuidplaspolder. This study investigated the extent of mainstreaming during the understanding, planning and managing phase. The extent of mainstreaming is enhanced by mainstreaming barriers and opportunities. The results and findings of this research were based on answering the main research question:

Which factors do influence the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder?

To answer the main research question, the sub-questions will be answered first. By answering the first sub-questions, a coincident answer to the main research question will be provided.

How can the extent of mainstreaming climate adaptation be assessed?

The mainstreaming of climate adaptation can be assessed by the extent of mainstreaming. This extent of mainstreaming will be briefly discussed during each phase of mainstreaming. Then, the extent of mainstreaming climate adaptation will be assessed overall. At the beginning of the understanding phase, *inclusion* of climate adaptation into the policy process was found. Workshops, participation and an exchange of knowledge took place between different stakeholders. One important outcome of the understanding phase was based on the guiding principle to make the soil- and water system a central focus throughout the urban planning process. The *weight* to this climate adaptive theme and measure made mainstreaming climate adaptation already *weighting* within the understanding phase. However, a shared understanding among stakeholders and experts was not found in the understanding phase. Based on the knowledge about climate change effects and the low-lying polder area, no *consistent* vision on mainstreaming climate adaptation for the Zuidplaspolder was present. In the planning phase, the extent of mainstreaming climate adaptation experiences *consistency* relating the physical and ecological condition of the polder. In this phase soil and water are a guiding basis. The waterboard Hoogheemraadschap van Schieland en de Krimpenerwaard and the province Zuid-Holland have an active and advisory role for the municipality Zuidplas regarding the development and soil- and water system. Due to limited financial resources, mainstreaming climate adaptation does not involve a lot of *weighting* within the planning phase, except for the soil- and water system. Climate adaptation competes with different policy domains in urban planning of the 'Vijfde Dorp'. In this case, climate adaptation does not experience priority in policy and the policy domains, but is seen as a relatively important objective for this development. In the managing phase, climate adaptation is mainstreamed gradually in a *consistent* way. Public and private stakeholders both are willing to implement climate adaptation when the managing phase will ensue.

However, no strategies or policies have been made regarding the implementation of climate adaptation. This results in less *ex ante reporting* of mainstreaming up to this moment. Furthermore, the lack of law and regulation, knowledge and financial resources for climate adaptation could increase the cost and influence the implementation of climate adaptation. This might reduce the *inclusion* of mainstreaming climate adaptation in this phase.

What are barriers and opportunities to mainstreaming in the understanding phase?

The main barriers and opportunities to mainstreaming climate adaptation in the understanding phase are the mainstreaming opportunity of the guiding principle of the soil- and water system. This principle has been highlighted as crucial for a new development by all stakeholders. However, not all experts and employees at different stakeholders, such as the province Zuid-Holland and Hoogheemraadschap van Schieland en de Krimpenerwaard were unanimous convinced about the urban planning project in relation to the changing climate effects in the low-lying polder. This unclarity in visions about the future of the Zuidplaspolder has not favoured the progress of mainstreaming climate adaptation. Ultimately, involved stakeholders have conformed to the development which resulted in a collaborative commitment among the involved stakeholders.

What are barriers and opportunities to mainstreaming in the planning phase?

The most important barriers and opportunities to mainstreaming climate adaptation in the planning phase are that climate adaptation faces competition from other policy objectives for the urban planning of the 'Vijfde Dorp' in the Zuidplaspolder. Financial capacity at municipal level and housing corporations together with the appearance of other crises as well, such as the energy crisis, other policy objectives are important too. Furthermore, the time pressure is a crucial mainstreaming barrier to mainstreaming climate adaptation for the planning phase. The municipality has agreed upon a legal appointment to construct and build the first houses in the 'Vijfde Dorp' in 2024. This agreement could function as a mainstreaming barrier, because the time pressure, together with the absence of law and regulation, might reduce the quality and attention for climate adaptation during the policy- and decision-making processes, such as zoning plans.

What are barriers and opportunities to mainstreaming in the managing phase?

The main barriers and opportunities to mainstreaming climate adaptation in the managing phase are the presence of tension on affordability to build houses. Climate adaptation measures require higher investment costs than conventional housing, but public and private stakeholders involved in the urban planning development of the 'Vijfde Dorp' hold limited financial resources. This might barrier climate adaptive measures during the managing phase. Furthermore, the lack of law and regulation, knowledge and capacity can influence the implementation of climate adaptation, as these three factors are helpful for climate adaptation.

What possible policy measures and instruments may improve the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder?

This thesis has highlighted different mainstreaming barriers and opportunities for climate adaptation into urban planning. Based on the different barriers and opportunities, policy measures and instruments that could improve the mainstreaming of climate adaptation can be drafted. First of all, a policy instrument that institutionalise climate adaptation in law and regulation will improve the mainstreaming of climate adaptation drastically. As the municipality and other involved stakeholders signed the 'Convenant Klimaatadaptief Bouwen' as an agreement to strive for (more) climate adaptation into urban planning, the Convenant is not legally enforcing stakeholder to really implement climate adaptation during a later phase (Provincie Zuid-Holland, 2018). A 'hard' legislation of climate adaptation could strengthen the 'soft' agreement in order to warrant climate adaptation into urban planning as an obligatory part of it.

Another policy instrument that could enhance and improve the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder is the presence of an initiator, such as an expert or stakeholder that initiates and guides climate adaptation during the process of urban planning. According to the data, sometimes climate adaptation is initiated well during the understanding, but loses momentum during the planning and managing phase, due to competition of other policy objectives. Here an organisation or expert that represents climate adaptation throughout the whole process of an urban development might strengthen the climate adaptation into urban planning of the Zuidplaspolder. The lack of knowledge on climate adaptation could be resolved as well by the implementation of this policy measure.

Further, more financial resources for climate adaptation will support (smaller) municipalities during the urban planning of a new town or neighbourhood. As this research has shown, limited financial resources causes uncertainty among the municipality and other stakeholders about the planning and implementation of climate adaptation into urban planning. More financial subsidies from the national government that only applies for climate adaptation would help municipalities to invest more in climate adaptive measures in the future.

Which factors do influence the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder?

During this research a variety of mainstreaming barriers and opportunities have been identified. The different sub-questions of this research have led to answering the main research question. The combination of document analysis, semi-structured interviews and focus groups has resulted in diverse data results. The mainstreaming of climate adaptation into urban planning in the Zuidplaspolder is influenced by a set of important factors. First of all, individual awareness and behaviour regarding climate change effects and climate adaptation influences the mainstreaming of climate adaptation. As behaviour plays an important role for the increasing change in climate effects, individual behaviour and awareness of it in terms of climate adaptation is a relevant factor for mainstreaming climate adaptation into urban planning.

Hence, awareness for climate adaptation among different stakeholders within the urban planning project in the Zuidplaspolder is a factor that influences the mainstreaming. Also, individual behaviour of inhabitants plays a role in mainstreaming climate adaptation into houses during a later phase in the Zuidplaspolder.

Soil and water as guiding principle throughout the understanding and planning phase is a factor that influences the mainstreaming of climate adaptation into urban planning of the Zuidplaspolder as well. The municipality Zuidplas together with involved stakeholders were confronted by an unsustainable water system, including soil subsidence. A transformation of the soil- and water system was advised by Hoogheemraadschap van Schieland en de Krimpenerwaard. Together with the urban planning development, soil and water have had a guiding role in the urban planning process. Based on this, the best soil structure has been chosen as location for new houses and the water system will be transformed to a water robust and climate adaptive system, which will be capable of adapting to the climate change effects of sea level rise, pluvial and fluvial flooding. This shows that flexibility in urban planning has been applied to adapt to future climate change effects. However, the zoning plans during the planning phase have not yet been designed. It is not clear yet how and to what extent soil and water will be guiding throughout the zoning plans and further decision-making processes. This might influence to what extent this will be mainstreamed during the end of the planning phase and the managing phase. Furthermore, affordability of houses challenges the mainstreaming of climate adaptation as investment costs are relatively higher for climate adaptive houses than conventional housing. Moreover, financial resources are limited at private stakeholders, such as project developers and housing corporations as well as at public stakeholders, such as the municipality Zuidplas.

Mainstreaming climate adaptation into urban planning in the Zuidplaspolder is influenced by a lack of law and regulation and knowledge as well. Currently, knowledge on the implementation of climate adaptive houses is relatively rare and novel. The municipality Zuidplas is in contact with universities and institutions about sustainable housing and climate adaptation. However, building houses climate adaptive against water related climate effects is a new concept. Private companies do not produce climate adaptive houses on a large scale as well. The knowledge about building in a climate adaptive manner is still fragmented in the case study, but might emerge strongly in the coming decades. This could serve as new input for the development of houses during phase two of the 'Vijfde Dorp', which will start in 2031.

Law and regulation is a factor that influences the mainstreaming of climate adaptation as well. As climate adaptation is a relatively new concept in relation to urban planning, only limited law and regulation exist to guarantee climate adaptation into policy and implementation for the municipality Zuidplas. This results in a factor that influences the mainstreaming of climate adaptation into urban planning in the Zuidplaspolder.

The last factor is time, especially the time frame between the planning and managing phase. The municipality Zuidplas has agreed to start building new dwellings in Q1 2024. All processes and developments before the managing phase experience time pressure. Although the communication and collaboration between the stakeholders is evident in the case study, the time pressure might influence the quality of zoning plans and decision-making processes, including the policy objectives of the 'Vijfde Dorp', such as climate adaptation. The aspect of time is a factor that influences the mainstreaming of climate adaptation into the 'Vijfde Dorp' of the Zuidplaspolder as well.

5.2 Discussion & Reflection

In this paragraph, the results of this thesis will be discussed. Then the methodological and theoretical aspects of this research will be elaborated upon. Finally, limitations of the research will be described.

5.2.1 Reflection on the results

The results of this research showed the mainstreaming of climate adaptation into an urban planning project. As the results show, climate adaptation is experienced as a relatively new and abstract concept that has emerged in the last couple of years. Based on the semi-structured interviews and focus groups, the concept of climate change and incorporating it into another sector, such as urban planning, does not develop easily. Various barriers and opportunities emerge in the context of mainstreaming climate adaptation. The results of this research might have been slightly different when an existing town, neighbourhood or city had been examined. Nonetheless, the results met the expectations of the researcher beforehand. The researcher expected that financial resources, individual behaviour, and law and regulation were bottlenecks for mainstreaming climate adaptation into urban planning. The dominance of soil and water throughout the mainstreaming phases, especially during the understanding and planning phase, was not expected. It created a large opportunity to mainstream climate adaptation into urban planning in this particular case. Furthermore, the guiding principle of soil and water, including the choice for the best underground layer to urbanise, shows that flexibility and adaptability has been applied regarding climate change effects (Glas, 2021).

The results of this research contributed to an understanding about which factors do influence the mainstreaming of climate adaptation in a new urban planning project in a low-lying polder. The results that were found during this research provided an insight the mainstreaming of climate adaptation into the sectoral policy of urban planning. Especially the focus group sessions gave more in-depth information regarding the mainstreaming of climate adaptation as some interesting additional factors were mentioned regarding mainstreaming. For example, the time pressure and an initiating expert for climate adaptation can be seen as additional factors regarding mainstreaming of climate adaptation in this case study.

The remaining planning and managing phase still need to occur in the case study. The results on this part of the development are only based on the semi-structured interviews and the focus groups. During the interviews and focus groups it was possible to ask and discuss about both the future and expected developments as well as the mainstreaming barriers and opportunities during these phases. This resulted in sufficient data about mainstreaming of climate adaptation in the remaining planning and managing phase.

5.2.2 Methodological reflection

The methodology of this research was based on qualitative research, where document analysis, semi-structured interviews and focus groups have been held. As climate adaptation is a relatively new concept in urban planning, this methodology was chosen in order to unravel an in-depth understanding and value of stakeholders regarding mainstreaming climate adaptation into urban planning. The qualitative research methods fulfilled this research relatively well. During the semi-structured interviews, it was possible to ask in-depth questions to stakeholders that are involved directly in the case study, the 'Vijfde Dorp'. This resulted in comprehensive data collection about each phase of mainstreaming climate adaptation. A quantitative study, including a survey might have resulted in more broad and general answers and data. Arguments and information on how and to what extent mainstreaming and corresponding barriers and opportunities did develop throughout the phase might not be found by carrying out a quantitative survey.

On the other hand, more stakeholders could have been interviewed, as urban planning is an extensive field where various stakeholders interact. Private developers as well as interest groups of inhabitants might have provided extensive data for this research. However, this study has collected data from the involved and influential stakeholders within the urban planning development of the 'Vijfde Dorp' in the Zuidplaspolder.

One interview was carried out with a senior advisor on climate adaptation from the ministry of IenW. This respondent was an expert on mainstreaming climate adaptation into urban planning on a national level. This created additional data that was useful for understanding mainstreaming climate adaptation into urban planning. However, as only one expert on mainstreaming climate adaptation in the Netherlands was interviewed, no findings and conclusions could be provided for mainstreaming climate adaptation in the Netherlands. However, the interview gave insight in regional differences regarding mainstreaming climate adaptation into urban planning.

As mentioned in chapter 3, the semi-structured interviews were executed by Microsoft Teams, except for one interview that was carried out physically at the office of Woonpartners where the researcher was invited by the respondent. By executing the interviews online via Microsoft Teams, a suitable date was found more easily as travelling time and the search for a physical location were not required. Furthermore, the interviews via Microsoft Teams were completed without any internet instability. This resulted in a fluent process throughout the online interviews.

The focus groups were performed to discuss and conclude on the outcomes of the document analysis and the semi-structured interviews. In total, three focus groups were formed, one with involved stakeholders within the case area, one with water experts from Sweco and one with urban planning experts from Sweco. All focus groups were done by Microsoft Teams as well, due to the physical distance between different participants. Also, the participants from Sweco work at different offices, which implied an online focus group by Microsoft Teams as the best solution. Each focus group proceeded well and participants gave positive feedback to the preliminary outcomes from the document analysis and interviews. The discussions between experts led to more in-depth answers that strengthened and expanded the data on mainstreaming of climate adaptation.

Furthermore, the focus group sessions were useful for answering each sub-question as well as the main research question. Especially, the focus group sessions were very helpful for sub-question 5 regarding the potential policy instruments and measures for mainstreaming climate adaptation.

5.2.3 Theoretical reflection

The theory on mainstreaming was the fundamental basis for this research. The theory provided support to investigate the process of climate adaptation throughout an urban planning process. The mainstreaming indicators were useful to investigate the extent of mainstreaming during this research (Kivimaa & Mickwitz, 2006). The different indicators corresponded were helpful to assess the extent of mainstreaming during the three phases of Moser and Ekstrom (2010) in the Zuidplaspolder. The theoretical information on mainstreaming barriers and opportunities from Adger et al. (2007) and Uittenbroek et al. (2013) provided theoretical background regarding different barriers and opportunities that can evolve during mainstreaming climate adaptation. The six barriers and opportunities served this research to examine how these barriers and opportunities were present during the three phases. Furthermore, Uittenbroek et al. (2013) investigated mainstreaming of climate adaptation into urban planning, which was a fruitful source for the researcher to understand mainstreaming climate adaptation into urban planning beforehand. Both academic articles contributed to the creation of the conceptual framework, which guided the researcher in the process of developing the operationalisation and during the period when interviews were held. The conceptual framework was developed based on the frameworks of Moser and Ekstrom (2010) and Uittenbroek et al. (2013) with adjustments by the researcher. The theory on mainstreaming was a clear and comprehensive theory to use and test during this research. It suited this research very well.

This research is not able to answer how each mainstreaming barrier could be (re)solved or how each mainstreaming opportunity could be advanced. Then the research would be too extensive in the projected time span of this study. However, by connecting the mainstreaming theory to the conceptual framework, mainstreaming barriers and opportunities were found in the case study. Also, several factors that influence mainstreaming more strongly than other factors were identified during this research in the case study the Zuidplaspolder. During this research, physical and ecological, financial and institutional and organisational aspects were relatively more important than the other aspects of the mainstreaming barriers and opportunities. For example, the soil- and water system was a guiding principle throughout the understanding and planning phase of mainstreaming climate adaptation into urban planning. Also, communication and collaboration between stakeholders has been an important institutional and organisational opportunity to mainstream climate adaptation during the understanding and planning phase. Further, the financial capacity of stakeholders in the 'Vijfde Dorp' are not unlimited for all policy domains. This influence mainstreaming of climate adaptation in this case, because climate adaptive measures might be limited and encounter barriers due to financial capacity as well as competition from other policy objectives. Nevertheless, climate adaptation is regarded relatively important as policy objective for the 'Vijfde Dorp'.

Also, this research provided new insights that influence the mainstreaming of climate adaptation. Law and regulation is a mainstreaming barrier and opportunity that has an effect on the mainstreaming of climate adaptation. This is an additional insight that relates to mainstreaming of climate adaptation in this case study.

Especially, law and regulation influenced mainstreaming during the planning and managing phase. In the case study, a lack of law and regulation for climate adaptation might barrier the attention and objective for climate adaptation into policy and implementation of the 'Vijfde Dorp', due to a lack of 'hard' norms and rules. The time pressure is a barrier that might influence the mainstreaming of climate adaptation during the planning phase and up to the managing phase in this case study. Due to the formal agreement to start building the first houses from Q1 2024 onwards, time pressure on the environmental impact assessment (MER) and the zoning plans could experience time pressure, which might influence the quality and implementation of climate adaptation into the urban planning of the 'Vijfde Dorp' in the Zuidplaspolder. Additionally, an initiating expert or advisor for climate adaptation could enhance the mainstreaming of climate adaptation during these phases by constantly mention and draw attention for climate adaptation during the process of policy- and decision making and implementation. These new theoretical insights in mainstreaming barriers and opportunities were found by investigating mainstreaming using the conceptual frameworks of Moser and Ekstrom (2010) and Uittenbroek et al. (2013) and might be interesting mainstreaming barriers and opportunities for further research into mainstreaming climate adaptation.

5.2.4 Limitations

This section will discuss the limitations of this research.

First of all, during this research only twelve interviews have been executed. This has resulted in limited empirical data on mainstreaming climate adaptation. Carrying out more interviews would have produced more data validity, which strengthens the answers to the research questions.

Another limitation of this research is associated with the empirical data. As only one case study has been investigated, the results are context-specific and no generalisations about other areas in the Netherlands can be made. As the Netherlands is a diverse country, based on underground layers and altitude, the results might have differed when another area with different conditions was examined. The location and the polder condition of the Zuidplaspolder, including the soil- and water system might have influenced the outcome of this research.

This research did not investigate how mainstreaming of climate adaptation would be in case maintaining the polder as an agricultural site would be most suited option. This is another way to focus and research this case study in relation to mainstreaming climate adaptation. Nevertheless, for the 'Vijfde Dorp' the municipality Zuidplas and the province Zuid Holland possess ownership of the sites for the new urban development in the polder. They sell these sites to private stakeholders by executing active land policy (*actief grondbeleid*).

Furthermore, the time of this research influenced the projected outcomes. Currently, the planning phase is still running. The managing phase and the realisation of new houses in the Zuidplaspolder has not yet started. Consequently, no hard conclusions can be made for the remaining planning and managing phase. The managing phase will start in Q1 2024, which leads to no conclusions how the mainstreaming of climate adaptation actually will develop during this phase. However, this research collected data about the managing phase and what mainstreaming barriers and opportunities will appear during this phase, according to respondents.

Further research into the mainstreaming of climate adaptation could examine and give insights in the mainstreaming during the remaining planning and managing phase of the 'Vijfde Dorp' in the Zuidplaspolder. Also, further research might find insight in the extent of mainstreaming regarding the mainstreaming indicator of *ex post reporting*, which could express if climate adaptation is evaluated among stakeholders when the urban planning project has been completed.

During the process of writing this thesis, several difficulties were encountered in acquiring respondents for interviews and focus groups. Firstly, within the time frame of data collection, not every type of stakeholder, such as a project developer, has been interviewed. Notwithstanding the fact that contact by email and phone was searched. Secondly, the focus group comprising involved stakeholders in the case area did not include the waterboard and the municipality. The latter two stakeholders possess an influential role during this development. As such a focus group complemented with these stakeholders might have produced interesting additional points of view. However, due to different time schedules and agendas of these stakeholders, this focus group set-up was hard to formalise. Furthermore, the focus group sessions with water and urban planning experts from Sweco were two separate sessions. In hindsight, a combined focus group with water and urban planning experts from Sweco could have resulted in more discussions and comprehensive data collection.

As climate change and urban planning are an ongoing debate in the Netherlands, the researcher is interested on a personal level as well. This personal interest and attention for the themes might have influenced the perception of responses by respondents or questions from the researcher during an interview. This might have been slightly steering and normative during interviews in order to gain a more in-depth understanding and data on specific issues. However, a semi-structured interview including an interview guide is a guideline where more in-depth and specific questions are allowed to ask during an interview.

5.3 Recommendations

This section will provide recommendations based on the executed study. This research has been carried out in name of Radboud University and consultancy firm Sweco. Hence, recommendations can be made for both the academic field as well as the practical field.

First of all, for the academic environment, further research on the mainstreaming framework on climate adaptation into urban planning of new urban developments is recommended in order to verify and validate the mainstreaming framework of this research, including both the mainstreaming indicators on the extent of mainstreaming as well as the mainstreaming barriers and opportunities for climate adaptation. As climate change is still a relatively new concept in urban planning, more academic research should be carried out regarding mainstreaming of climate adaptation into urban planning. Academic research will contribute to the question which factors mostly influence the mainstreaming of climate adaptation. This is recommended, because the Netherlands varies regarding soil structure, altitude and water system. However, large parts of the Netherlands will face the climate change effects together with housing shortages.

Further scientific research into mainstreaming of climate adaptation into urban planning projects across different landscape features will contribute to a better understanding of mainstreaming climate adaptation in the Netherlands. This could result in more knowledge on regional level regarding mainstreaming climate adaptation into urban planning.

Further research should be conducted regarding the planning and managing phase of mainstreaming climate adaptation into urban planning. During this research, the planning phase was in progress. More research into the remaining planning and managing phase would give a better understanding on which barriers hinder the mainstreaming and what opportunities advance the mainstreaming in these phases. Then, this research would be strengthened by the future research on mainstreaming in this specific case study, the Zuidplaspolder. Thus, future scientific research on mainstreaming climate adaptation into urban planning of the Zuidplaspolder is recommended.

Also, future scientific research within the field of mainstreaming climate adaptation could relate to the question which form of mainstreaming optimally suits mainstreaming climate adaptation in case of urban development in a low-lying polder. Maintaining the low-lying polder with its agricultural characteristics without a new urban development could be interesting research regarding mainstreaming climate adaptation as well. This could be interesting follow-up research into mainstreaming climate adaptation in a low-lying polder, such as the Zuidplaspolder or on a broader scale for the western part of the Netherlands which is located below NAP. Also, more academic research could be performed in how mainstreaming climate adaptation could result in more climate adaptive investments into urban planning in addition to conventional investments. This might prevent future management expenses and could increase (individual) awareness, which support the use of climate adaptive measures and investments in urban planning. This issue can be interesting for further academic research into mainstreaming of climate adaptation.

A practical recommendation is to increase the importance for an advisor or advisory group that is well known and focused on the relation of climate adaptation and urban planning. Such an advisor or advisory group should be included at each urban planning project in the Netherlands. This could enhance the (individual) awareness and quality of climate adaptation throughout the understanding, planning and managing phase. Together with law and regulation, more importance and impact regarding climate adaptation could be reached into urban planning.

For Sweco, a recommendation is to involve the mainstreaming barriers and opportunities on climate adaptation into future projects that connect climate adaptation to water related impacts with urban planning and housing developments. It should be recommended to incorporate the factors that influenced the mainstreaming of climate adaptation in this research in practice. As the Netherlands is experiencing climate change increasingly and the housing shortage will continue for several years, Sweco might use the outcomes about the extent of mainstreaming and the mainstreaming barriers and opportunities to connect to other urban developments in the Netherlands. For example, Sweco could support and cooperate with stakeholders to secure climate adaptation measures in norms and regulations in order to increase a stronger framework for climate adaptation into urban planning. This is especially relevant for low-lying (polder) areas that are experiencing climate change effects earlier. This might release and perhaps prevent increasing management expenses when climate change effects result in higher costs to adapt.

Finally, Sweco could play a leading role in advising the government to increase the importance of climate adaptation within their policy and plans during the coming years and decades. Overall, mainstreaming of climate adaptation is an issue that relates to everyone and the challenge requires understanding, regulations, cooperation and communication in order to react to the changing climate in the Netherlands.

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Appendix 1: Interview guide for direct stakeholders



English version

Time and date:

Respondent:

Interviewer: Kars Barkmeijer

Location: Microsoft Teams/physical location

Duration: +/- 60 minutes



Introduction

My name is Kars Barkmeijer and I am currently writing my thesis for the master Spatial Planning at the Radboud University. Within this master programme, I am following the specialisation Cities, Water and Climate Change. Through an internship at Sweco, I am writing my thesis to graduate for the master. The topic of my research is about the future of climate adaptation into urban planning in the municipality Zuidplas in relation to sea level rise, heavy rainfall and flood risk of the Hollandse IJssel in this area. I am curious about the process of policy and planning for climate adaptation into urban planning in the 'Vijfde Dorp'. In the remainder of this interview I will refer to these three different climate effects together as 'climate change'. Moreover, during the interview with the 'Vijfde Dorp' I will refer to the urban planning of the 8,000 houses in the Zuidplaspolder.

Goal of the interview

The aim of this interview is to gain insight into the barriers and opportunities that play a role in implementing flexible and adaptive policies to realise the 'Vijfde Dorp' in the Zuidplaspolder. My research focuses on the central question which factors play a role in the integration of climate adaptation into urban planning. In doing so, I make use of the theory of mainstreaming. This theory examines the extent to which climate adaptation is included in the policies of sectors, such as the housing market/urban planning. This interview should create an insightful vision that will contain important information to answer the research question.

The structure of the interview

The interview consists of a set of questions aimed at answering the sub-questions and main research question of my thesis.

Data collection and confidentiality

The data obtained from this interview will be used explicitly for the purposes of this thesis. Furthermore, the data from this interview will remain within the system of Sweco and Radboud University and will not be shared with third parties. Furthermore, you have the option to receive the entire transcript of the interview, if you wish to do so. Furthermore, you will remain anonymous as a respondent in my research. If I use a quote from this interview in my thesis, it will be marked 'Function respondent 1' or similar.

Recording

In order to be able to collect the data completely and correctly, I would appreciate it if the interview could be recorded. The recording of the interview will help me to transcribe the data completely and correctly and to analyse it afterwards. The transcript of the interview will be stored confidentially. Do you consent to a recording of this interview?

Do you have any remaining questions before starting the interview?

Start interview

General questions:

In order to get an overview of the respondents and the further course of my research, I would like to ask the following question:

1. What is your function and role in the project of the Fifth Village in the Zuidplaspolder?

Brief (additional) explanation of the interview questions

During the interview I will ask you questions that focus on the three different phases of mainstreaming climate adaptation. The first phase focuses on the initiation and programming phase of the 'Vijfde Dorp'. The second phase is about the policy-making for the area, such as the environmental impact assesment (MER) and the zoning plans for the 'Vijfde Dorp'. Decision-making on policy plans by the stakeholders involved will also be dealt within this phase. The final phase focuses on the design and implementation of the zoning plan. These questions about the various phases help me to investigate how climate adaptation is embedded in each phase of the 'Vijfde Dorp'.

Mainstreaming barriers and opportunities

Understanding phase:

Social and cultural

2. What do you think about the 'Vijfde Dorp' in relation to climate change?
3. Do you notice that stakeholders have different views on urban planning in relation to climate change? If so, do you think this has influenced the development of climate adaptation?

Informational and cognitive

4. Do you think there is sufficient awareness of climate adaptation among the various stakeholders involved in the 'Vijfde Dorp'? If yes, how can you tell?
5. Were agreements made on climate adaptation during the initiation and programming phase of the 'Vijfde Dorp'? If so, what was agreed?
 - a. Was climate adaptation supported publicly (broadly) during the initiation process?

Institutional and organisational

6. Do you think there was sufficient cooperation between stakeholders on climate adaptation during the initiation and programming phase of the 'Vijfde Dorp'?
7. In your opinion, are the stakeholders involved, driven to make climate adaptation important for urban planning in the 'Vijfde Dorp'? If not, why do you think not everyone is driven enough?
 - a. Do you experience public pressure on climate adaptation for urban planning in the 'Vijfde Dorp'?

Institutional and organisational

9. Do you consider climate change policy objectives important in relation to other policy objectives/fields? Why or why not?
10. In your opinion, are the different stakeholders willing to include climate adaptation in the policies of the Vijfde Dorp?
11. Do you or your organisation perceive an urgency within the municipality of Zuidplas and/or a governmental level to realise climate adaptation in the 'Vijfde Dorp'? If so, how do you perceive this? What measures have been taken to implement climate adaptation into policy?
12. If not, what is the reason for this?

Planning phase

Physical and ecological

1. Do you think the climate effects have much influence on the physical environment? For example, can the polder withstand a possible peak shower or dike breach? Even with the houses that will be built in the 'Vijfde Dorp'?
2. Is there any urgency in this matter?
3. Have plans been made to build the 'Vijfde Dorp' in a climate adaptive way to withstand possible climate effects, such as heavy showers or a rising sea level? And if so, how do these plans look like? Do you think they have been sufficiently taken into account in policy?

Financial

4. Will your organisation receive financial resources/subsidies from the state or province to plan and implement climate adaptation (municipality of Zuidplas €14 million → housing incentive from the government) for the 'Vijfde Dorp'? If so, what will these funds be used for?
 - a. Does your organisation have a budget for climate adaptation?
5. If the costs of climate adaptation will be implemented in housing, who will bear the costs of climate adaptation measures? Is it the developer(s) or the residents, or other stakeholders? What does this look like in the long-term?

Technological

6. In your opinion, are there sufficient technical possibilities to build climate adaptive housing (houses on stilts or floating houses)? If so, do you have examples? If not, why not? Will these be used?
7. Is it perhaps too expensive? Will investments be made in new climate-adaptive techniques?
8. Do you think there is consensus among the different stakeholders on how to operate/design urban planning in a climate adaptive way?

Managing phase

Financial

1. Have financial resources been made available to implement climate adaptation for the 'Vijfde Dorp'? If so, do you or your organisation think this is sufficient?

Institutional and organisational

2. What does the cooperation between your organisation and other stakeholders to implement climate adaptation in the 'Vijfde Dorp' look like? Do you have a concrete example? As stated in the Masterplan, construction will be in accordance with the 'Convenant Klimaatadaptief Bouwen'. Do you think this is good and promising, or do you think there are limitations?
 - a. What will be the scope for climate adaptation in relation to other policy areas during implementation?

Mainstreaming indicators

1. To what extent do you think that climate adaptation has been or is being addressed during the entire policy process of the 'Vijfde Dorp'?
2. And how do you think climate adaptation is applied in the Fifth Village? How do you think this is visible? For example through programmes, or laws and regulations, or through norms and values?

Overarching questions

1. In your view, what policy instruments are needed to address the future impacts of climate change for the 'Vijfde Dorp' in the Zuidplaspolder?

Concluding questions

1. After the interviews I conducted, I would like to organise a meeting to present the preliminary results of my research to experts in order to test the existing results. Would you be interested in such a meeting once I have completed the interviews and worked out the barriers and opportunities for the Zuidplaspolder?
 - a. If so, I will schedule this to be held at a later date. You will be hearing from me.
 - b. If not, would you like to receive not only the written transcript but also the final version of the thesis?
2. Do you have any additions or comments regarding my research?
3. Do you have any other remarks or questions as a result of this interview?

Stop recording

- Do you have any tips or possible points of improvement for me and my next interviews?
- Do you know other people who might be interesting for my research?
- Could I contact you if I have any further questions?

End of interview

Dutch version

Tijd en datum:

Geïnterviewde:

Interviewer: Kars Barkmeijer

Locatie: Microsoft Teams/fysieke locatie

Tijdsduur: +/- 60 minuten

Radboud University



Introductie

Mijn naam is Kars Barkmeijer en ik ben momenteel aan het afstuderen voor de master Spatial Planning aan de Radboud Universiteit. Binnen deze master volg ik de specialisatie Cities, Water and Climate Change. Via een afstudeerstage bij Sweco schrijf ik de scriptie om uiteindelijk af te studeren. Het onderzoek van de scriptie gaat over de toekomstige aanpasbaarheid van de woningbouw in de gemeente Zuidplas in relatie tot zeespiegelstijging, hevige neerslag en overstromingsrisico van de Hollandse IJssel in dit gebied. Ik ben benieuwd hierbij naar de planologische beleidsvoering van de klimaatadaptatie in de woningbouw van het 'Vijfde Dorp'. In het vervolg van dit interview noem ik deze drie verschillende klimaat effecten tezamen 'klimaatverandering'. Bovendien zal ik tijdens het interview met het Vijfde Dorp refereren naar de woningbouw van de 8.000 woningen in de Zuidplaspolder.

Doel van het interview

Het doel van dit interview is om een inzichtelijk beeld te krijgen welke barrières en kansen een rol spelen bij het implementeren van flexibele en aanpasbare beleidsmaatregelen om het Vijfde Dorp in de Zuidplaspolder adaptief te verwezenlijken. Mijn onderzoek richt zich op de centrale vraag welke factoren een rol spelen bij de integratie van klimaatadaptatie in de woningbouw. Hierbij maak ik gebruik van de theorie van mainstreaming. Deze theorie onderzoekt in hoeverre klimaatadaptatie voorkomt in het beleid van sectoren, zoals de woningmarkt/bouw. Dit interview dient een inzichtelijk beeld te creëren dat belangrijke informatie zal bevatten om de onderzoeksvraag te kunnen beantwoorden.

De opbouw van het interview

Het interview bestaat uit een set van vragen die gericht zijn op de beantwoording van de deelvragen en hoofdvraag van mijn afstudeerscriptie.

Datacollectie en vertrouwelijkheid

De data die verworven wordt uit dit interview zal expliciet gebruikt worden voor doeleinden van deze afstudeerscriptie. Verder zal de data van dit interview binnen het systeem van Sweco en de Radboud Universiteit blijven en niet met derden gedeeld worden. Bovendien heeft u de mogelijkheid om het hele transcript van het interview te ontvangen, mocht u dat willen. Verder zal u als respondent in mijn onderzoek anoniem blijven. Als ik een citaat uit dit interview in mijn scriptie toe pas, zal dit aangeduid worden aan de hand van 'Functie respondent 1' of soortgelijk.

Opname

Om de data volledig en juist te kunnen verzamelen zou ik het op prijs stellen om het interview op te nemen. De opname van het interview zal mij helpen om de data volledig en correct te kunnen transcriberen en hierna te kunnen analyseren. Het transcript van het interview zal vertrouwelijk worden opgeslagen. Geeft u toestemming voor de opname van dit interview?

Heeft u verder nog vragen voor aanvang van het interview?

Start interview

Algemene vragen:

Voor een overzichtelijk beeld van de geïnterviewde en het verdere verloop van mijn onderzoek, stel ik u de volgende vraag:

1. Wat is uw functie en rol in het project van het Vijfde Dorp in de Zuidplaspolder?

Korte (extra) toelichting over de interviewvragen

Gedurende het interview zal ik u vragen stellen die zich richten op de drie verschillende fases van mainstreaming klimaatadaptatie. De eerste fase richt zich op de fase van initiatie en programmering van het Vijfde Dorp. De tweede fase gaat over de beleidsvorming van de omgeving met bijbehorende plannen, zoals het MER en de bestemmingsplannen voor het Vijfde Dorp. Ook de besluitvorming over beleidsplannen van de betrokken partijen komt in deze fase aan bod. De laatste fase richt zich op de inrichting en implementatie van het (omgevings)beleid. Deze vragen over de verschillende fases helpen mij om te onderzoeken hoe klimaatadaptatie is ingebed in elke fase van het Vijfde Dorp.

Mainstreaming barriers and opportunities

Understanding phase:

Social and cultural

2. Hoe denkt u over het Vijfde Dorp met betrekking tot klimaatverandering?
3. Merkt u dat partijen verschillend denken over de woningbouw in relatie tot klimaatverandering? Zo ja, denkt u dat dit invloed heeft gehad op de ontwikkeling van de klimaatadaptatie?

Informational and cognitive

4. Vindt u dat er voldoende bewustwording voor klimaatadaptatie onder de verschillende partijen die betrokken zijn bij het Vijfde Dorp aanwezig is? Zo ja, waaraan merkt u dit? Zo niet, bestaat er bijvoorbeeld een gat tussen het willen en het doen van klimaatadaptatie?
5. Werden er tijdens de fase van initiatie en programmering voor het Vijfde Dorp afspraken gemaakt over klimaatadaptatie? Zo ja, wat is er bijvoorbeeld afgesproken?
 - a. Is klimaatadaptatie gedurende het proces van initiatie publiek (breed) ondersteund?

Institutional and organisational

6. Vindt u dat er tijdens de fase van initiatie en programmering voor het Vijfde Dorp voldoende samenwerking tussen partijen is geweest omtrent klimaatadaptatie?
7. Zijn de betrokken actoren volgens u gedreven om klimaatadaptatie belangrijk te maken voor de woningbouw van het Vijfde Dorp? En hoe merkt(e) u dat klimaatadaptatie een belangrijke rol speelt/speelde voor de woningbouw in de Zuidplaspolder? Zo niet, waardoor komt het volgens u dat niet iedereen gedreven genoeg is?
 - a. Ervaart u publieke druk omtrent klimaatadaptatie voor de woningbouw in het Vijfde Dorp?

Planning phase

Physical and ecological

1. Hebben volgens u de klimaateffecten veel invloed op de fysieke omgeving? Kan de polder bijvoorbeeld een mogelijke piekbui of dijkdoorbraak aan? Ook met de woningen die er in het Vijfde Dorp komen?
2. Is hier urgentie voor?
3. Zijn er plannen opgesteld om het Vijfde Dorp klimaatadaptatief te bouwen tegen mogelijke klimaateffecten, zoals een hevige bui of een stijgende zeespiegel? En zo ja, hoe zien deze plannen eruit? Vind je dat er voldoende is rekening gehouden in beleid?

Financial

4. Ontvangt uw partij financiële middelen/subsidie van het Rijk of Provincie om klimaatadaptatie (gemeente Zuidplas 14 miljoen euro → woningbouwimpuls van het Rijk) voor het Vijfde Dorp beleidsmatig door te voeren? Zo ja, waarvoor worden deze financiële middelen gebruikt?
 - a. Heeft uw partij een budget voor klimaatadaptatie?
5. Als de kosten van klimaatadaptatie doorgevoerd zullen worden in de woningbouw, wie zullen de kosten van klimaatadaptatieve maatregelen gaan dragen? Zijn dit de ontwikkelaar(s) of de bewoners, of andere partijen? Hoe ziet dit er op de lange termijn uit?

Technological

6. Zijn er in uw ogen voldoende technische mogelijkheden om de woningbouw klimaatadaptief (huizen op palen of drijvend bouwen) te realiseren? Zo ja, heeft u hier voorbeelden van? Zo niet, waarom niet? Gaan deze gebruikt worden?
7. Is het wellicht te duur? Wordt er geïnvesteerd in nieuwe klimaatadaptatieve technieken?
8. Bestaat er volgens u onder de verschillende partijen eenduidigheid over hoe de woningbouw klimaatadaptief moet worden geëxploiteerd/opgesteld?

Institutional and organisational

9. Vindt u de beleidsdoelen omtrent klimaatverandering, in relatie tot andere beleidsdoelen/velden, belangrijk? Waarom wel of waarom niet?
10. Zijn volgens u de verschillende partijen bereid klimaatadaptatie in het beleid van het Vijfde Dorp te betrekken?
11. Merkt u of uw partij dat er binnen de gemeente Zuidplas en/of bij een overheidsniveau urgentie speelt om klimaatadaptatie in het Vijfde Dorp daadwerkelijk te realiseren? Zo ja, hoe merkt u dit? Welke maatregelen zijn er (genomen) om klimaatadaptatie in het beleid door te voeren?
12. Zo niet, wat ligt hier aan ten grondslag?

Managing phase

Financial

1. Zijn er financiële middelen beschikbaar gesteld om klimaatadaptatie voor het Vijfde Dorp te implementeren? Zo ja, is dit volgens u of uw partij voldoende?

Institutional and organisational

2. Hoe ziet de samenwerking tussen uw partij en andere partijen eruit om klimaatadaptatie te implementeren in het Vijfde Dorp? Heeft u hier een concreet voorbeeld van? Zoals in het Masterplan staat, wordt er conform het Convenant Klimaatadaptief bouwen gebouwd, vindt u dit goed en kansrijk of denkt u dat er ook nog haken en ogen aan zitten?
 - a. Hoe zal bij de implementatie de ruimte voor klimaatadaptatie zijn t.o.v. andere beleidsvelden?

Mainstreaming indicators

1. In hoeverre vindt u dat in het gehele beleidsproces van het Vijfde Dorp aandacht is (geweest) voor klimaatadaptatie?
2. En hoe vindt u dat klimaatadaptatie wordt toegepast in het Vijfde Dorp? Op wat voor manier is dit zichtbaar volgens u? Bijvoorbeeld door met name programma's, of wet-en regelgeving of door normen en waarden?

Overkoepelende vragen

1. Welke beleidsinstrumenten zijn in uw optiek nodig om de toekomstige impact van klimaatverandering voor het Vijfde Dorp in de Zuidplaspolder aan te pakken?

Afsluitende vragen:

1. Na de interviews die ik gehouden heb, wil ik graag een bijeenkomst organiseren om de voorlopige resultaten van mijn onderzoek voor te leggen aan experts om op die manier de bestaande resultaten te toetsen. Heeft u eventueel interesse in zo'n bijeenkomst als ik de interviews heb uitgewerkt en de barrières en kansen voor de Zuidplaspolder heb uitgewerkt?
 - a. Zo ja, deze zal ik nader te bepalen inplannen. U hoort nog van mij.
 - b. Zo niet, zou u naast het geschreven transcript ook de uiteindelijke versie van afstudeeronderzoek willen ontvangen?
2. Heeft u nog inhoudelijke toevoegingen of opmerkingen die betrekking hebben op mijn onderzoek?
3. Heeft u naar aanleiding van dit interview nog andere opmerkingen of vragen?

Opname stoppen

- Heeft u tips of eventuele verbeterpunten voor mij en mijn volgende interviews?
- Kent u wellicht andere mensen die interessant kunnen zijn voor mijn onderzoek?
- Zou ik eventueel met u contact op kunnen nemen, indien ik nog vragen heb?

Einde interview

Appendix 2: Interview guide for indirect stakeholders

English version



Time and date:

Respondent:

Interviewer: Kars Barkmeijer

Location: Microsoft Teams/physical location

Duration: +/- 60 minutes



Introduction

My name is Kars Barkmeijer and I am currently writing my thesis for the master Spatial Planning at the Radboud University. Within this master programme, I am following the specialisation Cities, Water and Climate Change. Through an internship at Sweco, I am writing my thesis to graduate for the master. The topic of my research is about the future of climate adaptation into urban planning in the municipality Zuidplas in relation to sea level rise, heavy rainfall and flood risk of the Hollandse IJssel in this area. I am curious about the process of policy and planning for climate adaptation into urban planning in the 'Vijfde Dorp'. In the remainder of this interview I will refer to these three different climate effects together as 'climate change'.

Purpose of the interview

The purpose of this interview is to gain insight into the barriers and opportunities that play a role in the implementation of flexible and adaptive policies to make urban planning in the Netherlands adaptive. My research focuses on the central question of what factors play a role in integrating climate adaptation into urban planning. In doing so, I make use of the theory of mainstreaming. This theory examines the extent to which climate adaptation is included in the policies of sectors, such as the housing market/urban planning. This interview should create an insightful picture that will contain important information to answer the research question.

The structure of the interview

The interview consists of a set of questions aimed at answering the sub-questions and main research question of my thesis.

Data collection and confidentiality

The data obtained from this interview will be used explicitly for the purposes of this thesis. Furthermore, the data from this interview will remain within the system of Sweco and Radboud University and will not be shared with third parties. Furthermore, you have the option to receive the entire transcript of the interview, if you wish to do so. Furthermore, you will remain anonymous as a respondent in my research. If I use a quote from this interview in my thesis, it will be marked 'Function respondent 1' or similar.

Recording

In order to be able to collect the data completely and correctly, I would appreciate it if the interview could be recorded. The recording of the interview will help me to transcribe the data completely and correctly and to analyse it afterwards. The transcript of the interview will be stored confidentially. Do you consent to a recording of this interview?

Do you have any remaining questions before starting the interview?

Start interview

Start recording

General question:

In order to get a clear overview of the respondents and the further course of my research, I would like to ask you the following questions:

1. What are you involved in at organisation x?

Short (additional) explanation about the interview questions:

During the interview, I will ask you questions that focus on the three different phases of mainstreaming climate adaptation. The first phase focuses on the phase of initiation and programming of urban planning projects. The second phase deals with the policy-making of the environment with corresponding urban planning projects. Decision-making on policy plans of the parties involved is also dealt with in this phase. The final phase focuses on the design and implementation of the zoning plan. These questions about the various phases help me to examine how climate adaptation is embedded in each phase of urban planning.

Mainstreaming barriers and opportunities

Understanding phase:

Social and cultural

2. What do you think about urban planning in relation to climate change in the Netherlands? *If relevant:* (And what are your views on urban planning in the 'Vijfde Dorp' in relation to climate change?)

Informational and cognitive

3. Do you think there is sufficient awareness of climate adaptation among housing corporations, project developers and other relevant stakeholders in the Netherlands? If so, how can you tell?
4. Do you see that agreements on climate adaptation are being made among these stakeholders? If so, do you have an example of an agreement or agreements?

Institutional and organisational

5. Do you think there is sufficient cooperation between stakeholders on climate adaptation during the initiation and programming phase of urban planning in the Netherlands?

6. In your opinion, are the parties involved in urban planning projects in the Netherlands driven to make climate adaptation important? And how do you feel that climate adaptation plays/played an important role into urban planning?

Planning phase

Physical and ecological

1. In your opinion, will new urban planning developments have an impact on the physical environment (such as possible subsidence) in low-lying areas in the Netherlands? If so, does this possible effect factor into the policy of your organisation or of stakeholders with whom you collaborate for urban planning development in the Netherlands?
2. Have plans been drawn up (by your organisation) to build housing in the Netherlands in a climate adaptive manner against possible climate effects? And if so, what do these plans look like?

Financial

3. Does your party receive financial resources/subsidies from the national government (or province) to implement climate adaptation for urban planning projects in the Netherlands?

Not relevant for the interview with the national government

Question for the national government: Does the national government/your ministry provide financial resources to implement climate adaptation for housing projects in the Netherlands? If so, what are these financial resources used for?

Not relevant to the national government: If not, are you/your organisation making funds available to implement climate adaptation in housing projects in the Netherlands?

4. If the costs of climate adaptation are to be implemented in your urban planning projects, who will bear the costs of climate adaptation measures? Is it the project developer(s)/housing corporations or the residents, or other stakeholders? What do you think this will look like in the long-term?

Technological

5. In your opinion, are there sufficient technical possibilities to realise climate adaptive housing (in the Netherlands) (houses on stilts or floating construction)? If so, do you have any examples?
6. Do you think that there is uniformity among the various project developers/corporations or other stakeholders on how to operate/design housing in a climate adaptive way?

Institutional and organisational

7. Do you/your organisation consider climate change as an objective for housing, in relation to other objectives/requirements, important? Why or why not?
8. In your opinion, are all stakeholders, such as developers, the national government, the municipality willing to include climate adaptation in your projects?
9. Do you or your organisation notice that there is an urgency within a municipality and/or at another level of government to actually realise climate adaptation in (low-lying parts of) the Netherlands? If so, how have you noticed this? What measures have been taken to implement climate adaptation into policy?

Managing phase

Financial

1. Are financial resources been made available by your organisation to implement climate adaptation for urban planning in the Netherlands? If so, do you or your organisation think this is sufficient?

Institutional and organisational

1. How does the cooperation between your organisation and other stakeholders look like in order to implement climate adaptation in the Netherlands/in urban planning projects? Do you have a concrete example of this?

Mainstreaming indicators

1. To what extent do you think that climate adaptation has been or is being addressed throughout the urban planning process in the Netherlands?
2. And how do you think climate adaptation is being applied in urban planning projects in the (low-lying) Netherlands? In what way do you think this is visible?

Overarching questions

1. In your opinion, which (policy) instruments are needed to address the future impact of climate change on urban planning in the Netherlands?

Concluding questions

1. After the interviews I conducted, I would like to organise a meeting to present the preliminary results of my research to experts in order to test the existing results. Would you be interested in such a meeting once I have completed the interviews and worked out the barriers and opportunities for urban planning?
 - a. If yes, I will schedule one to be held at a later date. You will hear from me.
 - b. If not, would you like to receive not only the written transcript but also the final version of the thesis?
2. Do you have any additions or comments regarding my research?
3. Do you have any other remarks or questions as a result of this interview?

Stop recording

- Do you have any tips or possible points of improvement for me and my next interviews?
- Do you know other people who might be interesting for my research?
- Could I contact you if I have any further questions?

End of interview

Dutch version

Tijd en datum:

Geïnterviewde:

Interviewer: Kars Barkmeijer

Locatie: Microsoft Teams/fysieke locatie

Tijdsduur: +/- 60 min



Introductie

Mijn naam is Kars Barkmeijer en ik ben momenteel aan het afstuderen voor de master Spatial Planning aan de Radboud Universiteit. Binnen deze master volg ik de specialisatie Cities, Water and Climate Change. Via een afstudeerstage bij Sweco schrijf ik de scriptie om uiteindelijk af te studeren. Het onderzoek van de scriptie gaat over de toekomstige flexibiliteit en aanpasbaarheid van de woningbouw in de gemeente Zuidplas in relatie tot zeespiegelstijging, hevige neerslag en overstromingsrisico van de Hollandse IJssel in dit gebied. Ik ben benieuwd naar de planologische beleidsvoering van de klimaatadaptatie in de woningbouw van het 'Vijfde Dorp'. In het vervolg van dit interview noem ik deze drie verschillende klimaat effecten tezamen 'klimaatverandering'.

Doel van het interview

Het doel van dit interview is om een inzichtelijk beeld te krijgen welke barrières, kansen en factoren een rol spelen bij het implementeren van flexibele en aanpasbare beleidsmaatregelen om woningbouwprojecten in het algemeen/in Nederland adaptief te verwezenlijken. Mijn onderzoek richt zich op de centrale vraag welke factoren een rol spelen bij de integratie van klimaatadaptatie in de woningbouw. Hierbij maak ik gebruik van de theorie van mainstreaming. Deze theorie onderzoekt in hoeverre klimaatadaptatie voorkomt in het beleid van sectoren, zoals de woningmarkt/bouw. Dit interview dient een inzichtelijk beeld te creëren dat belangrijke informatie zal bevatten om de onderzoeksvraag te kunnen beantwoorden.

De opbouw van het interview

Het interview bestaat uit een set van vragen die gericht zijn op de beantwoording van de deelvragen en hoofdvraag van mijn afstudeerscriptie.

Datacollectie en vertrouwelijkheid

De data die verworven wordt uit dit interview zal expliciet gebruikt worden voor doeleinden van deze afstudeerscriptie. Verder zal de data van dit interview binnen het systeem van Sweco en de Radboud Universiteit blijven en niet met derden gedeeld worden. Bovendien heeft u de mogelijkheid om het hele transcript van het interview te ontvangen, mocht u dat willen. Verder zal u als respondent in mijn onderzoek anoniem blijven. Als ik een citaat uit dit interview in mijn scriptie toe pas, zal dit aangeduid worden aan de hand van 'Functie respondent 1'.

Opname

Om de data volledig en juist te kunnen verzamelen zou ik het op prijs stellen om het interview op te nemen. De opname van het interview zal mij helpen om de data volledig en correct te kunnen transcriberen en hierna te kunnen analyseren. Het transcript van het interview zal vertrouwelijk worden opgeslagen. Geeft u toestemming voor de opname van dit interview?

Heeft u verder nog vragen voor aanvang van het interview?

Start interview

Start opname

Algemene vragen:

Voor een overzichtelijk beeld van de geïnterviewde en het verdere verloop van mijn onderzoek, stel ik u de volgende vragen:

1. Waar houdt u zich mee bezig bij organisatie x?

Korte (extra) toelichting over de interviewvragen:

Gedurende het interview zal ik u vragen stellen die zich richten op de drie verschillende fases van mainstreaming klimaatadaptatie. De eerste fase richt zich op de fase van initiatie en programmering van woningbouwprojecten. De tweede fase gaat over de beleidsvorming van de omgeving met bijbehorende plannen voor de woningbouw. Ook de besluitvorming over beleidsplannen van de betrokken partijen komt in deze fase aan bod. De laatste fase richt zich op de inrichting en implementatie van het (omgevings)beleid. Deze vragen over de verschillende fases helpen mij om te onderzoeken hoe klimaatadaptatie is ingebed in elke fase van woningbouw/projecten.

Mainstreaming barriers and opportunities

Understanding phase:

Social and cultural

2. Hoe denkt u over de woningbouw met betrekking tot klimaatverandering in Nederland? *Mits relevant:* (En hoe denkt u over de woningbouw in het Vijfde Dorp in relatie tot klimaatverandering?)

Informational and cognitive

3. Vindt u dat er voldoende bewustwording voor klimaatadaptatie onder wooncorporaties, projectontwikkelaars en andere relevante partijen in Nederland is? Zo ja, waaraan merkt u dit?
4. Ziet u ook dat er onder deze partijen afspraken gemaakt voor klimaatadaptatie? Zo ja, heeft u een voorbeeld van een afspraak of afspraken?

Institutional and organisational

5. Vindt u dat er tijdens de fase van initiatie en programmering bij woningbouw in Nederland voldoende samenwerking tussen partijen is omtrent klimaatadaptatie?

6. Zijn bij woningbouwplannen in Nederland volgens u de betrokken partijen gedreven om klimaatadaptatie belangrijk te maken? En hoe merkt u dat klimaatadaptatie een belangrijke rol speelt/speelde voor de woningbouw?

Planning phase

Physical and ecological

1. Zal volgens u nieuwe woningbouw effect hebben op de fysieke omgeving (zoals mogelijke bodemdaling) van laaggelegen gebieden in Nederland? Zo ja, weegt dit mogelijke effect mee in het beleid van uw organisatie of bij partijen waar u mee samenwerkt voor woningen/woningbouw in Nederland?
2. Zijn er (bij uw partij) plannen opgesteld om de woningbouw in Nederland klimaatadaptatief te bouwen tegen mogelijke klimaateffecten? En zo ja, hoe zien deze plannen eruit?

Financial

3. Ontvangt uw partij financiële middelen/subsidie van het Rijk (of Provincie) om klimaatadaptatie voor projecten in Nederland beleidsmatig door te voeren? *Niet relevant bij interview met het Rijk*
Vraag voor het Rijk: Zet het Rijk/ uw ministerie financiële middelen beschikbaar om klimaatadaptatie voor woningbouwprojecten in Nederland beleidsmatig door te voeren?
Zo ja, waarvoor worden deze financiële middelen gebruikt?
Niet relevant voor het Rijk: Zo niet, zet u/uw partij zelf een budget beschikbaar om klimaatadaptatie door te voeren in woningbouwprojecten in Nederland?
4. Als de kosten van klimaatadaptatie doorgevoerd zullen worden in uw woningbouwprojecten, wie zullen de kosten van klimaatadaptatieve maatregelen gaan dragen? Zijn dit de ontwikkelaar(s)/corporaties of de bewoners, of andere partijen? Hoe ziet dit er volgens u op de lange termijn uit?

Technological

5. Zijn er in uw ogen voldoende technische mogelijkheden om de woningbouw (in Nederland) klimaatadaptatief (huizen op palen of drijvend bouwen) te realiseren? Zo ja, heeft u hier voorbeelden van?
6. Bestaat er volgens u onder de verschillende projectontwikkelaars/corporaties of andere partijen eenduidigheid over hoe de woningbouw klimaatadaptatief moet worden geëxploiteerd/opgesteld?

Institutional and organisational

7. Vindt u/uw partij klimaatverandering als doel voor de woningbouw, in relatie tot andere doelen/eisen, belangrijk? Waarom wel of waarom niet?
8. Zijn volgens u alle partijen, zoals ontwikkelaars, het Rijk, de gemeente bereid klimaatadaptatie in projecten van u te betrekken?
9. Merkt u of uw partij dat er binnen een gemeente en/of bij een ander overheidsniveau urgentie speelt om klimaatadaptatie in (laaggelegen delen van) Nederland daadwerkelijk te realiseren? Zo ja, hoe merkt u dit? Welke maatregelen zijn er (genomen) om klimaatadaptatie in het beleid door te voeren?

Managing phase

Financial

1. Zijn er door uw partij financiële middelen beschikbaar gesteld om klimaatadaptatie voor de woningbouw in Nederland te implementeren? Zo ja, is dit volgens u of uw partij voldoende?

Institutional and organisational

2. Hoe ziet de samenwerking tussen uw partij en andere partijen eruit om klimaatadaptatie te implementeren in Nederland/in woningbouwprojecten? Heeft u hier een concreet voorbeeld van?

Mainstreaming indicators

1. In hoeverre vindt u dat in het gehele beleidsproces van de woningbouw in Nederland aandacht is (geweest) voor klimaatadaptatie?
2. En hoe vindt u dat klimaatadaptatie wordt toegepast in woningbouwprojecten van (laaggelegen) Nederland? Op wat voor manier is dit zichtbaar volgens u?

Overkoepelende vragen

1. Welke (beleids)instrumenten zijn in uw optiek nodig om de toekomstige impact van klimaatverandering voor de woningbouw in Nederland aan te pakken?

Afsluitende vragen:

1. Na de interviews die ik gehouden heb, wil ik graag een bijeenkomst organiseren om de voorlopige resultaten van mijn onderzoek voor te leggen aan experts om op die manier de bestaande resultaten te toetsen. Heeft u eventueel interesse in zo'n bijeenkomst als ik de interviews heb uitgewerkt en de barrières en kansen voor de woningbouw heb uitgewerkt?
 - a. Zo ja, deze zal ik nader te bepalen inplannen. U hoort nog van mij.
 - b. Zo niet, zou u naast het geschreven transcript ook de uiteindelijke versie van afstudeeronderzoek willen ontvangen?
2. Heeft u nog inhoudelijke toevoegingen of opmerkingen die betrekking hebben op mijn onderzoek?
3. Heeft u naar aanleiding van dit interview nog andere opmerkingen of vragen?

Opname stoppen

- Heeft u tips of eventuele verbeterpunten voor mij en mijn volgende interviews?
- Kent u wellicht andere mensen die interessant kunnen zijn voor mijn onderzoek?
- Zou ik eventueel met u contact op kunnen nemen, indien ik nog vragen heb?

Einde interview

Appendix 3: Interview guide focus group

English version

Time and date:

Focus group participants:

Interviewer: Kars Barkmeijer

Location: Microsoft Teams

Duration: ± 90 min



Introduction focus group (total of ±20 min)

Meeting and introduction

Welcoming the respondents and thanking them for their time and cooperation for the focus group session. After this I ask the respondents to introduce themselves briefly.

After this I will explain the agenda and the course of the focus group:

- Presentation of preliminary findings
- Explaining the first conclusions based on the main research question
- Based on the set of questions, ask each respondent the focus group questions
- Start discussion
- Closing the meeting

Purpose of the focus group

The purpose of the focus group is to test the preliminary findings with the experts who are active and involved in the development of the 'Vijfde Dorp' in the Zuidplaspolder as well as in related projects. With the knowledge and expertise from the participants, the preliminary findings and analyses of the data can be checked. This clearly improves the reliability of the data and enhances the validity.

Expectations of the focus group

In the light of my research, I expect the respondent to give insightful, honest and clear answers to the interviewer's questions. This will strengthen my research outcomes and the answering of my research questions. Furthermore, I appreciate that everyone allows each other to finish speaking during the focus group so that everyone has the opportunity and time to express their opinions.

Data and recording

The data from this meeting will be used explicitly internally within the domains of Sweco and Radboud University. I will anonymously record and name each respondent in the transcript and results of my research. I would appreciate it if I could record the meeting. Do you consent to a recording of this interview?

Are there any questions at this point?

Start recording (when permission is provided)

Start focus group

Powerpoint presentation (5-10 min)

- a. Research questions (main and sub-questions), explaining the phases with conceptual model
- b. Identify barriers, opportunities and factors
- c. Explaining insights from interviews and documents
- d. State initial conclusions

2. Ask respondents to provide initial reaction and insight in response to the results of the presentation (20 min).

- a. Can you identify with the barriers and opportunities for climate adaptation into the urban planning of the 'Vijfde Dorp'?
- b. Is there an important barrier or opportunity (in one or more phases) missing?

3. Start focus group discussion (20 min)

(In-depth) questions to ask:

- a. Which factors will lead to bottlenecks if climate adaptation is eventually included in the realisation of urban planning in the 'Vijfde Dorp'?
- b. What need be done about possible factors influencing the process of climate adaptation for urban planning in the 'Vijfde Dorp'?

4. Ask the respondents how climate adaptation can be promoted in general (nationwide) in urban planning (15-20 min)

- a. How can the mainstreaming of climate adaptation in urban planning be improved?
- b. What actions or factors are needed to promote this?
- b. Who should or are responsible for realising this? How can they or should they take responsibility for this?

5. End of the focus group (5 min)

- Any remarks, questions and comments
- Thank the respondents for their availability, cooperation and time.

Dutch version

Tijd en datum:

Focus group deelnemers:

Interviewer: Kars Barkmeijer

Locatie: Microsoft Teams

Tijdsduur: ± 90 min



Introductie focus group (totaal ±20 min)

Verloop kennismaking en introductie

Respondenten welkom heten en bedanken voor hun tijd en medewerking aan de focus group. Hierna vragen aan de respondenten om ieder zich even kort voor te stellen.

Hierna zal ik de agenda en het verloop van de focus group toelichten:

- Presentatie over eerste bevindingen
- Eerste conclusies aan de hand van de hoofdvraag toelichten
- Aan de hand van de set aan vragen, elke respondenten vragen stellen
- Discussie starten
- Afsluiten

Doel van de focus group

Het doel van de focus group is om de eerste bevindingen te toetsen aan experts die actief en betrokken zijn bij zowel de ontwikkeling van het Vijfde Dorp in de Zuidplaspolder als bij soortgelijke projecten. Met de kennis en expertise van de respondenten kunnen de eerste bevindingen en analyses van de data gecheckt worden. Dit geeft een duidelijke verbetering aan de betrouwbaarheid van de data en komt bovendien de validiteit ten goede.

Verwachting van de focus group

Ik verwacht dat de respondent in het licht van mijn onderzoek inzichtelijke, eerlijke en duidelijke antwoorden geven op de vragen van de interviewer. Dit zal mijn onderzoeksresultaten en de beantwoording van mijn onderzoeksvragen versterken. Bovendien stel ik het op prijs dat iedereen elkaar laat uitpraten tijdens de focus group, om zo iedereen de gelegenheid en de tijd krijgt om zijn mening te verwoorden.

Data en opname

De data uit deze bijeenkomst zal expliciet intern gebruikt worden binnen de domeinen van Sweco en de Radboud Universiteit. Ik zal iedere respondent anoniem verwoorden en benoemen in het transcript en de resultaten van mijn onderzoek. Ik zou het waarderen als ik de bijeenkomst zou mogen opnemen. Geven jullie toestemming voor het opnemen van dit interview?

Zijn er op dit moment vragen?

Opname starten (mits toestemming)

Start focus group

1. Powerpoint presentatie (5-10 min)

- a. Onderzoeksvragen (hoofd- en deelvragen), de fases toelichten met conceptueel model toelichten
- b. Barrières, kansen en factoren benoemen
- c. Inzichten uit de interviews en documenten toelichten
- d. Eerste conclusies aangeven

2. Vragen om de respondenten eerste reactie en inzicht te geven naar aanleiding van de uitkomsten uit de presentatie (20 min).

- a. Kunnen jullie je vinden in de barrières, kansen en factoren voor klimaatadaptatie in de woningbouw van het Vijfde Dorp?
- b. Mist er een belangrijke barrière, kans of factor (in een of meerdere fases)?

3. Focus group discussie starten (20 min)

(Verdiepende) vragen om te kunnen stellen:

- a. Welke factoren zullen (met name) tot knelpunten leiden, mocht uiteindelijk klimaatadaptatie meegenomen in de realisatie van de woningbouw in het Vijfde Dorp?
- b. Wat zal er moeten gebeuren met mogelijke factoren die het proces van klimaatadaptatie beïnvloeden voor de woningbouw in het Vijfde Dorp?

4. Vragen aan de respondenten hoe klimaatadaptatie in zijn algemeenheid (landelijk) in de woningbouw bevorderd kan worden (15-20 min)

- a. Hoe kan de mainstreaming van klimaatadaptatie in de woningbouw verbeterd worden?
- b. Welke acties of factoren zijn hiervoor nodig om dit te kunnen bevorderen?
- c. Wie moeten of zijn hier verantwoordelijk voor om dit te kunnen realiseren? Hoe kunnen zij of moeten zij hier hun verantwoordelijk innemen?

5. Einde van de focus group (5 min)

- Eventuele nabranders, vragen en opmerkingen
- Respondenten bedanken voor hun beschikbaarheid, medewerking en tijd.