Parallel Planning : Applied

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Preface

The thesis lying, or projected, before you is the finishing piece of my academic journey and the concluding piece of my master's: *Management and the Built Environment*.

In 2023, between my bachelor's and master's, I needed a job and applied for a job to work at a supermarket, which landed me a job as a working student with a project developer (I still do not know how this happened). This job was my first experience with the process of development, in which I noticed different ways of developing housing among stakeholders. These differences led to communication challenges, reduced collaboration, and delays in development. These experiences, combined with my personal interest in the housing crisis, inspired the exploration of the cause of the housing crisis and what role development methods play in the duration of new builds. This thesis explores the duration of housing development as a roadblock in the reduction of the housing crisis and the aim of the working/development method, parallel planning, to reduce this duration.

The writing process of this thesis was one of the most challenging things I have ever done, and I could not have done it without the support of so many people. So, before you move on to reading my final hooray, there are some people I would like to thank. Firstly, my supervisors: Gerard van Bortel and Marjolein Spaans. Thank you for the detailed feedback, always making time to check my work and teaching me the valuable lesson of asking more questions. Secondly, my supervisors from BPD, Anke Wolters and Judith Boot, from the first day you believed in me, thank you for your daily support and feedback. I would also like to thank my other colleagues at BPD: the project developers for their openness in the interviews and the research team for welcoming me with open arms, with special thanks to Marith Lengkeek.

I could not end this gratitude section without thanking my family and friends, in particular Else Tiggelman and Ruben van der Boel. I do not think I could/would have finished my master's without your support. And finally, a special thanks to my partner Eva Stevenhagen, who got me through every ‘Sundaycryday’, post-feedback session dip, and her overall unwavering support in life.

Thank you all for everything!

Enjoy!

Kes

Abstract

The Netherlands is currently facing a housing shortage. One of the key challenges in the housing system is the lengthy duration of housing development, which averages around 10 years (Ministerie Volkshuisvesting en Ruimtelijke Ordening, 2023). The most time-consuming phase is the planning phase, which averages around 6 years. To address this issue, the concept of parallel planning has been introduced. Parallel planning is a planning method that combines activities along the timeline to shorten the overall duration and introduces a new working method for housing development projects. However, the applicability of this method has not yet been tested on completed projects. This research aims to evaluate parallel planning by addressing the following research question:

How can parallel planning address delays in housing development to reduce the planning phase?

This question is explored using qualitative methods, including literature analysis, interviews, and two case studies of completed housing projects. The results confirm that parallel planning seeks to reduce the duration of housing development not only by restructuring the timeline but also by mitigating delays through its working method. It primarily addresses internal delays by enhancing coordination among stakeholders and improving the overall efficiency of the planning process.

Keywords: Parallel planning, Delays, Housing Development, Housing Shortage, Planning of housing.

Executive Summary

Parallel planning: Applied is a study on how the parallel planning method can reduce delays in the planning phase of housing development. The motivation behind the research is the housing crisis in the Netherlands and the duration of housing development, averaging 10 years (Volkshuisvesting en Ruimtelijke Ordening, 2023). Due to the duration of the planning phase, research (Holt et al., 2022; Geuting et al., 2022) has been done to accelerate development. Parallel planning is part of a wider set of governmental and industry initiatives to accelerate housing development, including NH Bouwstroom and location subsidy reforms. This method is specifically designed to reduce the planning phase of housing development and is currently in its pilot phase. Even though it is still in the testing phase, parallel planning has become part of some subsidies' preconditions. This highlights the need for data on the effectiveness of parallel planning to reduce delays. This research aims to test the use of parallel planning against data from completed housing development cases. The research question is:

How can parallel planning address delays in housing development to reduce the planning phase?

The research question is addressed through a qualitative methodology, incorporating literature review, interviews, and case studies. The study is divided into four sections: the definition of parallel planning and its essential components, an examination of the housing development process, identification of factors of delay experienced during housing development, concluding in a comparison of the key ingredients of parallel planning to determine which factors of delay are mitigated.

The results define parallel planning as a new approach to project management in the Dutch housing sector, designed to replace the traditional, sequential planning model. The approach is built on four foundational pillars: parallel planning as a guiding principle, standardization, a continuous stream of information, and efficient working. Each pillar is supported by key ingredients designed to accelerate housing development and mitigate factors of delay.

This research focuses specifically on one part of the overall housing development process: the planning phase. To identify delays within this timeframe, it was necessary to clearly define the planning phase. Since the cases in this study are drawn from BPD area development, the planning phase was established based on their process for housing development. Typical activities during this phase include initiation (RAV Opstal), the design stages (SO, VO, and DO), followed by the permitting phase, pre-sale, and the awarding of the project (DUV and Gunning).

Within this timeframe, delays were identified using a combination of literature review and two case studies. These sources revealed 30 potential causes of delay, which were grouped into internal and external categories. Internal delays are those factors that originate within the control of the project team (municipality and developer), while external delays stem from factors outside the project team's control.

These 30 factors of delay were then compared with the key ingredients of parallel planning. The ingredients are defined based on the data of parallel planning. The links between the ingredients and the causes of delays indicate which factors are addressed by parallel planning.

The analysis of these links shows that parallel planning primarily targets internal, process-related delays, such as those resulting from poor communication and limited collaboration. In contrast, external delays, including legal procedures and third-party appeals, are more difficult to address through parallel planning. While the results indicate that parallel planning can help reduce internal delays, its impact on external delays remains limited. Based on the findings, it remains challenging to determine the exact extent to which parallel planning reduces delays in housing development. Nevertheless, the research demonstrates that parallel planning introduces a more intentional approach, enabling greater control over internal processes and improved coordination. Although the method has limited influence on external delays, it seeks to mitigate their impact through key elements such as open information sharing and early risk identification. Parallel planning thus provides a framework for reducing internal delays and increasing planning flexibility, even if its full impact on overall project timelines has yet to be fully demonstrated.

In conclusion, parallel planning has the potential to significantly shorten the planning phase, provided all parties involved are committed. The method requires a cultural shift, from reactive and varied planning approaches to standardized, proactive planning. While the most significant delays are often external and difficult to influence, internal optimization through parallel planning can help address them indirectly.

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Chapter 1: Introduction

1.1 Problem statement

The Netherlands is dealing with a housing shortage. The Dutch housing market faces significant challenges, as supply has failed to meet demand over the past decade (Geis, 2023). In other words: a housing crisis. One of the leading causes of the stagnation in housing development is the duration. The current average length of housing development is 10 years (Ministerie van Volkshuisvesting en Ruimtelijke Ordening, 2023). Currently, the government is collaborating with various parties on solutions and implementations to increase the availability of all types of housing in the Netherlands and accelerate development. The goal is to build approximately 900.000 additional homes by 2030 (Ministerie van Volkshuisvesting en Ruimtelijke Ordening, 2023). However, to achieve the government's goal of 900.000 homes by 2030, following the average duration, housing projects should have started 5 years ago.

Over the past 15 years and beyond, the Dutch government and consultants have introduced a range of initiatives aimed at accelerating the development of housing. Instruments that have been implemented include tools such as inclusionary zoning (inclusief bestemmingsplan), which stimulates the development of social housing, as well as regional steering tables that aim to streamline permitting and subsidies that encourage innovation and sustainability. Companies have also come up with their own ways to accelerate housing development, such as the NH-bouwstroom, which aims to approach the housing development challenge collaboratively with market parties and the government (NH Bouwstroom, 2025).

Although these instruments have been introduced, the duration of housing development has not yet been accelerated to the point where no further improvements are needed. To gain more insights into the duration of housing development, the Dutch government issued more research surrounding the duration of development. Government-issued research, such as the Rode Draad rapport by Holt et al. (2022) or research by the STEC groups by Geuting et al. (2022), mainly attributes the longer duration of a project to the planning and permit phase. With planning being the most important phase to a project's success (Khanna, 2011; Robbins et al., 2011; Royal Institute of British Architects, 2013), the duration of the planning phase takes years compared to months of the other activities, see Figure 1.1.

Phase project	Duration
Decision-making and planning phase (initiative)	Years
Procedure phase (zoning plan)	Weeks/months
Permitting phase	Months
Construction phase	Months

Figure 1.1: Phases and their duration of housing development (Holt et al., 2022)

These same reports, which analyzed the most frequent delays in housing development in the Netherlands, also presented ways to stimulate housing development and proposed a variety of solutions. The STEC groups' report by Geuting et al. (2022) focused on solutions based on a municipal perspective. It included ways to coordinate housing construction by municipalities, realistic planning, and enhancing the effectiveness and efficiency of zoning plan development. The Rebel report by Holt et al. (2022) proposes to include the same themes of accelerating, adding stimulating innovative ways of development that show acceleration potential, combining the STEC groups' research with other research from Van Randeraat et al. (2022) and Taskforce Nieuwbouw Woningcorporaties (2022).

In addition to these reports based on municipal data, the government instated Fakton in collaboration with Annius Hoornstra to propose ways of stimulating housing in the Netherlands from the perspective of developers. The proposal was based on research initiated by a discourse between 20 directors of urban development. The conclusion was related to the research mentioned earlier; if the government aims to develop 100.000 homes per year, with the same number of employees or fewer, they cannot simply continue doing what they are doing with slight improvements; it must be done radically differently (Fakton, 2022). The discourse was the basis of a list of possible instruments proposed by Fakton to accelerate housing.

In 2023, the Dutch government (Ministerie van Volkshuisvesting en Ruimtelijke Ordening) presented: 'The plan of attack to fast-tracking housing developments', based on the issued research from the previous paragraphs. Introducing points of improvement and instruments they are aiming to implement in the upcoming years. These included the earlier mentioned: efficient processes, increased coordination and collaboration, stimulating innovation, and adapting laws and regulations. One of the

proposed ways to accelerate housing development is the idea of parallel planning, researched and proposed by Fakton (Evelyn Rademaker) and Annius Hoornstra. This method is a different way of planning and working approach that, according to Fakton (2022), aims to reduce project planning from 6 to 2 years. It integrates activities on the same timeline in contrast to the traditional way of planning. Traditionally planned projects tend to execute activities one after another, thereby expanding the project timeline.

With the acceptance of the government to apply the new working method, the question remains what the working method entails and its effectiveness. The applicability of this method is currently being tested with pilot projects (Ministerie van Volkshuisvesting en Ruimtelijke Ordening, 2024a). The problem with testing the method is the duration. Like housing development, the pilot projects will take years to provide definite results. However, even though the effects of parallel planning have not been confirmed, the Dutch government has stated in December 2024 that parallel planning will become one of the standard terms and conditions included in location subsidies (Ministerie van Volkshuisvesting en Ruimtelijke Ordening, 2024b). This statement accelerates the need to confirm the applicability and effectiveness of the method to reduce the timeline of housing development in the Netherlands. This research aims to accelerate the evaluation of the method by defining the factors of delay within the planning phase of housing development and research the applicability of parallel planning to reduce these factors. This will be achieved through an analysis of completed housing projects[1].

1.2 Reading guide

The following research is divided into 8 chapters. The current chapter introduces the problem statement and the topic of the research. Chapter 2 will provide the established literature surrounding the topics introduced in Chapter 1 and the scientific and social relevance of the topics. Based on the literature, in Chapter 3, the research questions and conceptual models will be introduced. The remainder of Chapter 3 explains the research methodology. Chapters 4 till Chapter 7 present the results, analyzing the collected data to provide an answer to the main research question in Chapter 8. Chapter 8 concludes and discusses the results of the previous chapters and explores potential topics for further exploration.

[1] The projects are provided by BPD gebiedsontwikkeling. BPD is a big part of the housing development in the Netherlands; they are a company that mostly work on area development. By participating in this research, they aim to define and reduce the number of delays they encounter within their developments.

Chapter 2: Literature Review

The following chapter further explores the topics introduced in the problem statement by exploring the literature about project management and delays in housing development. It introduces the traditional way of planning in the Netherlands, and the factors of delay in housing development are explored on a global and national level. This chapter seeks to outline the existing literature and identify areas where further research may be needed. It is also the basis for the data analysis of the delays defined by the case studies. The definition of parallel planning will be discussed in the results, Chapter 4.

2.1 Traditional working method

There are different approaches to project management, each serving a different purpose. Examples of these different methods are Agile/SCRUM, Waterfall, Kanban, Lean Construction, PRINCE2 (Projects IN Controlled Environments), Design Thinking, and Integrated Project Delivery (IPD). Which type of project management used depends on the industry of the project. Some industries even use a hybrid version of all methods. Parallel planning uses Agile methodology as an alternative to the traditional approach used in the Netherlands. To understand the distinctions between these methodologies, this section introduces the conventional planning approach in the Netherlands.

Historically, in the Netherlands, the Waterfall Project Management is used for housing development projects. This is not unique to the Netherlands; other countries also gravitate towards the use of this method. The Waterfall method originated as a sequential approach to software development and project management, consisting of distinct phases such as planning, analysis, design, implementation, and testing (Herdiansyah et al., 2021). In terms of implementation in housing, the sequential phases change to planning, permitting, construction, and delivery. The method offers several benefits, including maintaining the project scope, controlling costs, managing time effectively, and providing documented evidence of activities (see Figure 2.1). However, it also has drawbacks that can extend the timeline of housing development (see Figure 2.1). The method emphasizes completing one task before beginning with the next, meaning that a delay in any single task can have an impact on the entire project schedule.

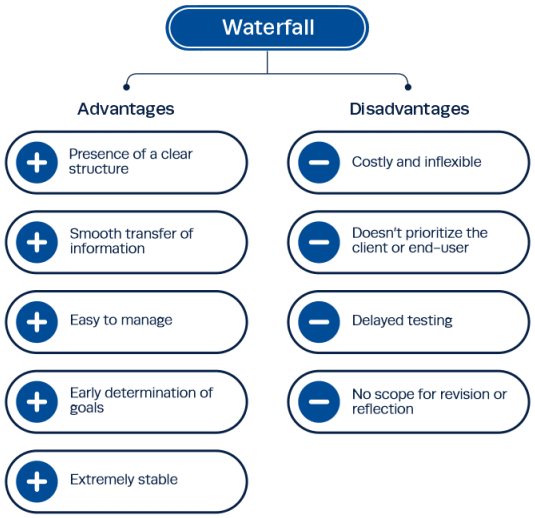

Figure 2.1: Advantages and disadvantages of Waterfall Project Management (Singh, 2025).

The Waterfall method not only influences the timeline, but also the collaboration and flexibility of a project. Ganis (2010) notes that the Waterfall method predominantly emphasizes freezing requirement specifications or high-level design early in the development lifecycle. This statement suggests that all boundaries need to be set early in the planning of housing. However, due to the duration, the vague boundaries, and the influence of external factors, housing development is mostly incapable of setting boundaries early on. This suggests that the Waterfall method may not be the most efficient for housing development, while simultaneously highlighting the need for more integrated methods.

2.2 Delays in housing development

When faced with bottlenecks, projects often get delayed. The following section states the definition of a delay and the factors that can cause a delay based on research into the topic of housing planning delays on a global as well as national level.

Definition of delays

The dictionary definition of a delay is referring to something late or slow, postponed, or deferred (Oxford University Press, 2013). However, to analyze the definition of housing development delays, the definition changes. Bartholomew (1998) has defined a delay as the slowing down of work without stopping it entirely. This is a type of delay that occurs in housing development. The definition used within this research is the following: a delay is an overrun time from the planned or contracted schedule (Majid, 1997). This definition is most applicable for delays within the planning phase of development, which is the scope of this research.

Global factors of delay

It is important to note that in a lot of academic literature, housing development is referred to as a construction project or a residential construction project, often combining different types of construction to conduct research. Considering this, the following part will refer to housing development as construction projects. The consequences will be discussed later.

One of the earliest published articles about types of construction delays is by Baldwin et al. (1971), presenting 17 causes of construction delays. Since then, a plethora of research has been conducted to define delays in construction. These papers assign a range of different amounts of construction delays, ranging from 11 (Kaming et al. 1997) to 293 (Aziz & Abdel-Hakam, 2016). In 2020, Sanni-Anibire et al. presented research that reviewed the causes of delays in the global construction industry, combining all previous research to create a global picture of factors of delay. Unfortunately, there are numerous causes of construction delays, and the plethora of studies available in the research landscape testifies to this fact (Sanni-Anibire et al., 2020). Thus, it can be argued that there is no consensus on what constitutes a major delay cause, resulting in varied perspectives on the subject matter by researchers (Sweis et al. 2008). Even though a lot of knowledge is presented on the number of factors that can cause delays, research continues to be conducted within different and more specific contexts to help define factors of delay at different scales of project development. Defining delays, with contexts and factors constantly changing, remains important to prevent and mitigate delays in future projects and improve the timeline of development.

The review of existing research on the factors of delay reveals that most studies focus on delays occurring during and after the permitting phase and combine all projects under construction projects. Thereby, it mostly excludes the design and planning phase of projects. Literature can be used as a basis to assign factors of the delays to different categories; however, for this research, another type of classification of delays needs to be developed to provide a broader overview of delays within housing developments. This new way of classification will encompass the factors of delays that are planning phase specific.

Factors of delays in the Netherlands

As mentioned, the type of delays and classification of delays all depend on the context of the project and its stakeholders. This research analyses case studies within the Dutch context. A variety of factors are responsible for the current restraints in housing development in the Netherlands. Factors that influence housing projects are, for example, the complexity of the project, the method of financing, the quality of decision-making, and the level of support for (or opposition to) the project. The staffing of the agencies involved in decision-making and dispute resolution for environmental law projects also influences the speed at which implementation can begin (De Graaf et al.,

2022). However, with the housing demand rising and the stagnant amount of housing development, the Dutch government issued research on a local level to find the origin of the lengthy duration of housing development. The research was done from a municipal perspective and looked for the lengthy duration of projects, trying to find the problems that lead to the lengthy time span of projects.

The STEC group's research, by Geuting et al. (2022), introduced possibilities to accelerate housing development. They first researched the main delays that happen in housing development to define the factors of delay. The factors of delay were investigated through questionnaires and interviews conducted across 88 municipalities. The results state that around 40% of current projects experience delays. Considering the projects of the responding municipalities. Within the response from municipalities, this percentage entails around 6800 delayed housing projects. The delays found are caused by financial, planning, preconditional, market, and locational problems (see Figure 2.2).

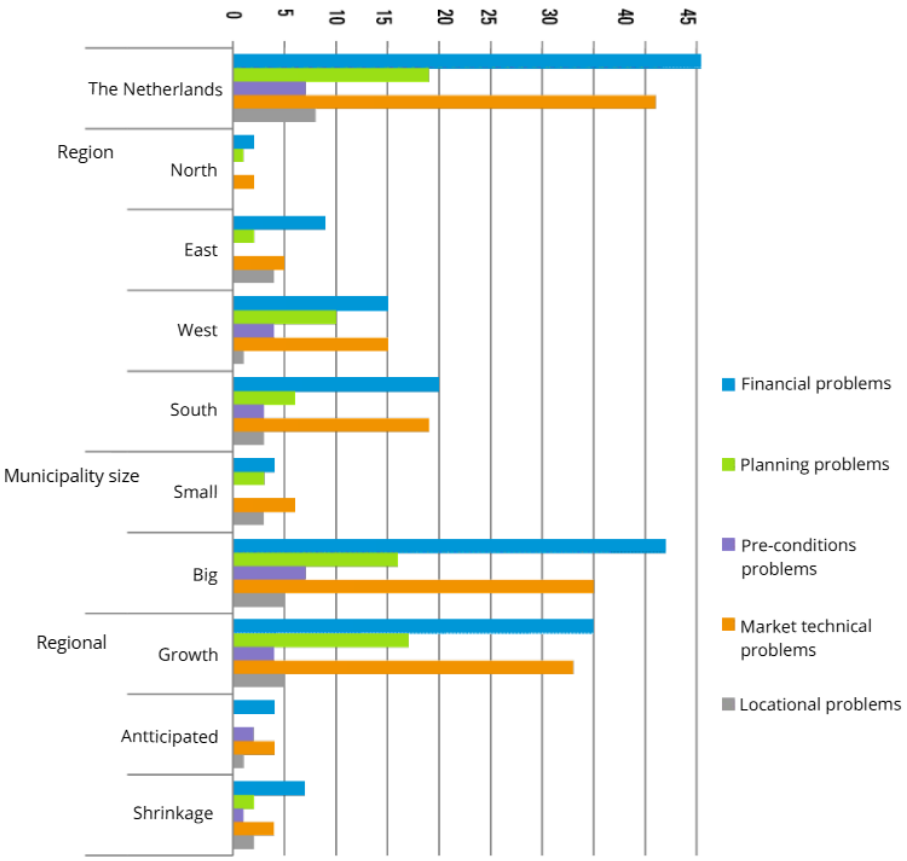

Figure 2.2: The possible causes of delays of project development, from the perspective of Dutch Municipalities (Geuting et al., 2022).

The government also issued the Rebel report, by Holt et al. (2022), which assigned delays to the following factors seen in Figure 2.3. Many of these factors of delays are based on problems that are caused by the regulations of the Dutch housing system.

Factor	Explanation
Personnel capacity	Limited availability of manpower (quantity and quality)
Priority	Differences in priorities among actors; the urgency is not felt everywhere
Project and process planning	The steps municipalities and developers go through together.
Setting frameworks	A lot of time is lost in determining what society specifically demands.
Collaboration, attitude, and behaviour	Lack of skills to reach agreements quickly.
Extensive research requirements	Increased complexity leads to significant research demands.
Spatial planning instruments and procedures	Choosing the right procedure and progressing efficiently
Court and Council of State	Capacity shortages at the Council of State delay housing construction.
System issues, laws, and regulations	Sector-specific rules and laws have (unintentionally) had a strongly delaying effect on housing production in recent years.
Coordination (by the national government or others)	Central coordination is essential to achieve ambitious objectives

Figure 2.3: Factors of delay housing development (Holt et al., 2022).

Other research by Derksen (2024) assigns the origin of delays of all social housing developments mostly to the issuing of the environmental permit (33%), closely followed by additional conditions of the municipality. Following this research, most of the delays are found in the procedure and permitting phase. However, the research does not link delays specifically with the planning process of projects, but does mention that their average amount per project is around 10 years. Figure 2.4 presents the percentage of all social housing projects delayed by the specific factor.

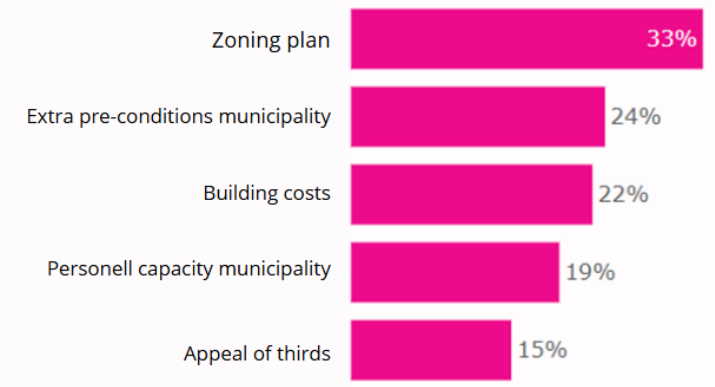

Figure 2.4: Factors of delay in housing development of Dutch housing developers (Derksen, 2024).

Drawing insights from these three reports, it becomes evident that multiple factors contribute to delays within the Dutch housing system. The most prominent factors lie within the permitting and processing phase, but financing is also mentioned as a prominent factor of delay. With the research being based on the experience from the government and housing associations, more research can be done into the experienced factors of delay by housing developers.

2.3 Scientific & societal relevance

This research aims to identify factors of delay within the Dutch context of project development. This will be done by integrating the perspective of housing developers. The research adds to the knowledge of factors of delay in housing development in the Netherlands. It will define these factors but also help test the current research in accelerating housing development tools like parallel planning. The testing of parallel planning will also add academic knowledge about parallel planning.

In society, this research will add knowledge on how to define problems of the housing system. With the housing crisis looming over the Netherlands, the government has been trying to stimulate housing development for the past years. There has been a lot of research into problems experienced by municipalities in developing housing. However, there is a need to look at the delays and stagnation from the perspective of developers. The research will also accelerate the feasibility of applying parallel planning, the most recent proposal to accelerate housing development. Evaluating whether the proposal may lead to a reduction in delays associated with housing development.

Chapter 3: Methodology

This chapter outlines the research questions, conceptual model, methodology, data collection and analysis, as well as ethical considerations and data management.

3.1 Research questions

Based on the problem statement and literature, this research aims to answer the following question:

How can parallel planning address delays in housing development to reduce the planning phase?

With the following sub-research questions:

1. What is parallel planning?
2. What are the activities and duration of the process of housing development?
3. What are the differences between the planned timeline and the final timeline of housing development?
4. What are the main factors of delays in housing development projects?
5. To what extent do the key ingredients of parallel planning contribute to reducing delays?

3.2 Research Scope

A research scope is established to direct the question within a specific context. The following research will be conducted within the scope of the Dutch housing system. The concept of parallel planning is developed to face the complexities within the Dutch context. Consequently, it will be most useful to test the method against projects in the context it was made. The Dutch housing system includes a wide range of project types, with various housing options and area densities. That is why this research will be aimed at a specific type of project. Since the duration of a project is not the only bottleneck in the development of housing, the research will focus on projects within the context of urban areas. These areas are complex but face a strong demand for more housing. Identifying recurring obstacles in these projects may address challenges in the housing market more effectively than focusing on other project types.

3.3 Conceptual model

The conceptual model combines the concepts in the literature about the factors of delays and the new working method: parallel planning. The conceptual model is presented in Figure 3.1. The image presents the scope of the research, and the concepts needed to answer the main research question.

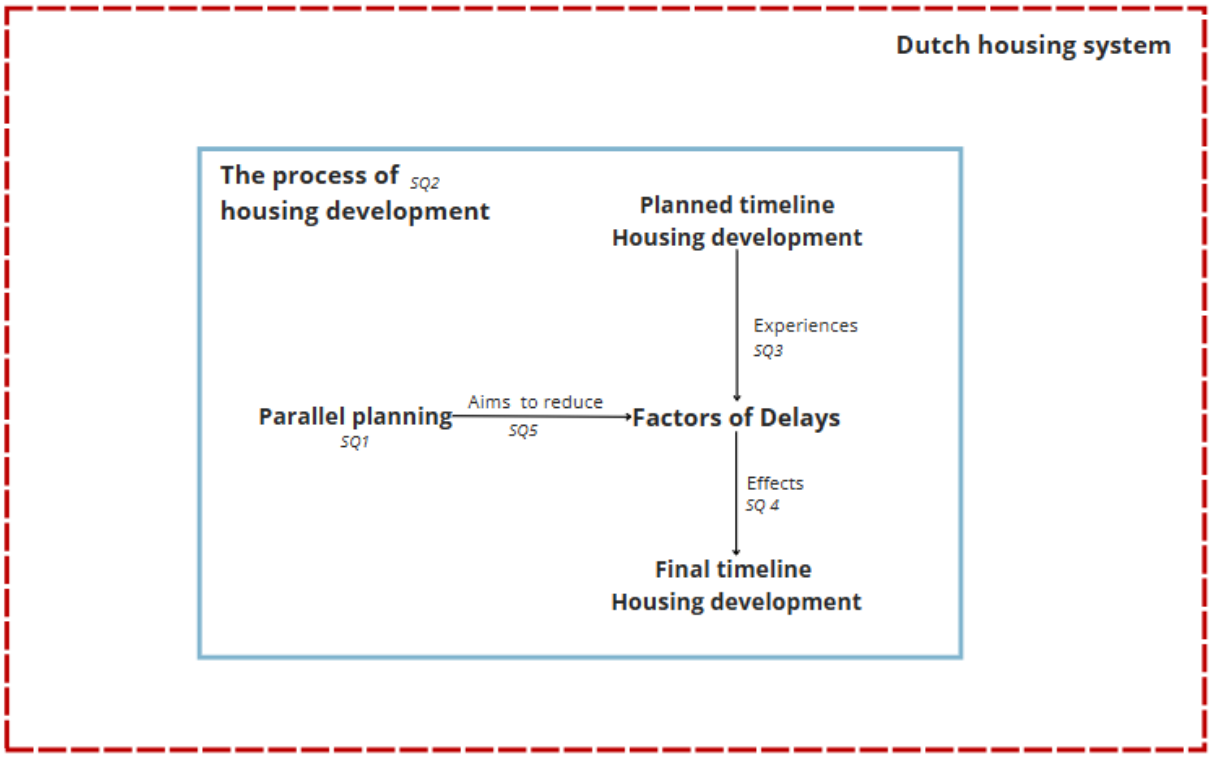

Figure 3.1: Conceptual Model (own figure, 2025).

3.4 Research Method

This study produces its findings through qualitative research, which consists of several data components: a literature review, interviews, archival data, and case studies. The results are structured into four parts: defining the key working ingredients of parallel planning (SQ 1), exploring the housing development process (SQ 2), identifying delays in housing development in the Netherlands (SQ 3&4), and testing these delays against parallel planning (SQ 5). The four parts are addressed using the following research methods.

Part 1: Parallel planning	
SQ 1:	**What is parallel planning?**
Type of Research	Qualitative Research
Data collection	Literature combined with podcast interviews, progress presentations, and an interview with an expert.
Goal	Create an understanding of the concept of parallel planning and identify the key ingredients of the method.
Used as	Basis for the final comparisons against the delays of housing development.
Part 2: The process of housing development	
SQ 2:	**What are the activities and duration of the process of housing development?**
Type of Research	Qualitative Research
Data collection	Literature review combined with archival data and the standard process of development of BPD (from the BPD Navigator).
Goal	Provide an overview of the standard activities included in housing development, with the average time schedule.
Part 3: Delays in housing development (Case study results)	
SQ 3:	**What are the differences between the planned timeline and the final timeline of housing development?**
Type of Research	Qualitative Research
Data collection	Literature combined with case study material of two different housing developments that meet the case criteria (paragraph 3.4). The case study material includes archival data, internet data, and interviews with internal stakeholders.
Goal	Find points of difference between the intended planning and final planning, to be able to define the points of delay.
Used to	Create overviews of the points of delay to answer sub-question 4.
SQ 4:	**What are the main factors of delays of housing development projects?**
Type of Research	Qualitative Research
Data collection	Literature combined with case study material of different housing developments that meet the case criteria (paragraph 3.4). The case study material includes archival data, internet data, and interviews with internal stakeholders.
Goal	Identify the factors contributing to delays in housing development
Used to	Create overviews of points of delay to answer sub-question 4.

Part 4: Testing parallel planning	
SQ 5:	**To what extent do the key ingredients of parallel planning contribute to reducing delays?**
Type of Research	Qualitative Research
Data collection	All information gathered by sub-questions 1 to 4.
Goal	To find the answer to the main research question
Used to	Find the way parallel planning addresses delays in housing development.

Figure 3.2: Research methodology per sub-research question 1 till 5 (own figure, 2025).

3.5 Research Model

The main question is addressed through the steps outlined in Figure 3.3. The research begins with sub-questions 1 and 2, and the data collected informs the selection criteria for the case studies. The case study criteria are provided in Chapter 3.6. After selecting case studies, data is collected through archival data, establishing the planned timeline and the final timeline of the case. The differences in timelines are the basis for the interviews, which are combined with the archival data to gain insight into the factors of delays. After identifying the causes of delays, these factors are compared to the key ingredients of parallel planning defined in sub-question 1, to determine how parallel planning seeks to shorten the planning phase in housing development. Hereby answering the main question of the research.

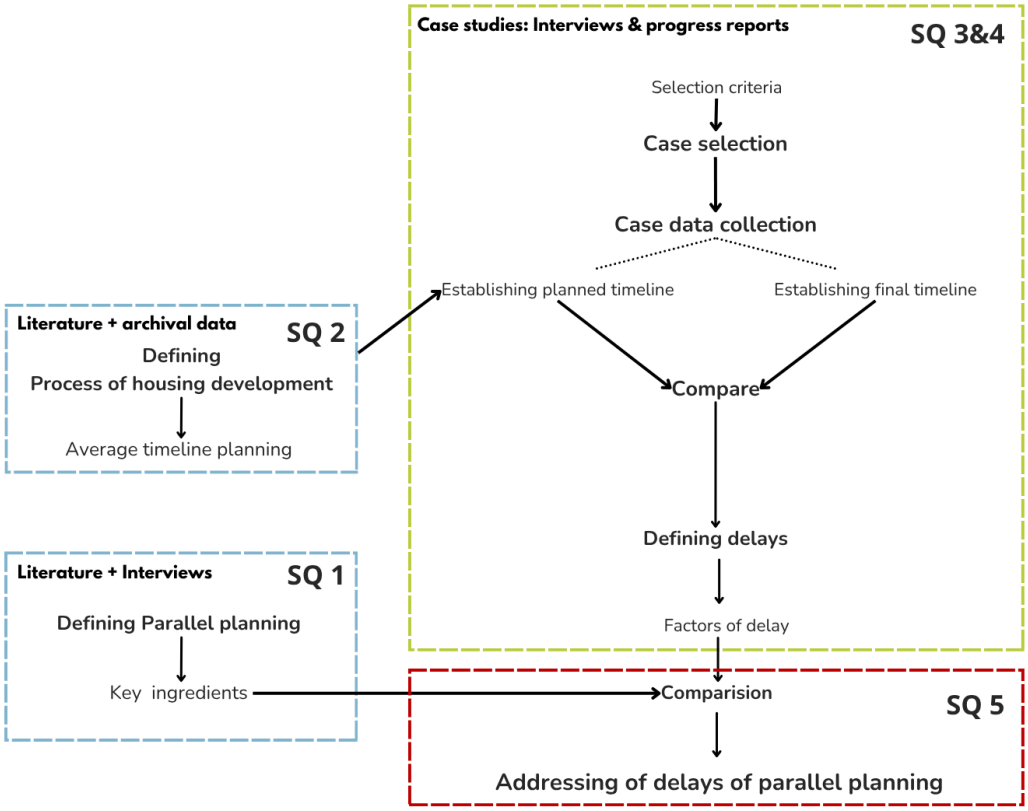

Figure 3.3: Research model (own figure, 2025).

3.6 Case Selection

Part of the results are based on case studies of housing development, from BPD Area development. The case selection is based on a long and short list. These lists will be based on archival data from BPD. From this long list of case studies, a short list will be conducted to find more specific information on delays, analyzing problems not only using archival data but also interviewing to find underlying issues and factors of delay. Following the research method, 2 case studies need to be analyzed to see recurring patterns of delay. The short-list cases will depend on the selection criteria met, consisting of the following:

- Cases are a housing project with more than 80 houses on a plot
- Cases are not a repeat of a previous development
- Cases are part of an overarching urban development.
- Cases that have come across delays.
- Cases whose original planning is available and complete.
- Cases of which BPD is a part, from the initiative to the environmental permit.
- Comparable Dutch cases within the same Province
- Cases with an irrevocable environmental permit.
    - Note: since the Environment and Planning Act has only come into force since January 1, 2024 (*General Information on Environment and Planning Laws*, n.d.), the number of cases can be limited. If this is concluded, other cases will be researched that may have gotten their permits under the old act.
- Cases are 'awarded' within the past year (2025), which means that the cases are going to be built.

These criteria are designed to select cases that effectively address the main and sub-research questions.

3.7 Data collection and analysis

The data collected for this research can be divided into multiple types: literature review, grey literature, interviews, and case studies, which include archival, internet, and interview data. The multitude of data sources makes the analysis objective and from multiple points of view.

Literature review

The literature found is analyzed and combines previously conducted research to create the basis of the research. The literature review can be found in Chapter 2. The literature used is a combination of scientific and grey literature. Grey literature is material produced by organizations (like governments, universities, and businesses) that is not commercially published and therefore not controlled by traditional academic

publishers. The analysis combines both types of literature to define a delay and create an overview of already established factors of delay.

Parallel planning: Key ingredients

The data about parallel planning is mostly collected through literature and grey literature. Added to both types of literature will be podcast interviews of the founders of the parallel planning method and an interview with a parallel planning expert, with a formal interview to gain extra information. The aim of the collected data is to define key ingredients of parallel planning for the final comparison of the research. The output of this analysis is a list that contains the key ingredients of parallel planning and their description.

Process of housing development

The process of housing development is based on the development process of BPD. The data is collected through their project navigator and the Boogle database. The BPD Navigator is a handbook for BPD employees that outlines work processes and provides access to key documents. The data gathered through the navigator is compiled to present an overview of key activities in housing development. The analysis of this data also concludes the start and finishing point of the BPD planning process. The average timeline duration of the activities is drawn from the project database Boogle, which tracks all BPD projects of the past 5 years. The average timeline of housing development is based on projects similar to the case studies of this research.

Delays of housing development

The case studies are selected through the Boogle database. The database includes the dates on which the project developer aims to achieve certain activities. The data contains the planning of the project, the final timeline/dates of submissions of documents, and progress notes. The database makes copies of the Excel every 5 minutes. These copies, when compared, can signal delays in projects. The older copies also present the original planned timeline for the project. When the cases are selected, their progress reports are collected. The progress reports are used to develop a clear overview of the activities that occurred during the project. Most of this data is found within the progress reports of the project within BPD. The internet supplements, verifies, and completes archival data from progress reports. This includes mostly newsletters and public progress records.

To check and add other points of view to the conclusions based on the archival and internet data, semi-structured interviews will be conducted (see interview questions in Appendix 1). The interviews are a way to prevent potential bias within the analysis. The interviews are conducted with the stakeholders of the case projects. The aim was to conduct at least 2 interviews for each case study. These stakeholders include not only BPD personnel, but also other stakeholders.

The collected data is first analyzed by creating comparative timelines. The timelines per case study are created by using a Gantt chart. The Gantt chart is named after its originator, Henry Gantt, and displays a timetable for each activity of the project (Vanhoucke, 2013). Each activity is represented by a scaled block or bar, illustrating its duration over time. The timeline typically runs horizontally, with various activities listed along the vertical axis. Figure 3.4 shows a Gantt chart illustrating an example of the parallel planning timeline.

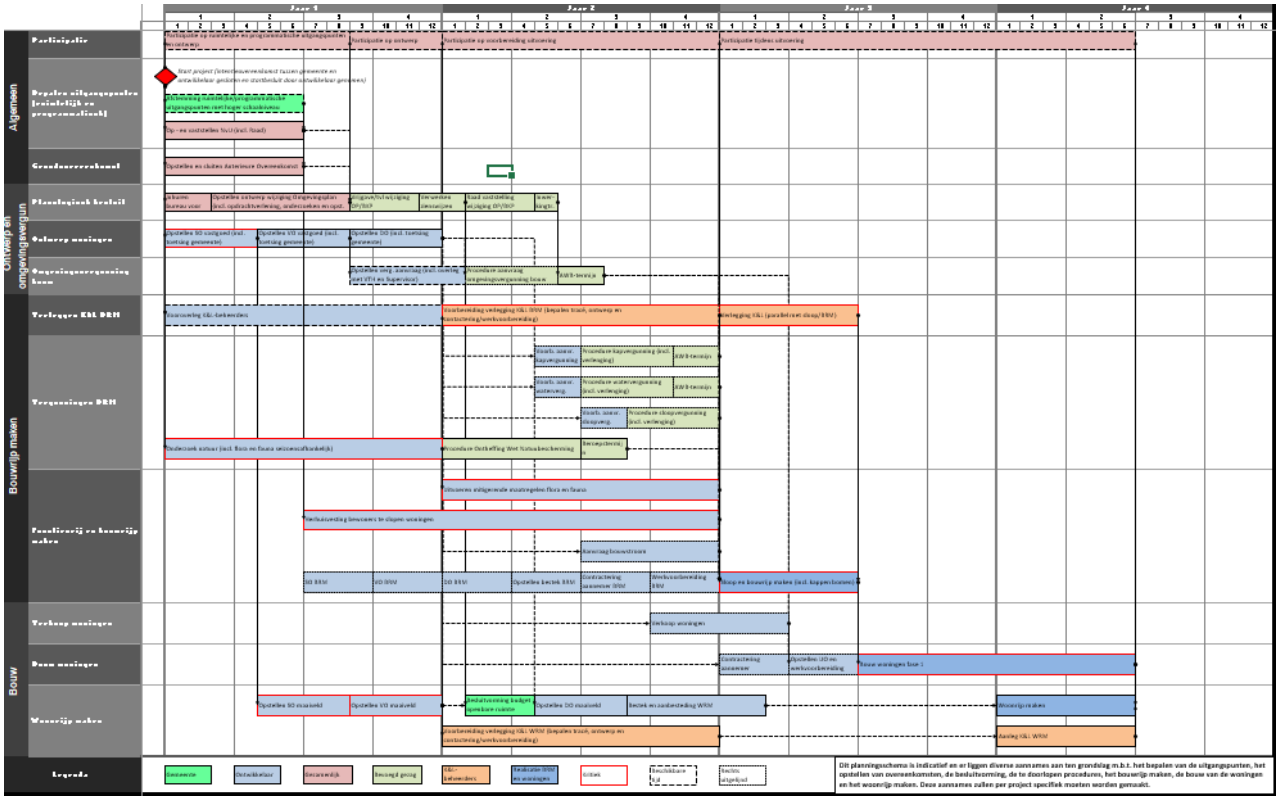

Figure 3.4: Example of a housing development project, parallel planning timeline (Ministerie van Volkshuisvesting en Ruimtelijke Ordening, 2025) (See Paragraph 4.4 for the zoomed-in version).

This way of organizing data highlights the differences between the planned and final timeline of the case studies and shows which activities got delayed. However, these timelines only show the activities that got delayed, not the factors that cause the delays. These factors need to be assembled after the comparison of timelines. They are explored through the progress reports and the interviews of the case studies. All the collected data from these data sources is analyzed by coding. The first codes that are used to analyze the progress report and interviews are deductive. These codes are a predefined set of codes, which are based on the delays defined through the literature review, see Figure 3.5. Factors of delay that cannot be coded are highlighted after the first round of coding and are categorized in a second round of coding. These additional factors of delays are added to the list made from the literature for the testing of parallel planning.

Deductive codes	
Personnel capacity municipality	Holt et al., 2022
Personnel capacity developer	Holt et al., 2022
Priority	Holt et al., 2022
Collaborated project planning	Holt et al., 2022
Collaboration	Holt et al., 2022
Coordination by municipality	Holt et al., 2022
Coordination by developer	Holt et al., 2022
Spatial planning instruments and procedures	Holt et al., 2022
Setting frameworks	Holt et al., 2022
Laws and regulations	Holt et al., 2022
Extensive research requirements	Holt et al., 2022
Building costs	Derksen, D., 2024
Appeal of third parties	Derksen, D., 2024
Environmental permit	Derksen, D., 2024
Pre-conditions Municipalities	Derksen, D., 2024
Market problems	Geuting et al., 2022
Technical problems	Geuting et al., 2022
Location problems	Geuting et al., 2022

Figure 3.5: Delays defined by literature (own figure, 2025).

Testing parallel planning

The results of the previous questions are used to answer this final sub-question: 'To what extent do the key ingredients of parallel planning contribute to reducing delays?'. The answer to this question is based on the links between the key ingredients of parallel planning established through sub-question 1 and the delays of housing development resulting from sub-question 4. The key ingredients will be linked to which delays they will be able to mitigate. Based on these results, the main research question will be answered.

3.8 Data management and ethical considerations

A data management plan (see Appendix 2) has been submitted to TU Delft that outlines the methods used for storing and collecting data. The research involves human participants, so all interview data is anonymized and collected with consent to ensure privacy. Additional data is provided by BPD; this data is all checked and has been given permission to be published. The data used is only accessible to the researcher and supervisors. The interviews are recorded and securely stored on a private and secure drive.

Chapter 4: Parallel planning

This research aims to assess parallel planning. Parallel planning is a response to the traditional method of housing development (see Paragraph 2.1). A clear definition of the concept is necessary for evaluating the new working method. The following chapter outlines the origin, pillars, implementation, progress, and challenges of the method, thereby answering the first sub-question: 'What is parallel planning?'. This chapter provides the basis for defining the key ingredients of parallel planning. These ingredients are necessary to determine how parallel planning addresses or reduces delays that occur during housing development.

4.1 Origin

Parallel planning is a new working method, developed by Fakton executives, led by Evelyn Rademaker from Fakton and Annius Hoornstra, commissioned by the Dutch government. It was initiated by a meeting of twenty directors of urban development in the summer of 2021. The main topic of the discussion was the acceleration of housing development. The result was a multitude of recommendations, concluding the following: if the government wants to develop more housing, with the same amount of manpower, radical change is needed. This has only one con: it demands willpower from all parties involved (Fakton, 2022).

With funding from the government, Fakton started developing a new working method that would aim to become the new norm in housing development. The current norm of housing development is the chronological norm, performing activities mostly in chronological order (see Paragraph 2.1). There is also currently no set timeframe within housing development; it ranges from 6 to 10 years (Fakton, 2022). Unlike, for example, the IT or aviation industry, which all work with strict schedules and planning, the construction sector just accepts delays. Rademaker as well as Hoornstra state that a time plan in the current way of working in the Netherlands is only used to track delays. The time plans made are an estimation, instead of a goal. The flexibility of moving deadlines can cost companies tons (Hoornstra, 2024).

Based on these challenges, parallel planning was introduced. Parallel planning is not only a way to plan activities parallel to each other, as implied in the name, but also lays the groundwork for a new way of working in the Dutch housing sector. The method aims to introduce the working methods of, for example, the IT sector and translate these to the housing development process. The parallel planned activities in combination with the new working method aim to reduce housing development planning from 6 to 10 years to 2. The working and planning method transforms a serial plan into one that stacks tasks on top of each other in a certain timeframe. Figure 4.1 provides a visual representation of this statement.

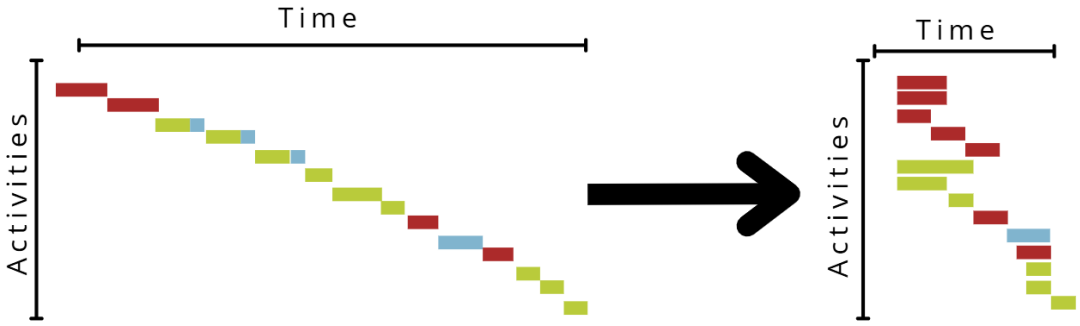

Figure 4.1: Visual representation of parallel planning (own figure, 2025)

4.2 Pillars of parallel planning

The method is based on the following pillars: (1) parallel planning as a guiding principle, (2) continuous stream of information, (3) narrowing down the formal steps of decision-making processes through standardization, preparing 'hammer pieces' (zoning plan, environmental permit, investment decision), and (4) working efficiently and unusually (Scrum). These main pillars are the basis of the Parallel planning method (Fakton, 2022).

Pillar 1: Parallel planning as guiding principle

The first pillar of implementing parallel planning is ensuring that all stakeholders are aligned and fully committed to the method. Selectively applying elements of parallel planning diminishes its effectiveness and its potential to shorten project timelines. The collective commitment of all parties involved to parallel planning is crucial to the project's success. In parallel planning, the project team consists of at least the project developer and the involved municipality. Next to the commitment, the schedule is a big part of parallel planning. The planning needs to be kept on 3 levels to have optimal success: overall planning, risk planning, and an 8-week planning. This method encourages hiring an independent planner to keep track of progress.

Pillar 2: Continuous stream of information

The second pillar of parallel planning emphasizes the importance of a continuous flow of information throughout the entire project. However, in project-based organizations, knowledge sharing often remains a challenge (Bartsch et al., 2013). This pillar encompasses not only internal communication within the project team but also transparent engagement with the public.

Preconditions and principles

Establishing clear intentions early on enhances transparency and sets realistic expectations (Hoornstra, interview, May 2025). A key component of this pillar is the early development of a preconditions document (*nota van uitgangspunten*), which outlines the foundational agreements and principles for the project. This includes risk analysis and sets clear expectations from the onset, enhancing transparency and alignment among stakeholders. The preconditions document covers a wide range of topics, including:

- A site description
- Policy frameworks
- Spatial and programmatic principles
- Sustainability and environmental considerations
- Communication and participation strategies
- Execution and realization agreements
- The parallel planning approach itself

This document defines the operational boundaries for the project team and will be developed collaboratively with the municipality. By doing so, it aims to streamline the permitting and zoning phases, reducing delays and improving efficiency. The preconditions also serve as a foundation for mutual expectations between parties. Clearly defined boundaries and responsibilities help accelerate negotiations and reduce the risk of prolonged discussions. These expectations are often supported by reimbursement agreements, which further prevent drawn-out negotiations. The shared commitment to these preconditions significantly contributes to the overall success of the project.

Public participation

This pillar also includes proactive information sharing with the residents. Transparency and public communication are essential to parallel planning, as they help expedite the permitting process, thereby shortening the development timeline. Public participation is encouraged from the early stages of the project to support continuous information flow. Neglecting public involvement can lead to significant setbacks, including project delays, inefficiencies, and public opposition (Healey, 2003; Nour, 2011).

Design phase

Information sharing continues into the design phase. In parallel planning, design is treated as a fluid process rather than being divided into traditional stages such as sketch, preliminary, and final design (Fakton, 2022). If the design remains within the predefined framework, it can evolve continuously.

Digital infrastructure

To support continuous information sharing, this pillar also includes the use of digital infrastructure. A shared server facilitates collaborative access to documents and promotes both verbal and digital transparency (Hoornstra, interview, May 2025). The goal is to foster open communication and ensure that all stakeholders remain informed and aligned throughout the project lifecycle. The pilots tried to facilitate the sharing of information through IT, but this remained one innovative step too much (Hoornstra, interview, May 2025). Hoornstra does see the advantages of reintegrating digital programs in the future to parallel planning.

Pillar 3: Standardization

Another goal of parallel planning is to create standardized documentation that simplifies and accelerates the zoning permit process. This is closely linked to identifying and selecting the most effective planning procedures in collaboration with legal experts. Given the current shortage of research professionals in this domain, the need for efficiency through standardization is especially pressing. While the challenges and limitations of standardization are well acknowledged, its benefits clearly outweigh the drawbacks (Killion, 1967). By establishing clear procedural frameworks and integrating design considerations early on, decisions related to environmental assessments can ideally become routine formalities. The Dutch government plays an important role in this process, bearing the primary responsibility for advancing standardized practices and more efficient planning procedures.

It is important to standardize within projects, to understand the critical importance of granting a mandate in advance instead of during the project. The developers of the parallel planning method have contributed to this effort by creating a standardized table of contents for the ‘notion of preconditions’ document (Hoornstra, interview, May 2025), further supporting consistency and efficiency across projects.

Pillar 4: Efficient working

The final pillar of parallel planning is efficient working, which encourages an interactive and collaborative process involving all stakeholders from the very first meeting. This approach is designed to minimize miscommunication and proactively manage risks. The foundation of this efficient working method is the Scrum methodology, a response to the traditional Waterfall approach in project management. Scrum is part of the broader Agile methodology, which emerged in the late 1990s within the software industry (Drury-Grogan et al., 2017). The Agile Manifesto outlines core principles but does not prescribe specific methods, tools, or skills (Beck et al., 2001). Over time, various Agile methods have been developed initially for software projects, but increasingly applied across other sectors (Dong et al., 2024). Scrum is an Agile framework focused on incremental progress and adaptability (Wonohardjo et al., 2019). It is particularly well-suited for mid- to large-scale projects that require planning and coordination at an organizational level.

While Agile is a mindset, Scrum provides a structured framework within that mindset. Parallel planning adopts a Scrum-like approach, treating housing development as a high-intensity, collaborative process, like a "pressure cooker" session (Fakton, 2022). This adapted Scrum framework is implemented to significantly reduce the planning timeline for housing development. The framework is built around short, focused work cycles that are planned, executed, and reviewed to drive progress toward the final product. In adapting Scrum to housing development, the roles are redefined:

- Scrum master → Professional planner
- Product owner → Project developer or municipality
- Development team → Consultants and stakeholders (e.g., housing associations, municipalities)

Daily Scrum meetings are adapted into weekly sessions, initially held as full-day workshops and later transitioning to half-day meetings. These sessions are typically held at a central location (acceleration chamber) and are designed to maintain momentum and alignment throughout the project. Using Scrum makes capacity more reliable through collaborative scheduling and teamwork.

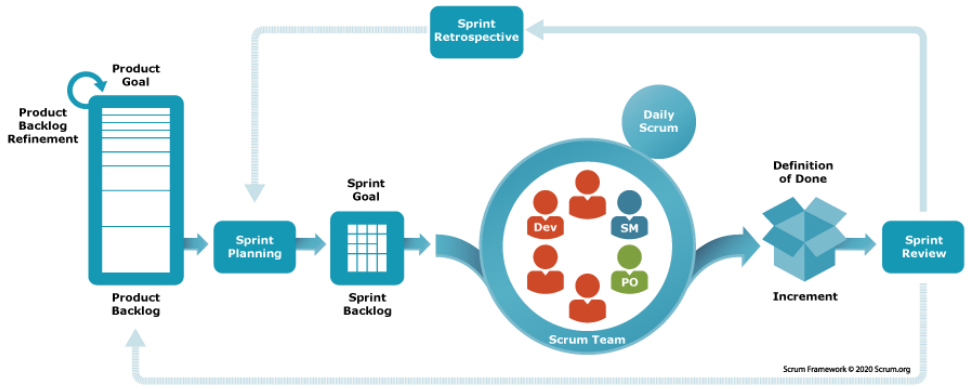

Figure 4.2: Scrum framework (Schwaber & Sutherland, 2020)

4.3 Implementation of parallel planning

A six-step method has been created to implement parallel planning and apply the working method to projects:

Step 1: Project start-up
The project starts with the creation of an 'accelerating chamber', ideally a physical space dedicated to collaboration, where the development team is co-located. This team typically includes:

- Project developer
- Architect
- Neighborhood representative
- Experienced planner
- Director of urban development
- Municipality
- Policy experts
- Permit coordinator
- External advisors
- Independent process manager
- Secretary

However, the key initial roles are the municipality, project developer, and planner (Hoornstra, 2024).

Steps 2 & 3: Notion of preconditions and plan of attack
Once the development team is formed, the municipality and project developer must define the project boundaries in a document known as the notion of preconditions (see paragraph 4.2). These preconditions outline the specific requirements against which the final design will be evaluated. This must be officially approved by the municipal council. Following this, an action plan is developed, along with a financial plan or an estimate of expected costs and revenues. Clarity at this stage is essential; any uncertainties in these boundaries can lead to significant delays (Rademaker, 2024).

Step 4: Open-Source Infrastructure
With the preconditions and municipal ruling in place, the next step is to establish the open-source infrastructure and decision-making process. This includes implementing digital systems to facilitate transparent information sharing and creating tools to continuously assess the feasibility of the plan.

Step 5: Let the Scrum begin
The project proceeds with weekly Scrum meetings and supervision sessions. For this to work, both the municipality and the project developer must be fully committed, not just by role, but by a shared motivation to develop the best possible project. These weekly meetings ensure short communication lines and consistent progress tracking.

Escalation boundaries, agreed upon during the preconditions phase, are introduced, with a maximum resolution time of three days. Escalation boundaries are rules set in place, for example, who will be notified in case of escalation. Daily progress is monitored by the process manager, municipality, and developer. These boundaries define how and to whom issues are escalated when problems arise (Hoornstra, interview, May 2025).

Step 6: Continuous sharing of experiences
Ongoing supervision and reflection are essential to evaluate the effectiveness of the parallel planning method. Structured knowledge sharing supports continuous improvement and organizational learning, recognized today as a key factor in project success (Liebowitz & Megbolugbe, 2003).

4.4 The timeline of parallel planning

To facilitate the implementation of parallel planning, an example plan was published, as illustrated in Figure 4.2. The timeline is an example of a housing development schedule. The overview shows all different types of activities that, according to Fakton, occur during the development process, matching activities with the stakeholders responsible. The activities are based on the experience numbers of the original planner of the timeline (Hoornstra, interview, May 2025). However, these are not set in stone; each project can pick and choose where to add or subtract months/weeks to certain activities (Hoornstra, interview, May 2025). This new way of planning enables projects to save time by not only parallel planning activities but also creating flexibility to mitigate risk more easily without delay. The planning is split into overall and 8-week schedules to meet deadlines and ensure results.

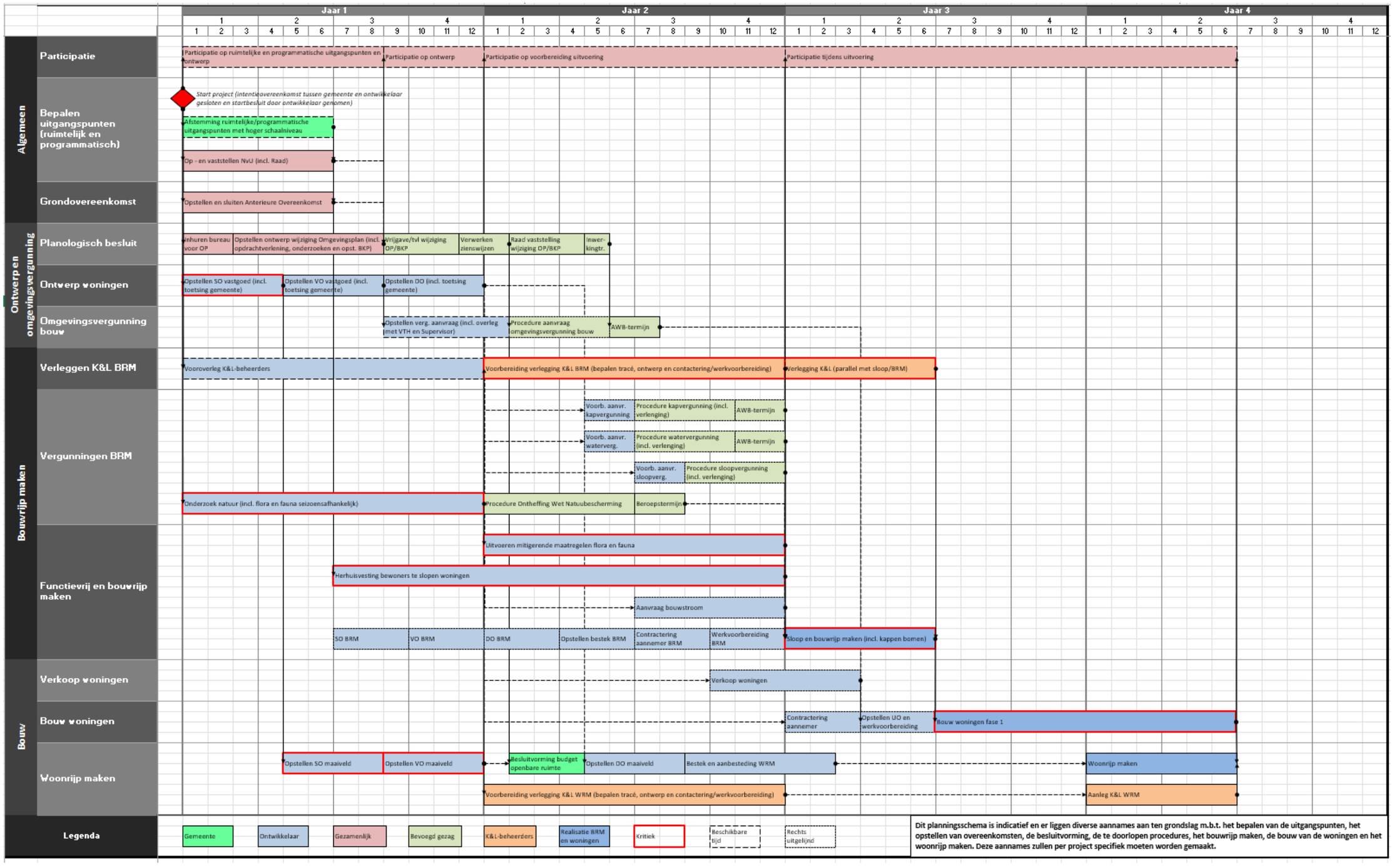

Figure 4.3: The example planning of parallel planning (Ministerie Volkshuisvesting en Ruimtelijke Ordening, 2025). For sharp Excel: see https://www.volkshuisvestingnederland.nl/documenten/publicaties/2024/08/22/voorbeeldplanningen-versneld-parallel-plannen.

4.5 Progress and challenges of parallel planning

In 2023, the Dutch government agreed to apply the parallel planning method to seven pilot projects. Four housing development projects (Alphen aan den Rijn, Den Bosch, Eindhoven & Sassenheim) and three area development projects (Tilburg, Utrecht & Dordrecht). A website has been introduced to show developers how they can accelerate their projects. In evaluating the progress of these pilot projects, several unexpected benefits emerged. Firstly, government agencies have traditionally operated at a different pace than developers. However, with the introduction of parallel planning, they have become more actively involved and better informed, allowing them to work in sync with developers. Secondly, if construction starts within two years, the project benefits from a stable regulatory environment: there are fewer changes in government policy, forecasts are more reliable, and updates become less unpredictable

Even though the initial observations appear promising, several challenges emerged. One ongoing issue is the lack of transparency in communication, particularly regarding public participation in the pilot projects (Hoornstra, 2024). It takes considerable courage to disclose all information upfront, especially when it's uncertain whether it will benefit the project. One of the pilot projects also faced an unexpected external obstacle: the presence of a natterjack toad, which threatened to delay progress by an estimated six months (Hoornstra, 2024). To tackle this issue, the team divided the responsibilities among themselves. Some stakeholders focused on finding a solution to the toad issue, while the rest continued with other project activities. This approach was intended to prevent the project from stalling entirely.

In conclusion, not all information is or can be known before starting the project. There are many preconditions that must be met to successfully implement the method. Like Scrum, where success depends on the skills and knowledge of team members and can lead to increased productivity, creativity, and business value (Wonohardjo et al., 2019), parallel planning requires willpower and collaboration. As a management tool, parallel planning can encounter similar challenges to those faced in Agile projects. A major obstacle can be the organization's culture, philosophy, or internal processes (Hoornstra, interview, May 2025). Other potential issues include a lack of management support, external pressure to adhere to traditional waterfall methods, and resistance to change.

4.6 Key ingredients parallel planning

This chapter aims to answer the following questions: 'What is parallel planning?', to be able to find the key ingredients of parallel planning. Parallel planning is a new approach to project management in the Dutch housing sector, designed to replace the traditional, sequential planning method. It emphasizes simultaneous execution of tasks, continuous information flow, standardization, and efficient working. Rooted in Agile principles and inspired by industries like IT, parallel planning aims to drastically reduce project timelines, from 10 years to as little as 2. Through its structured pillars and implementation steps, parallel planning not only aims to accelerate development but also introduces a cultural shift toward transparency, adaptability, and shared responsibility. It can also be concluded that the parallel planning method primarily emphasizes the internal processes of the project team.

From all the information provided in the previous paragraphs, the key ingredients are established based on the four pillars and the specific ingredients of each pillar, see Figure 4.4. The ingredients referenced will be incorporated in Chapter 7 to identify which delays are addressed by the key ingredients.

Pillar	Key ingredients	Description/effect
1. Planning in Parallel	Stacked Task Scheduling	Saves time by layering tasks efficiently. Saves both time and money through concurrent task execution and adds flexibility to the schedule (Figure 4.2).
	Collaborative Scheduling	The schedule is made in agreement with all parties involved. The use of collaborative scheduling establishes the intent of collaborative activities and promotes synchronized efforts. (Paragraph 4.2, Pillar 1 & 2)
	Structured 8-Week Planning	A structured 8-week schedule creates a stable environment, enhances collaboration, and improves capacity reliability.
	Professional Planner Involvement	The implementation of a professional aims to set firm deadlines that are not easily postponed. A professional planner is an independent party and can stay independent during strenuous situations.
2. Continuous Information Flow	Preconditions Document	This clarifies intent, introduces proactive resolution rules, sets project boundaries, and encourages collaboration (Paragraph 4.2, pillar 2).
	Digital Infrastructure (open information sharing)	Implementing a digital infrastructure enables open information sharing and continuous communication, with the project team as well as the public (Paragraph 4.2, pillar 2).

	Early Risk Identification	This facilitates proactive risk planning and mitigation through continuous supervision and reflection. This allows early detection of potential challenges.
	Continuous Feasibility Management	Ensures ongoing assessment of project viability and mitigates the risk of an unsuccessful project.
	Early Public Participation	The implementation of earlier public participation helps reduce delays in permit procedures through early engagement (Paragraph 4.2, pillar 2).
3. Standardization	Standardized Documents	Saves time and reduces required capacity through uniform documentation (Paragraph 4.2, pillar 3).
4. Efficient Working	Scrum Roles	Implementing roles ensures reliable capacity by sharing individual task responsibilities.
	Accelerating Chamber	The chamber promotes short communication lines, efficient workflows, and constant communication (Paragraph 4.2, pillar 2 & 4).
	Early Stakeholder Commitment	Commitment encourages synchronized efforts from the beginning (Paragraph 4.2, pillar 1, 2 & 4)
Other	Stable Governance	Through the reduction of time by all previous ingredients, the project works in a reliable environment. This also reinforces the intent of collaboration.

Figure 4.4: Key ingredients of parallel planning and their description (own figure, 2025)

Chapter 5: The process of housing development

To understand the case data in the following chapters and their timelines, the baseline process of development needs to be established. This chapter provides an overview of general parts and steps within the process of housing development, aiming to answer sub-question 2: 'What are the activities and duration of the process of housing development?'. The cases for this research are provided by BPD NL, an area developer. Considering that the cases are provided by BPD, activities of housing development will be presented based on their process, which is based on the BPD navigator.

BPD is an urban area developer, which means that as a company, they are involved in the acquisition of land to the transfer of newly built properties to their new owners. The development can be roughly distinguished into three phases: Land acquisition (and sale of land), Location Development, and Building Development. An overview is presented in Figure 5.1. The black arrows represent the process explained in the following chapter. The complete progress of development within BPD is monitored using the OBEYA board, which is also a type of Agile tool. An OBEYA board oversees the status of the different projects, but also aims to detect and discuss bottlenecks, to develop a project most effectively. It is also the basis for scheduling data and deadlines, which are used in the case analysis in Chapter 6.

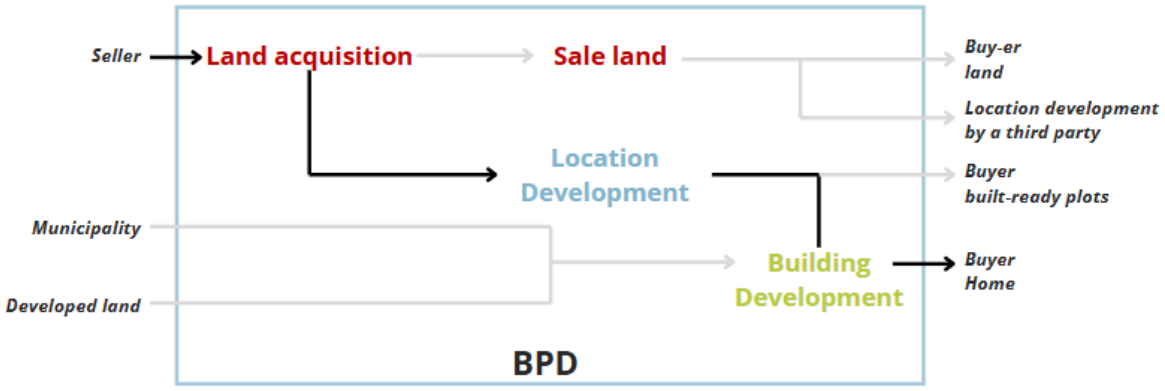

Figure 5.1: Area development Process BPD (own figure, 2025).

5.1 Part 1: Land acquisition[2]

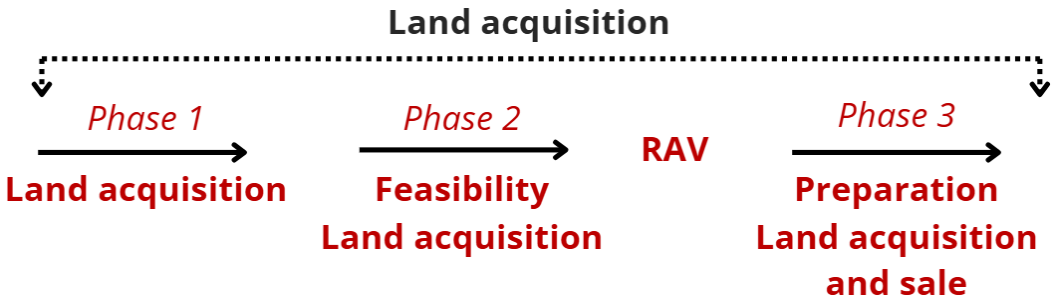

Figure 5.2: Part 1 of Area development by BPD (own figure, 2025).

Zainal (2015) states that the housing development initiation phase involves six different steps. Ranging from the exploration phase to the evaluation phase, to a pre-feasibility study, to further investigation, to a development schedule, and lastly a final feasibility study. These phases all occur before evolving to the planning phase. Within BPD, most of these phases occur during the land acquisition phase. They divide this section into three phases. The land acquisition phase includes a quick scan of the potential, the feasibility of land purchase, and the preparation phase for the purchase or sale of the land. The initiation of development depends on the feasibility of the land. Within BPD, the decision-making process is based on a Risk Acceptance Proposal (Risico Acceptatie Voorstel, RAV). The RAV is an internal acceptance report that is presented to the managing board for approval of the acquisition or sale of the land. Different RAVs are submitted throughout the housing development process. The RAV for land acquisition includes a feasibility study, which entails a potential business case, including a land exploitation (grondexploitatie, GREX) and a proposed RAV Building development (see part 3). When BPD decides to develop the land, now or in the future, the land moves on to part 2: Location development. If the site is not suitable for development, it will be sold.

5.2 Part 2: Location development

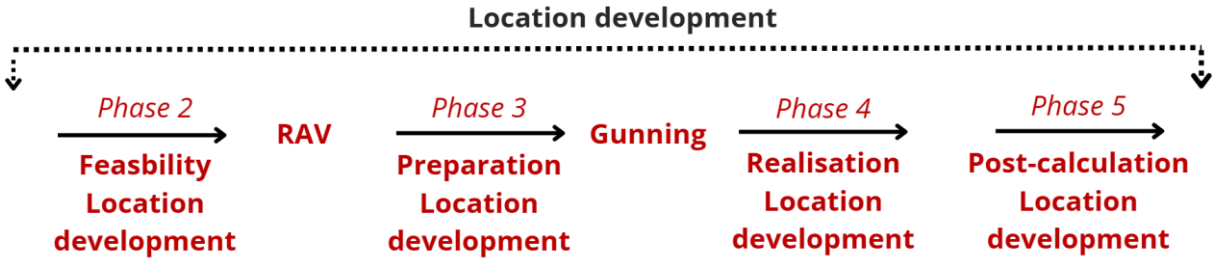

Figure 5.3: Part 2 of Area development by BPD (own figure, 2025).

[2] The following chapter includes multiple abbreviations, which are explained. However, the full overview can be found Appendix 7.

When BPD decides to initiate the development of the acquired land, the project moves on to Location development. The following steps occur during Location development: feasibility assessment, preparations, execution, and post-calculations. After purchasing the land, the feasibility study for location development is initiated. There can be a significant gap in time between the purchase and initiation of location development. In these years, the potential of the land, as well as potential collaborations, will be discussed. During these years, changes in the zoning plan are also discussed and, if needed, initiated. When it is clear which preconditions are set for a site, the location development can be officially started. After a (financial) feasibility study and preliminary agreements have been made with the municipality, the RAV location development is submitted to the management board for approval.

After the internal acceptance of the RAV, the participation trajectory for the Environmental permit and the preparations needed for the Anterior agreement[3] are initiated. Next to financial commitments, the Anterior agreement states decisions made about the locations urban design, programming, housing types, housing categories, process, timetable, phasing, location requirements, division of work and supervision, submissions of specifications, form of tender, delivery of land, establishment of limited rights and general provisions regarding dissolution, fines, damages, etc (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2022).

After signing the Anterior agreement, the urban design will be submitted for a zoning plan procedure. Making a change in the zoning plan is an 8-part procedure, from the first request to an irrevocable zoning plan approval:

1. Principal request
2. Pre-design zoning plan submission
3. Consultation
4. Design zoning plan submission
5. Consultation
6. Adopted zoning plan
7. Appeals
8. Irrevocable zoning plan

[3] An Anterior Agreement is in other words an intention agreement . It discusses a variety of points of settlement, including costs and financial subsidies (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2022). The agreement signifies the support of the municipality for the development.

Before the final submission, the draft is submitted for revision. The draft is called a pre-design zoning plan. The Municipality has 6 weeks to review and publish questions and feedback. The design will be revised and submitted again for final approval; the municipality again has 6 weeks to provide feedback or acceptance. If the design zoning plan is accepted, it will be published. From the moment the decision is published, the public has the right to appeal for 6 weeks. When this happens, the decision surrounding the changes in the zoning plan goes to court (Omgevingsbesluit, 2025), and the finalization of the change in the zoning plan is delayed.

When the change in zoning plan is approved, the urban design will be translated into a layout plan (inrichtingsplan), which is the basis for the Building development. The aim of Location development is also to prepare for Building development. This includes aligning the utilities, applying for permits and exemptions, preparing for construction, and/or residential developments by hiring a civil contractor. These activities are part of the execution phase of Location development. These activities run alongside building development and conclude with the delivery of the completed urban plot.

5.3 Part 3: Building development

Figure 5.4: Part 3 of Area development by BPD (own figure, 2025).

Phase 1 of Building development is the submission of a research budget. In cases where the projects have their own GREX, this phase is skipped. The official initiation of a Building development is drafting and submitting the RAV Building Development (RAV Opstal). This document is further developed in Phase 2. The RAV also includes a VEX/Real-estate exploitation (vastgoedexploitatie/stichtingskostenberekening, VEX), which explores the financial situation of the development (this is a more detailed version of the GREX). The RAV always includes the entire urban development; however, most BPD development projects are strategically segmented. This segmentation is also included in the RAV Opstal. The division of the development benefits selling strategies but also permits applications. After the approval of the management board of both the RAV and VEX, the preparation for construction can begin (phase 3). The process explained in the following section entails how one segment of an entire Location development is prepared for construction.

The preparations for construction depend on the chosen method of development. BPD differentiates between concept development, repeat development, and custom development. The chosen way of development influences the next phase of building development. For this research, cases are chosen that use the same way of building development: custom development.

The first phases of custom development (after the approval of the RAV) can be categorized under the design phase of the project. The design phase is divided into four different parts: sketch, preliminary, final, and technical design. Within BPD, after each phase, the design is tested against its feasibility, which includes the following aspects: financing, technical feasibility, the energy contract, and the legal framework. The design will also be tested against the approved RAV. The project does not move forward to the next phase without approval.

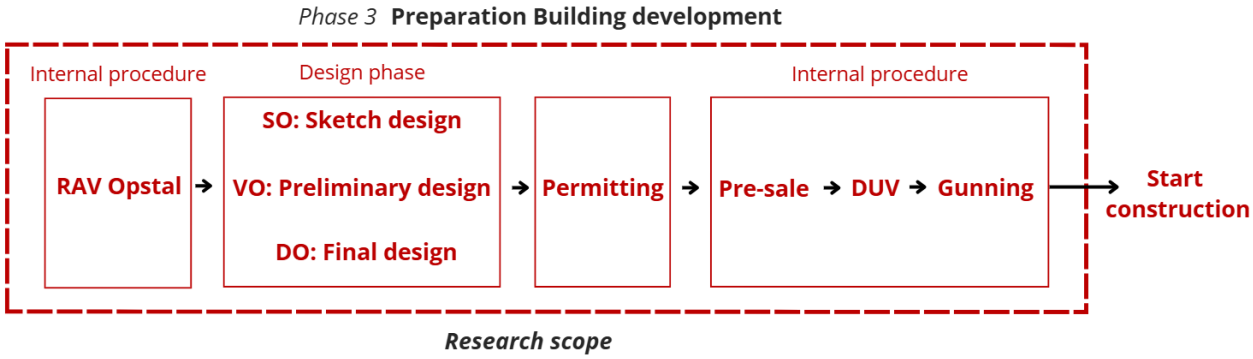

Figure 5.5: Steps of Custom-Building development of phase 3: preparation building development (own figure, 2025).

After the completion of the technical design, the project is submitted for Environmental permit approval. The length of the permit proposal depends on the quality of the submitted pieces, the size of the municipality, and the number of appeals submitted to the design. Projects do not apply to one permit, but to several; this depends on the design and location of the project. Standard procedures of permitting are 8 weeks (Omgevingsbesluit, 2025). The process can be extended with valid reasons for another 8 weeks (Omgevingsbesluit, 2025). After the acceptance of the permit, there is an option to appeal within 6 weeks following the ruling. When the 6 weeks are finished, the permit is officially accepted and cannot be appealed. If there is an appeal, the process is extended, which can result in a battle in court for approval.

Parallel to approval of the Environmental permit and other permits, the project will move forward to preparation for sale. This only occurs if the project has not been sold entirely to investors, like housing associations and real estate investors. To be able to go into sale, a DUV: Final Implementation Proposal (definitief uitvoerings voorstel) is submitted for approval to the management board. A DUV is needed for all cases, even if everything

is sold. Within BPD, the benchmark for the start of construction is when 70% of the homes to be built are sold. When this occurs, the project is officially ‘awarded’ and construction can begin. This is the end of the preparations/planning phase of the building development. The project is officially finished when all homes are built and sold.

5.4 Duration of housing development planning

The previous paragraphs outline the full process of urban development within BPD. This process involves various activities, and the project's outcome may differ from the initial intentions of the acquisition phase. Parallel planning is designed to shorten the planning phase of a project from six years to two years, not including the construction phase. However, the six-year average is an estimation, and the source of this data could not be tracked down. The following paragraph aims to gain more insight into the scope and duration of the planning phase by using the data of comparable cases of BPD.

The planning duration of a housing development project is influenced by a wide range of factors. Due to this variability, it is essential to clearly define the parameters of the "average planning phase timeline," including the selected start and end points, and the type of development. Parallel planning is initiated by the drafting of the preconditions document. Within BPD’s process, this is comparable with documentation of intent, referred to as the RAV Building Development (see paragraph 5.3). This marks the formal initiation of the planning process. The planning phase, in the parallel planning method, concludes at the start of construction, which, in BPD’s internal terminology, corresponds with the internal awarding of the project called Gunning (GUN). This limits the planning phase and scope of this research to the third part of development.

The average planning phase is derived from 13 different BPD cases, all of which are custom developments with more than 100 dwellings (see paragraph 3.6 for case selection criteria). The average timeline for these projects is shown in Figure 5.6 and includes estimated timeframes for the activities presented in Figure 5.5, such as the design phase, the permitting phase, and the internal process. According to the data, the average duration of the planning phase is approximately 2 years and 9 months until the start of construction. This is a significant difference compared to the 6-year planning average reported by Fakton (2022). Several factors could explain this discrepancy. Firstly, the data set is both limited and highly varied. While the average is 2 years and 9 months, the cases include outliers; two cases (from the same urban development) required only 13 months of planning, which is 60% faster than average, while three cases took more than 45 months (3 years and 9 months) to complete, with the most extreme outlier being 70% slower than average. The red arrows in Figure 5.6 illustrate this range. This variation underscores the lack of standardization and the challenge of determining an accurate average duration of the planning phase.

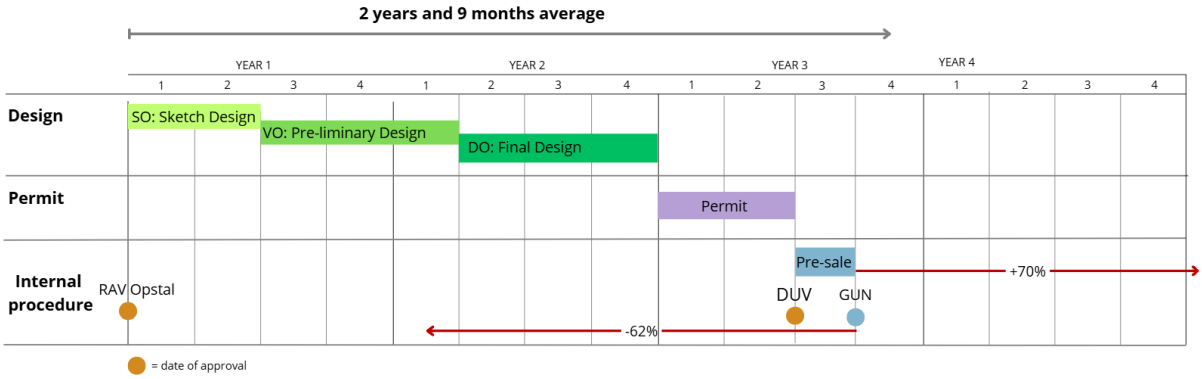

Figure 5.6: Average duration of planning phase BPD (own figure, 2025)

5.5 Conclusion

The chapter aimed to answer the following question: 'What are the activities and duration of the process of housing development?'. The development of land, from acquisition through location development, to building construction, involves a wide range of activities. This research focuses on just one part of this entire process: the planning phase. The planning phase in this research is based on phase 3 of Building development. The typical activities during the planning phase of a building development include the RAV Building development, SO, VO, and DO phases (collectively referred to as the design phase), followed by the permitting phase, DUV, pre-sale, and Gunning. Within BPD, these activities generally take around 3 years to complete for projects involving more than 100 dwellings. It is important to note that this timeline represents a general estimate. The specific activities involved, and their durations, can vary from project to project.

Chapter 6: Case study results

The following chapter aims to answer sub-questions 3 and 4: 'What are the differences between the planned timeline and the final timeline of housing development? & What are the main factors of delays of housing development projects?'. To answer these questions, two cases were selected for analysis, based on the criteria presented in Chapter 3.6. The final two cases were selected due to their similarities in size, program, and duration of the planning phase. Each project will be introduced briefly, followed by a presentation of the original schedule and the final schedule, comparing both to highlight the points of delay. The progress reports and interview outputs of the cases provide an insight into the factors causing delays in the timeline. The results of these case studies will provide an overview of the main factors of delay in housing development.

6.1 Case One

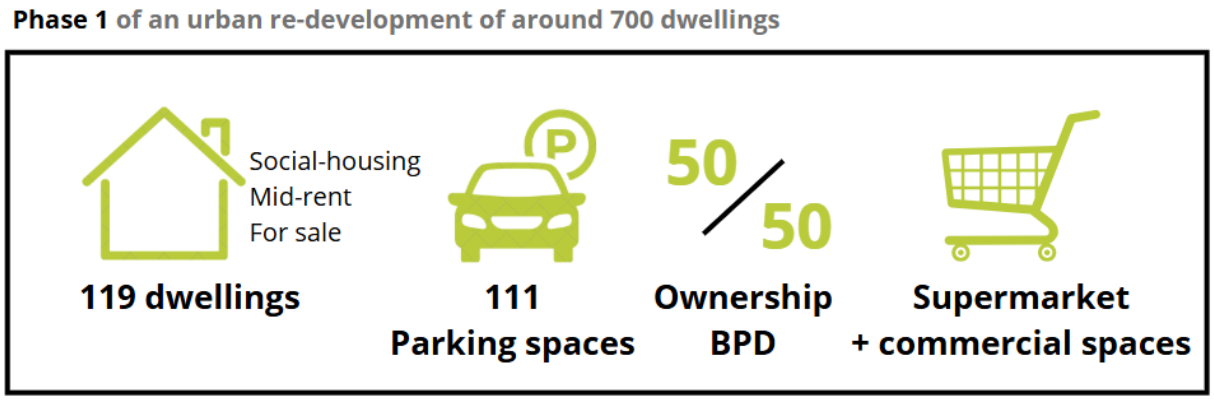

Figure 6.1: Case One overview (own figure, 2025)

The first case is a redevelopment of a port area; the project is located between the city center and a lake. The project is currently in the first phase of an urban development that totals around 700 dwellings. The first phase develops 119 dwellings, with social housing, mid-rent housing, and owner-occupied housing. In addition to housing, a supermarket, commercial spaces, and parking will be developed. The development is a collaboration between BPD and another developer on a 50-50 basis.

Planned & final timeline

In BPD terms, the planning phase is initiated with a RAV Building development (see paragraph 5.4). The RAV of this case was approved in February 2020. The original RAV includes a draft schedule based on the entire urban development. This first draft of the schedule can be seen as the 'original' planning of the project. However, because the RAV presents the schedule for the entire urban development, it cannot be used as a basis for comparing the planned and final timeline.

Originally, Case One was intended to be the second phase of the urban development. However, due to the feasibility issues of the initial phase, the phases were switched. This change occurred in 2022; the change marks the first planning documented in the database and was a change to the original RAV. This is considered the planned timeline in this analysis. The final timeline is the one that was in effect at the time the project was awarded (Gunning), which was in February 2025. The planned timeline in 2022 and the final timeline in 2025 are compared in Figure 6.2.

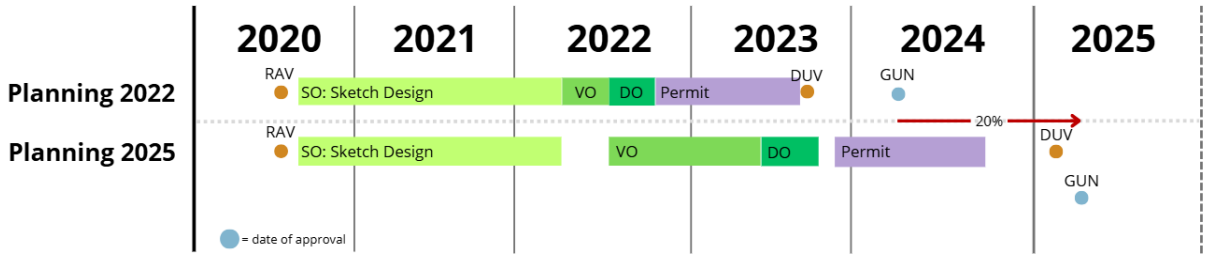

Figure 6.2: Comparison planned and final planning of Case One (own figure, 2025).

The activities recorded in the database are RAV, SO, VO, DO, permit issuance, DUV, contract award, and the start of construction (see Paragraph 5.3 for further explanation). These are the activities that are compared to see the differences between the initial and final timeline. It is important to note that RAV, DUV, and GUN are single dates. These dates only shift; they do not have a duration.

Figure 6.2 indicates that as of February 2025, the project experienced a delay of approximately 20% compared to the initial schedule. The planned duration was 40 months (about 3 years and 4 months), while the actual duration extended by roughly 8 months, resulting in a total completion time of 48 months. The differences in the schedule occurred over time. Between January 2022 (planned timeline) and February 2025 (final timeline), the timeline was changed on numerous occasions. Figure 1 Appendix 4 provides insight into when changes were made to the schedule throughout the project. It presents the project timeline estimation for each month from March 2022 till February 2025, with on the vertical axes the activities that are planned. The red cells in the figure represent times at which the planned dates got pushed forward by at least a month. The green cells are occurrences in which the activity would take less time than estimated, and the date got pulled back.

Analysing these date changes, Figure 1 in Appendix 4 shows that when the deadlines were not going to be met, the dates got pushed. The frequent pushing of dates makes it difficult to pinpoint which factors caused specific deadlines to be delayed. Additionally, within BPD, not all activities are planned; only milestones such as the acceptance of the final design, permit approval, or DUV acceptance are. Although the data from progress reports and timeline comparisons cannot attribute each delay to a specific factor, the

progress reports and interviews show that numerous bottlenecks have impacted this case and the final timeline.

When looking at the differences between the two timelines in Figure 6.2, the most noticeable delay occurs in the VO phase of the case. This phase was delayed by a year. The progress documents report that difficulties in this phase were mostly related to the feasibility of the plan, not only referencing the location of the project but also the rising building costs. Due to the extended VO phase, the project was unable to move on to the DO phase. The delay of the VO influenced the entire timeline of the project, confirming the challenges of the waterfall method (see paragraph 2.1).

What also stands out is the fact that the DUV and gunning closely follow each other. Due to the delays, the project was in danger of not meeting the deadline of the WBI (woningbouwimpuls) subsidy: a subsidy that contributes to the feasibility of the project and stimulates housing development by setting a hard deadline. This meant construction of the project needed to start before 2025, rushing the entire project to be accepted by the end of 2024 or/beginning of 2025. In terms of this research, this marks the end of the project's planning phase. However, due to other factors, the project has not been put on the market or started construction, resulting in further delays. This shows that the implementation of a deadline, like the WBI, may not always accelerate construction as it intends to. It also highlights the fact that the awarding of a project may not always be the end of the planning phase or the start of construction.

6.2 Case Two

Figure 6.3: Case Two overview (own figure, 2025).

The second case is an urban redevelopment of an office building area. Case Two is the sixth phase of an urban development that will develop around 3000 dwellings. The building block itself will contain 200 dwellings, with a program of mid-rent, social housing, and owner-occupied homes, like Case One. It also includes a supermarket and other commercial spaces. In contrast to the previous, the project is developed only by BPD.

Planned and final timeline

As stated, the RAV Building Development submission contains the first estimation of the entire urban development of 3000 dwellings. Following the overall schedule of urban development presented in Figure 6.4, the SO phase of this case was set to be initiated in Q1 2022, with the start of construction planned in Q4 of 2022. Because Case Two is part of an urban development, the starting date can be influenced by other concurrent sub-projects, like in Case One.

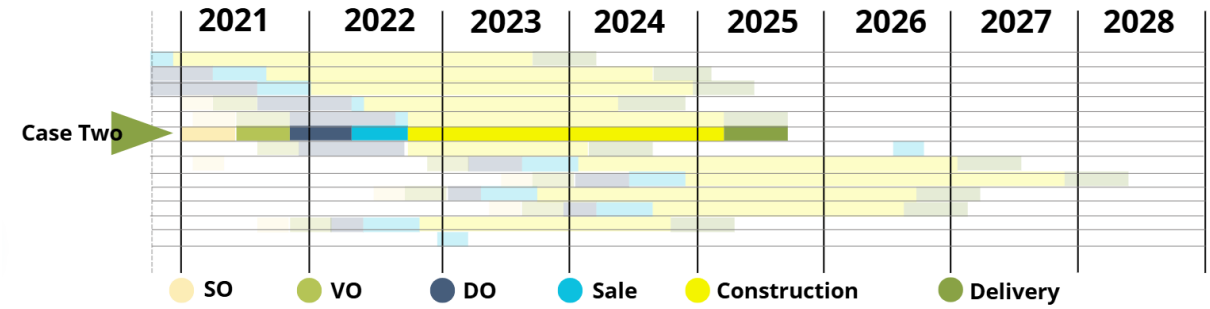

Figure 6.4: Original planning Urban development of Case Two (own figure, 2025).

Since the planning in Figure 6.4 is an estimation of the entire urban development and not the specific sub-projects, this first planned timeline is not used as a basis for the comparison. The earliest available planning of Case Two is from December 2021. This is used as a basis for the original timeline. The comparison between the planned and final timeline is presented in Figure 6.5. Case Two was initially scheduled to last approximately 22 months (1 year and 10 months). The actual duration extended to 43 months (3 years and 7 months), resulting in a delay of 95%.

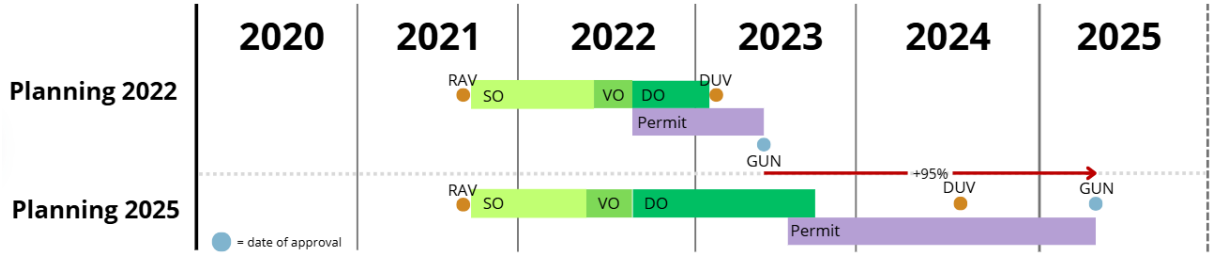

Figure 6.5: Comparison planned and final timeline of Case Two (own figure, 2025).

Between the planned and final timeline of Case Two, a lot of changes were made to the schedule. Figure 2 Appendix 4 presents the schedule changes for Case Two, from 2022 to 2025. The number of times changes were recorded is more recurring than in the first case; however, the changes are smaller. The frequency at which the changes are made suggests that the timeline dates are not meant as deadlines, but more as guidelines or estimations. Again, confirming the challenges of the waterfall method and that the current way of planning is only an estimation.

When analysing Figure 6.5, the most significant points of delay happened during the design phase, more specifically, the DO-phase and the permitting phase. In the progress reports, the delays in the design phase are linked to technical design issues, due to the preconditions of the municipality in combination with the proposed design of the building. The points of delay within the permitting phase are also linked to design technical changes and the same pre-conditions, but also to the lack of coordination of the municipality. The interview also attests to the same factors of delay, with the developer stating that because the interior had to be made to fit the accepted exterior, the design phase was lengthened.

6.3 Analysis of delays

The previous paragraphs introduce the cases of this research, the points of delay, and the main factors mentioned in the progress reports that caused these delays. However, next to these main delays, smaller delays were caused by other factors. In the following paragraph, the categorisation of delays is introduced. Based on this categorisation, all factors of delay that occurred in the cases from the progress reports and interviews are presented. The paragraph concludes with an analysis of these factors.

Categorization of delays

The factors of delay are categorised between the delays that are already established by literature and additional factors of delay that the cases may have encountered. Literature delays are factors based on the literature review, which derived a list of factors of Dutch housing development, see Figure 6.6 (see Appendix 3 for the complete list and description). The delays in Figure 6.6 serve as the basis for coding the data of both cases; these factors of delay will be referred to as ‘literature delays’. The case results also identified additional factors contributing to the factors in the literature, referred to as 'additional delays’.

To make the list more manageable and to differentiate between the various factors of delay, the factors are grouped into internal and external. This categorisation also highlights the differences required in mitigation methods for each factor of delay. Both internal and external factors require separate methods of mitigation. Separation creates an additional layer of comparison to assess the influence of parallel planning. In this research, internal delays are those factors that originate within the influence of the project team. The project team includes the developer and the municipality project leader, as a project team is viewed as what the parallel planning method considers a project team. Internal factors of delay include things such as collaboration and coordination. External factors originate outside the control of the project team, including factors such as third-party appeals or rising building costs. These additional delays will also be categorised under these two categories.

INTERNAL	Personnel capacity municipality
	Personnel capacity developer
	Priority
	Collaborated on project planning
	Collaboration
	Coordination by the municipality
	Coordination by the developer
	Technical design problems
EXTERNAL	Spatial planning instruments and procedures
	Setting frameworks
	Laws and regulations
	Extensive research requirements
	Building costs
	Appeal of third parties
	Market problems
	Location problems

Figure 6.6: Categorization of literature delays (own figure, 2025).

Literature delays

The frequency of the mentioned literature delays is based on the progress reports and interviews of both cases. The results of the literature delays of each case and the different data sources can be seen in Appendix 5. Figure 6.7 combines the results of both cases to compare the literature delays. The comparison in Figure 6.7 shows that some delays showed up more often in the data of one case than the other. For example, the capacity problems in Case One or the technical design problems in Case Two. The results indicate that the internal delays in these cases primarily involve issues related to the coordination between developers and the municipality, along with the set preconditions, and the technical design challenges. External delays of the cases involve market-related issues, legal and regulatory factors, and the costs associated with construction (building costs in Figure 6.7).

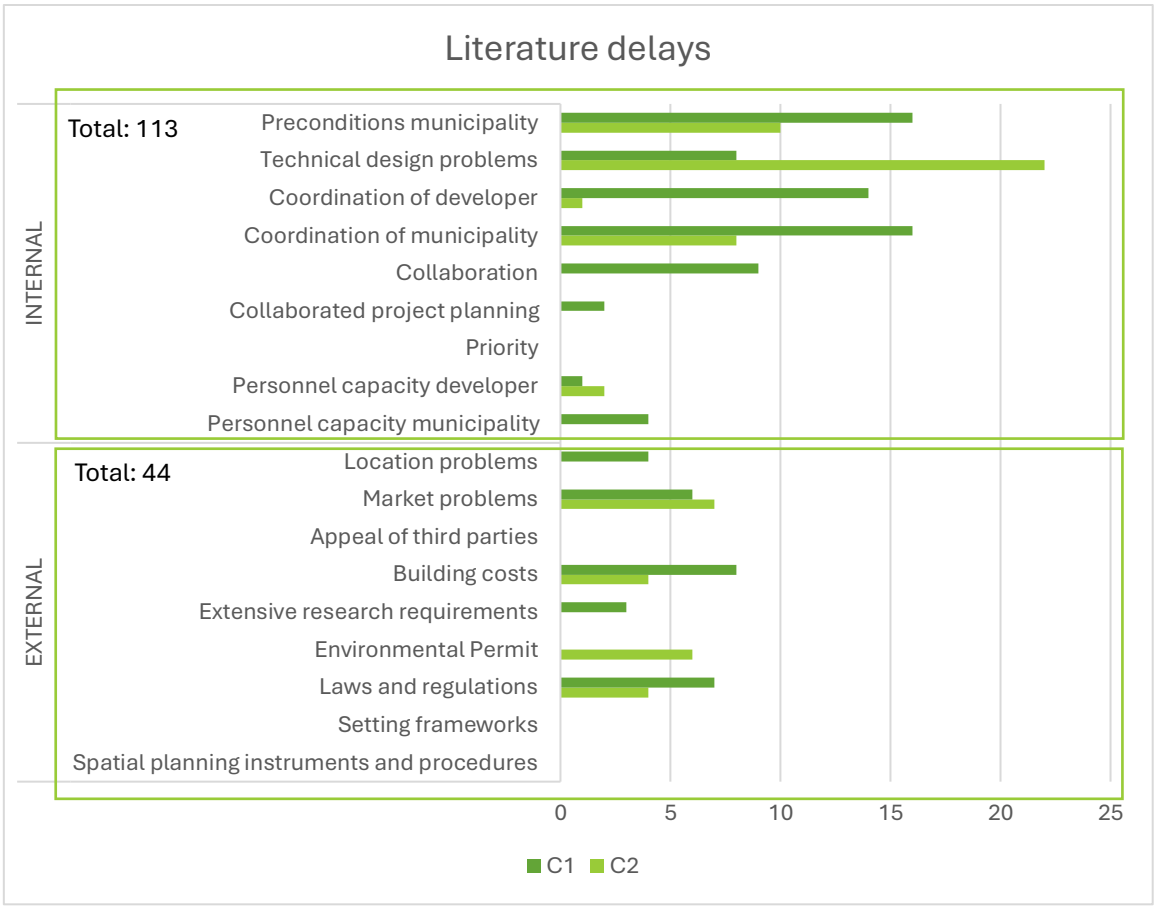

Figure 6.7: Comparison of the literature delays (own figure, 2025).

Figure 6.7 also shows the total mentions of all internal and external factors in the data, portraying a significant differentiation between the two categories. Internal factors have been mentioned a combined total of 113 times. External factors were mentioned 44 times. The number of mentions of the factors does not equal the amount or impact. However, the gap between the number of factors mentioned can be linked to the different roles of internal and external factors in the development process. Developers and municipalities have more insight into the internal process, making it easier to reflect on these factors in comparison to external factors. Internal factors of delay can be confronted on a day-to-day basis, whereas the effects of external factors are often more noticeable over a longer period and upon reflection of the entire project.

Some factors contributing to delays identified in the literature were not seen in the data of the two cases. The following are absent: third-party appeals, priority issues, the establishment of frameworks, and spatial planning tools and procedures. This does not imply that these factors never occur in housing development. These findings may arise from the possibility that they were simply not referenced in either the progress reports or the interviews or just did not occur due to the limited number of case studies reviewed. Most surprising, however, is the absence of appeal by a third party, as they are typically a contributor to the delay within the development of housing. Approximately one-third of all projects in the Netherlands face delays due to appeals (Bouwman, 2024). The appeal

process can extend the timeline of a project by 1 to 2 years (Bouwman, 2024). Even though the cases did not reference these factors, they will still be used as factors in testing parallel planning, since they may occur in other cases.

Additional delays

Both cases presented delays because of contributing factors outside the established literature delays, as shown in Figure 6.6. The additional factors, including description, are added to the list presented in Appendix 3. These new factors and their distribution in both cases are presented in Figure 6.8. The data found additional internal as well as external factors of delay. Figure 6.8 shows that the most prominent additional delaying factor is the contract negotiations. Contract negotiations can be extensive. Not only because of financial discussions, but also because of the preconditions wanted by the parties involved. In these cases, the negotiations were the most extensive with the potential buyers of the dwellings and commercial spaces. They are also recurring throughout the entire planning phase in both cases. As a result, splitting ways with external parties, like not proceeding with investors or contractors, can be seen as another significant factor of delay (see Figure 6.8). When splitting ways with external parties, the negotiation process will have been lost time.

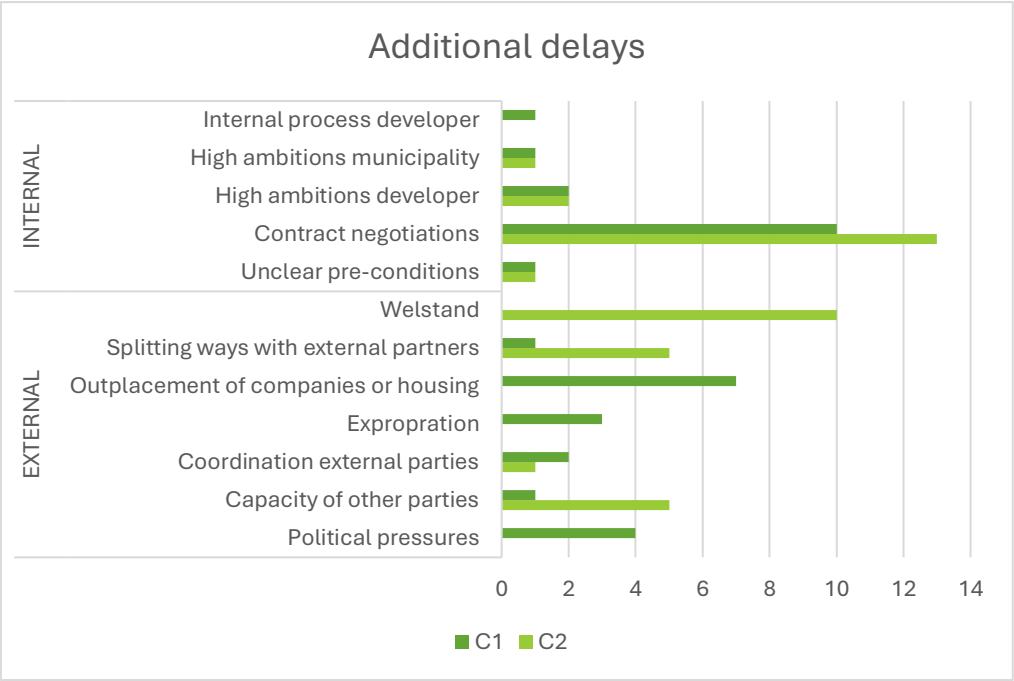

Figure 6.8: Comparison of additional delays (own figure, 2025).

The second most mentioned factor is the 'Welstand' (Quality Insurance Team), mostly occurring in Case Two. This delay occurs when a design does not fit the quality or the image that was discussed. In Case Two, the project needed some design changes, which were made at the expense of the original design of the building. These changes were difficult to get accepted by the 'Welstand'/ Quality team. Another, less mentioned, but impactful factor of delay is the outplacement of companies or housing from the

project site. When this is not done efficiently, the expropriation of households or companies occurs. The control of the timeline of the project will be moved to court.

Other additional factors are due to the coordination and capacity of external parties, unclear preconditions, high ambitions of both developer and municipalities (meaning the overall ambitions of the company, the developer, and the city council), internal processes of the company of the developer, and potential political pressures. Descriptions of these factors can also be found in Appendix 3. Even though these factors are mentioned less, they can contribute to the delay of a project and should be considered when testing parallel planning.

6.5 Conclusion

This chapter was set to explore the following sub-questions: 'What are the differences between the planned timeline and the final timeline of housing development? (SQ3) & What are the main factors of delays in housing development projects? (SQ 4)'.

The case studies provided insight into the dynamics of housing development and project timelines. When comparing both cases, the differences between the planned and final timelines, there are certain things that come to light. As mentioned by Fakton (2022), there is currently no set timeframe or estimation in the planning of housing development. Both cases of similar sizes have completely different first estimations, with Case One having an estimated duration of 3 years and 4 months and Case Two having an estimated duration of 1 year and 9 months.

The differences between the planned and final timelines of the cases can change anytime during the project (see Appendix 4). The number and size of the changes made depend on the project developer assigned to the project, reconfirming the lack of standardisation. In both cases, the timeline was often changed, and a shift in one deadline typically delayed others as well. These changes may result from a variety of factors. The aim of comparing the planned and final timeline of projects was to find and create overviews of the points of delays to answer sub-question 4. These delay points have been identified, and the factors of delays have been identified.

The results offer a look into the factors that can delay a project, adding additional factors to the list of literature delays, which are added for the testing of parallel planning in Chapter 7. One of the most important findings is that delays cannot be attributed to just one or two specific factors. Based on the results, it is a combination of multiple factors that leads to delays.

To provide insight into the influence of the key ingredients of parallel planning on factors of delay, it is important to identify which factors have a greater impact than others. However, based on the results, creating a definitive ranking of which factors cause the most delay is impossible. If the ranking were based solely on the case studies, it would appear as shown in Figure 6.9. Assigning the highest factors of impact to technical design issues, preconditions by the municipality, and coordination of the municipality.

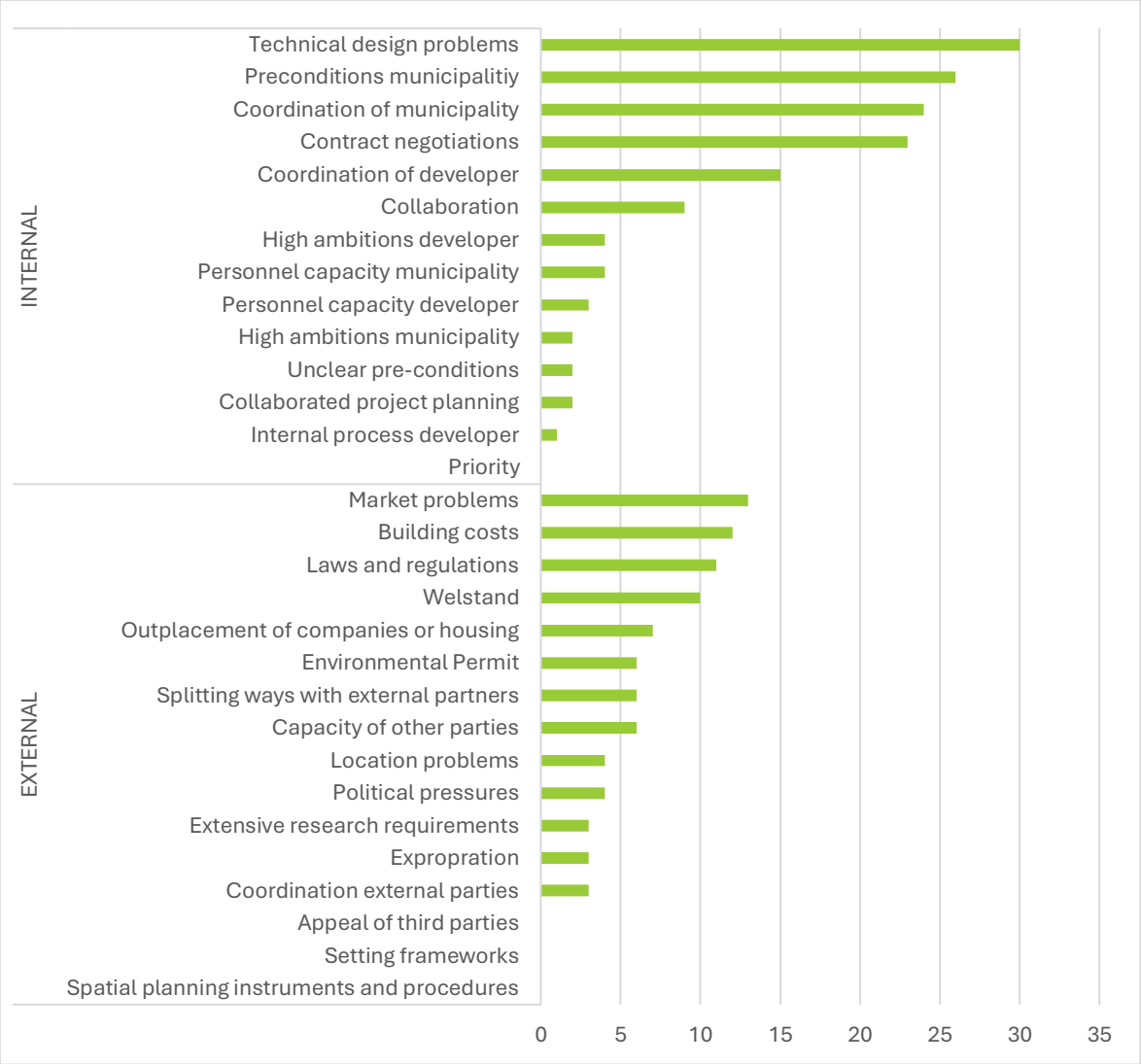

Figure 6.9: All mentions of delays (own figure, 2025).

The issue with these results is that they are purely based on the frequency with which each factor is mentioned. To establish a more accurate top five ranking, the findings from the case studies (how much impact certain linked delays had) are combined with insights from the literature review (Chapter 2) and the rankings provided by the developers during interviews. The points of significant delay from the case studies have also been researched to find the most impactful factors. The final ranking is based on an estimated impact of each factor of delay, derived from these combined sources, creating the following top five most impactful factors of delay:

1. **Appeal of third parties** *(Amount of delay: 6 to 12 months (Bouwman, 2024))*
2. **Financial issues (building costs) & Market problems**[4] *(Amount of delay: a few months to years (Case One))*
3. **Technical design issues** *(Amount of delay: 6 to 12 months (Case Two))*
4. **Preconditions Municipality** *(Amount of delay: 6 to 12 months (Cases One & Two)*
5. **Contract negotiations** *(Amount of delay: a few months to 6 months (Cases One & Two)*

The list is a combination of internal and external factors of delay. Based on this list, it can be determined that external factors, when present, can influence the project timeline to a greater extent. Since the factors ranked first and second originate outside the control of the project team, these delays are more challenging to address. The third, fourth, and fifth factors are largely the responsibility of the project team and often originate from within the team itself. However, these issues frequently require coordination with external stakeholders, which can make it more challenging to address and resolve them. In conclusion, factors with the greatest impact on the timeline of a project tend to be the most difficult to manage.

Using the list of factors identified from the literature and case studies and the ranking of impactful factors of delay, Chapter 7 will examine the use of parallel planning as an approach to reduce or address these delays.

[4] These two delays are combined, because they are always linked in occurrence.

Chapter 7: Reduction of delays by parallel planning

In this final chapter of the results, the parallel planning method is compared with the delays found in the literature and case studies (see Appendix 3). The next chapter explores the final sub-question: 'To what extent do the key ingredients of parallel planning contribute to reducing delays?'. The results show to what extent delays can be reduced by implementing parallel planning, by comparing the key ingredients with the delays established in Chapter 6.

7.1 Delay mitigation

The key ingredients, identified in paragraph 4.6, are the tools introduced by parallel planning to influence delays and accelerate development. Parallel planning aims to reduce the overall timeline of a project through the mitigation of delays in combination with the new way of scheduling. To demonstrate how parallel planning can influence the timeline of development, the delays affected and unaffected by the ingredients are identified. Key ingredients are matched to the specific delays they target in Appendix 6. The links are derived from the findings presented in the preceding chapters. Based on the table in Appendix 6, the number of links that are connected between a delay and its key ingredients are visualized in Figures 7.1 and 7.2. The number of links shows how many key ingredients of parallel planning are intended to address an individual delay (see Appendix 6), providing an overview of the types of delays that are affected by the parallel planning method. Figure 7.1 presents the internal delays, while Figure 7.2 presents the external. Internal delays are caused by factors within the project team's (municipality and developer) control, while external delays arise from factors outside their control (for further explanation, see Paragraph 6.1).

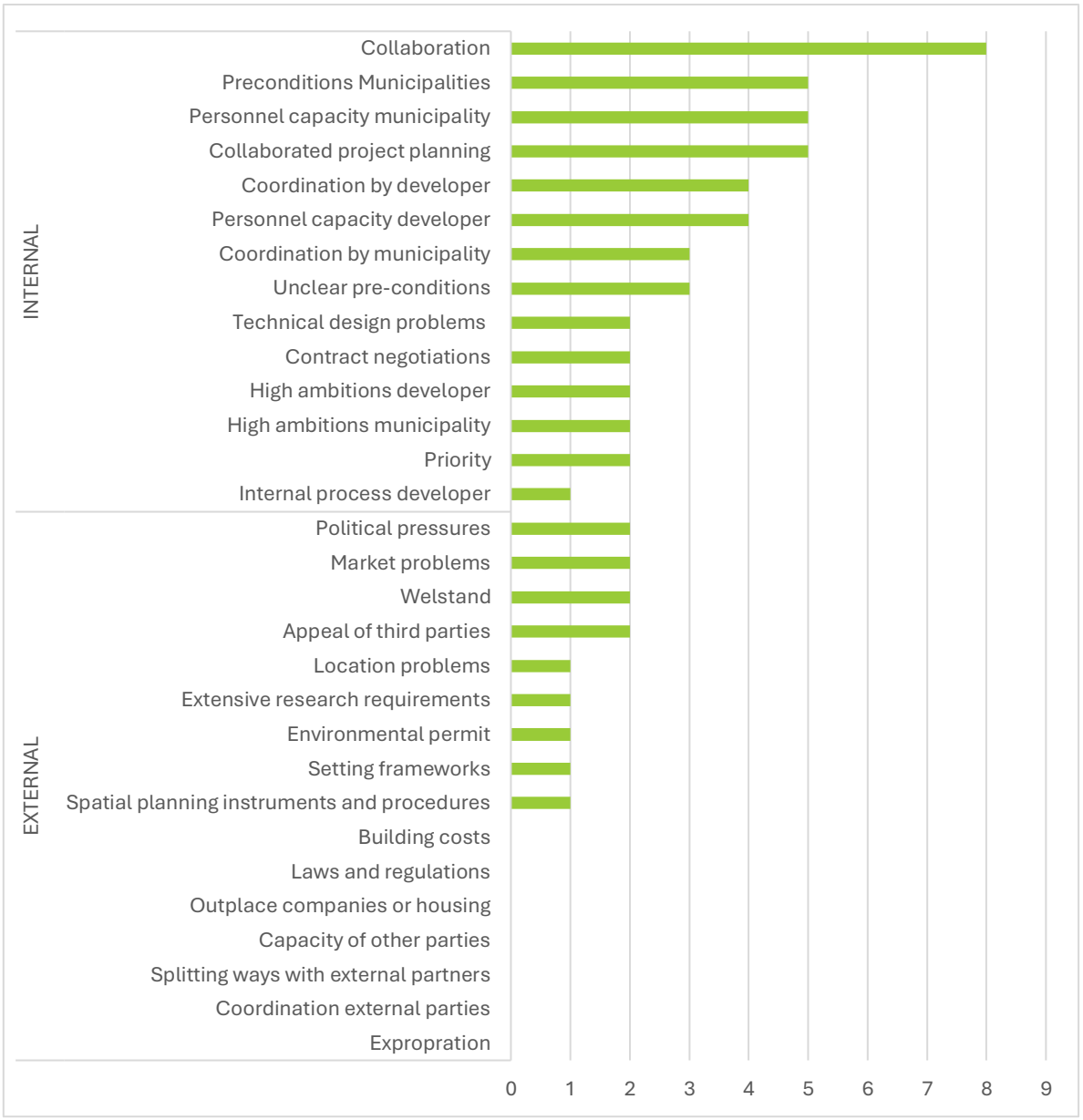

Figure 7.1: Number of key ingredients linked to factors of delay (own figure, 2025).

The results in Figure 7.1 show that parallel planning is mostly catered towards mitigating delays that are caused by coordination or collaboration. This is probably because the parallel planning method primarily emphasizes the internal processes of the project team. The method's approach to assigning tasks and responsibilities can also positively affect the team's capacity to do more work with reduced staff, thereby mitigating delays caused by capacity strains insight the project team. Compared to internal delays, there are limited measures to address delays from external factors. For example, open information sharing (see Appendix 6) aims to lessen third-party appeals, political pressures, and issues with 'Welstand'. Furthermore, early identification of risks related to the location or market can facilitate the mitigation of potential delays.

As indicated in the case results, most timeline delays arise from a combination of both internal and external factors. The combination concludes that the reduction of internal delays can help address external factors more effectively. For instance, better collaboration enables earlier identification of risks and resolutions of external factors like market or location problems. The results also show a significant differentiation between the number of ingredients that affect internal delays in comparison to external ones. To accentuate the gap in key ingredients working between internal and external delays, the number of links within each category is compared in Figure 7.3. With 46 links working to mitigate internal delays, in contrast to the 15 links to mitigate external delays, the results again conclude that parallel planning works mostly to mitigate delays within the scope of the project team (internal delays).

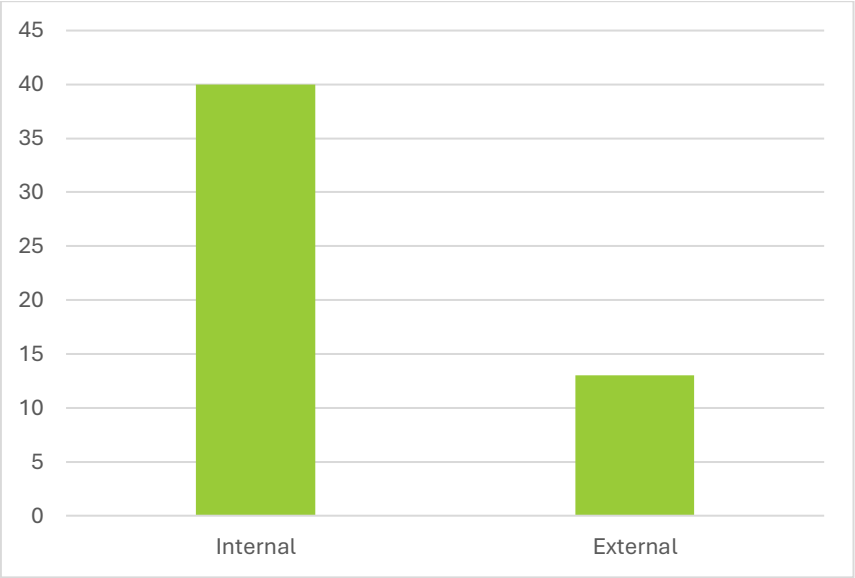

Figure 7.2: Comparison of the number of links with parallel planning key ingredients between internal and external delays (own figure, 2025).

Un-influenced factors

Some delays, based on the results, have no links/are not mitigated by the key ingredients of parallel planning; these are defined in Figure 7.3. When analyzing the delays that do not seem to be related to key ingredients, it becomes apparent that the delays are the result of external factors. These factors are based on parties outside of the project team or factors that are due to the political climate or the scarcity of materials. The project team cannot alter these factors by implementing parallel planning. Parallel planning may address these factors through early risk analysis. However, this approach does not directly mitigate these factors.

External
Building costs
Laws and regulations
Outplace companies or housing.
Capacity of other parties
Splitting ways with external parties
Coordination of external parties
Expropriation

Figure 7.3: Delays with no links to parallel planning's working ingredients (own figure, 2025) (see Appendix 3 for description of delays).

Impactful delays

In the conclusion of Chapter 6, the top five most impactful delays are presented based on the literature and case studies. As stated in Paragraph 6.4, these delays are also the most difficult to mitigate. Figure 7.4 provides a closer look at these impactful delays and their links with the key ingredients of parallel planning. The figure illustrates that all the most impactful delays are associated with a similar number of key ingredients derived from parallel planning. These ingredients include early risk identification, continuous feasibility management, early public participation (through open information sharing), the use of a preconditions document, early stakeholder commitment, and standardized documentation (see Paragraph 4.6 for descriptions of the key ingredients and Appendix 5 for the links to specific delays). Although this list of mitigation strategies is extensive, the number of measures addressing these delays is relatively low compared to those related to collaboration and other internal delays.

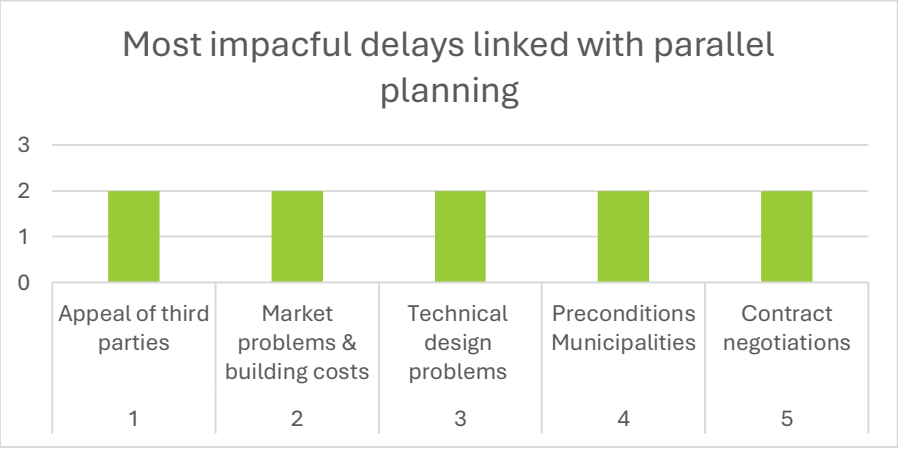

Figure 7.4: Most impactful delays and their links with the key ingredients of parallel planning (own figure, 2025).

7.2 Conclusion

This chapter aimed to explore the extent to which parallel planning principles help reduce the factors of delay identified in Chapter 6, thereby addressing the sub-question: ‘To what extent do the key ingredients of parallel planning contribute to reducing delays?’. To gain insight into this, the key ingredients of parallel planning were compared to the factors of delay from Chapter 6. This comparison was unable to show the extent parallel planning contributes to reducing these factors of delays. This is because the results of Chapter 6 were unable to set timeframes for certain delays. Also, the amount of reduction that parallel planning achieves is context-dependent and varies based on the origin of the delay.

However, the results do provide insight into which factors parallel planning aims to reduce. The analysis shows that parallel planning primarily targets internal, process-related delays, such as those caused by poor communication and limited collaboration. In comparison, external delays, including legal procedures and third-party appeals, are more difficult to mitigate through parallel planning. While the results indicate a contribution of parallel planning to reduce internal delays, its impact on external delays remains limited.

Chapter 8: Discussion & Conclusion

The following chapter reflects and discusses the methods and results of the previous chapters, highlighting their objectivity, generalization, validity, and limitations. From the results, the main and sub-questions are answered in the conclusion. The implications of the conclusion will be discussed, and recommendations are given for further research into delays and parallel planning in housing development and the application of parallel planning.

Problem statement versus research findings

The problem addressed in this research is the duration of housing development in the Netherlands, with a focus on whether parallel planning can help reduce delays in the planning phase. The study aimed to explore how parallel planning addresses the main factors of delay and whether it is a solution to accelerate project timelines. The results show that parallel planning mostly targets internal delays. While the method shows promise in improving internal processes and reducing some types of delays, its impact on external factors (like legal appeals, market fluctuations, or regulatory changes) remains limited. This aligns with the problem statement, which recognizes that not all factors of delay are under the control of the project team. Furthermore, the research presents that delays in housing development are usually the result of a combination of factors, rather than a single cause. Parallel planning may reduce these challenges, but its effectiveness is limited by external factors. In summary, the results partially address the problem statement: parallel planning offers a framework for reducing internal factors, but its ability to shorten the overall planning phase is still unproven and depends on its context.

Definition planning phase

An issue in researching the planning phase of housing is its definition. For this research, the internal acceptance of a project was chosen as the starting point, which was to adhere to a certain scope and set boundaries of the research. However, it can be argued that this is not the real start or initiation. In the process of BPD, the planning phase of a project can start as early as land acquisition. The planning phase can also start as early as the first idea or brainstorm. The same discussion applies to the end of the planning phase. Case One shows the fact that the awarding of a project may not always be the end of the planning phase or the start of construction. As a result, initiation and end of the planning phase remain a subjective concept within housing development planning.

8.1 Objectivity of the research

The following section addresses factors that may influence the objectivity of the research findings. Since this research is based on qualitative research methods, there is a risk for bias in the results. This is not only because the results are based on stakeholder interviews and progress reports written by developers, but also the interpretation of the researcher when analyzing this data. These points are important to review to evaluate the conclusion.

Stakeholders bias

The delays identified in the results are based on interviews and progress reports. These sources rely on the experiences of the developer and/or the municipality, which introduces potential bias. Specifically, the frequency with which delays are mentioned in these sources may influence the perceived significance of certain types of delays. For example, internal delays are often more straightforward to identify and are routinely addressed, making them more likely to be reported. Evaluating recently completed projects objectively can also be challenging, especially when delays occur. There may be a tendency to associate delays with negative outcomes, regardless of the actual effort or context, making it harder to discuss these in the interviews or progress reports. To maintain objectivity, no conclusions were drawn about the impact of delays based solely on how frequently they were mentioned.

Additionally, the objectivity of the results is limited by the lack of diversity in interview participants. Most interviews were conducted with project developers, and only one municipal project leader was included. Perspectives from other stakeholders, such as additional municipal officials, contractors, or residents, were not represented. This may have led to a partial or biased understanding of the causes and consequences of delays. However, given that the scope of this research was focused on the project team consisting of the municipality project leader and the developer, the results remain relevant and objective within that defined context.

Researcher bias

In addition to stakeholder bias, the interpretation of the findings may be influenced by the researcher’s own assumptions. This potential bias should be mentioned, as it can shape the interview responses, but also the way progress reports are analyzed and presented. Potential bias is most likely to happen during the comparison of links between parallel planning and the established delays. The links between parallel planning and the delays are established based on both their descriptions. However, certain key ingredients are not well defined, leaving it up to the researcher's interpretation whether the ingredients link with certain delays. To prevent this potential bias, the links are based on the given solely on the description of both key ingredients and delays.

8.2 Generalization

The following paragraph explores the extent to which the findings of this research can be generalized or transferred to other housing development contexts. Two main aspects are discussed: delays in housing development and the duration and process of housing development.

The delay-related findings are based on both literature and case study data. Although some delays identified in the literature did not occur in the case studies, they were still included in the final comparison, as they may be relevant to other projects. The case studies also revealed additional delays. It is important to assess whether these are truly new categories or if they could be grouped under existing ones, and whether they are not isolated to a single case. In this research, all additional delays were included because they occurred in the case studies; however, their relevance and transferability to other contexts remain uncertain.

The housing development process was analyzed from the perspective of BPD, focusing on the developer's role. This approach ensured consistency across the case studies and helped define the scope of the research. Nevertheless, it is important to recognize that housing development processes can vary depending on the company, municipality, or specific project. This variability may limit the transferability of process-related findings. However, the overarching factors for delays identified in the results are applicable to a wide range of housing developments, regardless of the specific process. This enhances the generalizability of the findings.

8.3 Validity

The validity of this study refers to whether the research measures what it is intended to measure. A qualitative approach was applied to obtain the results, and its internal validity was strengthened using multiple data sources: literature (both scientific and grey), interviews, archival data, and progress reports. However, there are some points to discuss surrounding the limitations in its validity.

To enhance the validity of the findings, an expert interview was conducted. However, a limitation of relying on an expert is that they may find it difficult to critically assess their own developed methodology. It is important to note that this research did not aim to evaluate the realism or practical challenges of implementing parallel planning. Therefore, the conclusions drawn remain valid within the defined scope of the study. Additionally, the use of comparable case studies, similar in terms of programming and scale, supports the internal validity of the research, as the findings are consistent across similar contexts. Regarding external validity, or the potential for generalization to other settings, the findings are somewhat limited. The cases studied are projects from a single company, with a similar number of dwellings and a mix of functions. As such, the results

are not directly transferable to all types of housing developments. The outcomes, particularly the observed delays, may be specific to the scope of this research, thereby limiting its external validity. The validity of the sources is also constrained by the limited availability of information on parallel planning and the evolving nature of its framework. Although the use of multiple sources helps to mitigate this issue, the risk remains that future developments could alter the conclusions drawn. Overall, the validity of the methods used in this research is reinforced by a thorough and multi-faceted approach to data collection and analysis. However, the generalizability of the findings to broader contexts remains limited, and caution should be exercised when applying these results to other housing development projects.

8.4 Limitations

While this study provides valuable insight into the workings of housing developments, delays and parallel planning. There are multiple limitations, due to the uncertainty surrounding the concept of parallel planning, but also due to the timeframe and choices made in the conduct of the research.

Development of parallel planning

The main limitation of this research is that parallel planning is still in its pilot phase, with no completed projects available for evaluation. As a result, the effectiveness of the method can only be assessed through theory and early-phase observations, rather than objective, real-world outcomes. There is also no standardized framework or comprehensive documentation for parallel planning; most information comes from presentations and related project management literature, which limits the depth and consistency of analysis. Some key ingredients are well-defined, while others remain abstract, making their practical application unclear. Additionally, when comparing delays and key ingredients, not all links are equally strong or direct, and the analysis does not weigh their relative significance. This means that while the research identifies connections, it cannot fully assess the impact or effectiveness of each ingredient in reducing delays.

Methodology limitations

Due to the timeframe of this research, it was chosen to limit the research to only two case studies with familiar contexts. However, this choice limits the amount of data surrounding delays in housing developments, especially in finding additional delays. Another limitation with the conduction of the delays is that both cases were still in the planning or early construction phase at the time of analysis. As a result, the full impact of delays could not be observed, and thereby compared to parallel planning. Some factors can cause delays, like a global pandemic, that have not been captured due to the scope and data sources.

8.5 Conclusion

This research aimed to explore: 'How parallel planning can address delays to reduce the planning phase of housing development?'. The research answered 5 sub-questions: defining parallel planning (SQ1) and the process and duration of housing development (SQ2), analyzing cases to find the differences between the planned and final timeline (SQ3), and researching which factors caused the changes en delays (SQ4). Finally, by comparing the delays with the key ingredients, the results indicate the extent to which parallel planning can mitigate delays (SQ 5). All the results are combined in the following paragraphs to answer the main question of the research: *How can parallel planning address delays in housing development to reduce the planning phase?*.

Parallel planning (SQ1, Chapter 4)
Parallel planning addresses delays in the housing development process by restructuring the planning phase to be more adaptive and efficient. It does so by rearranging the schedule to allow for overlapping activities and by introducing a new, more integrated way of working. The approach is built on four foundational pillars: parallel planning as a guiding principle, standardization, a continuous stream of information, and efficient working practices. Each pillar is supported by key ingredients designed to accelerate housing development and mitigate delays. Parallel planning not only accelerates development but also introduces a cultural shift toward transparency, adaptability, and shared responsibility.

The process of housing development (SQ2, Chapter 5)
The process of housing development entails three phases: Land acquisition, Location development, and Building development. This research focuses on just one part of this entire process: the planning phase. The planning phase occurs during the Building development phase of development. Typical activities during the planning phase of a building development include the initiation (RAV Opstal), the design phase (SO, VO, and DO), followed by the permitting phase, pre-sale, and the awarding of the project (DUV and Gunning). Within BPD, these activities generally take around 3 years to complete for projects involving more than 100 dwellings. The activities and their durations can vary from project to project.

Differences in planned and final timelines (SQ3, Chapter 6)
A lot can change between the planned timeline and the actual completion of a project. The planned timeline can serve two roles: either as a hard deadline or simply as an estimate for when a task might be finished. How it's used and how often updates are tracked depend on the project developer. In both cases studied, the planning changed frequently. Often, when one deadline shifts, it causes a ripple effect that pushes other deadlines too. These changes usually result from a mix of factors, which makes it

difficult to pinpoint a single cause for the differentiation between the planned and the final timeline.

Delays (SQ4, Chapter 6)
There is a wide variety of these factors that can cause delays in housing development. Based on a combination of literature and case studies, 30 potential causes of delay were identified and grouped into internal and external categories. In most cases, delays stem from a mix of factors and the overall complexity of the project, rather than a single issue. The five most impactful delays are: appeals from third parties, financial and market-related problems, technical design challenges, municipal preconditions, and contract negotiations.

Reduction of delays by parallel planning (SQ5, Chapter 7)
The comparison of key ingredients with the delays shows that parallel planning is primarily focused on reducing process-based delays. External delays remain more challenging to address through parallel planning. However, it is difficult to determine exactly how much parallel planning reduces delays in housing development, as the extent of reduction depends on the specific causes of delays and the project context.

Delays addressed by parallel planning (MQ)
Although the results do not specify the extent to which parallel planning reduces delays, they indicate which types of delays are addressed through parallel planning. By mapping the list of 30 delays against the key ingredients of parallel planning, the research answers how parallel planning aims to reduce the delays. Thereby shortening the planning phase of housing development. The findings show that parallel planning introduces an intentional approach to planning, allowing for more control over internal processes and improved coordination. It becomes clear that the method primarily targets internal delays. It does so by promoting coordination, collaboration, intention setting, and open information sharing. While parallel planning also attempts to address external delays, such as those caused by political factors or resource shortages, these are inherently more difficult to influence. Delays caused by factors outside the project team, such as the political climate and the scarcity of materials, remain largely beyond the scope of what parallel planning can control. While its influence on external delays is limited, it still contributes to reducing their impact through proactive planning and early risk identification. In conclusion, parallel planning offers a framework for addressing internal delays and increasing planning flexibility, even if its full impact and reduction on the overall project timelines have yet to be fully demonstrated.

8.6 Implications & Recommendations

The results offer several important implications for both practice and research, but they also highlight the opportunities for further exploration and application of parallel planning, the process of housing development, and delays.

Scientific relevance

The results translate a working method for housing development into literature, combining established theories with the method. This method is transformed into a theoretical approach, thereby narrowing the gap between scientific theories of parallel planning and the practice of housing development. The research has also provided additional information for science, adding new delays to the established literature delays. It introduces that delays often are a result of a combination of factors, which will help evaluate how delays manifest in development and what the consequences may be.

The research is most useful when seen as a first observation into the concept of parallel planning, establishing its definition and the workings of the method. However, to fully explore the potential of parallel planning, future research must focus on refining its theoretical foundations. There remains a need for longitudinal studies that follow parallel planning projects from initiation to completion. This would allow for a more in-depth evaluation of the effect of the method and its adaptability across different project types and regions. Another further exploration of this research would be to find a way to establish the effects of each factor of delay and the probability of occurrence. This would help to find mitigation or prevention measures.

Societal relevance

These first observations provide insight into the progress and potential of parallel planning. The research also presents more insight into the delays for which mitigation strategies can be developed. The findings suggest that implementing parallel planning principles, such as early stakeholder alignment through preconditions, continuous information sharing, and agile working methods, can reduce internal delays. Developers may also benefit from integrating these practices even outside of the usage of the parallel planning method. The study reinforces the need for systemic changes to address external delays, such as improving legal appeal processes and clarifying regulatory frameworks. This suggests that the success of parallel planning depends not only on tools and timelines, but on trust, transparency, and shared commitment among all stakeholders. Parallel planning alone cannot resolve these issues; it needs a culture change.

Parallel planning not only needs to be further explored on a scientific basis, but also in social and practical contexts. Further exploration can be done on how to provide better guidelines for the application of parallel planning in practice and how to develop it for future projects and on different scales of size and context. Further exploration of the implications of delays in housing development would help developers define problem cases with a higher risk of delays and provide better timeline estimations when certain delays occur. Defining the time implications of delays would help identify and reduce risks and thereby accelerate housing development.

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Appendix 1: Interview questions

Introductory Questions:

- How long have you been working in project development?
    - Favorite project?

Case-Specific Questions:

- In which parts of the project were the most bottlenecks? And what kind?

    a. Design phase
    b. Preparing the site for construction
    c. Permits
    d. Sales

- What were the biggest bottlenecks in this project?

- Looking at the list of delay factors from literature and team reports, which 5 had the most impact on this project?

- And which 5 had the least?

General Questions;

- In your history of project development, which 5 have had the most impact?
    - And which had the least?
- Which delays do you think can be prevented with internal measures?
- Which are contextual measures?

Positive Questions:

- What were the biggest positive surprises in this project?
- What would you repeat from this project in other projects?

Appendix 2: Data Management Plan

Plan Overview

A Data Management Plan created using DMPonline

Title: Parallel planning: applied

Creator:kes van leeuwen

Affiliation: Delft University of Technology

Template: TU Delft Data Management Plan template (2025)

Project abstract:

The research investigates the applicability of the new working method: parallel plannen in reducing the timeline of housing development. This is done by case studies of already permitted housing developments in the Netherlands. To find the applicability of the new working model delays of housing developments are defined. These are compared with key points of parallel planning to see the applicability of the model, and if can reduce the time of housing development.

ID: 167942

Start date: 10-02-2025

End date: 12-11-2025

Last modified: 01-07-2025

Parallel planning: applied

0. Administrative questions

Provide the name of the data management support staff consulted during the preparation of this plan and the date of consultation. Please also mention if you consulted any other support staff.

BK faculty Data Steward: Janine Strandberg

Is TU Delft the lead institution for this project?

- Yes, the only institution involved

I. Data/code description and collection or re-use

3. Provide a general description of the types of data/code you will be working with, including any re-used data/code.

Type of data/code	**File format(s)**	**How will data/code be collected/generated?** For re-used data/code: what are the sources and terms of use?	**Purpose of processing**	**Storage location**	**Who will have access to the data/code?**
Archival data of housing developments	.xlsx files & PDF files	Re-use of already collected data by BPD.	To understand timelines of housing developments and define delays.	SURF drive	The company BPD and the project team of TU Delft
Informed consent forms	PDF	Informed consent forms signed digitally.	To obtain and document informed consent for the interviews and the collected data through archival data.	SURF drive	Kes van Leeuwen
Interview data	.mp3/.docx	Collected through semi-constructed interviews.	To gain an understanding of the original causes of delays. The data collected is also around the definition of parallel planning.	SURF drive	Kes van Leeuwen
Personal Identifiable Information (PII) Names and email addresses, used only for administrative purposes	.xlsx files	Collected at the start of the interviews with the persons consent..	To ensure proper informed consent procedures	SURF drive	Kes van Leeuwen

II. Storage and backup during the research process

How much data/code storage will you require during the project lifetime?

- < 250 GB

Where will the data/code be stored and backed-up during the project lifetime? (Select all that apply.)

- SURFdrive

III. Data/code documentation

6. What documentation will accompany data/code? (Select all that apply.)

- Metadata – I will adhere to the metadata standards used by the data repository where the data will be shared (see section V)
-

Data – Methodology of data collection

IV. Legal and ethical requirements, code of conducts

Does your research involve human subjects or third-party datasets collected fromhuman participants?

If you are working with a human subject(s), you will need to obtain the HREC approval for your research project.

- Yes – please provide details in the additional information box below

Will you work with personal data? (This is information about an identified or identifiable natural person, either for research or project administration purposes.)

- Yes

Will you work with any other types of confidential or classified data or code as listed below? (Select all that apply and provide additional details below.)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- No, I will not work with any other types of confidential or classified data/code

How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering this question.

The anonymous qualitative datasets underlying the published papers will be publicly released following the TU Delft Research Data Framework Policy. During the active phase of research, the supervisor of the thesis (Gerard van Bortel & Marjolein Spaans) will oversee the access rights to data (and other outputs), as well as any requests for access from external parties (e.g. for research verification).

Which personal data or data from human participants do you work with? (Select all that apply.)

- Telephone number, email addresses and/or other addresses as contact details for administrative purposes
-
- Names as contact details for administrative purposes
-
- Copies of passports or other identity documents

Audio recordings

Proof of consent (such as signed consent materials which contain name and signature)

Please list the categories of data subjects and their geographical location.

Data subjects are the stakeholders involved in the chosen case studies surrounding housing development in the Netherlands.

Will you be receiving personal data from or transferring personal data to third parties(groups of individuals or organizations)?

- No

What are the legal grounds for personal data processing?

- Informed consent

Please describe the informed consent procedure you will follow below.

Participants will be sent an invitation containing a study overview, followed by an Informed Consent form that outlines the purpose, data usage, confidentiality measures, voluntary participation, and publication plans. Consent will be asked digitally through a signed form, this will be combined with verbal confirmation will also be requested at the beginning of the interviews. Participants may withdraw at any time.

Where will you store the physical/digital signed consent forms or other types of proof of consent (such as recording of verbal consent)?

The proof of consent (digital copy of signed document) will be preserved on the TU Delft Project Data Storage (U:) drive.

Does the processing of the personal data result in a high risk to the data subjects?(Select all that apply.)

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data in your research project. If any category applies, please provide additional information in the box below. Likewise, if you collect other type of potentially sensitive data, or if you have any additional comments, include these in the box below. If one or more options listed below apply, your project might need a DPIA. Please get in touch with the Privacy team (privacy-tud@tudelft.nl) to get advice as to whether DPIA is necessary.

- None of the above apply

What will happen with the personal data used in the research after the end of the research project?

- Anonymised or aggregated data will be shared with others

For how long will personal research data (including pseudonymised data) be stored?

- Personal data will be deleted at the end of the research project

How will your study participants be asked for their consent for data sharing?

- In the informed consent form: participants are informed that their personal data will be anonymised and that the anonymised dataset is shared publicly

V. Data sharing and long term preservation

27. Apart from personal data mentioned in question 23, will any other data be publicly shared?

Please provide a list of data/code you are going to share under 'Additional Information'.

- All other non-personal data/code underlying published articles/reports/theses

How will you share research data/code, including those mentioned in question 23?

- All anonymised or aggregated data, and/or all other non-personal data/code will be uploaded to 4TU.ResearchData with public access

How much of your data/code will be shared in a research data repository?

- < 100 GB

When will the data/code be shared?

- At the end of the research project

Under what licence(s) will the data/code be released?

- Other – please explain below

The research is a Thesis project and is automatically placed under copyright.

VI. Data management responsibilities and resources

If you leave TU Delft (or are unavailable), who is going to be responsible for the data/code resulting from this project?

My supervisor Gerard van Bortel, Chair Housing management , Management and the Built Environment, with

What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

4TU.ResearchData is able to archive 1TB of data/code per researcher per year free of charge for all TU Delft researchers. I do not expect to exceed this and therefore there are no additional costs of long term preservation.

Appendix 3: All factors of delay

Factor of delay	Source	Description
Appeal of third parties	Derksen, D., 2024	Legal objections or appeals by stakeholders can halt or delay development processes.
Building costs	Derksen, D., 2024	Rising/uncertain construction costs can delay project initiation or continuation.
Collaborated project planning	Holt et al., 2022	Joint planning efforts may face delays due to misalignment of goals or timelines/ the lack of effort, and or communication.
Collaboration	Holt et al., 2022	Lack of effective collaboration between stakeholders can lead to miscommunication and delays.
Coordination by the developer	Holt et al., 2022	Inefficient internal coordination by the developer can slow down progress.
Coordination by the municipality	Holt et al., 2022	Delays and miscommunications in municipal coordination can affect permitting and approvals.
Environmental permit	Holt et al., 2022	Obtaining environmental permits can be time-consuming due to assessments and compliance.
Extensive research requirements	Holt et al., 2022	Mandatory studies (e.g., environmental, traffic) can extend the planning timeline.
Laws and regulations	Holt et al., 2022	Complex or changing legal frameworks can introduce procedural delays.
Location problems	Geuting et al., 2022	Site-specific issues such as contamination or accessibility can hinder development.
Market problems	Geuting et al., 2022	Fluctuations in housing demand or financing availability can delay projects.
Personnel capacity developer	Holt et al., 2022	Limited staffing on the developer side can slow down project execution.
Personnel capacity municipality	Holt et al., 2022	Insufficient municipal staff can delay reviews and approvals.
Pre-conditions municipalities	Derksen, D., 2024	Strict requirements can delay project, making them less feasible or delay the project.
Priority	Holt et al., 2022	Low prioritization of a project by stakeholders can result in slower progress.
Setting frameworks	Holt et al., 2022	Delays in defining spatial or policy frameworks can postpone development.
Spatial planning instruments and procedures	Holt et al., 2022	Procedural steps in spatial planning can be lengthy and bureaucratic.
Technical design problems	Geuting et al., 2022	Technical issues in design can require revisions and delay approvals.
Additional delays		
Capacity of other parties	Results author	Limited availability of consultants or contractors can delay project phases. But also, the capacity of a contractor can be limiting.

Contract negotiations	Results author	Prolonged negotiations over terms and conditions can postpone project initiation.
Coordination of external parties	Results author	Delays in aligning with utilities or other third parties can affect timelines.
Expropriation	Results author	Legal processes to acquire land can be lengthy and contested.
High ambitions developer	Results author	Overly ambitious plans of company policy/ambitions may require revisions, causing delays.
High ambitions municipality	Results author	Municipal demands for quality or innovation can extend planning time. Overly ambitious plans may require revisions, causing delays.
Internal process developer	Results author	Inefficiencies in the internal workflows of a company can slow down project progress.
Outplacing companies or housing	Results author	Relocation of existing occupants can delay site availability.
Political pressures	Results author	Political debates or changes in leadership can stall decision-making.
Splitting ways with external partners	Results author	Termination of partnerships can require reorganization and renegotiation, causing delay.
Unclear pre-conditions	Results author	Confusion in requirements can lead to misinterpretation and delays.
Welstand	Results author	Design review by the quality team can delay approval if standards are not met.

Figure 1: All factors of delays within the planning of housing development (Made by author)

Appendix 4: Planning changes of cases One and Two

	feb-22	mrt-22	apr-22	mei-22	jun-22	jul-22	aug-22	sep-22	okt-22	nov-22	dec-22	jan-23	feb-23	mrt-23	apr-23	mei-23	jun-23
IRAV	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg
RAV	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020
SOK/anterieure ovk gemeente	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg
Bestemmingsplan	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019
SO (opstal)	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022
VO (opstal)	1-3-2022	1-3-2022	1-3-2022	1-3-2022	1-3-2022	1-3-2022	1-3-2022	1-3-2022	1-1-2023	1-1-2023	1-1-2023	1-1-2023	1-1-2023	1-1-2023	15-5-2023	15-5-2023	15-5-2023
DO (opstal)	1-9-2022	1-9-2022	1-9-2022	1-9-2022	1-9-2022	1-9-2022	1-9-2022	1-9-2022	1-5-2023	1-5-2023	1-5-2023	1-5-2023	1-5-2023	1-5-2023	1-10-2023	1-10-2023	1-10-2023
Welstand akkoord	15-9-2022	15-9-2022	15-9-2022	15-9-2022	15-9-2022	15-9-2022	15-9-2022	15-9-2022	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023
Prijsvorming aannemer afgerond	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-1-2024	1-1-2024	1-1-2024
Omgevingsvergunning ontvankelijk	1-12-2022	1-12-2022	1-12-2022	1-12-2022	1-12-2022	1-12-2022	1-12-2022	1-12-2022	1-6-2023	1-6-2023	1-6-2023	1-6-2023	1-6-2023	1-6-2023	15-10-2023	15-10-2023	15-10-2023
DUV	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-4-2024	1-4-2024	1-4-2024
GKA getekend	15-12-2023	15-12-2023	15-12-2023	15-12-2023	15-12-2023	15-12-2023	15-12-2023	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-3-2024	1-4-2024	1-4-2024	1-4-2024
Omgevingsvergunning afgifte	1-6-2023	1-6-2023	1-6-2023	1-6-2023	1-6-2023	1-6-2023	1-6-2023	1-6-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	15-3-2024	15-3-2024	15-3-2024
Start verkoop	1-1-2024	1-1-2024	1-1-2024	1-1-2024	1-1-2024	1-1-2024	1-1-2024	1-4-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	15-4-2024	15-4-2024	15-4-2024
Omgevingsvergunning onherroepelijk	15-8-2023	15-8-2023	15-8-2023	15-8-2023	15-8-2023	15-8-2023	15-8-2023	15-8-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	30-4-2024	30-4-2024	30-4-2024
Bouwrijp	1-5-2024	1-5-2024	1-5-2024	1-5-2024	1-5-2024	1-5-2024	1-5-2024	1-5-2024	1-10-2024	1-10-2024	1-10-2024	1-10-2024	1-10-2024	1-10-2024	1-10-2024	1-10-2024	1-10-2024
Planacceptatie	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024
Gunning	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-10-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-10-2024	1-10-2024	1-10-2024

	aug-23	sep-23	okt-23	nov-23	dec-23	jan-24	feb-24	mrt-24	apr-24	mei-24	jun-24	aug-24	sep-24	okt-24	nov-24	jan-25	feb-25
IRAV	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg
RAV	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020	6-2-2020
SOK/anterieure ovk gemeente	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg
Bestemmingsplan	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019	3-10-2019
SO (opstal)	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022	1-1-2022
VO (opstal)	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023	15-5-2023
DO (opstal)	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023	1-10-2023
Welstand akkoord	15-5-2023	15-5-2023	15-5-2023	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024	1-2-2024
Prijsvorming aannemer afgerond	1-1-2024	1-1-2024	1-1-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024	1-4-2024
Omgevingsvergunning ontvankelijk	15-10-2023	15-10-2023	15-10-2023	25-12-2023	25-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023
DUV	1-4-2024	1-4-2024	1-4-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	3-2-2025
GKA getekend	1-4-2024	1-4-2024	1-4-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-2-2025
Omgevingsvergunning afgifte	15-3-2024	15-3-2024	15-3-2024	15-4-2023	15-4-2023	15-4-2023	15-4-2023	15-4-2023	15-4-2023	15-4-2023	15-4-2023	15-4-2023	1-7-2024	1-7-2024	1-7-2024	1-7-2024	1-7-2024
Start verkoop	15-4-2024	15-4-2024	15-4-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-9-2024	1-3-2025	1-3-2025	1-3-2025	22-4-2025	22-4-2025
Omgevingsvergunning onherroepelijk	30-4-2024	30-4-2024	30-4-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024	1-8-2024
Bouwrijp	1-10-2024	1-10-2024	1-10-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024
Planacceptatie	1-12-2024	1-12-2024	1-12-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024
Gunning	1-10-2024	1-10-2024	1-10-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	1-12-2024	16-12-2024	1-2-2025	1-2-2025

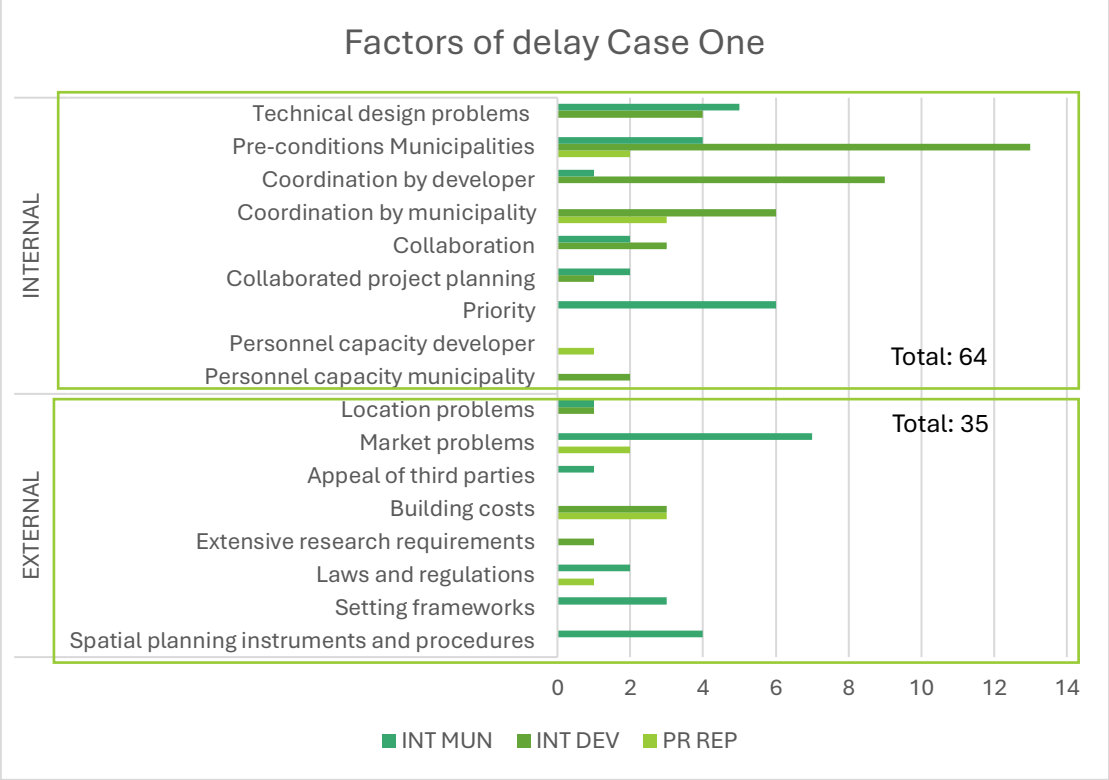
Figure 1: All the times the planning was changed throughout Case One (Made by author based on BPD database boogle).

	dec-21	jan-22	feb-22	mrt-22	apr-22	mei-22	jun-22	aug-22	sep-22	okt-22	nov-22	jan-23	feb-23	mrt-23	apr-23	mei-23
IRAV	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg
RAV	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021
SOK/anterieure ovk gemeente	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	12-11-2018	12-11-2018	12-11-2018
Bestemmingsplan	3-11-2022	3-11-2022	3-2-2023	3-2-2023	3-2-2023	3-2-2023	3-2-2023	3-2-2023	16-5-2023	16-5-2023	5-12-2023	5-12-2023	5-12-2023	5-12-2023	5-12-2023	5-12-2023
SO (opstal)	17-1-2022	17-1-2022	17-1-2022	17-1-2022	27-5-2022	27-5-2022	27-5-2022	27-5-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022
VO (opstal)	23-5-2022	23-5-2022	23-5-2022	23-8-2022	23-9-2022	23-9-2022	23-9-2022	28-10-2022	13-12-2022	13-12-2022	13-12-2022	15-2-2023	15-2-2023	15-5-2023	15-5-2023	15-5-2023
DO (opstal)	21-11-2022	21-11-2022	21-11-2022	21-2-2023	21-2-2023	21-2-2023	21-2-2023	24-2-2022	16-5-2023	16-5-2023	16-5-2023	15-7-2023	15-7-2023	12-9-2023	12-9-2023	12-9-2023
Welstand akkoord	14-11-2022	14-11-2022	14-11-2022	14-2-2023	14-2-2023	14-2-2023	14-2-2023	31-3-2023	14-4-2023	14-4-2023	14-4-2023	14-4-2023	14-4-2023	14-7-2023	14-7-2023	14-7-2023
Prijsvorming aannemer afgerond	12-12-2022	12-12-2022	12-12-2022	12-3-2023	12-3-2023	12-3-2023	12-3-2023	28-4-2023	6-6-2023	6-6-2023	6-6-2023	15-9-2023	15-9-2023	5-3-2024	5-3-2024	5-3-2024
Omgevingsvergunning ontvankelijk	2-1-2023	2-1-2023	2-1-2023	2-4-2023	2-4-2023	2-4-2023	2-4-2023	28-4-2023	6-6-2023	6-6-2023	6-6-2023	2-10-2023	2-10-2023	2-10-2023	2-10-2023	2-10-2023
DUV	27-2-2023	27-2-2023	27-2-2023	27-2-2023	27-5-2023	27-5-2023	27-5-2023	27-5-2023	11-7-2023	11-7-2023	11-7-2023	15-10-2023	15-10-2023	26-3-2024	26-3-2024	26-3-2024
GKA getekend	20-2-2023	20-2-2023	20-2-2023	20-5-2023	20-5-2023	20-5-2023	20-5-2023	16-6-2023	4-7-2023	4-7-2023	4-7-2023	21-10-2023	21-10-2023	29-3-2024	29-3-2024	29-3-2024
Omgevingsvergunning afgifte	10-4-2023	10-4-2023	10-4-2023	10-7-2023	10-7-2023	10-7-2023	10-7-2023	18-8-2023	10-10-2023	10-10-2023	10-10-2023	8-1-2024	8-1-2024	8-1-2024	8-1-2024	8-1-2024
Start verkoop	27-3-2023	27-3-2023	27-3-2023	27-3-2023	27-6-2023	27-6-2023	27-6-2023	27-6-2023	22-8-2023	22-8-2023	22-8-2023	1-11-2023	1-11-2023	26-3-2024	26-3-2024	26-3-2024
Omgevingsvergunning onherroepelijk	22-5-2023	22-5-2023	22-5-2023	22-8-2023	22-8-2023	22-8-2023	22-8-2023	29-9-2023	9-10-2023	9-10-2023	9-10-2023	26-2-2024	26-2-2024	26-2-2024	26-2-2024	26-2-2024
Bouwrijp	25-9-2023	25-9-2023	25-9-2023	25-12-2023	25-12-2023	25-12-2023	25-12-2023	25-12-2023	1-12-2023	1-12-2023	1-12-2023	1-1-2024	1-1-2024	26-3-2024	26-3-2024	26-3-2024
Planacceptatie	17-7-2023	17-7-2023	17-7-2023	17-10-2023	17-10-2023	17-10-2023	17-10-2023	17-10-2023	15-8-2023	15-8-2023	15-8-2023	15-10-2023	15-10-2023	26-3-2024	26-3-2024	26-3-2024
Gunning	31-7-2023	31-7-2023	31-7-2023	1-2-2024	1-12-2023	1-12-2023	1-12-2023	1-12-2023	28-11-2023	28-11-2023	28-11-2023	1-3-2024	1-3-2024	18-6-2024	18-6-2024	18-6-2024

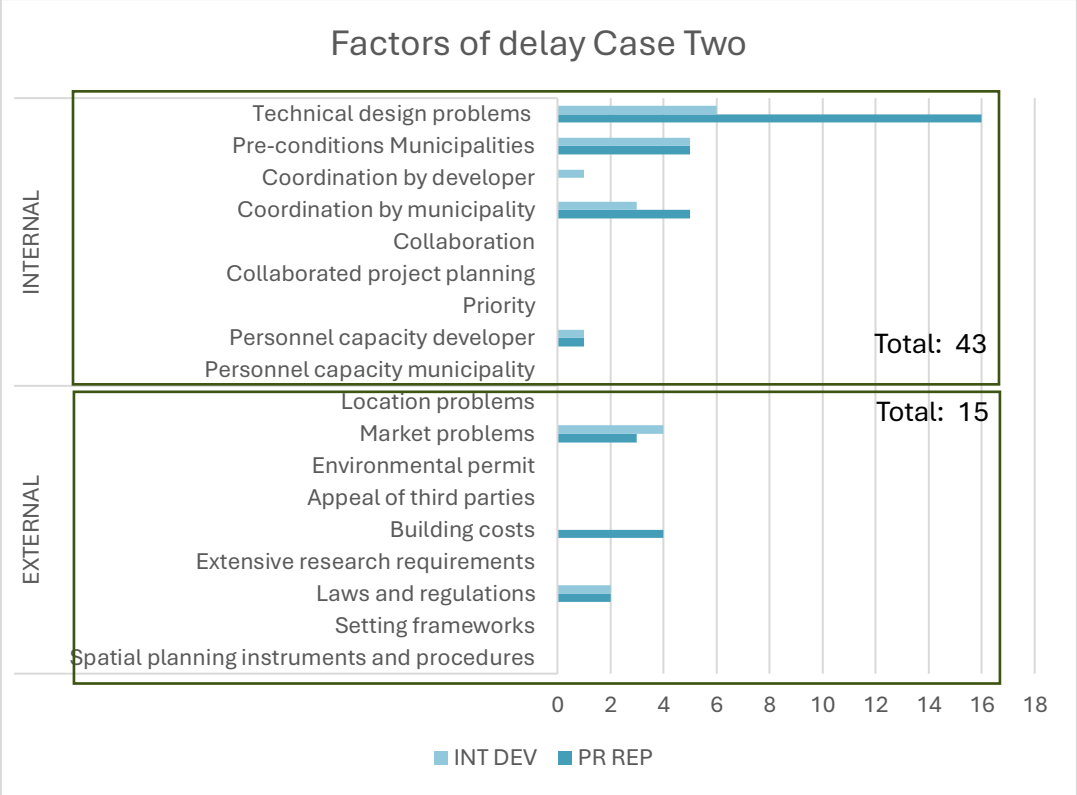
	aug-23	sep-23	okt-23	nov-23	jan-24	feb-24	mrt-24	apr-24	mei-24	jun-24	aug-24	sep-24	okt-24	nov-24	jan-25	feb-25
IRAV	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg	Leeg
RAV	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	7-9-2021	11-3-2024	11-3-2024	11-3-2024	11-3-2024	11-3-2024	11-3-2024	11-3-2024	11-3-2024	11-3-2024	11-3-2024
SOK/anterieure ovk gemeente	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018	12-11-2018
Bestemmingsplan	1-4-2024	1-4-2024	1-4-2024	9-9-2024	9-9-2024	9-9-2024	9-9-2024	9-9-2024	9-9-2024	25-11-2024	17-12-2024	17-12-2024	17-12-2024	3-2-2025	3-2-2025	3-2-2025
SO (opstal)	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022	5-7-2022
VO (opstal)	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023	12-9-2023
DO (opstal)	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023	1-12-2023
Welstand akkoord	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023	21-11-2023
Prijsvorming aannemer afgerond	5-3-2024	5-3-2024	5-3-2024	26-4-2024	26-4-2024	26-4-2024	26-4-2024	26-4-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024	1-6-2024
Omgevingsvergunning ontvankelijk	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023	22-12-2023
DUV	26-3-2024	26-3-2024	26-3-2024	10-5-2024	10-5-2024	10-5-2024	10-5-2024	10-5-2024	1-8-2024	1-8-2024	18-10-2024	18-10-2024	28-10-2024	16-11-2024	16-11-2024	16-11-2024
GKA getekend	29-3-2024	29-3-2024	29-3-2024	3-5-2024	3-5-2024	3-5-2024	3-5-2024	3-5-2024	1-8-2024	1-8-2024	11-10-2024	11-10-2024	1-11-2024	9-12-2024	9-12-2024	9-12-2024
Omgevingsvergunning afgifte	28-3-2024	28-3-2024	28-3-2024	22-7-2024	22-7-2024	22-7-2024	22-7-2024	22-7-2024	8-10-2024	8-10-2024	17-12-2024	17-12-2024	9-1-2025	3-2-2025	3-2-2025	3-2-2025
Start verkoop	26-3-2024	26-3-2024	26-3-2024	20-5-2024	20-5-2024	20-5-2024	4-6-2024	4-6-2024	20-8-2024	20-8-2024	29-10-2024	29-10-2024	26-11-2024	17-12-2024	15-2-2025	15-2-2025
Omgevingsvergunning onherroepelijk	15-5-2024	15-5-2024	15-5-2024	9-9-2024	9-9-2024	9-9-2024	9-9-2024	9-9-2024	25-11-2024	25-11-2024	4-2-2025	4-2-2025	3-3-2025	21-3-2025	21-3-2025	21-3-2025
Bouwrijp	26-3-2024	26-3-2024	26-3-2024	26-3-2024	31-10-2024	31-10-2024	31-10-2024	31-10-2024	31-10-2024	31-10-2024	1-11-2024	1-11-2024	1-11-2024	1-11-2024	1-11-2024	1-11-2024
Planacceptatie	26-3-2024	26-3-2024	26-3-2024	17-5-2024	17-5-2024	17-5-2024	17-5-2024	17-5-2024	15-11-2024	15-11-2024	15-11-2024	15-11-2024	1-2-2025	1-2-2025	1-2-2025	1-2-2025
Gunning	11-9-2024	11-9-2024	11-9-2024	11-9-2024	11-9-2024	11-9-2024	11-9-2024	11-9-2024	1-12-2024	1-12-2024	11-2-2025	11-2-2025	1-4-2025	1-4-2025	1-4-2025	1-4-2025

Figure 2: All the times the planning was changed throughout Case Two (Made by author based on BPD database boogle).

Appendix 5: Factors of delays per case



Literature delays of Case One
PR REP: Progress report
INT DEV/MUN: interview developer & interview municipality



Literature delay of Case Two

PR REP: Progress report

INT DEV/MUN: interview developer & interview municipality

Appendix 6: Links delays and parallel planning

Internal factors of delay links with Parallel Planning

Factor of delay	Mitigation ingredients of Parallel planning	Total of ingredients
Personnel capacity municipality	Standardized Documents	4
	Structured 8-Week Planning	
	Scrum Roles	
	Stacked Task Scheduling	
Personnel capacity developer	Standardized Documents	4
	Structured 8-Week Planning	
	Scrum Roles	
	Stacked Task Scheduling	
Priority	Preconditions Document	2
	Early Stakeholder Commitment	
Collaborated project planning	Collaborative Scheduling	5
	Professional Planner Involvement	
	Structured 8-Week Planning	
	Stacked Task Scheduling	
	Early Stakeholder Commitment	
Collaboration	Collaborative Scheduling	8
	Structured 8-Week Planning	
	Preconditions Document	
	Professional Planner Involvement	
	Digital Infrastructure (open information sharing)	
	Accelerating Chamber	
	Early Stakeholder Commitment	
	Stacked Task Scheduling	
Coordination by municipality	Collaborative Scheduling	5
	Preconditions Document	
	Structured 8-Week Planning	
	Stacked Task Scheduling	
	Stable Governance	
Coordination by developer	Collaborative Scheduling	4
	Structured 8-Week Planning	
	Preconditions Document	
	Stacked Task Scheduling	
Preconditions municipalities	Digital Infrastructure (open information sharing)	5
	Standardized Documents	
	Early Stakeholder Commitment	
	Preconditions Document	
	Stable Governance	
Unclear pre-conditions	Standardized Documents	3
	Digital Infrastructure (open information sharing)	
	Preconditions Document	

Contract negotiations	Preconditions Document	2
	Early Stakeholder Commitment	
High ambitions developer & municipality	Preconditions Document	2
	Continuous Feasibility Management	
Internal process developer	Stacked Task Scheduling	1
Technical problems	Early Risk Identification	2
	Continuous Feasibility Management	

Externla factors of delay links with Parallel Planning

Factor of delay	**Mitigation ingredients of Parallel planning**	**Total of ingredients**
Spatial planning instruments and procedures	Early Risk Identification	1
Setting frameworks	Standardized documents	1
Laws and regulations	Early Risk Identification	1
Extensive research requirements	Early Risk Identification	1
	Collaborative Scheduling	
Environmental permit	Early Risk Identification	1
Building costs	Continuous Feasibility Management	1
Appeal of third parties	Early Public Participation (open information sharing)	2
	Digital Infrastructure (open information sharing)	
Market problems	Early Risk Identification	2
	Continuous Feasibility Management	
Location problems	Early Risk Identification	1
Political pressures	Digital infrastructure (open information sharing)	2
	Stable Governance	
Capacity of other parties	-	0
Coordination of external parties	-	0
Expropriation	-	0
Outplacement of companies or housing	-	0
Splitting ways with external partners	-	0
Welstand	Digital Infrastructure (open information sharing)	2
	Preconditions Document	

Appendix 7: Abbreviations and subject terms

Term	Abbr.	Translation
Risico Acceptatie Voorstel	RAV	Risk Acceptance Proposal
Defenitief uitvoerings voorstel	DUV	Final Execution Proposal
Grond exploitatie	GREX	Land exploitation
Gunning	GUN	Awarding of the project (signal to start construction)
Schets-ontwerp	SO	Sketch Design
Voorlopig ontwerp	VOf	Preliminary Design
Definitief ontwerp	DO	Final Design
Technisch ontwerp	TO	Technical Design