

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences



Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Samuel Orobio de Castro
Student number	4477480

Studio		
Name / Theme	Management in the Built Environment - Design and Construction Management	
Main mentor	Joris Hoekstra	Housing
Second mentor	Tom Daamen	Area development
Argumentation of choice of the studio	Withing this thesis it will be explored if housing can be developed on livestock farms. Therefore, the combination of housing an area development for studio's is obvious.	

Graduation project	
Title of the graduation project	From pig barn to family apartment <i>A thesis on the opportunities and challenges of housing developments on livestock farm locations in The Netherlands</i>

Goal	
Location:	[Somewhere in The Netherlands]
The posed problem,	Currently, The Netherlands is dealing with two large societal problems: an enormous shortage of houses and a big surplus of nitrogen emissions. This research will explore the possibilities to develop housing projects on land that is currently being used for livestock farming. These livestock farms emit large amounts of nitrogen, which is especially a problem near Natura 2000 locations. Today, the recently formed government is planning to the buy-out and relocate livestock farmers. The aim of this research is to explore whether it is possible to kill two birds with one

	<p>stone: lowering nitrogen emissions through replacing livestock farming by housing projects. Developing housing in an such an area could be an extra possibility for the government to reach its 1 million houses ambitions before 2030. However, for this to work, these developments must be feasible within the Dutch real-estate context. Thus, exploring if these livestock farms are feasible development locations will be the intention of this research.</p>
<p>research questions and</p>	<p><i>How can housing developments on livestock farm locations become a viable proposition for real estate developers in The Netherlands?</i></p> <ol style="list-style-type: none"> 1. <i>How do legal-, financial-, governmental-, and societal factors interrelate in the two chosen case studies?</i> 2. <i>When developing housing on livestock farm locations, which of the social-, governmental-, financial- and legal dimensions within the two chosen case studies caused the most issues/delays?</i> 3. <i>To what extent, and how, can the phenomenon of housing developments on livestock farm locations be scaled up from the level of the two case studies?</i> 4. <i>Which go-no-go moments can be established for real estate developers when realizing housing on a large scale on livestock farm locations?</i>
<p>design assignment in which these result.</p>	<p>Conducting a explorative housing development case with over 100 units on a livestock farm location, while participating at an internship at a real estate developer.</p>

[This should be formulated in such a way that the graduation project can answer these questions.

The definition of the problem has to be significant to a clearly defined area of research and design.]

Process

Method description

4. Research method

4.1. Type of study

The type of study, methods and techniques, data collection and data analyses within this research will differ per question. Below is an overview:

- Main question: Experimental research, will be answered via findings from experimental case and analyzing outcomes sub-questions.
- Sub-question 1: Qualitative research done via semi-structured interviews, desk research and literature study, the outcomes will be analyzed using qualitative analysis.
- Sub-question 2: Qualitative research done via semi-structured interviews, desk research and literature study, the outcomes will be analyzed using qualitative analysis.
- Sub-question 3: Qualitative research will be answered via findings from experimental case and case studies, done via semi-structured interviews, desk research and literature study, the outcomes will be analyzed using qualitative analysis.
- Sub-question 4: Qualitative research will be answered via findings from experimental case, the outcomes will be analyzed using qualitative analysis.

Below in figure 7 the research model can be seen.

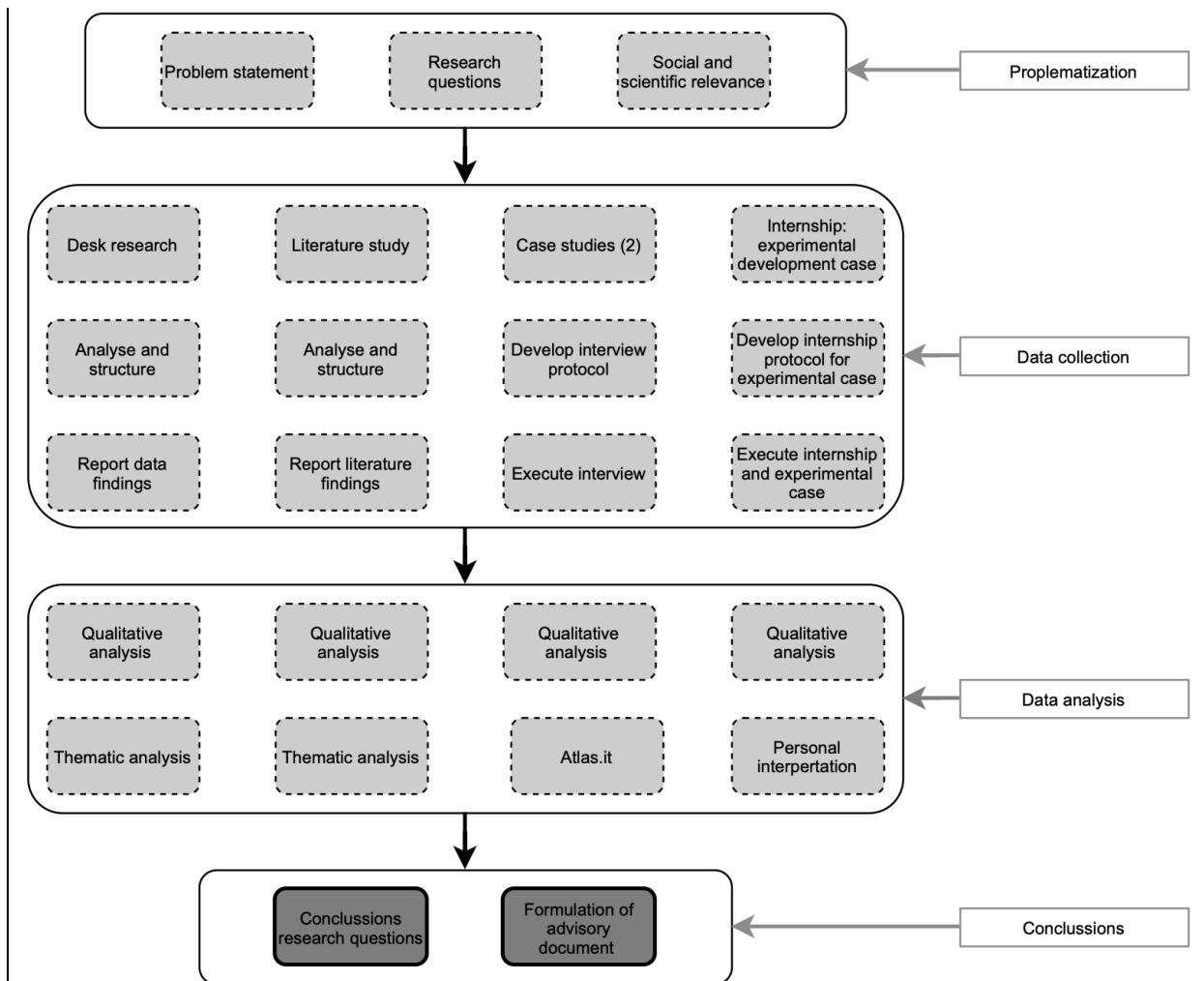


Figure 7: Research model. Own ill.

4.2. Methods and techniques to be used

To understand the possibilities for housing development on livestock farm locations in the Netherlands two case studies of housing developments on livestock farm locations and an experimental case will be used.

First this research will use two case studies that take different approaches to developing housing on livestock farm locations. These two case studies will be used to create a better understanding of the opportunities and challenges of developing housing on livestock farm locations. Also, these case studies will be used to answer the sub-questions concerning the social-, governmental-, financial- and legal aspects of developing housing on livestock farm locations within the Dutch context of real estate development.

These two case studies will however not be the focus of this research, they will be used as supportive information. To keep the amount of collected data manageable

for the timeframe of this research, the semi-structured interviews will be held with a minimum amount of people; an executive from the development company and a concerned of the municipality. Further, it is the intention to have close contact with the representatives of both case studies. When having a good working relationship, it will be easier to access useful information, ask questions and for example plan a visit to the company of development location to conduct fieldwork. When writing this P2 report contact has been made with both case studies and both representatives have agreed to be associated with this research.

The main focus of this research will be the experimental housing development case on a livestock farm location within The Netherlands. Within this experimental case this research will explore the challenges and opportunities of developing housing on a large scale on a livestock farm location. In coordination with the to be chosen internship firm, the development of the selected livestock farm location will be approached as if it is a real development proposition with over 100 units. The focus will be on choosing a viable development location, conducting a feasibility study, calculating the financial conditions, and possibly formulating a brief. Given the timeframe of this research it will obviously not be possible to go through all regular processes. The experimental case should be seen as a fast-track mock-up of a housing development. By doing the experimental case at a real estate developer, the knowledge of the development company makes it possible to realize a complete result in the given timeframe. Within the internship it would for example be possible to; understand what timeframe for a land-use plan change in the context of housing developments on livestock farm locations is acceptable, what kind of land price is acceptable within the given context and risk, what kind of housing developments would be best suited in the given context, how market parties approach the negotiation with governmental institutions and farmers, etc..

By taking this approach it will become clear what challenges and opportunities there are for developing housing on livestock farm locations, and how housing developments on livestock farm locations can become a viable proposition for real estate developers in The Netherlands. As the research internship and experimental case will give an inside look at the inner workings of real estate development. The observations and findings in this research internship would be of great benefit in writing the final advisory document and answering the main research question, as this internship could function as a testbed for the literature- and case study findings.

The method of this research can be summarized as follows:

- Case study 1: understanding housing development on livestock farm locations on minimal scale; focus on restoring nature
- Case study 2: understanding housing development on livestock farm locations medium scale; provide luxurious living in rural areas

- Experimental case study during internship: investigation of developing housing on a large scale on livestock farm locations; understanding challenges and opportunities

When applying this method, the main- and sub questions of this research can be answered. After answering the research questions, it will be possible to formulate an advisory document on how to develop, or what is needed to develop, housing on livestock farm locations in The Netherlands. An introduction of the two case studies and an elaboration on the internship can be found in the subchapters below.

4.1.1 Introduction case study 1: Peel Natuurdorpen

'Peel Natuurdorpen is a' project in the Peel region in The Netherlands, in Eastern Brabant and Northern Limburg. The area is known for its special landscape. However, due to intensive livestock farming this landscape is under pressure. The population is also vulnerable due to reliance on farming.



Figure 7, Peel. Wikipedia (2021)

These issues make that living- and working environment is under pressure. The Peel organization has formulated the following problems and opportunities (Peel, 2021);

- *'New nature is badly needed.*
- *Water retention and quality are under great pressure in the Peel.*
- *There is an enormous need for affordable housing for young and old in a healthy environment, where it is pleasant to live and work.*
- *A need that will only increase (much) in the coming years.*
- *The intensive livestock farming in the Peel calls for a solution.*

- *This project will make sure that the agricultural system in the Peel will once again meet the demands of society.*
- *We can make use of the enormous potential that the Peel offers.*
- *There are opportunities in the areas of: nature, culture, history, geographical and physical characteristics, as well as its location in Europe.*
- *Nitrogen problems are a huge issue in the Peel, but also offer opportunities here.*
- *Create an exceptionally strong and stable financial basis for nature-inclusive and circular and circular agriculture”.*

The Peel organization is of the opinion that these issues can be solved by developing tiny houses on livestock farm locations. By financially compensating for downsizing the number of livestock, the farmer is able to continue with farming while having a smaller amount of livestock. The organization formulates their project as the following: *‘The Peel Nature Villages project is all about Landscape Farming. This is a unique and smart combination of small and comfortable living in tiny houses in new nature on agricultural land in the Peel. Farmers create new nature on agricultural land. The new nature forms as scenic landscape: woods, hedges, hedgerows, water features and herb-rich grassland. Tiny houses will be built here, hidden between the trees. This is unique in the Netherlands and far beyond’*(Peel, 2021).

Peel has formulated five success factors to make the project a success (Peel, 2020)

1. Support base and shared values
2. Make project profitable
3. Stimulating law and regulations
4. Knowledge, innovation, and education
5. Cooperation on regional level.

The fact that the Peel project is focused on regaining nature and uses a minimal amount of housing to provide the funds is very interesting for this research, as the goal is to keep the amount of housing to a minimum. From informal conversations with the organization, it became clear that the current focus of the project is making sure laws and regulations will comply. The organization is in talks with local municipalities. The organization has already found farmers that are very interested in having tiny houses on their property.

4.2.2 Introduction case study 2: Ruimte voor Ruimte

Ruimte voor Ruimte is a concept in Brabant that uses the ‘Ruimte voor Ruimte’ arrangement from the national government. This arrangement involves the demolition of livestock buildings in outlying areas with the renunciation of phosphate rights and to make it possible to allocate building plots and building titles elsewhere

in the province of Brabant on the outskirts of towns and villages (Ruimte voor Ruimte, 2021).

The demolition compensation received by the farmers is financed from the proceeds of the selling of lots. For the implementation of this scheme, the Development Company Ruimte voor Ruimte CV was founded by the Province of Noord-Brabant. Meanwhile, the development company Ruimte voor Ruimte is a 100% participation of the province of North-Brabant.

After acquisition of the required land, the development company first makes an urban development plan for the location and a design for the public area. Next, the plots are prepared for construction and sold. Finally, Ruimte voor Ruimte will take care of the paving and greening of the public area.

The 'Ruimte voor Ruimte' concept is proven to be very successful. By now, over 9 million kilos of phosphate have been taken out of the market through the termination of livestock farms and almost 2 million m² of stables have been demolished. Since 2004, more than 1,600 "Ruimte voor Ruimte" plots have been sold. The organization claims that in the coming years, some 1,600 plots are still in the pipeline throughout Brabant. And that a location has already been found for approximately 1,000 of these plots, which means that some 600 plots still need to be acquired.

What makes the concept interesting for this research is that there is no relationship between where stables have been demolished and where plots are being developed, which enlarges the possibilities for housing developments. This way of working possibly helps avoiding land-use plan issues, however, this will have to be researched further. The fact that the 'Ruimte voor Ruimte' organization is a governmental organization is also very interesting. This makes that the organization is not allowed to develop housing themselves. However, a lot can be learned from such an organizational structure.

Important to note is that within the 'Ruimte voor Ruimte' concept the difficult process of land-use plan change is circumvented. As discussed in the theoretical framework, this process is one of the larger obstacles when developing housing on livestock farm locations.

4.2.3 Internship

The research internship should be done at a real estate- or area developer that is familiar with realizing housing developments on a large scale. Large scale is for this research defined as 100+ dwellings in one project. There are many companies in The Netherlands that do such projects. To give guidance to contacting companies for an internship two criteria are set; the company is specialized in developing housing in rural areas, or the company belongs one of larger development companies in The

Netherlands. Conducting the internship at a real estate developer that specializes in developing housing in rural areas would be preferred. See table 7 for an internship company shortlist.

Company specialized in developing housing in rural areas	Large Dutch real estate developers
Van Wanrooij (specializes in provinces G + B)	BPD
	Heijmans
	Dura
	Vorm
	VolkerWessels
	Lingotto

Table 7: Overview internship companies. Own ill.

When talking to a possible internship it will be important to have a clear communication about the experimental development location. For this research it is essential that the development location is on a livestock farm location. It will not be accepted if a development companies suggests to work out a development location in a rural area that is not on a livestock farm location for the experimental development location.

Chapter 7 discusses when connections with companies must be made and what the deadlines and intrepidities are.

4.3. Data collection

As stated in chapter 4.1, the research questions will be answered via qualitative research, done using an experimental case, semi-structured interviews, case study analysis, desk research and literature study, the outcomes will be analyzed via qualitative analysis. Below is an overview on how data will be collected per segment.

The data from the experimental case will become known when conducting the case. When this data becomes available an appropriate collection method will be chosen.

Semi-structured interviews will be done with an interview guide when researching the case studies. For these semi-structured interviews, it is important to mention that per case study only an executive from the development company and a concerned of the

municipality will be interviewed. For this research the interview protocol is formed, see table 8 below.

INTRODUCTION

- 1. Could you describe the project and what makes it, according to you, unique?*
- 2. What was/ is your role during the project?*
- 3. Do you represent a company or organization? If so, what company or organization?*
- 4. Where did the project take place and what kind of urban development was realized?*
- 5. What stakeholders were included in the process?*

KNOWLEDGE/EXPERIENCE REALIZING HOUSING ON LIVESTOCK FARM LOCATIONS

- 1. Did you experience any challenges regarding the choice of developing housing on livestock farm locations for the project?*
- 2. If so, how did you address this challenge during the project?*
- 3. Are you aware or did you participate in any market research concerning developments on livestock farm locations? And if so, could you elaborate on this knowledge?*

STAKEHOLDER ENGAGEMENT

- 1. Did you experience any difficulties regarding the engagement of all stakeholders?*
- 2. If so, what solutions were found to improve the engagement and participation?*

FINANCIAL ARRANGEMENTS

- 1. Did you experience any difficulties completing the project in a financially viable way?*
- 2. If so, how was this solved?*

INSTITUTIONAL SPACE

- 1. Did you experience any issues regarding policies, regulations and ownership during the project?*
- 2. If so, was there a solution to this issue?*

GOVERNMENTAL PARTICIPATION

- 1. How would you describe the political participation during the project?*
- 2. Were public stakeholders supportive of the project?*

FINALIZING

- 1. Looking back at what we discussed, what do you see as the biggest challenges in your case?*

2. *Do you have any general advice for parties that want to develop housing on livestock farm locations?*
3. *Would you like to say anything else about this topic?*
4. *And do you have recommendations for other interviewees regarding this topic?*

Table 8: Interview protocol case study actors, own ill.

Desk research will be done via analyzing and collecting data using information that is publicly available, via collecting factual data and existing research data. For example, statistical data on housing prices per region in The Netherlands. Desk research is focused on creating a clear factual image of the situation. Literature study will be done by collecting scientific papers and the opinion of scholars. For example, opinion of scholars on how to mitigate housing crises. Literature studies will be aimed at gaining theoretical, scientific knowledge and understanding about a concept or topic.

4.4. Data analysis

This research will be using qualitative analysis methods. The data is from the desk- and literature research thematic analysis. In this research the case study analysis will be done via summarizing the most important information. The same will be done, and has been done, for the findings of the literature study and desk research. The data collected from the interviews will be analyzed via the Athlas.it program. Within this analysis method indicators are formed, and data from the full transcripts can be grouped easily. When the information is grouped and coupled to themes, the data can be processed. The data from the experimental case study will be analyzed to personal interpretation and summarizing the most important information. When executing the experimental case study, it will become clear on what kind of information will become available. This data will be the base for formulating the advisory document on how to develop housing on livestock farm locations.

4.5. Data plan

Wilkinson et al. have formulated the FAIR guiding principles for scientific data management and stewardship, as there is an urgent need to improve the infrastructure supporting the reuse of scholarly data; *'Distinct from peer initiatives that focus on the human scholar, the FAIR Principles put specific emphasis on enhancing the ability of machines to automatically find and use the data, in addition to supporting its reuse by individuals'*. Table 9 below gives an clear overview of the FAIR Guiding Principles by Wilkenson et al.

FAIR Guiding Principles
To be Findable:
F1. (meta)data are assigned a globally unique and persistent identifier F2. data are described with rich metadata (defined by R1 below) F3. metadata clearly and explicitly include the identifier of the data it describes F4. (meta)data are registered or indexed in a searchable resource
To be Accessible:
A1. (meta)data are retrievable by their identifier using a standardized communications protocol A1.1 the protocol is open, free, and universally implementable A1.2 the protocol allows for an authentication and authorization procedure, where necessary A2. metadata are accessible, even when the data are no longer available
To be Interoperable:
I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation. I2. (meta)data use vocabularies that follow FAIR principles I3. (meta)data include qualified references to other (meta)data
To be Reusable:
R1. meta(data) are richly described with a plurality of accurate and relevant attributes R1.1. (meta)data are released with a clear and accessible data usage license R1.2. (meta)data are associated with detailed provenance R1.3. (meta)data meet domain-relevant community standards

Table 9: FAIR Guiding Principles by Wilkenson et al. (Wilkenson, 2016)

This research will use the FAIR Guiding Principles as described in table 9 above.

To make sure that the data in this research is according to the FAIR guiding principles the TU Delft data plan will be used. This data management plan is filled in via the online webtool provided by the TU Delft. See appendix 1 for the data management plan for this research. As of this moment there are quite some uncertainties in the data management plan, these will be taken away as soon as possible.

4.6. Ethical considerations

When conducting research, it is important to consider the ethical side of doing research. The most essential issues to consider concerning ethics are;

- Validity
- Voluntary participation and consent

- Sampling
- Confidentiality
- Risk of harm
- Choosing the appropriate research methods

Within and during this research all the above will be considered with the upmost respect for the research and all participants. There are however some ethical aspects in this research that need extra consideration. This research focuses on a subject that can be personally, socially, and politically sensitive. For example: it could have large consequences and cause tensions for an area if a farmer that wants to sell his/her land while their neighbor does not. In the case this kind of information comes to revelation in an interview held for this research, it is critical that this data is handled ethically and does not cause harm. Alongside this example, you could think of numerous other situations where information concerning this research could cause harm when not handled correctly.

Literature and general practical preference

9. References

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Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?
Withing this thesis topic I'm able to apply almost all aspects of the MBE track to a real life case.
2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

Through this research, it will hopefully be possible to gain a better understanding if housing developments on livestock farm locations are feasible. Because of the urgency of the housing- and emission crisis in the Netherlands, this would be very useful societal and scientific knowledge. The outcome, not being a solution or being a solution, would also not discount the relevance of this research. If the conclusion is that housing developments on livestock farm locations are not feasible, this will also be good to know, then the involved actors have knowledge on why developing housing of livestock farm locations is inviable. Additionally, undertaking research that does not benefit from one outcome is preferable from a scientific standpoint.