

**The future of  
countryside living:**  
Integrating the transition  
towards nature inclusive  
agriculture with the  
development of new homes.

# Abstract

A decades long process of replacing biodiverse landscapes with agricultural monocultures has led to a significant drop in biodiversity in the Netherlands. The current agricultural landscape offers limited habitats for animals and insects and lacks resilience to cope with the effects of climate change. A strong departure from the current system is required by adopting nature-inclusive agriculture which utilizes and protects biodiversity in and around the farm. At the same time, there is a structural shortage in housing stock. The problem is that the increased demand for housing and the need for nature-inclusive agriculture are competing issues, where one has to make way for the other. But what if the development for new homes could be integrated with the transition towards nature inclusive agriculture? There are clear indications that demand is changing towards more spacious homes in natural environments. To build homes with the future agricultural landscape, they must be designed differently: in a nature inclusive way that facilitates biodiversity in and around the farm without reducing the current amount of food production. In addition, the integration of homes could enable the transition towards nature-inclusive agriculture, either by establishing a collective or by involving multiple partners. To conclude, a case study project is proposed in the Noordoostpolder, an area that is uniquely suited as a test ground for exploring the future of countryside living because it offers a relative central location and is highly adaptable and scalable.

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# Foreword

My hometown will always be Emmeloord, a small town in the Noordoostpolder. When people ask me, “where is the Noordoostpolder?”, I explain it by saying, “go north from Amsterdam, past Almere and Lelystad, and then it’s that octagonal shaped thing at the top.” I was born in the Noordoostpolder in 1994 and lived there for almost twenty years until I moved to Delft to study at the University of Technology. When I was four years old, I moved to a converted farmhouse where my parents currently still live. During my teenage years I started to become more aware of how unusual the Noordoostpolder actually is. I still remember how once in high school we got asked the question: “who is happy with where you live?” And my answer was “I’m not... everything is designed with a ruler and nothing is created organically over time!”

It was only when I went to university that I started to realize the benefits of living in the Noordoostpolder. Going back home for the weekend, I could truly appreciate the space, quietness and sheer expansiveness. I started to see the possibilities the area has to offer, thinking about how for instance, old farmhouses could be converted into multiple spacious homes with wide open views. Yet, I also became aware of how relatively little interest architects and planners have for areas such as the Noordoostpolder. Throughout my time at the faculty of architecture, the city was always seen- and presented as the domain of the architect. This was justified because half of the population nowadays lives in cities. Ironically, this also means that the other half does not. Instead, they live in areas such as the Noordoostpolder. We must also not forget, that the Noordoostpolder used to be the pinnacle of Dutch ingenuity. This perceived lack of interest for the countryside and my personal connection with it, made me decide that for my graduation project I wanted to focus on the Noordoostpolder.

Before I started my graduation project, I went on a half-year adventure to the United States. Specifically, to the state of Vermont, where I worked at architecture office and building company Birdseye to work on private residential projects in extraordinary rural environments. There I got inspired by what countryside life can offer and how vibrant small rural communities can be.

My graduation project started almost simultaneously with the exhibition of ‘Countryside the future’ in the Guggenheim by Rem Koolhaas in February 2020. As a result, the countryside came back into the spotlight. And then the pandemic hit... All of a sudden, the countryside was not a narrow focus point anymore, people started to see the downside of the city. For my project, I did not yet know exactly what I would focus on, other than knowing that I wanted to do something in the Noordoostpolder and preferably something with housing. I started by doing research on the future of agriculture. When I saw more and more evidence on how the current agricultural system is quickly becoming unsustainable and especially how it could change for the better by completely transforming the landscape, I started to put two and two together. Because I grew up cycling through an industrial mono-cropped agricultural landscape, I got extremely excited about this possible future: a landscape which could be transformed into a lush, vibrant and three-dimensional landscape whilst simultaneously restoring biodiversity and making the production of food more resilient. Would this not be a great environment to live in?



# Introduction

The Dutch agricultural landscape is not nature. Crops are grown in large monocultures where every year, the ground is made devoid of any vegetation in order to give a crop the exclusive right to grow. Every year, these crops extract nutrients from the ground and it is only with the use of artificial fertilizer, pesticides and heavy machinery that production levels can be maintained.<sup>1</sup> As a result, soil health is rapidly depleting. Even though the Dutch landscape might be perceived of as nature, it exists predominantly of these fragile industrial agricultural landscapes that keep the cycle of nature outside the door. Furthermore, the agricultural landscape offers few and limited habitats for animals and insects. As a consequence, the Dutch agricultural landscape has become a landscape that provides us humans with food but does not provide any other lifeform with food or shelter.

As a result, biodiversity in the Netherlands is plummeting (figure 0.1). A decades long process of replacing biodiverse landscapes with agricultural monocultures has led to the threat of extinction for nearly 40% of all animal species in the Netherlands,<sup>2</sup> and, since 1960, a decline of 60-70% in the presence of meadow birds.<sup>3</sup>

1 Mark Shepard, *Herstellende landbouw: Agro-ecologie voor boeren, burgers en buitenlui*, 2nd ed. (Jan van Arkel, 2019), 20.

2 dr.ir. Marlies Sanders, “Nederland haalt de biodiversiteitsdoelen in 2020 niet,” WUR, October 28, 2019, <https://www.wur.nl/nl/nieuws/Nederland-haalt-de-biodiversiteitsdoelen-in-2020-niet.htm>.

3 “Achteruitgang Boerenlandvogels,” *Compendium Voor de Leefomgeving*, March 27, 2017, <https://www.clo.nl/nieuws/achteruitgang-boerenlandvogels>.

Fig. 0.1. “Fauna in agrarisch gebied” *Compendium Voor de Leefomgeving*, November 29, 2019, <https://www.clo.nl/indicatoren/nl1580-trend-fauna-agrarisch?ond=20877>

Fauna in agrarisch gebied

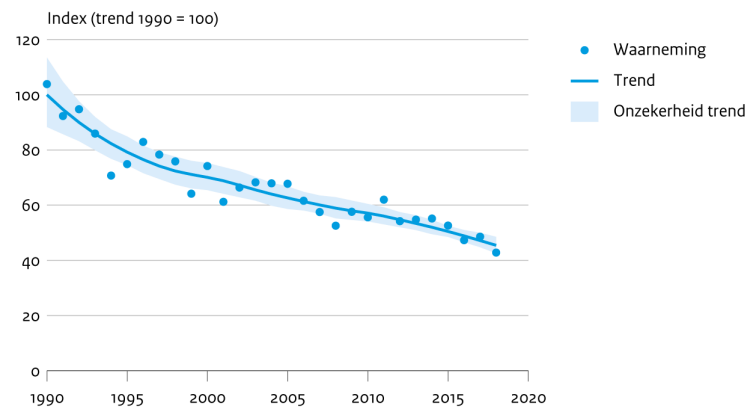


Fig. 0.1. Fauna in the agricultural landscape.

This is extremely concerning because biodiversity is crucial in supplying many vital ecosystems, creating and maintaining healthy soils, pollinating plants, controlling pests and providing habitats for wildlife, each of which is vital to agricultural food production and livelihood.<sup>4</sup> Furthermore, the Food and Agriculture Organization of the United Nations stresses why it is so important to restore biodiversity:

“Biodiversity makes production systems and livelihoods more resilient to shocks and stresses, including those caused by climate change. It is a key resource in efforts to increase food production while limiting negative impacts on the environment. It makes a variety of contributions to the livelihoods of many people, often reducing the need for food and agricultural producers to rely on costly or environmentally harmful external inputs.”<sup>5</sup>

The scale of the issue must not be overlooked. In 2015, the Dutch Central Bureau of Statistics labelled 68% of the surface of the Netherlands as green space, of which 54% agricultural land.<sup>6</sup> The scale of the agricultural sector suggests a significant negative impact but is also an indicator of the potential positive effectiveness of transforming the agricultural landscape.

What can be done to restore biodiversity and increase resilience? One way to do so is by a strong departure from the current way of farming, by adopting nature inclusive agriculture, a term that will be used frequently throughout this paper. Nature inclusive agriculture is defined by Wageningen University as “a form of circular agriculture which utilizes and protects biodiversity in and around the farm and where food is produced within the limits of the natural- and the living environment.”<sup>7</sup> In other words, instead of trying to control nature, technology must be used to enable the inherent complexity of nature.<sup>8</sup> To do so, the agricultural landscape will have to change dramatically. First of all crops should be diversified by creating small strips or pixels and cultivating those with smaller, lighter and smarter machinery; secondly, permanent habitats for animals and insects must be created by planting biodiverse buffer zones within and around the agricultural plot in the form of wildflowers, hedges, bushes and trees.<sup>9</sup> In addition, these buffer zones can still be used to produce yields in the form of fruit and nuts or construction wood.<sup>10</sup> Figure 0.2 is a sketched visualization of how this future agricultural landscape could look like.

4 J. Bélanger and D. Pilling, “The State of the World’s Biodiversity for Food and Agriculture 2019,” *Www.Fao.Org*, accessed September 1, 2020, <http://www.fao.org/state-of-biodiversity-for-food-agriculture/en>.

5 J. Bélanger and D. Pilling.

6 Centraal Bureau voor de Statistiek, “Minder landbouw, meer natuur,” *webpagina, Centraal Bureau voor de Statistiek*, accessed September 27, 2020, <https://www.cbs.nl/nl-nl/nieuws/2016/08/minder-landbouw-meer-natuur>.

7 Anne van Doorn, “Natuurinclusieve landbouw,” WUR, September 22, 2015, <https://www.wur.nl/Natuurinclusieve-landbouw.htm>

8 Carolyn Steel, “Food as a Portal into the Future: FutureHero Carolyn Steel,” *Atlas of the Future*, May 20, 2019, <https://atlasofthefuture.org/carolyn-steel-urban-visionary-food/>.

9 Isabella Selin Norén Andrew Dawson, “Inspiratie Voor Een Biodiverse Akkerbouw: Bouwstenen Voor Integratie van Biodiversiteit in de Bedrijfsvoering” (Wageningen University, 2019), <https://www.wur.nl/InspiratievooreenBiodiverseakkerbouw.pdf>.





Fig. 0.2. The possible future agricultural landscape.



These kinds of changes to the agricultural landscape can actually result in growing more food per hectare than with most crops in a monoculture, whilst simultaneously creating healthy topsoil, restoring biodiversity, cleaning ground- and surface water, preventing erosion, creating habitats for all kinds of life, reducing the need for external input and extracting carbon from the atmosphere.<sup>11</sup> Moreover, these ideas are not mere theoretical. Multiple test cases<sup>12, 13</sup>, and (small) nature inclusive farm collectives are appearing around the country.<sup>14, 15, 16</sup> The Dutch government has also committed to work towards making farmlands more resilient and sustainable by actively encouraging farmers to experiment with- and implement new ideas.<sup>17</sup>

Simultaneous to the biodiversity crisis, there is a structural shortage of housing in the Netherlands. This is a problem because the increased demand in housing and the need for nature-inclusive agriculture are currently competing issues. That is because the Netherlands is a country of which every square meter is accounted for, thus, to make space for nature or residential areas, something else has to give. This is already visible in the incremental expansions of cities where agricultural land is being replaced by residential areas.<sup>18</sup> To illustrate this point, the Dutch governmental architect, Floris Alkemade, warns on hastily building new residential areas on agricultural land, explaining how this will form a barrier for the transition to sustainable agriculture.<sup>19</sup> So what if, instead of seeing nature, residential areas and agriculture as separate functions that take away space from one another, all three functions work together in symbiosis on the same plot of land? Figure 0.3 considers how these issues could overlap, creating potential ground where both housing and biodiversity goals could be achieved.

This leads to the core question of this paper: How can the development of new homes be integrated with the transition towards nature inclusive agriculture, whilst maintaining the level of food production?

Imagine a future countryside where instead of the wide open plain, the landscape has become vibrant, three-dimensional and full of life. There are multiple strips of different crops alternating between rows of trees and bushes, in which homes will be placed spaciouly. These homes are designed and built in such a way that they are in symbiosis with the agricultural landscape. This creates extraordinary living environments for small communities who care about sustainable food production, where all residents have an interest in the wellbeing of their surroundings.

11 Mark Shepard, *Herstellende landbouw: Agro-ecologie voor boeren, burgers en buitenlui*, 2nd ed. (Jan van Arkel, 2019), 21.

12 Wijnand Sukkel, "Proeftuin Agroecologie en Technologie," WUR, July 10, 2018, <https://www.wur.nl/Landbouw-van-de-toekomst/proeftuin-agroecologie.htm>.

13 "Lasting Fields in de Praktijk - Akkerbouw Innovatie," Lasting Fields in de praktijk - Akkerbouw Innovatie, accessed September 27, 2020, <https://www.futurefoodproduction.nl/nl/projecten/lasting-fields-akker-van-de-toekomst>.

14 "Herenboeren – Samen duurzaam voedsel produceren," accessed June 2, 2020, <https://www.herenboeren.nl/>.

15 "Land van Ons," Land van Ons, accessed June 10, 2020, <https://landvanons.nl/en-de-grond/>.

16 De Melkbouwerij, "Ons Verhaal – De Melkbouwerij," accessed June 10, 2020, <http://www.melkbouwerij.nl/ons-verhaal/>.

17 Rijksoverheid, "Omslag Naar Duurzame En Sterke Landbouw Definitief Ingezet | Nieuwsbericht | Rijksoverheid.Nl," accessed September 23, 2020, <https://www.rijksoverheid.nl/actueel/nieuws/2019/06/17/omslag-naar-duurzame-en-sterke-landbouw-definitief-ingezet>.

18 "Nederland versteent: landbouwgrond wijkt voor bouw," accessed October 19, 2020, <https://nos.nl/l/2298985>.

19 Floris Alkemade, *De toekomst van Nederland: De kunst van richting te veranderen*, 108.

This paper discusses the desirability, feasibility, and achievability of this idea. Chapter one explores to what extent there is growing demand for homes in the Dutch countryside. Chapter two considers whether it's possible to build new homes that are embedded in a future nature-inclusive agricultural landscape. Chapter three demonstrates that the creation of new homes can not only coexist with nature-inclusive agriculture but can actually enable the transition towards it. Finally, chapter four proposes a possible location for a first case study project.

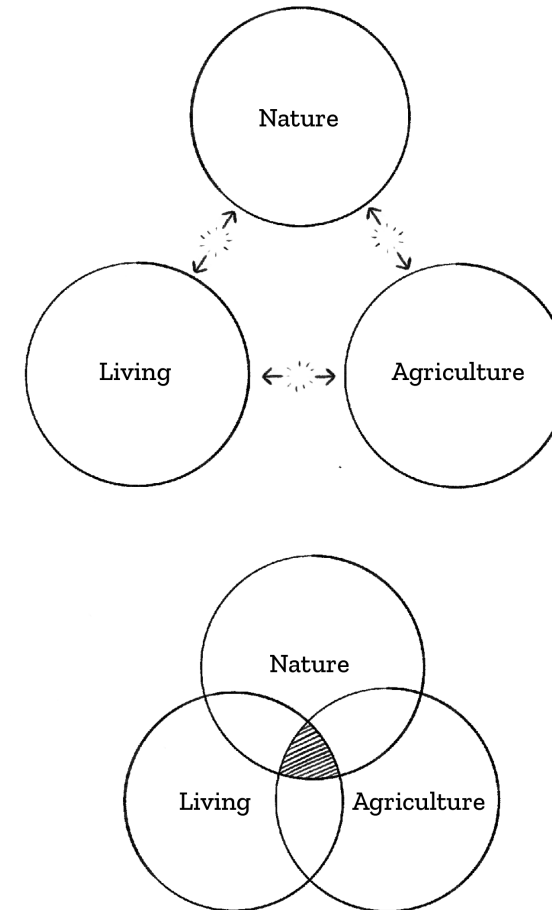


Fig. 0.3. Living, nature, agriculture as mutually exclusive functions, and combined.

# 1. Demand for spacious homes in green environments

Demand for homes that have more space and are located in the natural environment is rising. There is a visible trend that more and more people move out of the Randstad to the countryside.<sup>20</sup> Especially young families and people in their twenties and thirties are looking to move out of the city and into the countryside.<sup>21</sup>

Part of the reason is that more people are now working from home. The COVID-19 pandemic accelerated this existing trend. In 2019, before the pandemic hit, 39% of all working professionals in the Netherlands worked at least one day from home.<sup>22</sup> There are many indicators that even after the pandemic, people will keep working from home, at least for a few days a week.<sup>23</sup> It will become less common to commute to work during rush hour and as such the office building will function more as a place to meet co-workers than a space for work.<sup>24</sup> According to professor of Urban Geography at the TU Delft, Maarten van Ham, our home has become our new office and not merely a place of relaxation. As a result, we are setting new requirements for our homes such as having a balcony or a large garden and a separate work room.<sup>25</sup>

These requirements make a home in the city unaffordable for most people. Moreover, these requirements come on top of an already exploding housing market, where the average price of a home has increased with 51% since 2013,<sup>26</sup> with the bulk of the price increase occurring in the Randstad.<sup>27</sup> It explains the current noticeable departure out of the city towards the countryside, especially for young families.<sup>28</sup> In ‘Countryside a Report’, Niklas Maak describes a future where the countryside could offer space for dissatisfied urbanites who only occasionally go to town,<sup>29</sup> leaving the city for more space, privacy and tranquility.

But other than space and relative affordability, what else can the countryside offer? One could confidently say that working from home can also be tiring, especially those long and intense Zoom meetings. Yet it seems that productivity is on average higher compared to working in an office, depending on the

20 “Daling boeren biedt nieuwe kansen platteland,” accessed October 19, 2020, <https://www.nvm.nl/nieuws/2020/daling-boeren-biedt-nieuwe-kansen-platteland/>.

21 Tom Flipse, “Dit is waarom het coronavirus jongvolwassenen verdrijft uit de grote stad,” NU, May 31, 2020, <https://www.nu.nl/uit/6054281/dit-is-waarom-het-coronavirus-jongvolwassenen-verdrijft-uit-de-grote-stad.html>.

22 Centraal Bureau voor de Statistiek, “Bijna 4 op de 10 werkenden werkten vorig jaar thuis,” Centraal Bureau voor de Statistiek, accessed September 28, 2020, <https://www.cbs.nl/nl-nl/nieuws/2020/15/bijna-4-op-de-10-werkenden-werkten-vorig-jaar-thuis>.

23 Sanne Wolters, “Derde van de thuiswerkers wereldwijd wil na de crisis niet terug naar kantoor,” AD.nl, May 12, 2020, <https://www.ad.nl/ad-werkt/derde-van-de-thuiswerkers-wereldwijd-wil-na-de-crisis-niet-terug-naar-kantoor-br~a5dd2c61/>.

24 Yasmine Esser, “Het nieuwe werken na de coronacrisis: veel meer vanuit huis, als het aan deze bedrijven ligt,” de Volkskrant, May 18, 2020, <https://www.volkskrant.nl/gs-b26b407f>.

25 Tom Flipse, “Dit is waarom het coronavirus jongvolwassenen verdrijft uit de grote stad.”

26 Centraal Bureau voor de Statistiek, “Koopwoningen ruim 8 procent duurder in augustus,” Centraal Bureau voor de Statistiek, accessed September 28, 2020, <https://www.cbs.nl/nl-nl/nieuws/2020/39/koopwoningen-ruim-8-procent-duurder-in-augustus>.

circumstances at home.<sup>30</sup> As mentioned, space is one requirement, but there is also a need for nature. Living in an environment with an abundance of nature can have a positive influence on one’s recovery of fatigue or stress.<sup>31</sup> That is because when you encounter nature, it does not judge or demand anything of you, but is a place that encourages contemplation and mediation.<sup>32</sup> This might explain why during this pandemic, there has been a big spike in demand for allotment gardens.<sup>33</sup> Even though there is no academic consensus on exactly what type of nature provides optimal recovery, there are some conclusive requirements. For instance, the perceived ‘nature’ must evoke a sense of leisure or recreation, like gardening or sports. Additionally, the landscape must have a form of continuity, creating the sense that you could endlessly wander through it.<sup>34</sup> Perhaps then, having the home office in a natural environment, which adheres to the beforementioned requirements, is a more productive place to work.

All in all, offering people the possibility of a relatively affordable, high-quality home in the countryside, can be an interesting proposition to many, provided that it includes certain benefits as space, tranquility and privacy to make the move worthwhile. Moreover, the countryside should provide a sense of nature. As established in the introduction, the current agricultural landscape has limited capability to do so. Thus, to really answer the demand, the agricultural landscape should change.

27 Rick van de Lustgraaf, “De Randstad Wordt Duurder En Duurder l Trouw,” accessed September 28, 2020, <https://www.trouw.nl/nieuws/de-randstad-wordt-duurder-en-duurder~b6405e0a/>.

28 Frederieke Hegger, “Meer groen en een groter huis: we willen anders wonen door corona,” RTL Nieuws, August 12, 2020, <https://www.rtlnieuws.nl/woonwensen-woning-markt-koop-huur-funda-nvm-landelijk-wonen-randstad>.

29 Rem Koolhaas, *Countryside a Report* (New York: Taschen, 2020), 42.

30 Malini Witlox, “Thuiswerken: tussendoor de hond uitlaten maakt ons creatiever en productiever,” RTL Nieuws, July 16, 2020, <https://www.rtlnieuws.nl/economie/life/artikel/5171464/thuiswerken-werk-geluk-tno-vertrouwen>.

31 Stephen Kaplan, “The Restorative Benefits of Nature: Toward an Integrative Framework,” *Journal of Environmental Psychology* 15, no. 3 (1995).

32 S de Vries, J Maas, and H Kramer, “Effecten van nabije natuur op gezondheid en welzijn,” n.d., 91.

33 Johan Hardeman, “Vraag naar volkstuinen geëxplodeerd in coronatijd: ‘Tuinieren is coronaproof, 1,5 meter afstand houden is niet moeilijk,’” AD.nl, July 29, 2020, sec. Amersfoort, <https://www.ad.nl/vraag-naar-volkstuinen-ge-explodeerd-in-coronatijd-tuinieren-is-coronaproof-1-5-meter-afstand-houden-is-niet-moeilijk-abf-dc026/>.

34 de Vries, Maas, and Kramer, “Effecten van nabije natuur op gezondheid en welzijn,” 91.

## 2. Embedding a new function within the future agricultural landscape

Chapter one establishes that there is a demand to live in spacious and natural environments. However, is it actually possible to build new homes in the future agricultural landscape without compromising food production and biodiversity?

First of all, what is the current use of the agricultural landscape and is it possible to incorporate a new function within it? As mentioned, 54% of the total surface area of the Netherlands was agricultural land in 2015. Yet this percentage was already reduced from what it was before. In the period 2012-2015, a total of 15.000ha of agricultural land got reallocated to become natural terrain (11.000ha) and built area (4.700ha of which 2.330ha residential).<sup>35</sup> In a way, figure 0.3, visualized this situation where nature, living and agriculture are mutually exclusive domains. Moreover, changing agricultural land into residential areas results overall in more paved surfaces that have a negative impact on biodiversity.<sup>36</sup>

Evidently, agricultural land is currently being replaced by natural terrain and built areas. This means that there is potential space to integrate the creation of natural terrain and residential areas within the agricultural landscape. But, is it possible to open up that space within the agricultural plot without compromising food production? In *Countryside a Report*, Lenora Ditzler from Wageningen University writes that crops grown in narrow strips can produce up to 25 percent more yield than those grown in large mono-cropped fields.<sup>37</sup> Supporting evidence for this claim is limited because a lot of testing in practical applications is still to be done. Even so, there is general hope from agricultural experts that nature inclusive agriculture will in fact produce more yields when compared to mono-cropped fields.<sup>38</sup> This means that by increasing the yields, space in the future agricultural landscape could be appointed to incorporate a new function within the agricultural landscape without reducing the total amount of yields.

35 Centraal Bureau voor de Statistiek, "Meer agrarisch gebied wordt open natuurlijk terrein," webpagina, Centraal Bureau voor de Statistiek, accessed September 28, 2020, <https://www.cbs.nl/nl-nl/nieuws/2018/49/meer-agrarisch-gebied-wordt-open-natuurlijk-terrein>.

36 "Nederland versteent: landbouwgrond wijkt voor bouw" accessed October 19, 2020, <https://nos.nl/1/2298985>

37 Rem Koolhaas, *Countryside a Report*, 302.

38 Mark Shepard, *Herstellende landbouw: Agro-ecologie voor boeren, burgers en buitenlui*, 2nd ed. (Jan van Arkel, 2019), 277.

However, this should only be done, provided that we design and build these homes differently. Nature inclusive agriculture, and the prospect of increased yields, will only thrive in a natural balanced environment, where there are plentiful habitats for animals and insects as well as a variety in plants, trees and wildflowers. Thus, the possible available space is not a 'go' for building typical homes with manicured gardens within and along the future agricultural landscape. These would disrupt biodiversity, reducing the positive effects. Therefore, just as the transition of the agricultural landscape itself, the architecture of the countryside should be similarly nature inclusive. This means that the home should facilitate in restoring biodiversity in and around the farm.

There are many decisions an architect can make in order to achieve a more nature inclusive building.<sup>39</sup> Most nature inclusive buildings can nowadays be found in cities, where images of green skyscrapers dominate the topic. In the case of building the home within the nature inclusive agricultural landscape, nature-inclusive architecture is as essential to creating a symbiotic relationship. Examples of building in a nature exclusive way can be found in the use of green roofs, minimizing paved surfaces, limiting the garden, meaning no lawn and planting (wild) flowers and plants along the home. Additionally, the façade of a home should have a form of porosity, as to offer opportunities for animals and insects to settle.<sup>40</sup> Figure 2.1 illustrates how nature-inclusive architecture, allows the home to become a part of the biodiverse zones that are part of nature-inclusive agriculture. If these homes are designed in a nature inclusive way, they can actually help facilitate biodiversity in and around the farm reducing the space the home occupies on the agricultural land to a minimum.

Because of national demand for more natural and residential areas, the possibility of increasing yields with nature-inclusive agriculture, and the possibility of building nature-inclusive homes, embedding new homes in the future agricultural landscape becomes a plausible and exciting proposition.

39 "Natuurinclusief bouwen met deze 40 punten," *Stadszaken.nl*, accessed October 19, 2020, <https://stadszaken.nl/artikel/1079/natuurinclusief-bouwen-met-deze-40-punten>.

40 Maike van Stiphout, *First Guide to Nature Inclusive Design* (Nextcity, 2019).

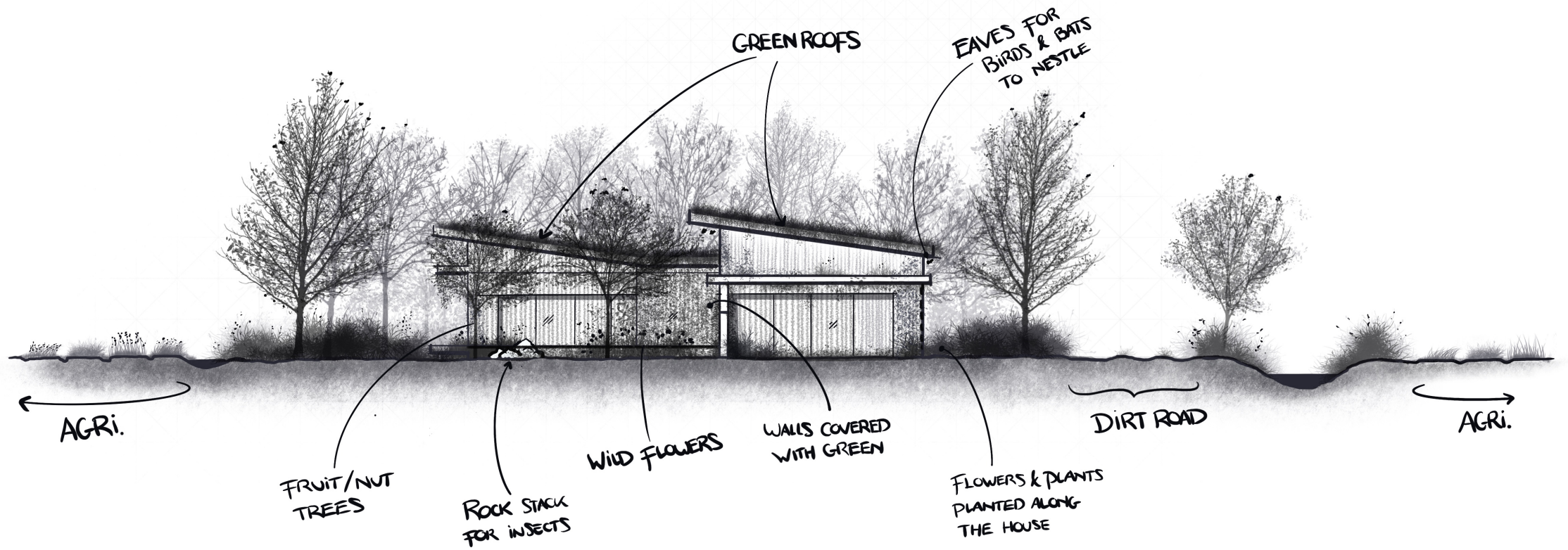


Fig. 2.1. Sketch of the home with some examples of nature-inclusive architecture in order to be embedded in the future agricultural landscape.



### 3. Enabling the transition

Even though there are clear observations that nature inclusive agriculture can help restore biodiversity, make the farm more resilient and even increase yields, the agricultural landscape is still dominated by large mono-cropped fields. Steadily rising costs in combination with consistent low prices result in the farmer having to resort to ever more mechanization and efficiency instead of taking the leap towards sustainable agriculture.<sup>41</sup> The investment that is required to farm in a nature-inclusive way, financing advanced machinery and structurally changing the way the farm operates, is a significant barrier towards change. This chapter will explore how the transition towards nature-inclusive agriculture actually can be enabled by the integration with the development of new homes. To do so, multiple approaches and economic models can be adopted. In this chapter, two mechanisms will be highlighted while taking a look at an existing project with a similar vision.

The first mechanism is establishing a collective farm, bridging the financial gap that makes the transition possible. This idea is based on- and an expansion of, the several small collective sustainable farms that are emerging around the country. One example is a collective called ‘Herenboeren’. This collective runs a farm of around 20ha that can provide food for around 200 households year-round. Members pay a onetime fee and a monthly contribution and in return receive fresh vegetables and optionally meat on a bi-weekly basis.<sup>42</sup> The monthly contribution makes it possible to employ a farmer fulltime, meaning members are not required to do any work.<sup>43</sup> Still, helping on the farm and organizing events has become part of the community that emerges out of the collective.<sup>44</sup> In a similar fashion, there are other collectives operating to grow and distribute food differently,<sup>45</sup> or to restore biodiversity throughout the Dutch agricultural landscape.<sup>46</sup> These types of sustainable collectives can be expanded on in order to enable the transition to nature-inclusive agriculture. For instance, an agricultural plot can be bought by a collective, similar to the Herenboeren, but imagine that members are the residents and live directly on the farm. The farm could be run by a fulltime employed farmer, paid for by the collective. In return, residents would receive year-round yields because of the intrinsic diversity of the nature-inclusive farm. Additionally, residents could share the profits gained from the farm operating on the (inter)national market or decide to focus on shortening

production and distribution chains by operating on a local level. The benefit from this mechanism is that the investment that the transition requires is split amongst residents and farmer. Furthermore, a mutual interest amongst residents for the wellbeing of the farm will be established, creating a sense of community. However, a downside can become the added costs associated with the home in the collective, making it financially less accessible.

The second mechanism to enable the transition is by creating partnerships on a regional and/or national level. This differs from approaching the project as a collective in that it is a more traditional development project. For instance, a municipality could appoint specific plots of agricultural land that it considers suitable for this project. The municipality can either decide to invite developers or work with potential future residents. This would all have to be done in consultation with potential farmers who are excited about the future of agriculture and are open to exploring new business models. In a way, this mechanism can be seen as a thinly scattered residential project within the agricultural land, with the added specification that demands to create nature-inclusive architecture are adhered to. All in all, this mechanism could facilitate the process of transition by facilitating the process and involving multiple parties who all have an interest in the success of the project.

Ultimately there are many options in establishing a new economic model of the farm. One example that is currently being developed is called ‘Oosterwold’ in southern Flevoland. Oosterwold is the development of an originally agricultural area on which future residents can and must create their own home and living environment, including the construction of roads, paths and public space either individually or together.<sup>47</sup> Freedom of design, allocation, going collective or private is at the core, putting it in stark contrast to the traditional Dutch residential projects that are usually highly controlled. What makes this project especially interesting is the focus on agriculture. One of the very few requirements in Oosterwold is the relative use of space within a plot. Of every plot, 59% of its surface must be used for agriculture, 18% can be used for the home, 8% for paved surfaces, 13% for public green space and the remaining 2% for water elements (figure 3.1).<sup>48</sup>

41 Wijnand Sukkel, “Biodiversiteit op de akker door gewasdiversiteit,” n.d., 4.

42 Herenboeren, “De baten... en de kosten – Herenboeren,” accessed September 28, 2020, <https://www.herenboeren.nl/de-herenboerderij/de-baten-en-de-kosten/>.

43 Herenboeren, “De boer in dienst – Herenboeren,” accessed September 28, 2020, <https://www.herenboeren.nl/de-herenboerderij/de-boer-in-dienst/>.

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47 “Over Oosterwold | Maak Oosterwold,” accessed October 20, 2020, <https://maakooosterwold.nl/over-oosterwold/>.

48 Rijk-regioprogramma, “Almere Oosterwold: Land-Goed Voor Initiatieven,” 52, accessed October 10, 2020, <https://maakooosterwold.nl/wp-content/uploads/2019/11/rapport-landgoed-voor-initiatieven.pdf>.

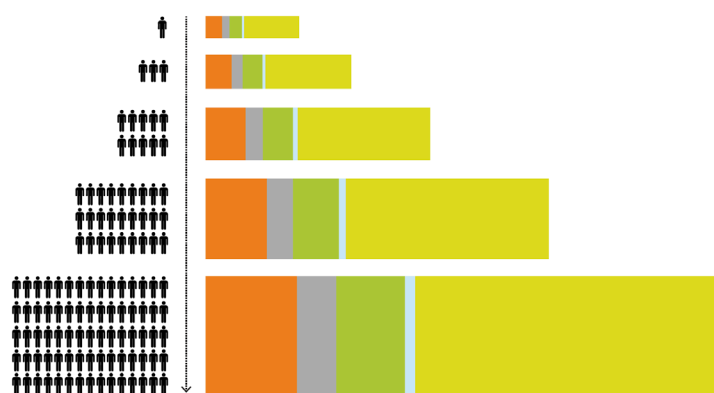


Fig. 3.1 “Almere Oosterwold – Land-Goed voor initiatieven” Almere Oosterwold, N/A, <https://maakooosterwold.nl/wp-content/uploads/2019/11/rapport-land-goed-voor-initiatieven.pdf>.

Fig. 3.1. The allocation of different functions within the standard plot in Oosterwold, 18% home, 8% paved surface, 13% public green space, 2% water elements and 59% agriculture.



Fig. 3.2 Edited “Almere Oosterwold – Land-Goed voor initiatieven” Almere Oosterwold, N/A, <https://maakooosterwold.nl/wp-content/uploads/2019/11/rapport-land-goed-voor-initiatieven.pdf>.

Fig. 3.2. The allocation of combining nature-inclusive agriculture with the development of new homes, graphically displayed. The difference: green spaces are integrated with the home as well with the agriculture.

These functions can be implemented individually, for instance having your own kitchen garden, or by establishing a collective, combining multiple plots in order to create a collective farm where participation is not mandatory.<sup>49</sup> Evidently there is overlap between Oosterwold and the research topic of this paper. The main commonality is the focus on agriculture, yet there is a difference in the agricultural ambition. Agriculture in Oosterwold is regularly described as ‘urban agriculture’, indicating that the scale and location set it apart from arable farming. Nature-inclusive agriculture is about enabling complex natural processes with the use of technology to maintain or increase yields and restore biodiversity in- and around the farm. This paper envisions a project where agriculture plays a dominant role in the landscape and thus puts the emphasis on countryside living. This difference can also be explained in the separation of green space and agriculture in Oosterwold as seen in figure 3.1. In contrast, this paper envisions an integration of green or natural spaces with agriculture, hence, nature-inclusive agriculture. Furthermore, the integration with nature continues in the homes as explained in chapter 2, thus resulting in more restrictions for the design and placement of one. Figure 3.2 graphically illustrates the difference between this concept and Oosterwold. Even though there are obvious differences, Oosterwold demonstrates the potential for new living- and agricultural concepts that connect residential areas with sustainable food production.

To conclude: Integrating the future nature inclusive agricultural landscape with living could enable the needed transition, this can either be done through a collective, sharing costs and benefits, or involving multiple partners. Oosterwold is an excellent example on how to facilitate sustainable food production by making it an integral part of a residential area. These ideas can be applied to the design of possible future case study project.



# 4. The Noordoostpolder: A testing ground for future countryside living

There is demand for affordable high-quality homes in the countryside, it is possible to build these homes in coexistence with the agricultural landscape and the transition to nature inclusive agriculture could be enabled with the integration of homes. The only element missing is a location for a case study. An area that is imminently suited for this project is the Noordoostpolder. The polder was reclaimed in 1942 and development of the area began after the second world war. It was designed from a blank slate with the mindset of endless mechanization of agriculture in order to never experience hunger again.<sup>50</sup> However, as described in the introduction, this way of farming has become unsustainable. As a result, the foundation for the Noordoostpolder's existence has become unsustainable. Yet, does this mean that the Noordoostpolder will become a relic of the past? on the contrary!

First a brief explanation of the layout and design of the Noordoostpolder. The layout of the Noordoostpolder is based on principles of Ebenezer Howard's Garden City. Garden city was the idea of a self-sufficient urban area where six satellite cities surround a central town, which are connected by railways with agricultural land in-between. The Noordoostpolder contains visibly a lot of the same principles: ten satellite villages surround the central town of Emmeloord connected by a ring road and spokes with agricultural land in between. However instead of railways, the thinking was that wherever you are in the area, you were always within biking distance of a village or town. The largest part of the polder, the agricultural landscape, has been designed with mechanization and monocropped fields in mind, making it highly homogenic in order to be as efficient as possible for using heavy machinery. This is clearly evident in the grid of perfectly rectangular 300- by 800-meter plots that dominate the landscape. However, an open plain of 48.000ha would be uninhabitable. To make the scale more comprehensible, the horizon was brought closer by planting trees along roads, dividing the land up in multiple green compartments.<sup>51</sup> These compartments become smaller in scale closer to a village, as shown in figure 4.1.

50 Bruin, W and Staal, A. North Eastern Polder, Forum (Amsterdam: Van Saane, 1955).

51 Stuvel, H, Bouwen Op Nieuwe Bodem Ten Behoeve van de Gemeenschap in Het Voormalige Zuiderzeebekken (Assen: Van Gorcum, 1967), 16.

Fig 4.1.H. Stuvel, Dorpen Noordoostpolder, 1967, Bouwen op nieuwe bodem (Assen: Van Gorcum, 1967), 167

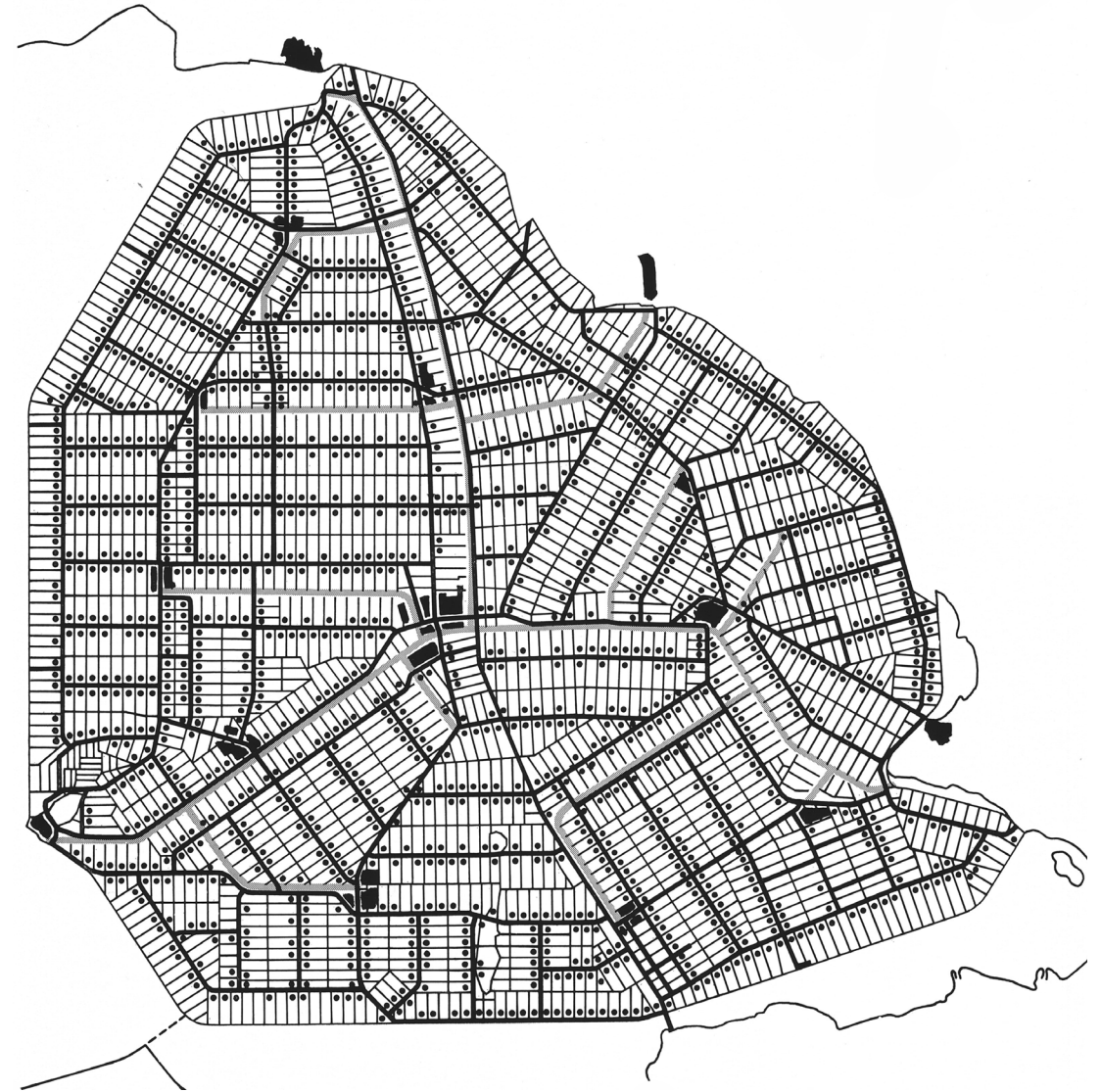


Fig 4.1. Allocation plan of the Noordoostpolder. Central is the town Emmeloord with 10 villages around it. Almost every plot is 300x800m. Roads are lined with trees creating green compartments.

As a result of these design principles, the Noordoostpolder is actually just as well suited for transitioning to nature-inclusive agriculture as it was for large monocultures. That is because nature-inclusive agriculture is inherently complex, requiring the use of smarter, smaller and autonomous machinery, which can be used efficiently on a perfectly rectangular plot with only few variables.

Moreover, the homogeneity of the landscape makes a first case study easily scalable and applicable to future locations. The landscape of the Noordoostpolder can be seen as an abstracted agricultural landscape, with limited variables within and around each plot. As a result, design principles of one case study project can relatively easily be applied to a different plot with only minor changes. Moreover, the same principles can be applied and tailored to fit different agricultural plots throughout the entire polder landscape of the Netherlands. In other words, the standard plot of the Noordoostpolder is a template for the Dutch polder landscape and thus a well-suited start point for a case study project.

Finally, the impact of nature-inclusive agriculture on the landscape of the Noordoostpolder will be telling. The current landscape, which is commonly regarded as wide-open and windy, will change to a three dimensional and diverse landscape. Even though this might not be a change that is applauded by everyone, the densification of certain areas of the polder can actually reinforce the experience of openness of other areas which makes the area unique. The use of compression and release is a well-known architectural tool in which the experience of a large open space is enhanced by being preceded by a small and compressed space. Therefore, potential sites for a case study with the possibility of future expansion in mind must be chosen carefully within the landscape design of the polder. For instance, smaller green compartments near the villages or Emmeloord could limit the impact on some of the quintessential expansive polder views whilst also offering the possibility of expansion within the compartment. An example of this can be found in a future vision of Flevoland by landscape architecture firm Feddes/Olthof. In their vision, a zone of urban agriculture is placed around Emmeloord in order to connect the city to food production.<sup>51</sup> As a result, a soft gradient between the urban- and the agricultural landscape is created, see figure. 4.2.

The area makes it possible to commute to Amsterdam, Utrecht or Groningen in exactly one hour by car, from almost every corner of the region. This is important for the desirability of the area, making it possible for those people that only occasionally need to go to the city to commute. Although a connection by train is still missing, the influx of new residents in the area could create new interest for the construction of this rail line.

52 “Feddes/Olthof - Regio van de Toekomst,” accessed October 22, 2020, <https://www.feddes-olthof.nl/regio-van-de-toekomst/>.

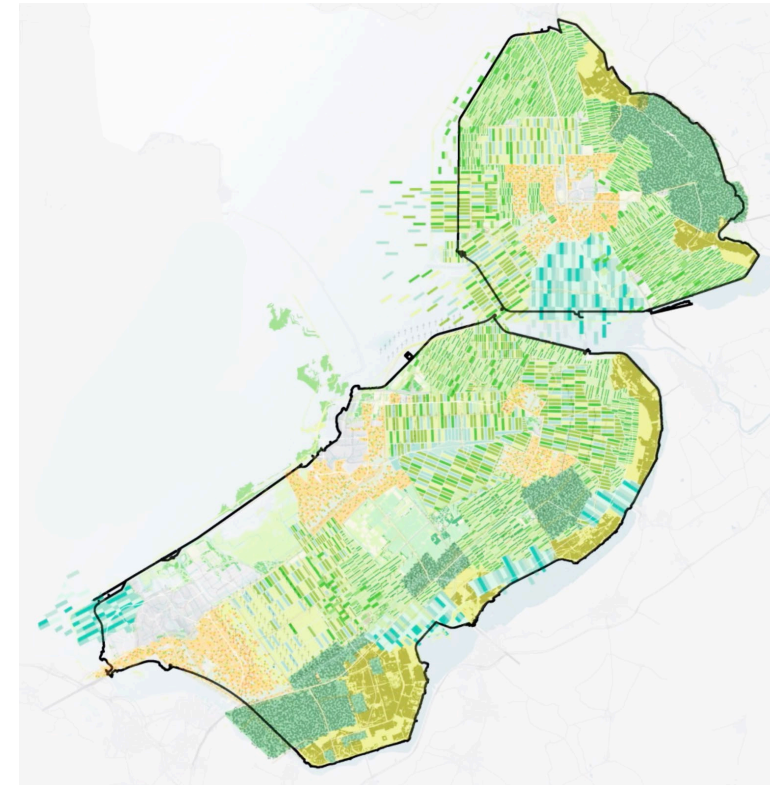


Fig 4.2. Future vision of Flevoland where sustainable agriculture is combined with nature, urban development and energy production.

To conclude, the Noordoostpolder is uniquely suited as a test ground for exploring the concept of future countryside living. The landscape design of the area is highly adaptable and scalable, there is the opportunity to revitalize existing communities and its located relatively centrally within the Netherlands. Redesigning a singular plot in the Noordoostpolder could be the starting point of imagining a future where biodiversity in and around the farm is restored by the coexistence of nature, living and agriculture.

## 5. Discussion

The areas of nature inclusive agriculture and nature inclusive architecture are both extensively researched topics. Thus, this paper has not set out to provide new insights within either areas of research. However, it does provide insight in bridging the gap between the two. Research on nature inclusive agriculture is limited within its own sector and research on nature inclusive architecture is predominantly focused on the urban environment. As this paper demonstrates, there is potential within the overlap of both fields. Nature inclusive agriculture can create extraordinary living environments for those who want to move out of the city, whilst the integration can help dissolve the barrier to the agricultural transition whilst maintaining productivity.

If both fields had more connections– nature-inclusive planning approaches could be exchanged between architects, planners and agricultural experts. Moreover, the enormous relevance and thus the potential impact of the countryside must not be overlooked when it comes to the environmental challenges we face. As a result, the significance of this paper is found in addressing the potential that emerges from the overlap between the urban environment and the agricultural landscape.

Has this paper demonstrated whether it's possible to integrate the search for new homes with the transition towards nature inclusive agriculture? This paper demonstrates that this future scenario is not only desirable, but also, depending on the execution, achievable, by arguing that there is (growing) demand for relatively affordable high-quality homes in the countryside, that embedding new homes in the future agricultural landscape is a plausible proposition, and that integration of living with nature-inclusive agriculture could even enable the transition.

Nevertheless, there are themes that could be further explored and/or researched. For instance, chapter 3 that explores the possibility of enabling the transition to nature-inclusive agriculture by the integration of homes, is a topic that demands further dedicated research. Yet, this basically requires a full economic research on the workings of a nature-inclusive farm. This is similarly the case for the architectural design of nature-inclusive homes, which would need added research in not just an urban but a rural context, think for instance of the exact types of plants, flowers and trees that need to be planted in order to optimally facilitate

biodiversity in and around the farm. It is also uncertain how the implementation of nature-inclusive agriculture on a large-scale would impact the landscape. Furthermore, it could be argued that the Noordoostpolder is not the only good place for a case study. Because the Noordoostpolder is part of a bigger plan of polders with similar design principles (the Wieringermeer in North-Holland, eastern Flevoland and southern Flevoland), these areas could also be considered as locations for a future case study. Finally, it is recommended to conduct further research on this topic through organizing conversations with all involved parties such as architects, farmers, agricultural researchers, landscape designers, developers and municipalities.

## 6. Conclusion

The goal of this paper was to research the possibility of integrating the creation of new homes with the transition to nature inclusive agriculture. This goal was the result of a personal observation that there could be overlap between the search for sustainable agriculture and the demand for new homes.

There are clear indications that demand for spacious homes in a natural environment is rising, a trend that has been accelerated by the Covid-19 pandemic. Furthermore, the agricultural landscape can be opened up to incorporate a new function within it. The national demand for more nature and residential areas can be integrated in the agricultural landscape without reducing yields. However, it is important that these homes will be designed in symbiosis with the landscape. In addition, the transition to nature inclusive agriculture can actually be enabled from the integration with new homes, either by establishing a collective or involving multiple partners. In both cases, costs and benefits can be shared, thus taking away the biggest barrier. Ultimately, the location for a possible case study project can be found in the Noordoostpolder, an area that is eminently suited by being highly adaptable and scalable and offering a relative central location.

To conclude, biodiversity in the Netherlands is in peril and the current agricultural system lacks resilience. Yet, by occupying more than half the surface of the Netherlands, the agricultural landscape also packs the huge potential to restore biodiversity and secure our food production. To do this, however, it must change. To enable this transition, we should respond to the demand for new spacious homes in green environments by building these homes within the highly appealing, nature-inclusive, future agricultural landscape.



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