P5 Report

The relevance of in-between

repositioning the role of the urban and peri-urban of the Dutch Flanders region into the larger transition of the Scheldt Delta

Christiaan Hanse
MSc. Urbanism | 2020/2021

Preface

Acknowledgements

In this report, the results of my graduation project on Dutch Flanders are presented. Over the course of ten months, I have explored the many aspects of urbanism by applying it into my own project. Dutch Flanders is a region closely related in my family tree, but has always felt distant in physical and emotional form. As this distance is reflected in Dutch society too sometimes, I hope this project can provide new perspectives on the role and importance of this region, to benefit the surrounding regions, and especially the inhabitans of this region itself.

The research has been conducted in a challenging year. While most research activities were not limited by these conditions, meeting with others has for the majority of time taken place in online environments. Especially in these conditions, I would like to thank my mentors, dr. Rodrigo Cardoso, for his unlimited guidance, the inspiration for the development of this project and the great amount of interest, knowledge and offers to help with every detail of the research; dr. Alexander Wandl, for the inspiration of spatial design, for always stimulating me to have a critical perspective on every detail of the design and guiding the translation of theories and concepts to space.
I would also like to thank my family at home, for the unconditional support and always faciliating me in every possible way throughout this year and my [future] studies, and my friends and fellow students from the faculty, the department of Urbanism and our Planning Complex Cities studio for the support and interesting discussions we had. It has been a pleasure.

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P5 Report MSc. Architecture, Urbanism & Building Sciences | Track: Urbanism

The relevance of in-between | ***repositioning the role of the urban and peri-urban of the Dutch Flanders region into the larger Scheldt Delta***

Key Concepts regional decline, Dutch Flanders, Scheldt Delta, regional strategies, regions in transition, regional governance

Author Christiaan Hanse
Student number 4576977

First mentor dr. Rodrigo Cardoso
Second mentor dr. Alexander Wandl
Studio coordinator dr. ir. Verena Balz

Planning Complex Cities studio

Faculty of Architecture and the Built Environment, Department of Urbanism

Delft University of Technology

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Front cover image: Satellite view of Dutch Flanders-Flanders, Belgium border (Edited by Author, 2021 Based on: Google, 2020)

Introduction

This report is written as part of a graduation project on the region of Dutch Flanders at the faculty of Architecture and the Built Environment at Delft University of Technology. The project takes place within the Planning Complex Cities studio at the department of Urbanism. It contains the research done for defining the problems and opportunities in the region, including an essay, reflection and the research design for the following graduation project.

The region of Dutch Flanders faces several challenges related to regional decline and its positiona at different borders. This has affected the image and perception of the region by both inhabitants and its surroundings. The region is part of the larger functional region of the Scheldt Delta, which is undergoing a transition due to changes in economy, environment and society. A strategy for repositioning the Dutch Flanders region into the Scheldt Delta region and its (inter)national context is proposed to go along with this transition.
This project aims to develop this strategy by looking for strategic opportunities for unlocking the potentials that the region of Dutch Flanders can offer. This is done by looking at the origins of the decline in the region and strategic approaches to counter further decline. Additionally, by doing research on the opportunities that the regional transition provides, the spatial interventions that are needed for unlocking the potential of Dutch Flanders, and finding the role governance and spatial planning can play, a strategy for successfully repositioning the region and counter the decline is developed.

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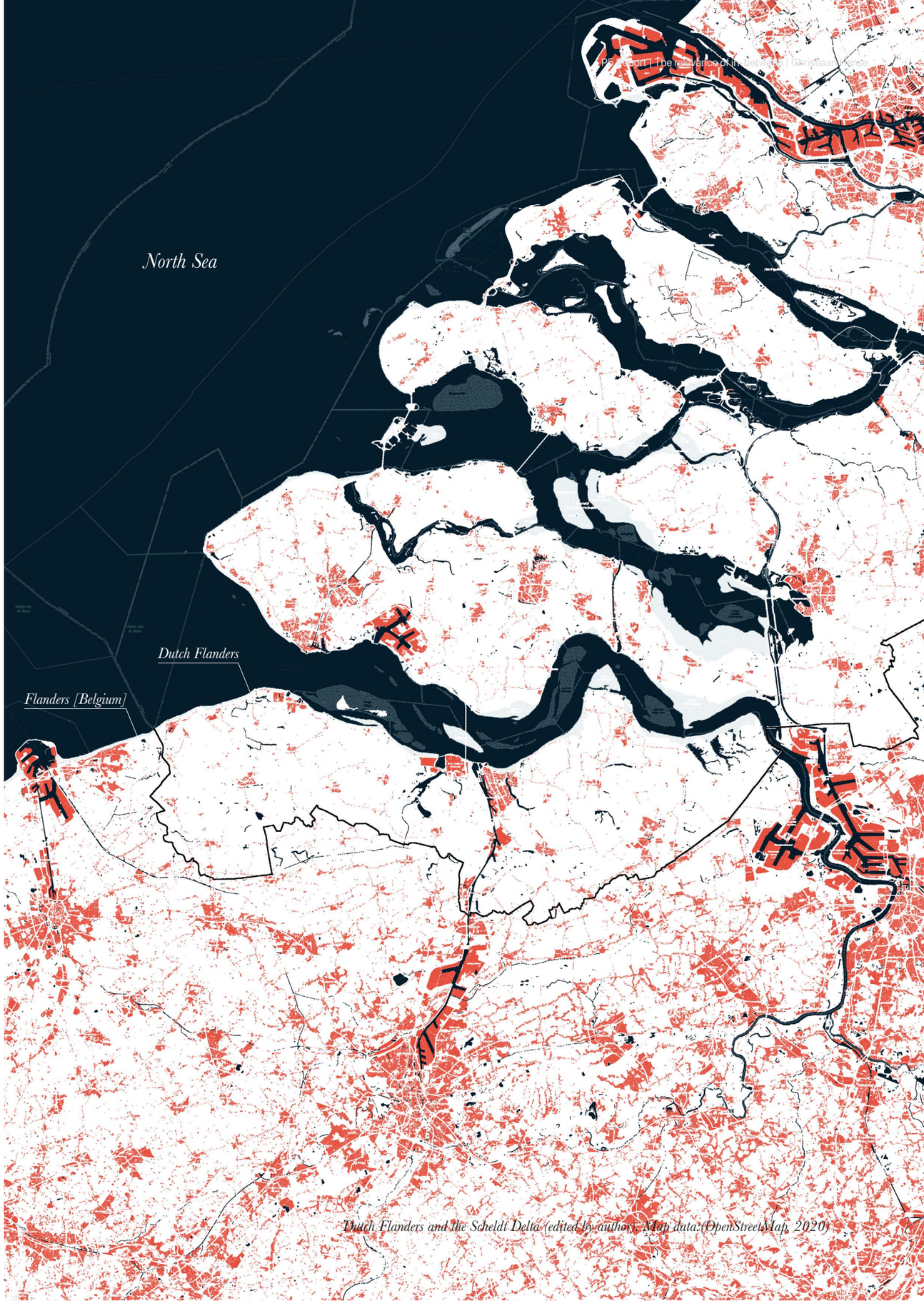

Dutch Flanders and the Scheldt Delta (edited by author). Map data: (OpenStreetMap, 2020)

Motivation

The decision for studying Urbanism has for me been the opportunity to focus on the more social side of development of the built environment, as I have always wanted to combine this with a real estate oriented masters, but it felt to me as if there was something missing in this. As if I couldn't understand the people we built for by only following the more managerial side, before studying the processes and relations of the built environment and the people themselves. I have for a long time been interested in both urban development, specifically housing, and heritage (re)development projects that were happening in practice, both in terms of individual architecture as well as on the (urban) neighbourhood scale. During my studies, I have become more interested in the larger scales of planning as well. I am driven by the ambition to create the best living environments possible within the limited means, and specifically in the Netherlands, limited space. I believe there is much more to be improved in both the current and future built environment by preventing 'mistakes', which often do not consider seemingly unimportant details and the future residents themselves.

Besides the social, I am interested in the spatial qualities and history of (housing) estates and surrounding (natural) landscapes for their contribution to Dutch culture and value of place. Preservation of these areas only will not be enough and is not sustainable in a highly dynamic environment, both physical and societal. Instead what interests me is how to design with, and plan for these in the future challenges, in both the urban an non-urban.

Moving seawards, another interest lies within the challenge of the sea-level rise and pressure on the hinterlands of the (southern) Dutch coastal shores where I grew up. Not only the sea, but also societal changes cause pressure on the current economic systems driven by agriculture and tourism in many of these coastal regions. In this graduation theme I have found an opportunity to combine the transitions in the dynamic Dutch landscape, and the social driver for connecting this to the living- and built environment in an area that I haven't had the opportunity to explore before.

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North Sea Port, transfer of resources at industries near Ghent (Author, 2020)

1.
Context
Introduction | Summary

In order to define a problem statement, in this section the context of the project is described. Three themes are derived from the problematisation for the research, being [1] regional decline, [2] border region (frictions), and [3] regions in transition. The studied region of Dutch Flanders is facing several challenges related to regional imbalances, perception and realities of regional decline. The location at the border is providing opportunities, but also causing frictions and risk. Finally, the larger functional region of the Scheldt Delta is in need of transition because of economic, environmental and technological changes. This chapter will elaborate on these themes by review of theories, societal developments and statistic and spatial information through mapping. A summary of this chapter is inluded on the following pages, after which each theme will be elaborated on in the main chapter of Context.

Summary of context

Summary of context:
In this section, the contextual developments that have led to the current state of this region are summarised from the chapter of context, to frame the problem statement in the following chapter. This will concern the issue of regional decline, border regions and the regional transition of Dutch Flanders and the Scheldt Delta.

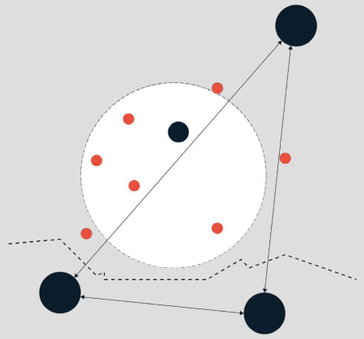
Regional decline
Many regions in the more peripheral areas of the Netherlands, including Dutch Flanders, are facing issues related to regional decline (Beunen et al., 2020; Haartsen et al., 2014; Haartsen & Venhorst, 2010; Verwest et al., 2009). Often, population decline is both an origin and result, causing a decline of amenities which can affect the perception and realities of liveability in a region (Christiaanse, 2020; Gieling & Haartsen, 2017; Haartsen & Venhorst, 2010; Küpper et al., 2018). Related to this is the decline in employment (Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; Rabobank, 2018; van der Wouw, 2017) and misalignments with education that is present and can cause further decline of population (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; Thissen et al., 2010). The perception of a declining region is also affecting investments in a region, as described by (Meester & Pellenbarg, 2006; Meijers et al., 2018), which contributes to further decline of the region. Opportunities to counter the decline exist in alignments between different educational levels and employment in the region ((Nistal & Schep, 2013; Thissen et al., 2010), as well as improved connectivity for agglomeration benefits (Meijers & van der Wouw, 2019), diversity in employment (Dax & Fischer, 2018; Haartsen et al., 2014; Thissen et al., 2010), and in-migration from outside the region (Bijker et al., 2012; Haartsen et al., 2014; Meijers et al., 2018; Nistal & Schep, 2013).

Border region
The Dutch Flanders region is not only spatially peripheral, also on an institutional level different borders exist, between both the Belgian border, as well as the border to the rest of the Netherlands, spatially represented by the Westerscheldt water. On the Dutch side, remoteness is affected by perception, which is, as described previously, negative for development and investments in the region. On an institutional level friction and remoteness exists because of policies that required regions to deal with decline themselves (Beunen et al., 2020), as well as the lack of institutional force (Meijers & van der Wouw, 2019), which is the issue in many regions that are also spatially peripheral (Kühn, 2015). The peripherality partly originates in the lack of intraregional collaboration ((Meijers & van der Wouw, 2019; van Zwet & van Vuuren, 2016), but also physically due to limited connectivity to especially the Dutch surrounding areas (Meijers et al., 2018; Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; van Baalen, 2018). The border on the Belgian side is also causing challenges, both culturally (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020) and institutionally, due to misalignments in policies and (economic) imbalances (de Vries, 2008a; Slenter et al., 2015; van den Berghe & Willems, 2017; van der Heijden, 2019). As described earlier, migration from surrounding regions, including Belgium, can be an opportunity which also contributes to counter decline (Haartsen et al., 2014; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; Nistal & Schep, 2013). Additionally, regarding governance, improving political force and alignment through complementary areas on different scales is important (Dax & Fischer, 2018; Küpper et al., 2018; Meijers & van der Wouw, 2019). Policies should also consider more local (social, cultural) aspects (Dax & Fischer, 2018), and be established on different (cross-border) scales (de Vries, 2008a; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020).

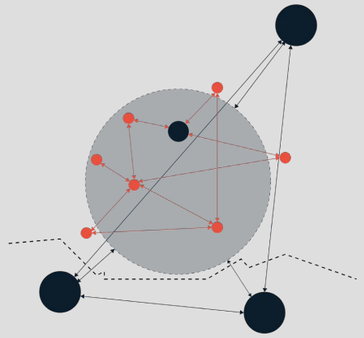
Regions in transition: Dutch Flanders and the Scheldt Delta
The region of Dutch Flanders is located south of the Scheldt estuary (the Westerscheldt water). The water is connected to the port cities of Flushing (Vlissingen), Terneuzen, Antwerp and Ghent that are part of the larger functional Scheldt Delta region. Dutch Flanders is providing the major connections on Dutch territory through the canal between Terneuzen and Ghent and the Westerscheldt water to the port of Antwerp. These areas are facing challenges due to the water, but also due to other environmental changes that include energy transition and circular economy, for example in agriculture (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; van den Berghe et al., 2020). The water is mainly a risk for the large-scale agricultural activities due to salination, but also other elements like drought and stormwater flooding are a risk (Gebiedsoverleg Zuidwestelijke Delta, 2020). Additionally, supply of freshwater is at risk due to rising sea-water levels, causing salination. This affects not only the supply for inhabitants, but also industries and, in combination with rising temperatures, affects agriculture and natural areas in the

Summary of context

region (Gebiedsoverleg Zuidwestelijke Delta, 2020). A potential for this region is the storage and collection of renewable energy (Wientjes, 2020), for which a national aim exists to become the main European location for sustainable (primary) industries (Ministerie van Economische Zaken en Klimaat, 2020; Smart Delta Resources, 2020). Besides the transition related to climate, the orientation towards the Flemish region is increasing, also due to increased in-migration from Flanders (CBS, 2019, 2020; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; Nistal & Schep, 2013). Collaborations already exist in for example the health sector (Meijers & van der Wouw, 2019; Slenter et al., 2015), and the North Sea Port (Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020). Also tourism is one of the elements present in the region that is likely to undergo a transition, with increasing foreign visitors (Kenniscentrum Kusttoerisme, 2019), and changes in ownership, demography and recreational activities (Gebiedsoverleg Zuidwestelijke Delta, 2020). This also brings forward challenges related to the increased pressure of tourism, sustainability of recreation and pressure on the natural landscape in the region (Gebiedsoverleg Zuidwestelijke Delta, 2020).



Regional and national boundaries and the in-between



Crossing borders through joint force and collaboration

1. Context

[1] Regional decline

1.1 Perception & reality

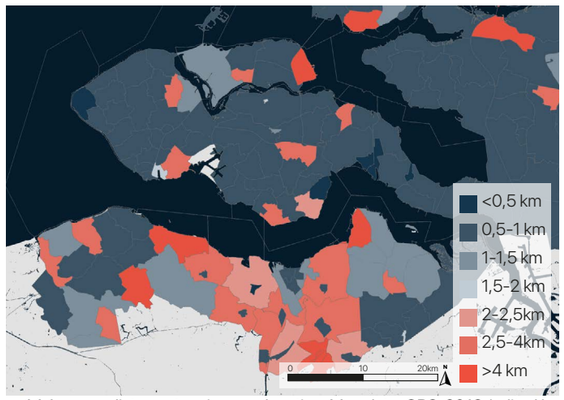
Many regions in the more peripheral areas in the north, east and south of the Netherlands are facing demographic changes like shrinkage of the population (Haartsen & Venhorst, 2010). About 61% of municipalities will have a shrinking population and 9% will have a smaller number of households (Verwest et al., 2009). While this doesn't necessarily mean liveability in these regions is under pressure, inhabitants of these regions can perceive a region in decline due to decline of amenities for example, which is often suggested to affect liveability perception (Christiaanse, 2020; Haartsen & Venhorst, 2010). Mostly, amenity decline is due to the concentration in more central areas (Christiaanse, 2020; Nistal & Schep, 2013). These amenities are, besides providing a service or facility, also providing a location for social and emotional interaction (Christiaanse, 2020; Christiaanse & Haartsen, 2017; Nistal & Schep, 2013). In the maps in Figures 1.1-1.10 the availability of amenities per district is shown. Especially the surroundings of main cities have access to amenities nearby, while at the edges and towards the East, the amenities are less and distances to them are larger.

In the Netherlands, decline of population is perceived to go along with decline of amenities (Christiaanse, 2020). While this phenomenon is not unique to areas facing depopulation, it is possibly more influential to them as less amenities were already present initially. In the province of Zeeland, this phenomenon has been accelerated even faster, as relatively more amenities were present initially because of the different islands that had to be self-sufficient due to limited connections. As these islands were becoming connected by dams and the Westerscheldetunnel, accessibility improved and therefore the need for having certain amenities on each of the islands became less.

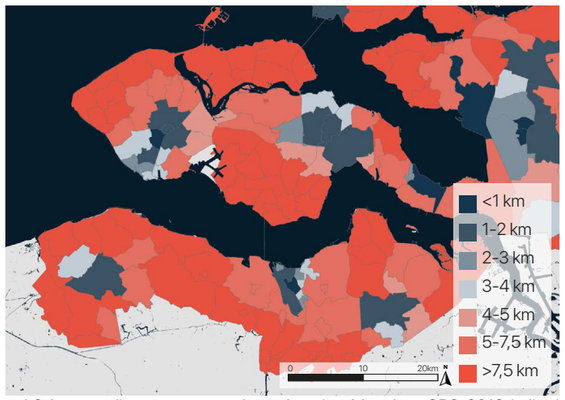
Besides perception of a declining region in terms of liveability, changes in numbers of population, and shifts in demography like imbalances of age, cause practical issues for present companies and opportunities for future company settlements in these regions. There is the risk of misalignments in demand and offer of employment and employees as also local education is under pressure. In Dutch Flanders a decline of 25% of students is expected (Nistal & Schep, 2013). Especially the sectors of industry and healthcare are facing this issue of shortages in the region (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b). However, the number of jobs overall has also been declining in recent years, so this might only apply to specific sectors (Rabobank, 2016). Overall, the rate of employment is comparable to the rest of the Netherlands, which is possibly caused by both the decline in jobs and population at the same time in recent years (Eurostat, 2018).

Due to population decline there is a risk of concentration of low-income groups, because other families have the means to move to places outside the declining region (Nistal & Schep, 2013). Population decline could also mean that in less attractive areas, vacancies can increase up to 30% if no changes are made to the existing housing stock (Nistal & Schep, 2013). However, while changes in population are occurring in the region, the perception of decline is not always well grounded. Decline of population in Dutch Flan-

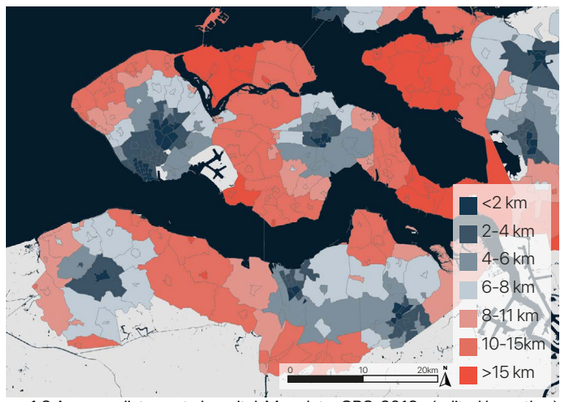
Context



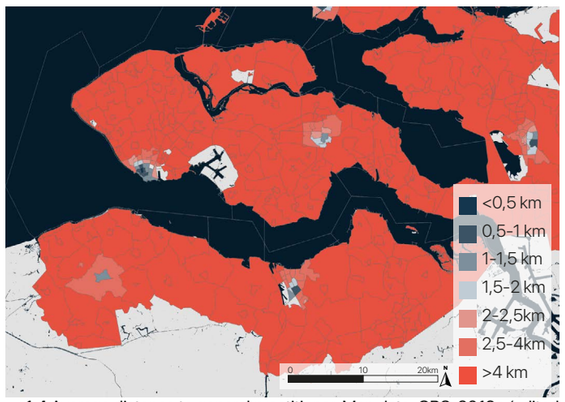
1.1 Average distance to primary education. Map data: CBS, 2018 (edited by author)



1.2 Average distance to secondary education. Map data: CBS, 2018 (edited by author)

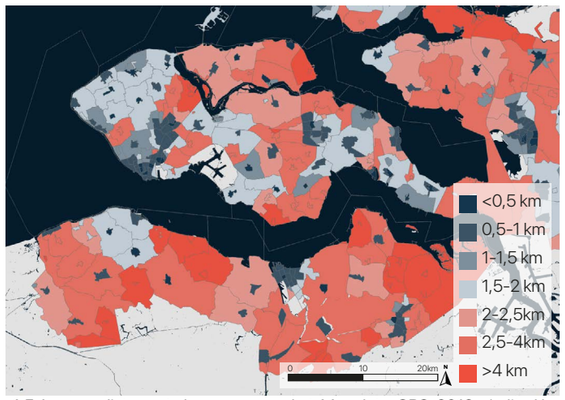


1.3 Average distance to hospital. Map data: CBS, 2019a (edited by author)

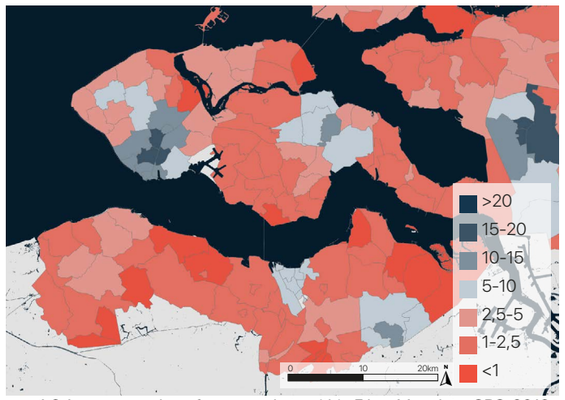


1.4 Average distance to general practitioner. Map data: CBS, 2019a (edited by author)

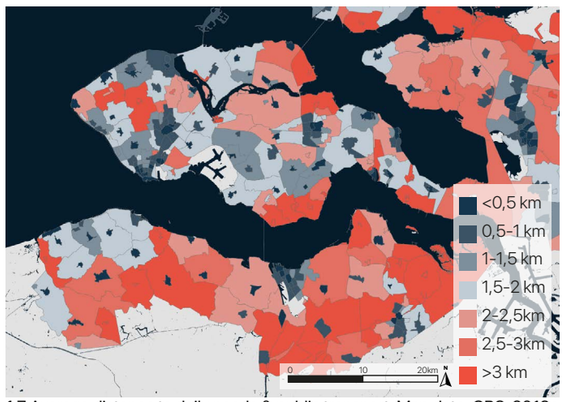
Context



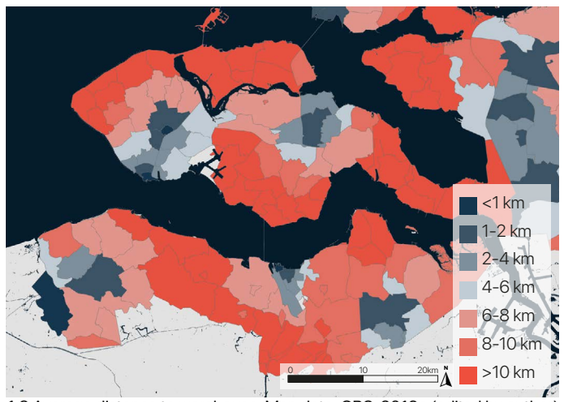
1.5 Average distance to large supermarket. Map data: CBS, 2019a (edited by author)



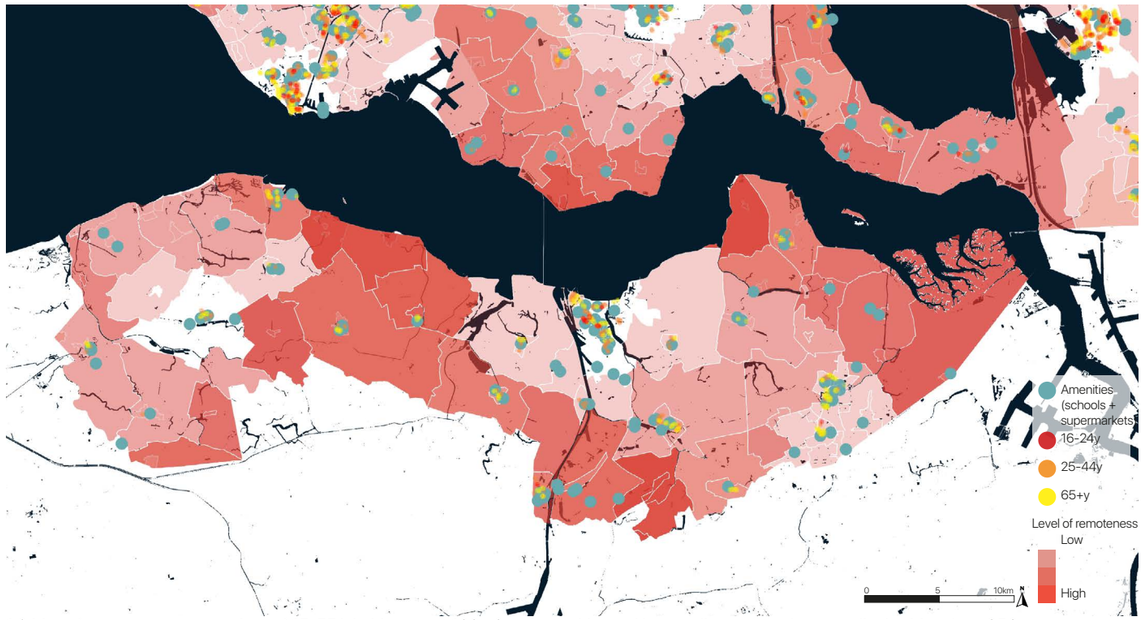
1.6 Average number of supermarkets within 5 km. Map data: CBS, 2019a (edited by author)



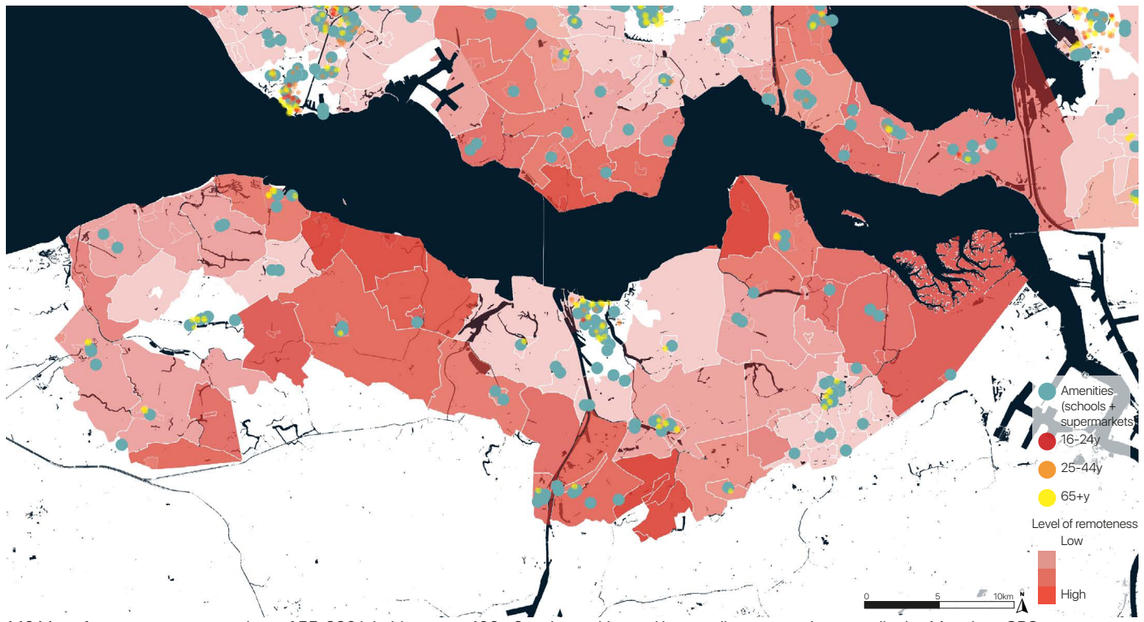
1.7 Average distance to daily needs & public transport. Map data: CBS, 2019a (edited by author)



1.8 Average distance to warehouse. Map data: CBS, 2019a (edited by author)



1.9 Map of age group concentrations of 15-55 inhabitants per 100m2 and amenities and largest distances to them per district. Map data: CBS, 2018;2019a;2019b (edited by author)



1.10 Map of age group concentrations of 55-330 inhabitants per 100m2 and amenities and largest distances to them per district. Map data: CBS, 2018;2019a;2019b (edited by author)

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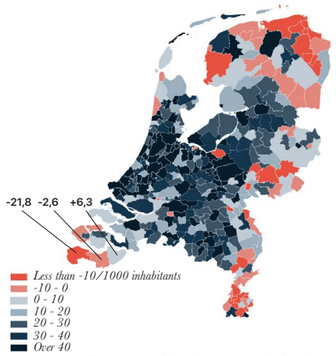
ders occured less in recent years (2018, 2019) compared to the average from 2015-2019, as can be seen in Figure [1.11-1.16] (CBS, 2019; CBS, 2020). However, as will be discussed in the next section and as Figure 1.6 (CBS, 2020) shows, this is strongly related to migration.

Once the image of a region in decline emerges, there is a risk for a negative vicious circle. If a region is perceiving itself, and is perceived by others to be declining based on the leaving of companies for example, this perception can cause other companies to leave as well, merely based on the image of decline. As described by (Haartsen & Venhorst, 2010), different developments like a reduced number of jobs and an ageing population cause a reduction of public and private resources for investments. This could be one of the reasons why the youngest group of people shows concentrations in the more urban areas in Figure 1.9 & 1.10, as they are more dependent on the proximity of education and employment for example, while the elderly in both levels of concentration are much more spread across the region. The reduction of resources and investments further reduces the amount of jobs and leads to younger people leaving the region, making this phenomenon a self-fulfilling prophecy. Regions might then become less attractive for companies to settle, and governments can be less prone to have large scale investments or major functions located in these regions (Meijers et al., 2018).

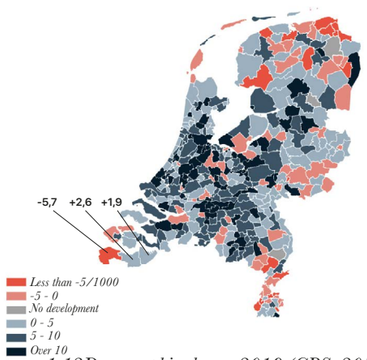
As described by (Meester & Pellenbarg, 2006), the decisions for companies to settle, are to a large extent based on their perception and 'soft' and 'private' aspects of locations. This perception has been of large influence in the province of Zeeland as well, as the example of the relocation of the mariners base to the city of Vlissingen shows. It was, amongst other reasons, canceled due to the perception of limited employment opportunities for their partners and the perception of a bad housing market, causing a risk in case they wanted to leave (van Oostvoorn, 2018). This has increased and confirmed the perception of being a region of decline, by both the inhabitants and the rest of the Netherlands (Rozendaal, 2020). This shows that although perception only is not the reason for decline, it does influence decision-making as described before.

1.2 Perception of remoteness and neglection

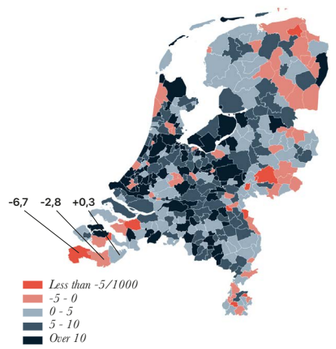
As described earlier, the perception of the region as remote and declining influences decision-making and the image of a region. Perception of remoteness in Dutch Flanders is not only because of its peripheral position and the physical distance to the Randstad metropolitan area in the Netherlands. Dutch Flanders has physical limitations too, further enhancing the perception of remoteness. Dutch Flanders is also the only region in the Netherlands to be defined as rural by Eurostat (2013). While the other islands in the Dutch Province of Zeeland were connected by dams and bridges after the flooding in 1953, Dutch Flanders stayed remote as a ferry was the only connection. Later, the construction of the Westerscheldetunnel allowed for faster connections to the rest of Zeeland and the Netherlands, as can be seen in Figure 1.17. However, toll must be paid to cross the tunnel, and alternatives require additional distance and time by travelling over main land. This is causing the perception of being 'locked up' in the province, and limits the possibilities for development and connections to other areas in the province (van Baalen, 2018). The discussion on toll for crossing the water has been present from the 1950's on, when a ferry was used still (Meijers & van der Wouw, 2019). This could further increase the perception of being left behind compared to the rest of the Netherlands of the region. Physical remoteness is present in the lack of a good connection for public transport too, as there is no railway in the Dutch Flanders region (see Figure 1.17) and the only connection elsewhere in Zeeland is taking much additional time (Meijers & van der Wouw, 2019).



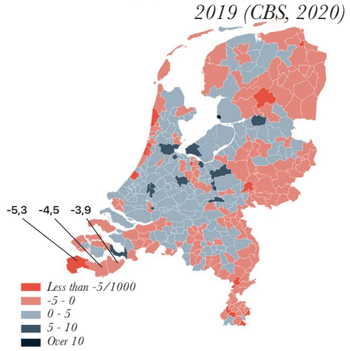
1.11Demographic change period 2015-2019 (CBS, 2020)



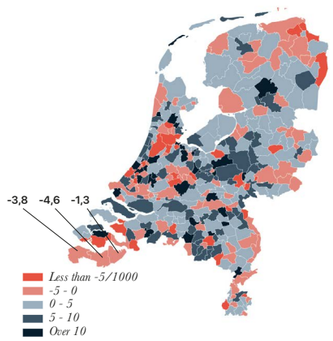
1.12Demographic change 2018 (CBS, 2019)



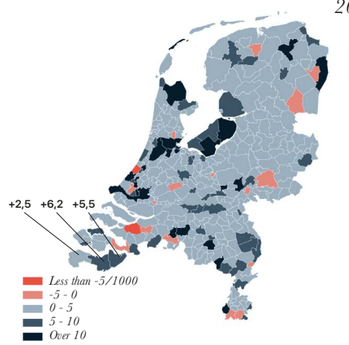
1.13Demographic change 2019 (CBS, 2020)



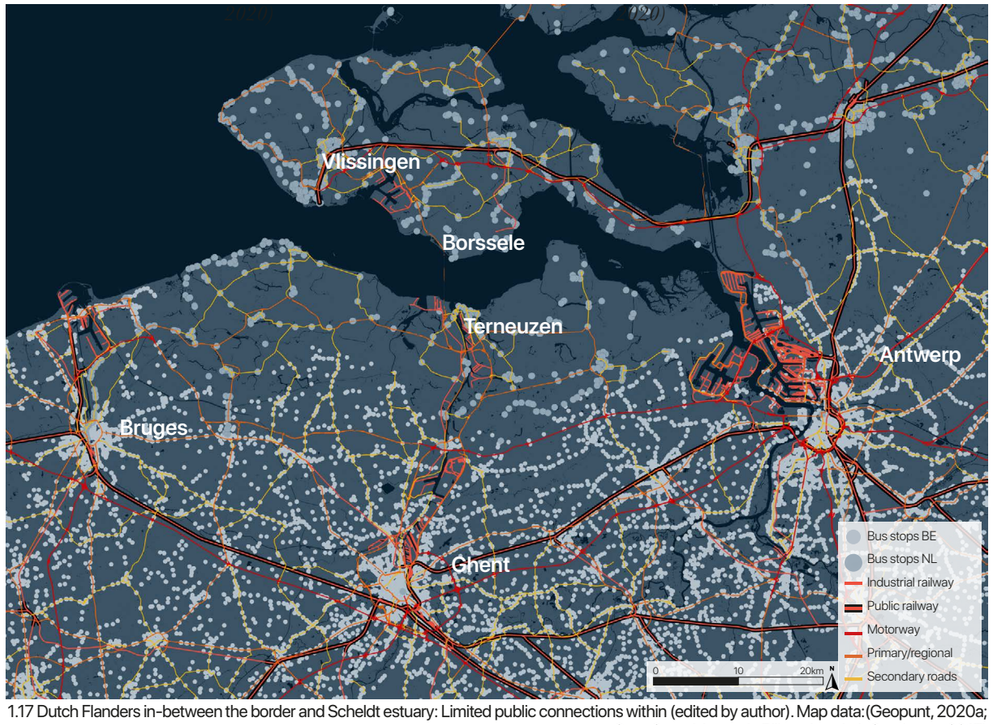
1.14Natural development 2019 (CBS, 2020)



1.15Moving within Nl 2019 (CBS, 2020)



1.16Migration 2019 (CBS, 2020)



1.17 Dutch Flanders in-between the border and Scheldt estuary: Limited public connections within (edited by author). Map data:(Geopunt, 2020a; OpenStreetMap, n.d.; Rijksuniversiteit Groningen, 2017)

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Context

1.3 Regional imbalance

Another element of regional decline in the province of Zeeland and Dutch Flanders, is regional imbalance. While other regions in the Netherlands, like the more central regions in the Randstad area, are more successful, others are not and face issues of decline. Regional imbalance is not only about economy, it includes social, political, historical and geographical elements too, for which the developments might cause larger gaps between different regions. Imbalances here exist in for example GDP and employment rate, which is lower in the province compared to the rest of the Netherlands (Eurostat, 2018b; 2018a), accessibility of jobs (ZB | Planbureau voor Zeeland, 2018) and the amount of jobs available in the region (Rabobank, 2016). In Dutch Flanders, the issue not only persists between the region and other regions in the Netherlands. To the Flemish side in Belgium, these differences are existing as well. One example is the contribution of the Dutch to the maintenance of access to ports like Antwerp and Ghent which isn't directly beneficial for the Dutch Flanders region, while it does benefit the Flemish ports and port-cities as described by (van den Berghe et al., 2020; van den Berghe & Willems, 2017). This illustrates the differences existing because of different types of borders too, which will be further elaborated on in the next section.

1.4 Opportunities for regions facing decline

Different approaches have been applied to regions facing decline in the Netherlands, with varying levels of success. (Beunen et al., 2020) describe in their research on strategies for population decline three different approaches, being: a focus on local initiatives, aiming for large scale spatial investments to counteract decline and focusing on real estate investments. All of these are based on scenarios of economic growth or denial of the decline (Beunen et al., 2020; Haartsen & Venhorst, 2010), while in some cases anticipating on the scenario of decline is more beneficial. Haartsen & Venhorst (2010) describe the importance of planning for quality instead of quantity, like more demand based or more recreational and natural types of land use. This would need a change in financing of local governments too, not based on the number of population, which could cause the effect of a self-fulfilling prophecy as described before. Meijers & van der Wouw (2019) describe the importance of agglomeration benefits many declining rural regions are lacking. It appears that regions not having a set of three medium-sized cities (40.000 inhabitants) or one larger city (of 100.000 inhabitants) could explain decline, based on the benefits of agglomeration such regions do not have (Cuadrado-Roura, 2001; Meijers & van der Wouw, 2019; Polèse & Shearmur, 2006) in: (Meijers & van der Wouw, 2019). This would mean accessibility to these is of importance to be able to benefit from the larger metropolitan areas in the surroundings of declining regions. In their paper, Meijers & van der Wouw (2019) also describe the opportunity for such regions to create one clear visible centre or have a network of smaller strongly integrated villages and cities instead. For each of these cities or areas in the network it is important to have a clear function / role in the region, to avoid rivalry or competition and function more as one entity. For this, not only infrastructural networks are needed. In the case of Dutch Flanders it would also mean institutional or organisational networks need to be improved as it requires a cross-border network. This example shows the importance of accessibility and networks for the region to be able to connect to its surroundings. As described earlier in this paragraph, these investments require a different approach in planning against regional decline, including changes in governance to avoid the negative vicious circle declining regions are at risk of.

Context

[2] Border region

The region of Dutch Flanders was once central in the Dutch Republic, and was strongly related to the Port-cities like Antwerp and Ghent. However, due to the Peace of Münster in 1684, the border between Belgium and Dutch Flanders emerged and the region became peripheral for the Netherlands (van den Berghe et al., 2020). This occurrence of a border could be related to the current regional decline in Dutch Flanders described in the previous sections. In current times, the proximity of the border is providing opportunities like international trading, but the differences on both sides can cause friction too. As there is a likely relation between the decline of the region and the border, in this section, the problems and opportunities the presence of a border has for the region of Dutch Flanders are elaborated on.

2.1 Border frictions and misalignments

The presence of the border is causing movements to- and from the Belgian side and the Dutch side. While tourism is, especially in the cities and coastal areas of Dutch Flanders, providing a lot of employment and income, it is also causing friction. This mainly relates to the ownership of second homes (van der Werf, 2020b). Especially in the peri-urban areas, this can cause the issue of less permanent inhabitants, which influences the pressure on amenities like schools and vacancies in certain periods of the year. Construction of residences for tourists are also causing friction, as for the development and exploitation of this economy they are needed, but also affect the unique open (coastal) landscapes which is one of the reasons many tourists visit the region, as can be seen in Figure 1.21& 1.22. Additionally, concerns have emerged amongst locals on Belgian migrants who do permanently live in the region of Dutch Flanders, but are less integrated as they still are employed in their home country and have their social contacts and schools in Belgium still. Ohers see this in-migration as an opportunity against the decline of population (Omroep Zeeland, 2015; NOS, 2016). Migration and tourism are popular amongst Belgian Flemish inhabitants as housing prices and retail prices are generally lower compared to Belgium. A recent example is showing the misalignment in policy which caused many Belgian tourists to visit Dutch Flanders because of the closing of non-food retail, causing pressure on the Dutch Flanders retail and hospitality industry (Giele, 2020). Also on an institutional level, the presence of the border causes difficulties. The collaboration of Zeeland to Flemish port access as decribed in paragraph 1.3 (van den Berghe et al., 2020; van den Berghe & Willems, 2017) is an example of this. Another example are public services. While collaboration between different hospitals is taking place, friction exists because of differences in policy, causing competition between Dutch and Flemish hospitals for specialist healthcare (Slenter et al., 2015; van der Heijden, 2019). Regarding spatial cross-border planning, governments tend to approach projects from the perspective of the national interest based on what separates these countries in planning projects, while it could be more beneficial to look at the existing relations instead (de Vries, 2008). While a lack of knowledge might be causing this, the absence of an independent research institute for analysing specific projects and the missing of a central authority or institution of independence for decision-making could also be one of the reasons for these frictions in cross-border planning (de Vries, 2008).

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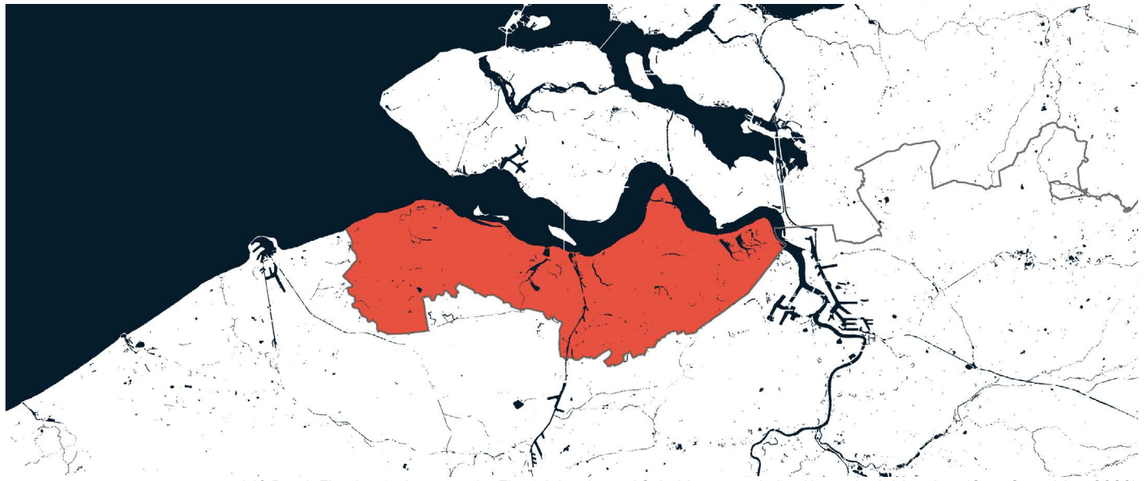
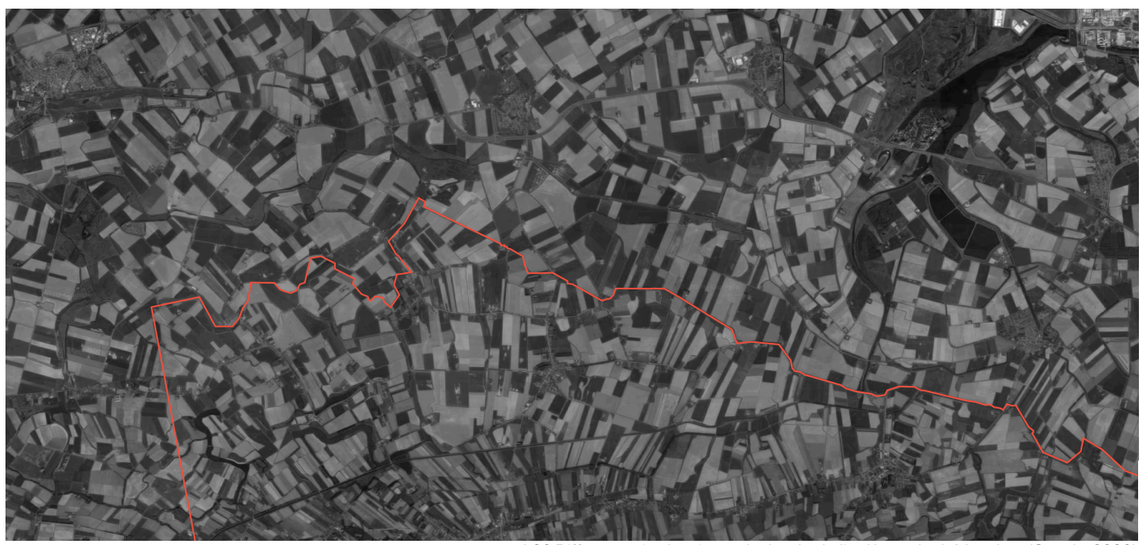
1.18 Satellite view of villages of Cadzand and Nieuwvliet and their coastal tourist residences, larger than the villages themselves. (Google, 2020)



1.19 Dutch Flanders in-between the Flemish border and Scheldt estuary (edited by author). Map data:(OpenStreetMap, 2020)



1.20 Differences in planning at the border (edited by author). Map data:(Google, 2020)

Context

1.21 Landscapes of touristic residences in the polders of Dutch Flanders (Author, 2020)

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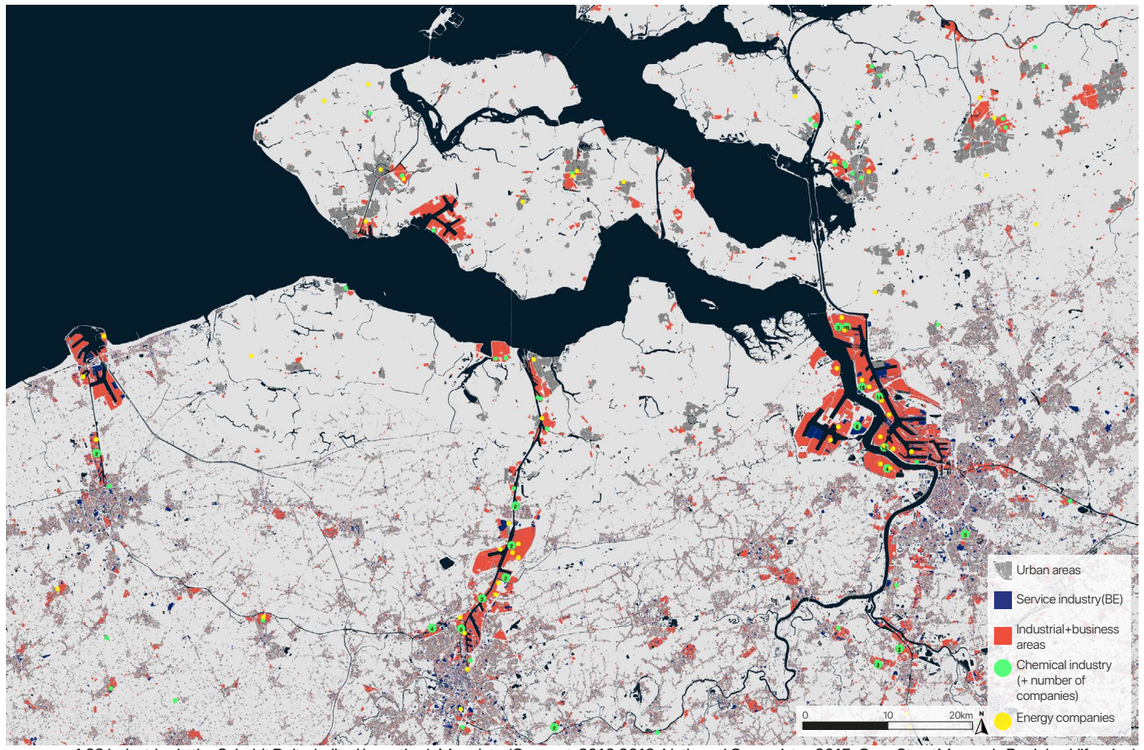
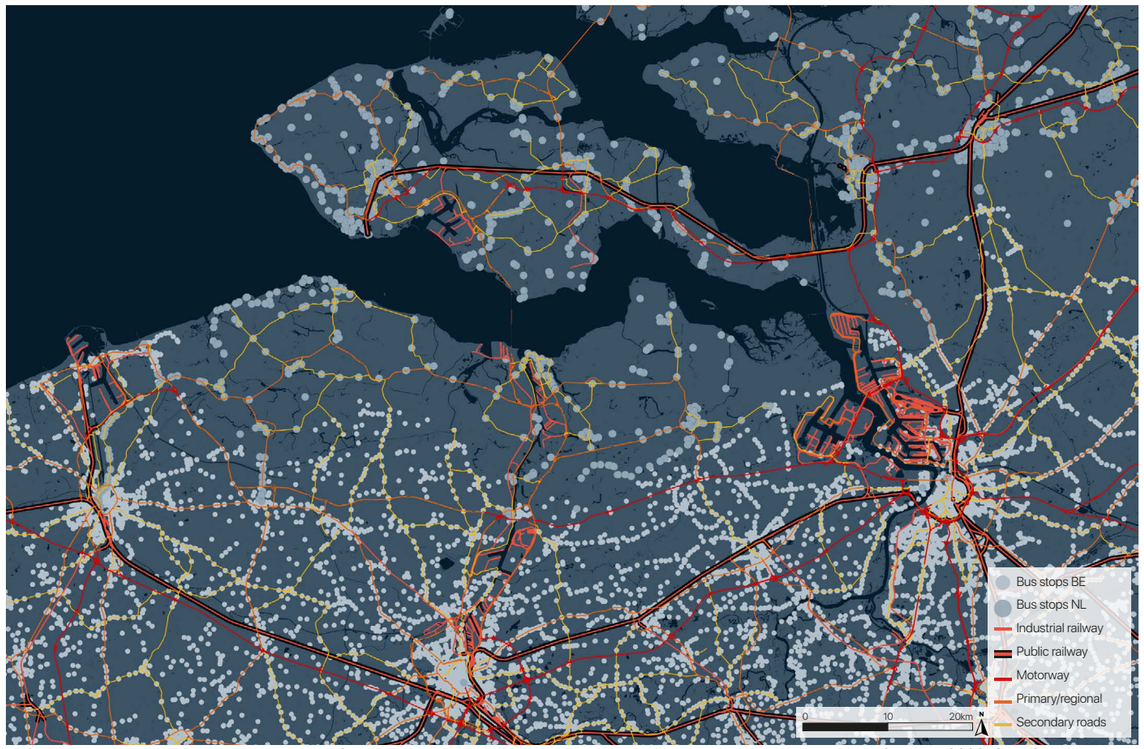
Context

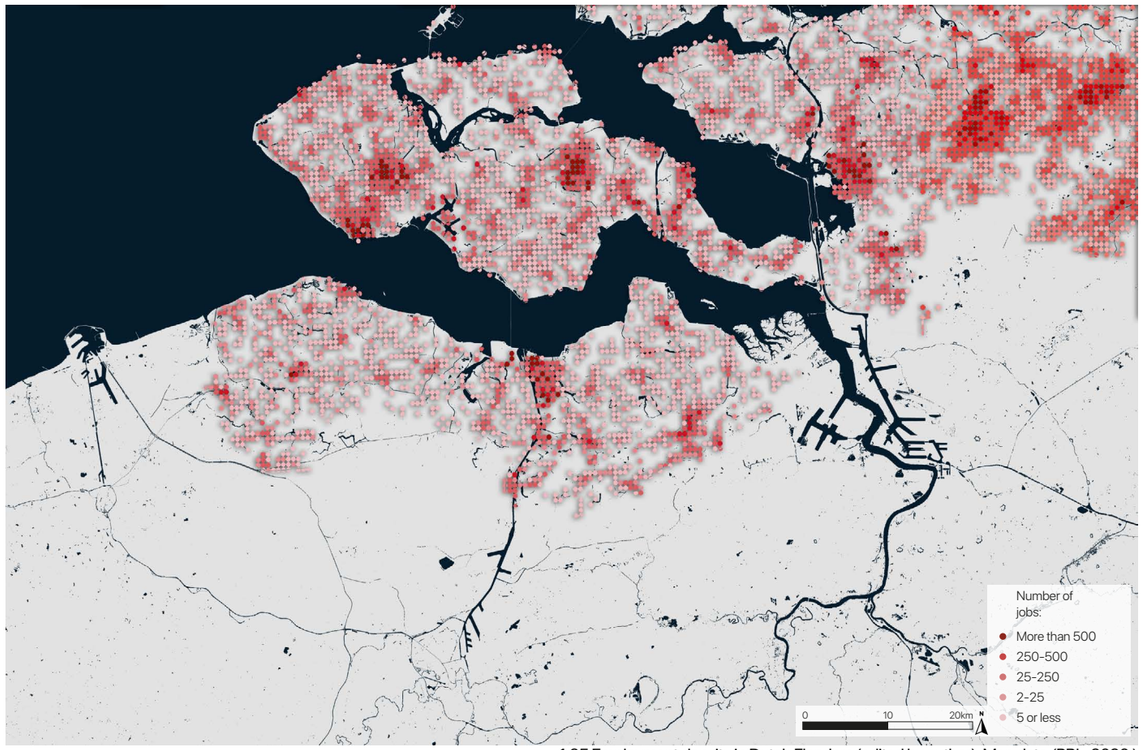
1.22 Contrasts of construction of touristic residences and agriculture in the coastal village of Cadzand (Author, 2020)



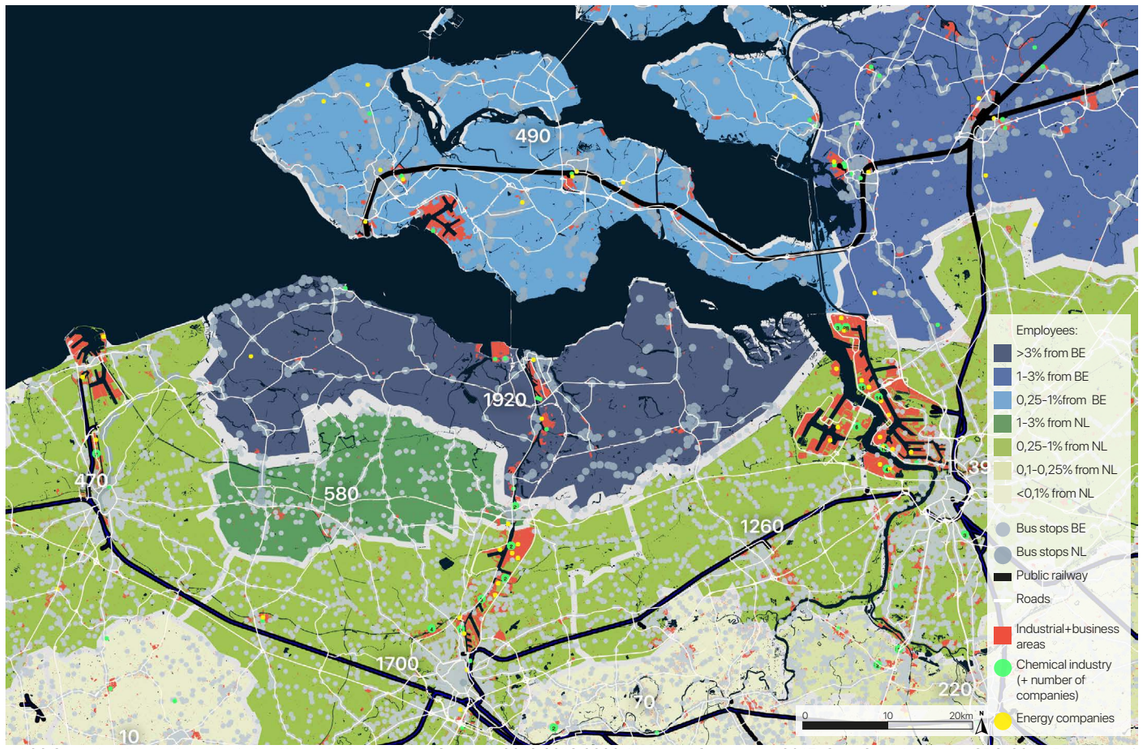
1.23 Industries in the Scheldt Delta (edited by author). Map data:(Geopunt, 2016,2018; Nationaal Georegister, 2015; OpenStreetMap, n.d.; Regiobedrijf, n.d.;)



1.24 Dutch Flanders in-between the border and Scheldt estuary: Limited public connections within (edited by author). Map data:(Geopunt, 2020; OpenStreetMap, n.d.; Rijksuniversiteit Groningen, 2017)



1.25 Employment density in Dutch Flanders (edited by author). Map data:(PBL, 2020)



1.26 Cross-border employment (edited by author). Map data:(Geopunt, 2016,2018,2020; Nationaal Georegister, 2015; OpenStreetMap, n.d.; CBS, 2014; Regiobedrijf, n.d.; Rijksuniversiteit Groningen, 2017)

2.2 M*igration & cross border (tourism) opportunities*

While frictions exist because of differences on both side of the border, it also provides opportunities as both sides of the border provide functions and conditions unique to their side of the border. As discussed earlier, migration of Flemish people into Dutch Flanders is one of the phenomena happening because of the attractive conditions on more affordable housing and the spatial qualities as an example. Another reason for this is the lack of competition on the Dutch side because of the toll that must be paid for the Westerscheldetunnel, being a barrier between Dutch Flanders and the rest of the Province (Meijers et al., 2018). In the case of Dutch Flanders, population decline was expected for the coming years, however, due to the immigration of Belgians, the decline stabilised and increased in two of the municipalties (Meijers et al., 2018; Nistal & Schep, 2013).-Also tourism is providing opportunities, as especially the coastal areas and historical cities like Sluis are attracting (Flemish) tourists but the location at the border itself can attract visitors as well (Gelbman & Timothy, 2011; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b; Nistal & Schep, 2013).

2.3 Opportunities for cross-border collaboration

As described earlier, there are opportunities for improved cross-border collaboration. For this, independent central institutions specifically configured for collaboration could improve this (de Vries, 2008). These could be configured out of delegates from both collaborating sides for example. An example of advanced cross-border cooperation already exists in the region. The North Sea Port connects the ports of Vlissingen, Terneuzen and Ghent (Figure 1.23). This cross-border cooperation is different from other commercial international integration, as mostly these ports are owned by the local governments (van den Berghe et al., 2020). Other opportunities for collaboration in the region are related to the infrastructure, economic and institutional relations like the example of healthcare mentioned before. As can be seen in Figure 1.25 &1.26 Cross border employment is mainly taking place in Dutch Flanders , of which over 3% is of Belgian origin, and Antwerp and Ghent, in which up to 1% is of Dutch origin. In Dutch Flanders this mainly takes place in the Ports and larger cities, for which infrastructure to these locations is required. Public transport infrastructure is less dense in on the Dutch side, and public railway connections currently don't exist, which can contribute to limited cross-border employment. This shows that also in terms of infrastructure, there are opportunities like the development of the railway between the city of Terneuzen in Dutch Flanders and Ghent in Flanders, Belgium which is proposed in a future upgrade of the industrial railway (van der Werf, 2020a). This can further support the functions of the region as an important node for international transport and industry.

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Context

[3] Regions in transition: Dutch Flanders and the Scheldt Delta

Dutch Flanders is the Dutch region south of the Westerschelde estuary. It consists of the three municipalities of Sluis, Terneuzen and Hulst. The Scheldt Delta region contains this region, but includes cities like Antwerp and Ghent and their surrounding areas, that are part of this functional region related to the Scheldt and water-related activities. Dutch Flanders is providing the major connections on Dutch territory to these larger port cities through the Canal between Ghent and Terneuzen and the Westerscheldt estuary of the Scheldt river, which connects to Antwerp. The relation to water is a risk too, further accelerated by environmental changes. The region is facing cultural and economic changes too, related to the Flemish border and development of stronger relations and movements across it. While the other sections of the contextual chapter describe the problems and approaches for the issues of decline and the related location at the border, this section will frame the elements of transition of Dutch Flanders and the larger Scheldt Delta region based on contextual developments.

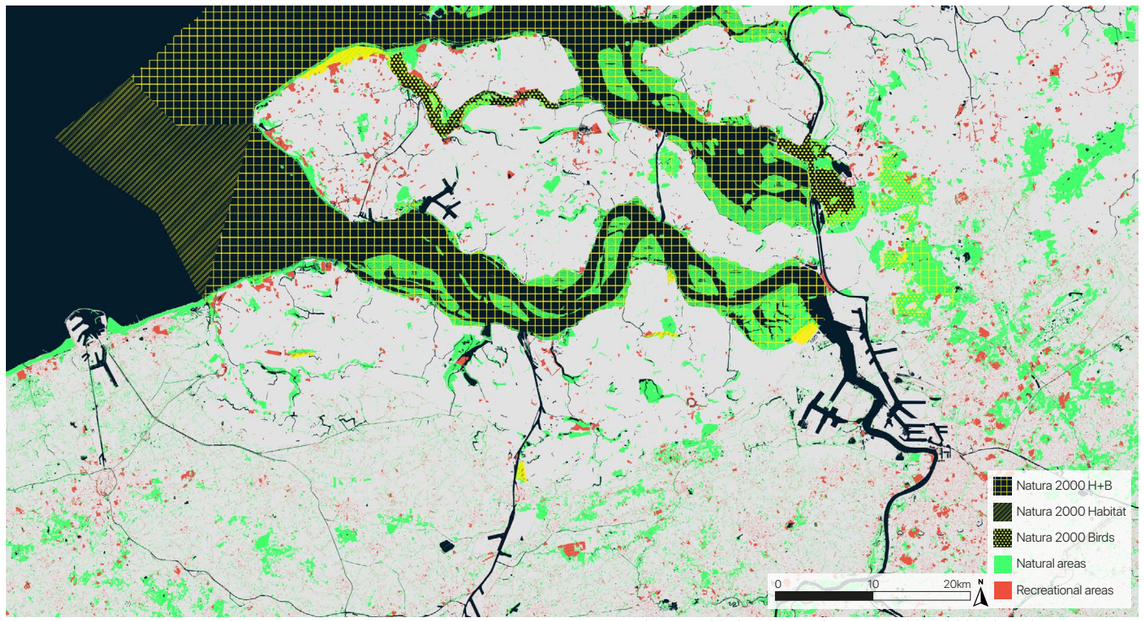
3.1 Economy: ports, industry and tourism

As described earlier, the North Sea Port is a recent example of cross-border cooperation on an institutional level. The ports that are merged provide the opportunity to face challenges related to climate change, the energy transition and circular economy (van den Berghe et al., 2020). Also, emerging changes like more demands for local production, employment, added value for the direct surroundings and environmental impact on the direct surroundings are a challenge for ports and industries.

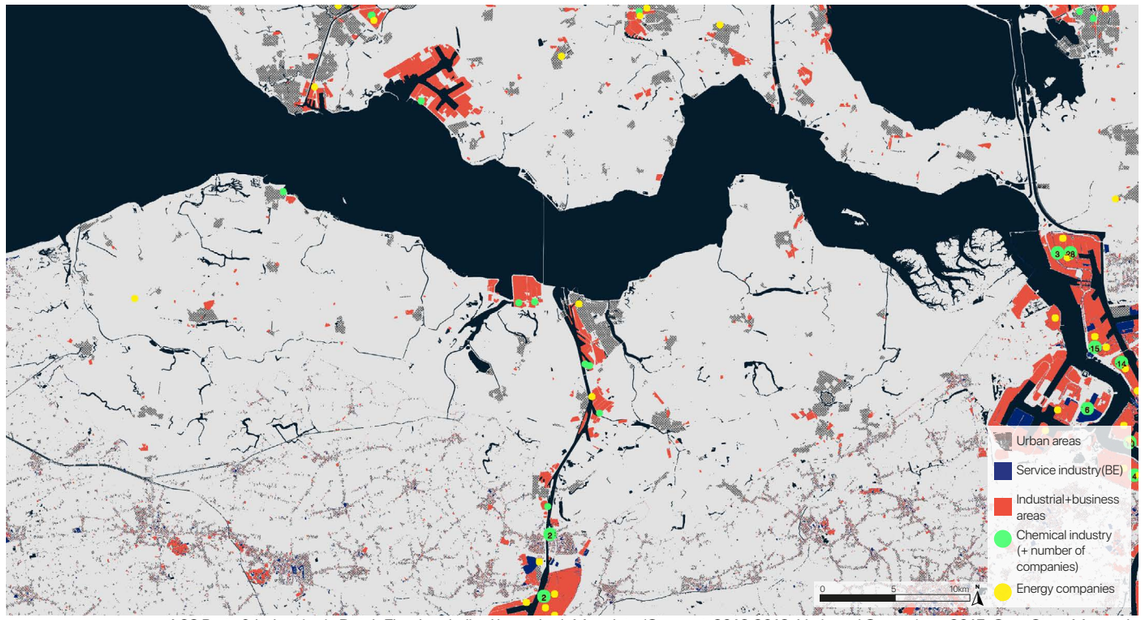
The industries in the area are related to the activities of the ports, for which they share similar challenges. A shift to more local production, circular economy, and the use of flows of (waste)material between industries towards a more circular economy is also part of the transition of industries of the Scheldt Delta (Wientjes, 2020). Additionally, this region has potential for storage and collection of renewable energy (Ministerie van Economische Zaken en Klimaat, 2020), which fits into the national aim of becoming the main European location for sustainable primary industries (Ministerie van Economische Zaken en Klimaat, 2020; Smart Delta Resources, 2020). Figure 1.23 & 1.28 show that currently the majority of chemical and energy-related industries is located in the port-areas. If the potential for energy is combined with the logistic functions of the ports and improvements of the connection to, and from the Dutch Flanders region and the Netherlands, this might be an opportunity for the region to increase its importance as an international node.

Tourism is a large share of the economy in the province of Zeeland, as well as for the Dutch Flanders coastal region and cities like Sluis and this number is rising as more foreign tourist visit the province (Kenniscentrum Kusttoerisme, 2019a). The municipality of Sluis in the western part of the region is one of the larger touristic destinations in the province as 20% of the provincial total number of tourists visit this municipality (Kenniscentrum Kusttoerisme, 2019b). Additionally, changes in ownership, demography and recreational activities are part of the transition in tourism (Gebiedsoverleg Zuidwestelijke Delta, 2020). As described before, the number of Flemish migrants is increasing, but the ownership of second homes is too. The developments of coastal residences in is significantly higher in Dutch Flanders compared to the rest of the province (NOS, 2016). As can be seen in Figure 1.27, recreational development mainly takes place in the coastal areas, and recreational and natural areas are mostly located in proximity to each other. This

Context



1.27 Natural areas and recreation (edited by author). Map data:(Geopunt, 2016; Nationaal Georegister, 2015;2020; OpenStreetMap, n.d.)



1.28 Ports & Industries in Dutch Flanders (edited by author). Map data:(Geopunt, 2016,2018; Nationaal Georegister, 2015; OpenStreetMap, n.d.; Regiobedrijf, n.d.;)

Context

1.29 Contrasts of natural areas and the Port of Antwerp (Author, 2020)

1.30 Steel production from coal in the North Sea Port near Ghent (Author, 2020)

development is also causing concerns and provides challenges related to the increased pressure of tourism, sustainability of recreation and pressure on the natural landscape in the region (Gebiedsoverleg Zuidwestelijke Delta, 2020). Pressure of tourism can be for instance due to privately owned second homes that cause vacancies during certain periods of the year and an exponential increase of inhabitants during peak periods which can cause pressure on the amenities for example. However, if a better balance could be found, growth of tourism is one of the potentials against regional decline for the region and improved connections to Flanders (Meijers et al., 2018; Nistal & Schep, 2013).

3.2 Culture & society

The developments in the region of Dutch Flanders seem to emerge more on the Flemish side rather than the Dutch. This development is also described by (van den Berghe et al., 2020), mentioning the region is becoming more and more 'Flemish'. This can be seen in the migration of Flemish as mentioned earlier, but also the increase in cross-border movements for employment, healthcare, education and leisure activities (Nistal & Schep, 2013; Slenter et al., 2015). This development can be an opportunity if the region can develop economic, cultural (societal) and institutional relations to overcome the issues of barriers and imbalances in (economic) benefits from it. This balance is important as this allows the urban and peri-urban in-between to permanently benefit and to avoid an issue similar to the one explained before, where Flemish live on the Dutch side, but spend most of their time and resources in Flanders still, negatively affecting the support for (local) amenities and social cohesion in the Dutch Flanders region. This could also be of importance for the elimination of the perception of decline and being neglected, as culturally, the Flanders region is more related to Dutch Flanders as well.

3.3 Environment

As mentioned before, climatological changes affect the regions industries and port-economies. More local production and circularity are developments part of this transition that are related to sustainability and environmental change. In Dutch Flanders there is another large economy exposed to the risk of environmental change, being the agriculture industry. Rising sea-water levels can cause salination, and biodiversity is under pressure due to intensive agricultural activities like tillage and over-fertilisation. Additionally, emissions like nitrogen cause issues and affect activities elsewhere (aan de Brugh, 2020). Issues like drought and stormwater flooding are also expected to be occurring more in the coming years (Gebiedsoverleg Zuidwestelijke Delta, 2020). The risk of water is also present as the Dutch Flanders region is directly connected to the sea. This does not only affect the agricultural industry due to salination, it also causes other risks like the supply of freshwater, which affects inhabitants and in combination with rising temperatures, affects both agriculture and the natural landscape in Dutch Flanders (Gebiedsoverleg Zuidwestelijke Delta, 2020). Only dikes separate the land from the water, unlike other regions in Zeeland and the Netherlands, who are protected by dams and extensive dune landscapes. Using the position at the water by growing resistant or other species, or opening parts of the protective structure to create new (semi-) agricultural landscapes could be an opportunity for the region as part of this transition. This nature-inclu-sive approach is also part of a recent agreement made between the national government and the region (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b). These developments require changes in governance, institutional (cross-border) cooperation and opportunities for (spatial) planning to guide this transition in the Dutch Flanders and larger Scheldt Delta region.

In this section, elements that are part of the larger (functional) transiton in the context of Dutch Flanders and the Scheldt Delta have been described. In the following chapters the role of the in-between in the transition will be elaborated on. In governance, first steps are made for independent development of Dutch Flanders through the 'Regional Deal'. In this, several projects are supported related to cultural identity and participation, the living environment and nature-inclusive agriculture, liveability and maintaining amenities and economic development. The review and integration of approaches to regional decline, the issues and opportunities of the border and challenges for the transition provides strategic opportunities to eventually guide the transition of both the scales of Dutch Flanders and the Scheldt Delta.

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Context

2.
Problem statement

Problem statement

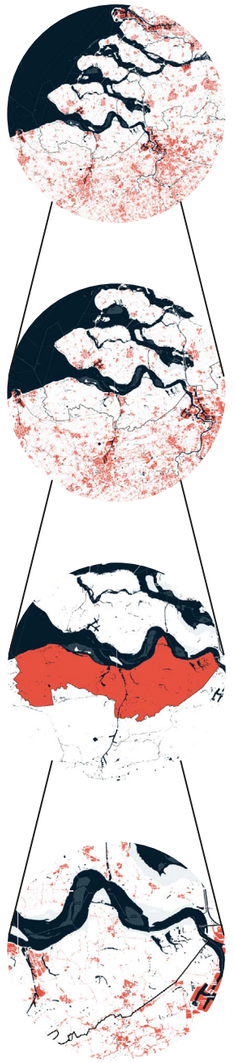
The region of Dutch Flanders is located in the South of the Dutch Province of Zeeland and is known for its unique relation to Belgium, while it is perceived more remote to the Dutch side. This remoteness is manifested both physically and culturally (Christiaanse, 2020; Meijers & van der Wouw, 2019; Nistal & Schep, 2013; van Baalen, 2018). In the region various touristic, agricultural, industrial and port-related activities take place, which relates Dutch Flanders to the larger Scheldt Delta region, including a part of Flanders in Belgium too. These activities connect the region to large cities like Antwerp and Ghent. However, liveability in the more remote urban and peri-urban areas is under pressure as they are, and are perceived to be part of a declining region, which can trigger further decline (Slenter et al., 2015; van den Berghe et al., 2020; van den Berghe & Willems, 2017). These areas can be found in between the large scale activities in industry, agriculture and (port)logistics, but don't seem to be as well connected to the regions' (inter)national relations and connections. These vulnerabilities also exist in the form of the geographical location at the border and the Scheldt Delta, causing frictions and environmental risk and imbalances (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; Nistal & Schep, 2013; van den Broek, 2018), and in the form of lack of diversity in employment (de Vries, 2008a; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; van der Wouw, 2017), causing out-migration of younger and highly educated people (Küpper et al., 2018; Thissen et al., 2010). However, this location also provides opportunities for these urban and peri-urban places, related to tourism, industry, the ports and employment in complementary services, as well as the opportunities of cross-border cooperation (Meijers et al., 2018; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; van den Berghe et al., 2020; van den Berghe & Willems, 2017). It is the aim of this study to connect the cross-border planning aspect of the functional part of the region to the peri-urban and urban areas that are present in between these larger functions. Existing literature focuses predominantly on the aspect of cross-border planning in terms of infrastructure and policy alignment for example, while the cultural, social and economic relation with the 'in-between' at risk of regional decline, has been less studied. The productive (economic), cultural and environmental element of the region is expected to be undergoing a transition towards a more sustainable landscape (Gebiedsoverleg Zuidwestelijke Delta, 2020; Ministerie van Economische Zaken en Klimaat, 2020; Smart Delta Resources, 2020; van den Berghe et al., 2020), which is also challenge for the economies of industry, tourism, ports and agriculture present in the region. A large role in this transition is because of the location in the Scheldt Delta region, which introduces the risks of the water, but also due to other effects of a changing climate (Gebiedsoverleg Zuidwestelijke Delta, 2020; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020). In Dutch Flanders, integration of the ports has started recently (van den Berghe et al., 2020). Further functional integration, both cross-border and within the region, might contribute to the resilience of the region in economic, social and environmental terms, if this can also attract new economies and employees (van den Berghe et al., 2020). A challenge for this is to find a balance between more local economic activities, like agriculture and services going on in the 'in-between', and the larger interregional developments and their benefits. At the same time the development and further integration of the Dutch Flanders region into the Scheldt Delta region is needed to overcome institutional, cultural and economic barriers, imbalances and environmental challenges. A strategy that looks into enhanced cross-border operation, functional and regional connections and the link to the in-between and its economy and people, could support a repositioning of the region and strengthen its relevance into the physical and institutional Dutch and Flemish landscape.

1.33 Problem Statement

3.
Research Design
Introduction

The previous chapters have shown Dutch Flanders is facing several challenges related to employment, liveability and economy. The region is part of the functional region of the Scheldt Delta, in which a repositioning of Dutch Flanders is proposed. This is to benefit and improve the regional physical, institutional and economic relations, and translate this into the smaller scale of the rural and peri-urban areas 'in-between' areas and their economies and societies. As the Scheldt Delta is in transition, this is proposed as an opportunity for improving the regional physical, institutional, economic and cultural relations, and translating this into the smaller scale of the rural and peri-urban areas 'in-between' areas. The complex network of relations in different scales is causing frictions too, for which a more balanced development strategy can be developed. This chapter explains the methodological approaches to reach the aim of revealing the potential of the unique location of Dutch Flanders at the border and in the Scheldt Delta region. It aims to clarify and visualise the (theoretical) concepts and methods used to execute the research of this thesis. During the research of the project, the chapter was updated accordingly to the methods and results of this research, and will therefore continue to develop. This chapter starts with the research questions and aims that are formulated based on the problem statement. These are followed by the scientific and societal relevance of the project, the conceptual framework and research framework. Finally, the chapter includes a concluding and reflective part which includes limitations of the research and ethical considerations.

Historic city of Sluis in Dutch Flanders (Author, 2020)



Scales of design, from the in-between to Dutch Flanders, the Scheldt Delta region and (inter)national level.

Research question
Research aim

Research question

From the problematisation the following research question is derived:

How can the Dutch Flanders region reposition the economic, social and environmental role of its urban and peri-urban areas as part of the larger functional transition of the Scheldt Delta?

For answering this question, four sub-questions have been formulated to support and define the research more specifically:

What are the origins of the institutional and cultural misalignments and (regional) imbalances of Dutch Flanders?

What are the strategic opportunities that Dutch Flanders can seize based on the ongoing economic, social and environmental transitions in the Scheldt Delta?

What spatial interventions are needed to help the urban and peri-urban 'in-between' areas of Dutch Flanders unlock their potential and take advantage of the identified opportunities?

What is the role of spatial planning and governance in implementing these interventions and successfully repositioning the region of Dutch Flanders?

Research aim

The aim of this research is to reveal the potential coming from the location of the region of Dutch Flanders at the border to Flanders and the location within the Scheldt Delta region. The research is structured to show the different opportunities existing for the transition of the Scheldt Delta. This will be based on the research that shows the challenges in economy, society and environment that are relating to this region. The research aims to combine the analysis of the (role of) the urban an peri-urban 'in-between' with research on the transition. This is combined in order to reveal the position these in-between areas, that are at risk of decline, can take in this process and in the possible scenarios of the new regional conditions. Within the Dutch Flanders region, the aim is to recreate the visibility and reveal the potential for development, to re-establish the perception of relevance of this region and its role towards the rest of the Netherlands. Additionally, the research is meant to investigate the conditions and mechanisms that are at the origin of regional decline, and by that explore opportunities to counteract this phenomenon. This includes showing the institutional and planning systems that play a role in this region, in order to develop strategic outcomes by combining policy and analysis and applying it to the specific case of Dutch Flanders and the Scheldt Delta region. Furthermore, the research aims to support the region's relevant position by looking at the opportunities for economic (functional), cultural and institutional integration and (cross-border) cooperation to enhance the connections and benefits between Dutch Flanders and the larger Scheldt Delta region, and their surroundings in their transition.

Initial expected research output

The expected research output is the analysis result on (the development of) current conditions of the region, combined with analysis of the 'in-between' and regional transition. Together with the research on current governance conditions and future possibilities in a policy (change) framework, this can be used to formulate a set of strategic possibilities in planning of the Dutch Flanders region, in both spatial design and governance on different scales. This will result in the repositioning strategy for the development of the 'in-between' and Dutch Flanders region.

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Relevance

Scientific relevance

The plan could contribute to scientific research on economic transitions going on in regions and their major economic activities (van den Berghe et al., 2020). In this study a spatial plan is attached to this transition. As described by (van den Berghe et al., 2020), regions are facing relatively new challenges related to economy, society, the environment and technology, for which the urgency is increasing. Additionally, it focused specifically on a border region and opportunities this provides. For this, research does exist on cross-border cooperation in general and in other regions (de Vries, 2008b, 2008a; Princen et al., 2016; van den Berghe & Willems, 2017; van den Broek, 2018). This study could contribute to the application to the case of the Scheldt Delta region (de Vries, 2008b, 2008a; van den Berghe et al., 2020) and specifically, the Dutch Flanders region (Meijers et al., 2018; Meijers & van der Wouw, 2019).
Another field of research it relates to is the role of the smaller urban and peri-urban in-between larger economic or metropolitan regions and how to plan for these, like (Rodríguez-Pose, 2018; Wandl, 2020). Also, it relates to regions facing issues of decline in more remote, non-metropolitan areas (Beunen et al., 2020; Bijker & Haartsen, 2012; Christiaanse, 2020; Christiaanse & Haartsen, 2017; Dax & Fischer, 2018; Haartsen & Venhorst, 2010; Kühn, 2015; Küpper et al., 2018). The study will aim for linking these relations to the transitions mentioned earlier in this paragraph, to which it can contribute to multiple fields of research described in this paragraph. For this it will link theory-based research and research on governance to implement spatially on a regional level.

Societal relevance

As is discussed in the chapter on context, the reality and perception of regional decline (Christiaanse & Haartsen, 2017; Haartsen & Venhorst, 2010; van Baalen, 2018; van Oostvoorn, 2018; Rozendaal, 2020), the frictions of being at the border (NOS, 2016; Omroep Zeeland, 2015; van der Heijden, 2020; van der Werf, 2020) and the institutional and economic focus on the Flemish side are part of recent societal issues and developments. The increased orientation towards Flanders provides further opportunities for improved economic, cultural and institutional alignment and sustainable relations. The recent regional agreement between Dutch Flanders and the national government (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b), shows the relevance and need for development of the region, and acknowledge the possibility of it. Additionally, recent examples of cross-border cooperation like the North Sea Port (van den Berghe et al., 2020; van den Berghe & Willems, 2017), show the existence of realistic opportunities for enhancing these relations as the region is located at the border. The developments of becoming more oriented towards the Flemish and demographic changes (Meijers et al., 2018; Meijers & van der Wouw, 2019; Nistal & Schep, 2013; Slenter et al., 2015; van den Berghe et al., 2020), are also an indicator of societal changes for which the study could contribute to by providing a strategy of guiding this in a balanced approach. The study could contribute by the development of an approach for these opportunities, regional imbalances, perception and reality of decline in the strategy to positively affect the urban and peri-urban in-between and their inhabitants. In this way it could contribute to the increased relevance, and repositioning of, Dutch Flanders in the larger Scheldt Delta region and (inter)national context.

Conceptual framework

The conceptual framework shows the relation of the region of Dutch Flanders to the larger Scheldt Delta region and their context. It is based on the previously described research and problematisation. Between these scales, different borders exist. Between Dutch Flanders and the Scheldt Delta there is an economic border, present in the misalignments in benefits and opportunities for achieving these benefits (de Vries, 2008a; Haartsen et al., 2014; van den Berghe & Willems, 2017). Regarding the Belgian border, mainly the institutional misalignments and cultural frictions are forming a barrier for improved cooperation (Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b). On the Dutch side, the lack of political force creates an institutional barrier, as well as a cultural barrier based on perception, and a physical barrier in the form of limited connectivity of the (toll) tunnel (Meijers et al., 2018; Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b).

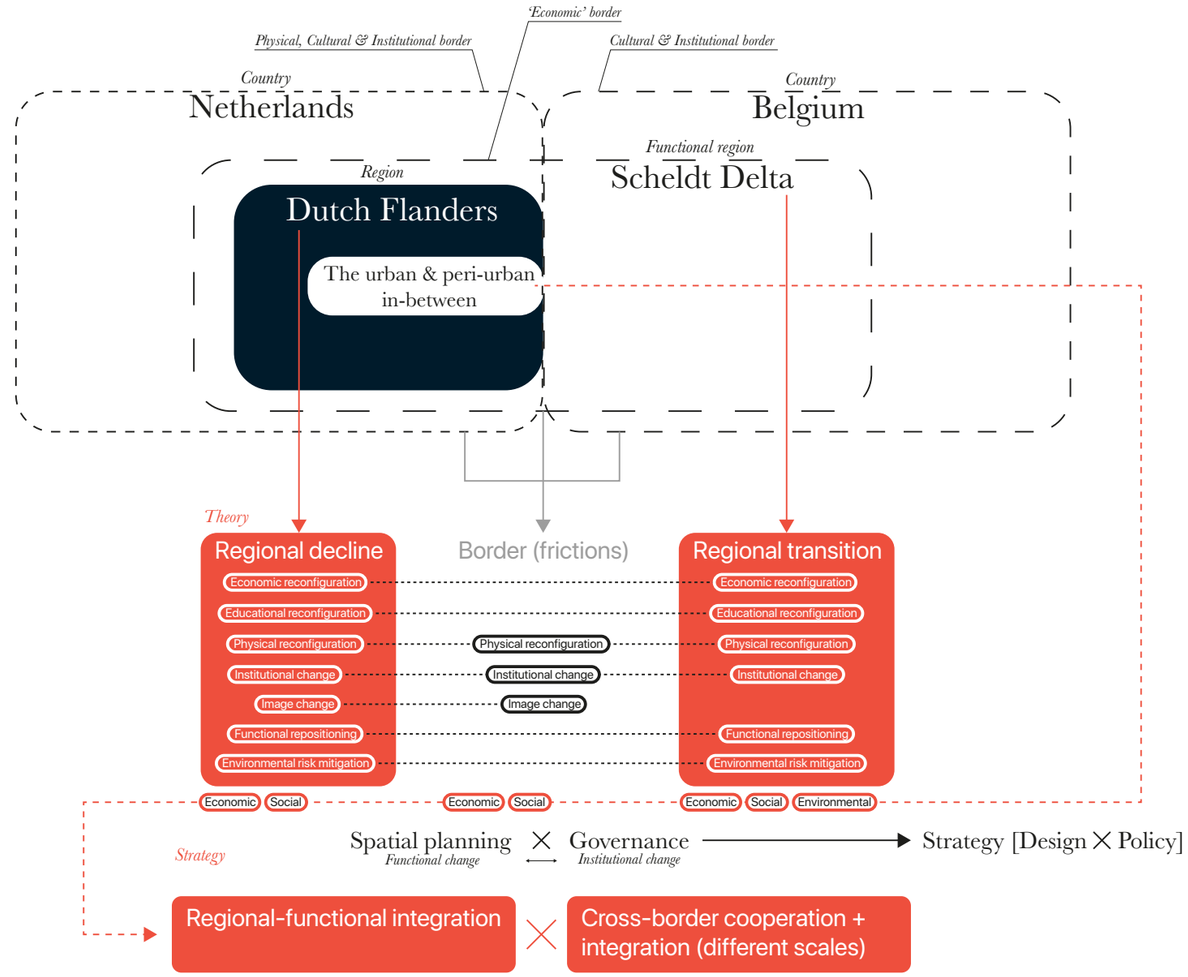
From these scales, three contextual subjects are at the origin of the problem statement: regional decline, border (frictions), and the regional transition. Regional decline related to the perceptions and realities present in the Dutch Flanders region specifically. The frictions of being a border region relates to borders on different scales, both physical and institutional. Finally, the element of regional transition is derived from contextual societal and environmental aspects and the location in a Delta region, which cause the need for a transition for future sustainability. For the three theories of the context, different concepts for approaches and their relations have been shown in the conceptual framework.

Economic reconfiguration is meant to include the diversification of economic sectors (Dax & Fischer, 2018; Thissen et al., 2010) to counter decline and the requirements for transition of economic activities (Haartsen et al., 2014; Ministerie van Economische Zaken en Klimaat, 2020; Thissen et al., 2010) as part of regional transition.

Educational reconfiguration includes the alignment with economic sectors present (Thissen et al., 2010), as well as opportunities for higher levels within the region or improved connections to these from the region (Nistal & Schep, 2013). As the economic activities are in transition, educational change that aligns with these adaptations is also part of this reconfiguration.

Physical reconfiguration relates to the spatial elements like connectivity, both within the region and towards outside for opportunities of agglomeration, migration and crossing borders (Haartsen et al., 2014; Meijers et al., 2018; Meijers & van der Wouw, 2019; Nistal & Schep, 2013). This includes spatial (planning) adjustments like the concentration of certain amenities in larger urban centres, urban restructuring (Bijker et al., 2012; Haartsen et al., 2014; Verwest et al., 2009) and adaptations to the landscape that are part of regional transition.

Institutional change refers to the different concepts mentioned that are aimed at complementary governance and joint forces (Dax & Fischer, 2018; Küpper et al., 2018; Meijers & van der Wouw, 2019), cross-border governance, diversity of approaches that look beyond growth (Beunen et al., 2020; Christiaanse & Haartsen, 2017; Dax & Fischer, 2018) and institutional levels aimed at cooperation (de Vries, 2008a; Haartsen et al., 2014).



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Conceptual framework

Conceptual framework

Image change refers to importance of changing the perception of a declining region, which can affect the investments in the region (Meester & Pellenbarg, 2006), but also the perception of remoteness and cultural distance through different types of borders mentioned (Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b), by both inhabitants and the surroundings. This requires change in order to counter further decline (Bijker & Haartsen, 2012; Meijers & van der Wouw, 2019) and to reposition Dutch Flanders as part of the larger transitions.

Functional repositioning refers to the change of the role of the 'in-between' in Dutch Flanders, as well as the role of Dutch Flanders within the Scheldt Delta region. This theory is based on the valuable geographical location between different economic core regions in both Belgium and the Netherlands and the proximity of major transport routes and industries the region provides access to, which is not always used to its full potential (Meijers & van der Wouw, 2019; van den Berghe et al., 2020).

Environmental risk mitigation is based on the theory that if no action is taken to mitigate and adapt to the risks present, due to the location in a Delta region, but also other climatological effects, the region is at risk of further decline. The risks and need for adaptation apply to both the economies and inhabitants (Gebiedsoverleg Zuidwestelijke Delta, 2020; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b) of the region and relate to the theories of economic and spatial reconfiguration as part of the regional transition as well.

As shown in the conceptual framework, the regional transition is, both with the opportunities of the border and approaches for regional decline, presented as an opportunity to link the urban and peri-urban 'in-between' on an economic, social and environmental level to these developments. This aims to make the more 'local' areas benefit from the larger scale environment they are part of, which is required to sustain the activities in their environment too. This concept of linking the in-between to the three theories leads to two concepts of strategies. In regional-functional integration, the in-between and Dutch Flanders are proposed to be more integrated in the larger scale (spatial) economic and environmental systems in which they are repositioning their role. Cross-border cooperation and integration refers to the integration on an institutional and cultural level on different scales, required for a successful spatial and economic integration to eventually be able to reposition the 'in-between' of Dutch Flanders. The use of these concepts in a structured research approach are explained in the following paragraphs.

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Research framework

Research Framework: methodology

The methods and tools that are used are shown in the research framework. This framework shows how the different steps and concepts in the project are relating to each other and to the research aim of the thesis project. The steps or phases in analysis are based on the four sub-questions. The methodology-concept is based on the three themes of regional decline, border (frictions) and regional transition coming from the problematisation and analysis of context, for which two strategic concepts are proposed to be implemented in the final output of the thesis.

Structuring the research

From the motivation and analysis of the context per theme, the problem field is defined. The main issue defined here is regional imbalance, both within the region (the 'in-between' areas) and to its surroundings (the Scheldt Delta).

In order to answer the main question, four sub-questions have been developed. These refer to different phases of the research. For each of these questions, the methods that are proposed to be applied, are indicated in a simplified diagram, as is represented in the research framework.

Diagnosis | *What are the origins of the institutional and cultural misalignments and (regional) imbalances of Dutch Flanders?*

This question defines the analytical part of the research to understand the problems and their origins in the region. It considers demographic, socio-economic, perception and governance aspects of regional decline. Additionally, the implications of being a border region are researched in this phase. Finally, the role of the type of urbanisation and urban functions for the issues in Dutch Flanders is researched.

Opportunity | *What are the strategic opportunities that Dutch Flanders can seize based on the ongoing economic, social and environmental transitions in the Scheldt Delta?*

This step introduces the region of the Scheldt Delta and analysis on the transition of this region from multiple levels of scale. This is based on existing scenarios and policies for this region. The identified set of possibilities for this transition is used to select where Dutch Flanders can be connected to and provide advantages for. This selection will be based on the research on the factors of decline and the conditions of the 'in-between' from the first sub-question.

Intervention | *What spatial interventions are needed to help the urban and peri-urban 'in-between' areas of Dutch Flanders unlock their potential and take advantage of the identified opportunities?*

Depending on the outcomes of the opportunities from the previous research sub-question, in this step of intervention the strategic design approaches for the region of Dutch Flanders are developed.

Implementation | *What is the role of spatial planning and governance in implementing these interventions and successfully repositioning the region of Dutch Flanders?*

To develop a successful strategy, in this step the previous interventions will be combined with research on the aspects of (adjustments in) policy, governance, stakeholders and planning opportunities. This will translate the vision and governance proposals into a strategic design for the region of Dutch Flanders as an answer to the main question.

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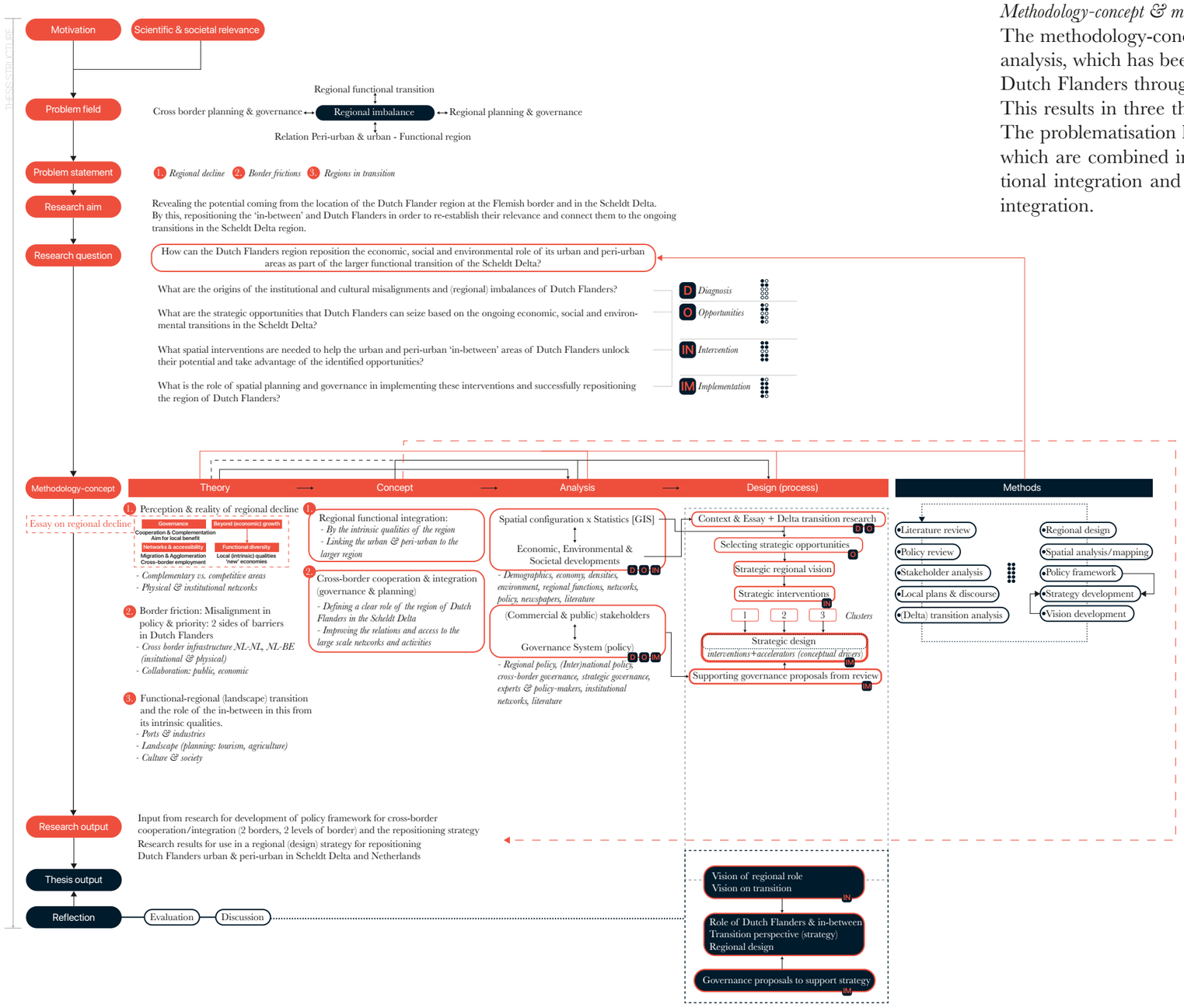
Research framework

Research framework



Methodology-concept & methods

The methodology-concept shows the concepts in the analysis, which has been at the origin of the issues in Dutch Flanders through literature and policy review. This results in three themes in the problematisation. The problematisation leads to a set of opportunities, which are combined in two concepts: regional-functional integration and cross-border cooperation and integration.

For developing the final output, additional analysis is done. This includes spatial analysis by combining the regional and urban morphology with statistic information through mapping. This is done on the scale of the region, and in a selection of representative locations on a smaller scale. Besides the analysis on theory from the problematisation, additional research on developments in economy, environment and society is executed. This includes literature review, policy review and analysis on the transition of the Scheldt Delta region. Both the spatial-statistical and analysis on contextual developments are providing input for additional research for each other. The result of this analysis aims to provide input for a strategic vision for the repositioning of the 'in-between' and the regional transition of Dutch Flanders and the Scheldt Delta. In the design process, it translates the research on context and transition and the selection of strategic opportunities for it. Additionally, in order to develop the governance proposals for implementation of the (design) strategy, analysis on stakeholders is combined with analysis existing governance is combined. The methods used for this are policy review, literature review on governance systems and analysis on involved stakeholders and local plans & discourse. The selected strategic interventions are finally implemented in three different clusters defined in the vision. This is part of the final strategic design for the transition of the Scheldt Delta region and repositioning of Dutch Flanders and the 'in-between', which answers the main research question and is constructed as the proposed thesis output.

Conclusion
Reflection

In this chapter, the main concepts and origins of the research design and methodology have been presented. The Dutch Flanders region is facing issues related to regional decline, for which seizing the opportunities coming from the Scheldt Delta transition can be an opportunity, along with interventions in the region itself for improving physical, cultural and institutional relations. The aim of the research is revealing the potential of its location and connecting the transition to the repositioning of the 'in-between'. To overcome borders on different scales, a set of theoretical concepts regarding regional decline, border (frictions), and regional transition are combined with the repositioning of the economic, social and environmental role of the 'in-between'. This is combined in two strategic concepts of regional-functional integration and cross-border cooperation and integration. For executing the research based on these concepts and problematisation, four research questions are developed that define four phases of diagnosis, opportunity, intervention and implementation. For answering each question, a different composition of research methods is used, as indicated in the research framework. The analysis consists of a combination of spatial analysis, statistical information and research on developments in economy, environment and society in the context of the project for the phases of diagnosis, opportunity and intervention. Additionally, analysis on governance and local plans & discourse will be done, which relates to diagnosis, opportunity and implementation mainly. Respectively, these provide input for the vision and strategy on the role of the region and its transition, policy interventions and design interventions. The developed final outcomes of the research are implemented in a regional design strategy, in order to answer the main question of the thesis project.

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Research limitations of proposed research design

In the definition of approaches to the problems and issues that are central in this thesis, not all approaches are developed by the author through combining individual research. In here, assumptions of the most probable strategies and directions provided in literature and policy, suiting the main theme of the project, have been selected as the timeframe of a thesis project is limited. Regarding the problem definition, the assumption has been made based on individual research that the Dutch Flanders region is suitable for economic improvements, while literature describes only several areas have such economic potential. Yet, the research has been limited to this assumption as a procedure of selection criteria is not part of the research scope, and this research has an exploratory nature in the end. This is based on the hypothesis of this region being one of these potential regions, as it is uniquely located in between economic core areas of both Belgium and the Netherlands. Finally, the hypothesis that linking the 'in-between' will benefit both Dutch Flanders and the Scheldt Delta region and their inhabitants and economies to counter decline, will have to be reflected on after conducting the complementary research of this project.

Ethical considerations of proposed research design

In the problematisation of the proposal the transition of major economic functions and (industrial) activities is described. The effects of large-scale agriculture and port-industries that are part of this will be taken into consideration. Currently, these are industries under pressure because of their negative externalities on the local and global scale. However, these are essential components of logistics and food supply in modern society, and likely will be in the future. Therefore, a transition addressing the issues, risks and opportunities of these will be researched in the project, considering sustainable development amongst other considerations regarding the direct (Delta) and indirect environments of the region of study.

The described decline of the region is something which is partly influenced by perception and context. A declining region in the Netherlands is different from one in another (spatial, social and economic) context outside Western Europe. In this project decline is defined relative to the surrounding areas in the Netherlands and surrounding countries. The existence of decline in this study will additionally be supported by data like demographics and economic developments, relative to its surroundings in order to balance the regional and local benefits.

Regarding the field work of the area represented in this project, this is an analysis of a specific state and condition of the areas visited through the lens of the author. This means perception and historic research and knowledge are part of this. As the role of perception is inevitably present in the research on the image of the region, the perceived frictions and the review of literature that are part of the project, the approach when processing these data is executed with a neutral voice as much withing the limitations of neutrality by one author. These limitations are considered and are aimed to be mitigated by consulting different positions coming from the research, which will eventually result in a final position that is supported by research. The same approach applies to the review of policies from different scales of institutions that will be part of the research. Although these persepctives and policies can be biased or not objective, these are treated as neutral as possible by comprehensive research done in advance and will be critically reflected on.

4.
Theory essay

This section includes the essay written for the course *AR3U023 Theories of Urbanism*, as part of the Graduation programme. It is aimed at developing a theoretical review to support the graduation project. The essay will mainly concern the issues of regional decline in Dutch Flanders. It is therefore an important contribution to answering the first research question: '*What are the origins of the institutional and cultural misalignments and (regional) imbalances of Dutch Flanders?*' and links the review of origins to a set of approaches. This can eventually be used in the development of the strategy as discussed in chapter 3 on Research Design.

Planning for the imbalanced: turning the tide of regional decline in Dutch Flanders.
A review of origins and strategic approaches in regional planning applied to the case area of the Dutch Flanders region in the Netherlands.

AR3U023 Theories of Urbanism
MSc Urbanism, Delft University of Technology
25 November 2020

Christiaan Hanse

4576977

Abstract

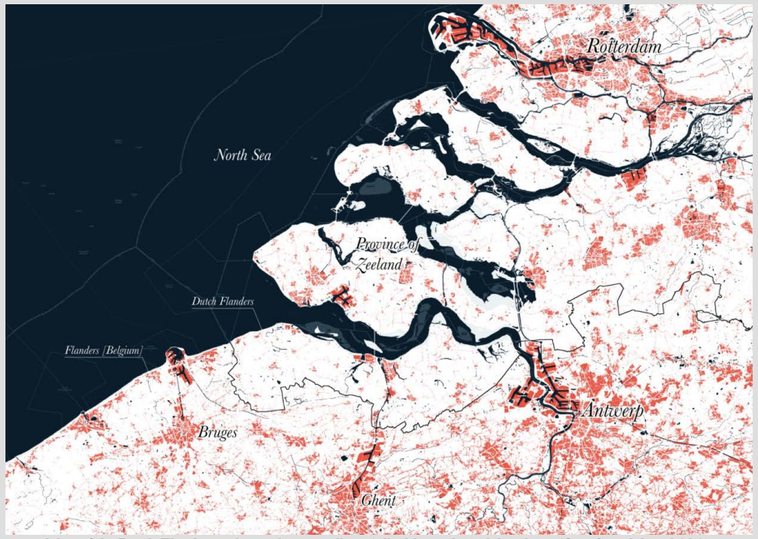
Many peripheral areas in the Netherlands will face population decline and its consequences in the coming years. While this is a common trend, some regions are more successful in reacting to this than others. Many regions have tried to counteract or neglect regional decline by attempting to attract people and businesses from outside to stimulate economic growth which has proven to be mostly unsuccessful. This essay reviews the literature about the possible origins of, and opportunities for, regions facing decline. Additionally, it reviews different approaches over the years aimed at presenting a set of strategic possibilities for declining regions. Both the origins of decline and the strategic approaches are illustrated through the case of the Dutch Flanders region in the Netherlands. Often, the origins of decline are a cumulation of forces operating within the region and its context. Lack of available opportunities for employment and poor alignment with education, limited connectedness within and towards their surroundings, political misalignment between stakeholders and institutional fragmentation can contribute to decline of regions as has been the case in Dutch Flanders. Approaches to counter regional decline include physical reconfiguration through improved connections, concentration of amenities in well-connected centres, and institutional integration, all leading to greater agglomeration benefits. In Dutch Flanders specifically, the alignment of governmental institutions is needed to implement these approaches. This would result in complementary functions in the region, enabling regional cooperation and a stronger position on a political and economic level. With the strategic location of Dutch Flanders between economically strong core regions this can contribute to a more balanced regional development.

Key words
regional decline, population decline, Dutch Flanders, regional strategies, regional connectivity

Introduction
Many regions in the Netherlands, specifically in the peripheries, are facing decline or issues related to regional decline (Beunen et al., 2020; Haartsen et al., 2014; Haartsen & Venhorst, 2010; Verwest et al., 2009). This is expected to continue in the coming years, meaning that strategic planning approaches for these areas are required, as regions neglecting the decline have proven to be unsuccessful in their development (Beunen et al., 2020; Haartsen & Venhorst, 2010). While on a European level regional decline is often perceived to take place in remote, rural or peripheral areas, regional decline can also take place in a more urbanised context (Thissen et al., 2010). The term decline here refers to the poor job opportunities, out-migration, closing down of amenities (Küpper et al., 2018) and the general loss of population and economic

development in the region, leading to further decline. This essay will mainly describe regional 'decline' as economic decline in relation to population decline. This essay will introduce the region of Dutch Flanders, located in the southern Province of Zeeland, which is facing issues related to regional decline.

To answer the research question: *'What are the origins of regional decline and what approaches can successfully react to this phenomenon in the case of the Dutch Flanders region?'* the origins of decline in a more developed (Western) context and the respective approaches to counter that decline will be researched through a literature review. Part of this research on origins are the consequences caused by decline. The results of this will be reviewed for the case of Dutch Flanders. Additional research will be done, specifically focusing on the local context and characteristics of the region to present a selection of approaches suitable for this region. The first two sections will describe the origins of regional decline in general and specifically for the region of Dutch Flanders. Section 3 will describe the opportunities and approaches combined after which a conclusion and reflection on the contents of the research will follow in the last section.



Map of the Dutch Flanders region and surroundings (edited by author). Map data: (OpenStreetMap, 2020).

1. Origins and consequences of regional decline

This section describes a set of reasons that are at the origin of regional decline. This includes the consequences of decline as well, as some are subsequently causing further decline. In the following section, the origins of decline will be explained starting from demographic changes and employment, followed by decline of amenities and perception, and the physical conditions and their effects on decline.

1.1 Effects of regional decline: changes in demographics and employment

As described in the introduction, one of the factors of regional decline is demographic change. Many industrialised countries are in the last stages of demographic transition, meaning their natural increase has stagnated (Polèse & Shearmur, 2006). This is one of the indicators of

regional decline. Additionally, exogenous forces like deindustrialisation and sub- and re-urbanisation, can cause demographic and economic decline in peripheral and more industrial areas (Küpper et al., 2018).

In the Netherlands, a decline of population and ageing is not unique to some municipalities, as about 61% of these will face a decline of the number of population, while 9% will face a decline in number of households as well (Verwest et al., 2009). Specifically, the out-migration of younger people can be an issue. Thissen et al. (2010) describe that especially higher educated people are leaving the more rural areas in the North-West of Europe. This is of concern as migration to more central national locations for employment of the younger population, is seen as a threat to the economic development and reputation of the region, especially in combination with the an ageing population. Another reason for the out-migration of younger people is their perception of hard structural factors, like opportunities for (future) employment, and soft cultural factors, like their identification or bonds with their home region (Thissen et al., 2010). The lack of companies in research and development, knowledge-based industries and for example a university, is also limiting job opportunities for these highly educated groups, forcing them to leave or making it less attractive to return after education (Küpper et al., 2018).

Beunen et al. (2020) describe population decline is often occurring due to a combination of different developments that evolved in a region. These can be an ageing population and a loss of jobs, leading to less investments because of a decline of public and private resources (Haartsen & Venhorst, 2010). This development can lead to further decrease of the available jobs and lead to younger people leaving the region. The decline of population is in this case both part of the origins of decline as well as the result of a declining region.

Finally, the decline of households can cause weaknesses in the housing market, especially affecting those that are offering housing. The result of this can be lower housing prices, which can in return concentrate lower income groups in especially the less favourable areas and neighbourhoods in the region. Eventually this process could cause vacancies and decline of quality of these neighbourhoods, further accelerating this negative movement of decline (Nistal & Schep, 2013; Verwest et al., 2009).

1.2 Decline of amenities and perception

While the decline of population doesn't necessarily mean liveability is under pressure, regions facing decline are often perceived to also face a decline in number of amenities (Christiaanse, 2020). Having a decline of amenities is subsequently affecting the perception of liveability in these regions (Christiaanse, 2020; Gieling & Haartsen, 2017; Haartsen & Venhorst, 2010). The issue of a negative perception or image can negatively affect the development and investments in the region, as for example companies tend to select their locations based on 'soft' or privately preferred aspects of the location (Meester & Pellenbarg, 2006). This means the risk of further population decline is present, which can have negative consequences like the decline in amenities. In addition, concentration processes on the national scale can cause regional differences (Dax & Fischer, 2018). This could be the concentration of investments or (governmental) institutions outside the region (Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020), but on the small scale also concentration of amenities, causing a declining number of amenities in regions.

The costs of these public and private services are relatively high, which means keeping open the remaining facilities is unsustainable in less dense regions (Küpper et al., 2018). Christiaanse (2020) describes another reason besides the economic unsustainability. Their research describes a decline of amenities is not occurring at the same rate as population decline. Mainly, the decline of amenities, especially concentration of them in larger regional centres, is due to increased mobility, as well as the benefits of an increased scale due to concentration. While in the Netherlands the decline in absolute number of amenities is present in more rural

or peripheral areas, this does not mean access to these in general has decreased, as mobility in these regions is relatively high (Christiaanse & Haartsen, 2017). Yet, to some groups who are less mobile in terms of their ability to travel larger distances or to more vulnerable groups, the decrease in number of amenities can be an issue as accessibility does not mean facilities are available at the same rate in every village or city. After all, accessibility is determined by the conditions in the region, culture and by individuals (Christiaanse, 2020), which is why some groups appear to be more affected by decline. Amenities include for example supermarkets, (health)care services (Beunen et al., 2020) and educational facilities (Thissen et al., 2010). Besides providing a practical function, they are having a social function as these are often locations for social interaction (Christiaanse & Haartsen, 2017). In addition, educational facilities provide opportunities for younger people to stay and companies to settle as they provide an educated population, who are possible future employees. Especially the transition to higher education is of importance to be present in the region, as this is among the main reasons many younger people are leaving the region (Thissen et al., 2010).

1.3 Physical conditions and their effects

Besides the developments or trends occurring on a demographic or societal level, physical conditions and (geographical) location contribute to the probability of decline. More rural areas can face economic challenges along with demographic decline due to the lack of agglomeration benefits and presence of economically stronger urban areas. These can be perceived to be competing the weaker regions and causing decline due to the relationship as economic centre-, and -peripheries (Meijers & van der Wouw, 2019; Polèse & Shearmur, 2006). Additionally, the size of urban centres in the region can determine regional decline. If in regions, no urban centre or city of a 100.000 inhabitants, or no minimum of three urban centres of 40.000 inhabitants is present, this is one of the determining factors for regional decline (Polèse & Shearmur, 2006). In their research, they also describe the importance of accessibility, like the presence of a major transport or trading route, as well as the rate and presence of 'old' industrial activities based on labour-intensive or primary processing of resources, for determining decline. Finally, the location of being spatially peripheral to economic core activities in a country and limiting geographical or climatologic conditions can determine, if a combination of these exists, the probability of regional decline (Haartsen et al., 2014; Polèse & Shearmur, 2006). These factors describe intrinsic (economic) strength or weakness, the (dis)ability to connect to neighbouring activities and the rate of physical inter-connectedness to be of importance for determining, and origins of, regional decline.

To conclude, the decline of a region is often caused by a combined set of endogenous and exogenous forces. In population decline, the main origin is the lack of, or loss, of available jobs that fit both the existing (future) employees and the educational opportunities present in the region, as well as external employees like migrants and population from surrounding regions. The lack of diversity in employment opportunities and sectors is described to be a factor in decline as well, as this would fit a diverse population of employees. In return, the loss of population can affect the investments in the region and decline of amenities, which can cause further economic and demographic decline and shortages of both employers as well as employees. Finally, in this section the physical conditions like size of urban centres, possibilities to agglomeration benefits nearby and (insufficient) connections are described to be a factor of origin in regional decline.

2. Regional decline: Dutch Flanders case analysis

The region of Dutch Flanders is facing challenges related to regional decline and regional imbalances. In this section, the factors described in the previous section will be reviewed for the case of Dutch Flanders in addition to more specific factors in decline of this region. Finally, the aspect of governance in decline will be introduced in this section, as this is more specific to the Dutch Flanders region.

2.1 Demographic change and employment: imbalances in Dutch Flanders

A decline in number of population and (access to) jobs, both indicators for regional decline, are present in the region of Dutch Flanders (Rabobank, 2016; (ZB| Planbureau voor Zeeland, 2018). However, the overall employment rate is comparable to the rest of the Netherlands, which could be due to the decline of both population and employment (Eurostat, 2018; CBS, 2019; 2020; van der Wouw, 2017). Additionally, jobs in the service industry have declined, especially governmental-related services, which led to a decline of 16% in jobs in the main cities of the province (Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; van der Wouw, 2017). At the same time, in the industrial and healthcare sectors, which are among the main industries in Dutch Flanders, there are shortages in number of employees (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020). The number of total students is expected to further decline by 25% (Nistal & Schep, 2013), possibly increasing this issue of shortages in employees.

Also, the risk of out-migration described in the previous section, causing a concentration of lower-income groups, is present in this region (Nistal & Schep, 2013). The out-migration of students is, as previously described, a risk if the link to higher education is missing. In Dutch Flanders up to 90% is leaving the area for study, while only one third is willing to return (van den Berg, 2010), and only 23% is eventually returning after graduation (de Cuyper, 2017) as many are staying in the surroundings of their location of study. Additionally, the risk of vacancies exists. In the least attractive areas and housing stock, the vacancies could go up to 30% if no changes are made to existing stock, increasingly affecting the image of decline (Nistal & Schep, 2013). While the decline of population in Dutch Flanders is partly reduced by in-migration from Flanders, the overall regional population is at decline due to migration to other parts of the Netherlands and stagnation of natural development (CBS, 2020). This stagnation is one of the indicators described earlier for regional decline (Polèse & Shearmur, 2006).

2.2 Amenities and perception in Dutch Flanders

As mentioned in section 1, the decline of amenities is an indicator for regional decline. In the province of Zeeland, another reason than population decline, can have contributed to this. Meijers & van der Wouw (2019) describe in their research that due to the former isolated structure of the islands, each depended on their own facilities. This caused a relatively large number of services and facilities to be present on each island. Due to the construction of dams, bridges and tunnels, some amenities were no longer needed on each island, as the connectivity increased. This caused a relatively larger decline of amenities compared to other regions, which could partly explain the image and reality of a declining region.

Another factor related to the perception of the Dutch Flanders region, is that of a declining region, being 'left behind' and at the peripheral location (Meijers & van der Wouw, 2019). This perception exists by both the inhabitants as well as from outside. This can in return negatively affect the investments settlement of major functions or companies (Meester & Pellenbarg, 2006; Meijers et al., 2018). For example, the planned relocation of a mariner's base in this province was cancelled due to the perception of not being able to provide sufficient employment and risks of not being able to sell their house by mariners (van Oostvoorn, 2018; Rozendaal, 2019). This has confirmed the negative perception is affecting the investments and location of major functions in this province.

2.3 Physical condition: limited accessibility, periphery and border

Dutch Flanders is located at the Dutch periphery, bordering the region of Flanders in Belgium. Between the Flemish region, physical connectivity is present as the border is not a limitation to cross. On the Dutch side, there is only one way to reach the rest of the Netherlands without first travelling around Antwerp, through Belgium. This connection has been a topic of discussion for many years (Meijers et al., 2018; Meijers & van der Wouw, 2019; van Baalen, 2018, p.54), for both the previous ferry as well as the current tunnel for which toll has to be paid. Already after the Second World War, the costs for crossing the Westerscheldt water were discussed to be unfair and limit the accessibility of the region. The region was considered as different from others and it was perceived inappropriate to try to keep the area attached as much to the Netherlands, while surrounding countries were opening borders, and tickets costs were perceived to be reasonable (van Baalen, 2018, pp.51-57). The presence of the toll for the tunnel, being the only fast connection to Dutch mainland, causes the perception of being locked up and having less opportunities for development (Meijers et al., 2018). This also limits the possibilities to- and from other regions in the province as well as other metropolitan regions, to work or live in different regions on two sides of the tunnel. This is one of the examples of physical peripheries and remoteness previously described for regional decline. Next to this, the presence at the border is still an issue, separating the area from Belgium as well. This makes the area a periphery while it is actually in between Dutch and Flemish economic core regions, which is also due to limited connectivity, and long travel times to them (Meijers & van der Wouw, 2019; van den Berghe et al., 2020). Reasons for this are the limited connection of train transport which takes relatively long, and the absence of a motorway connecting the region to the rest of the Netherlands beyond the tunnel, resulting in longer commutes and lowest availability of jobs within a reasonable time compared to the rest of the Netherlands (Meijers & van der Wouw, 2019). While this border is causing cultural frictions as well (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020) regional imbalances are existing because of it, as the Dutch side cannot always benefit from the positive effect its (water) infrastructure provides for the Belgian ports(cities), while the Dutch are contributing to the maintenance of these (de Vries, 2008; van den Berghe & Willems, 2017). Also, in for example the health sector, frictions and competition exist because of differences and misalignments in policy on two sides of the border regarding specialist healthcare, which negatively affects the Dutch hospitals in the region (Slenter et al., 2015; van der Heijden, 2019).

2.4 Governance issues related to Dutch Flanders

Regional decline was a topic on the political agenda in the Netherlands for years but was later considered to be more of an issue for individual regions and should be solved by regions accordingly (Beunen et al., 2020). Specific to this region is the lack of governmental (lobbying) force, which can be an issue if decline is not considered a national interest. As described by Kühn (2015), this is an issue in many regions where not only spatially, also in terms of network a peripheral position can exist. Meijers & van der Wouw (2019) describe the region has missed many opportunities because of this in the past. For example, the construction of the tunnel has not been presented as being of international importance and was therefore not considered by the national government as such, resulting in the payment of toll as it was only perceived for the inhabitants of the region. In this process, the province also did not manage to collaborate with the institutions of surrounding metropolitan areas to stress the importance of the connections. Another example is the decision for trains which have to stop at every train station in the province, making travelling to the Randstad to take longer than by car. Partly this lack of power is also due to the tendency of competition (Meijers & van der Wouw, 2019; van Zwet & van Vuuren, 2016) between different municipalities and regions in the province, which all have their own identities and see the other islands as being different to them. This can cause

them to only aim for their own interest, instead of collaborating in the province's interest. This reduces their political force because of their division, which could be another factor in the decline of the region.

In conclusion, misalignments exist between educational opportunities and employment in Dutch Flanders. Population decline has been in line with decline of employment, which causes relatively no difference in unemployment rates. However, this decline has led to a decreased number of amenities and decreased perception of a peripheral region. The limited physical and institutional connectivity to surrounding regions has also contributed to the economic and demographic underdevelopment, as this limits the opportunities to combine working and living in, and collaboration with, different regions. These limitations are partly caused by lack of coherence, competition and lack of political force on larger scales by the local governments to which the opportunities of being in between core metropolitan regions cannot be fully exploited.

3. Approaches for planning in declining regions

Based on the previous two sections on the origins, approaches for regions facing decline are in this section described in general and for Dutch Flanders specifically. The section will start with a short introduction on existing approaches and why these have not always been successful. The following paragraphs will concern approaches to changing demographics and economy, the decline of amenities, the physical reconfiguration and the aspect of governance in approaching regional decline. Per paragraph these will be linked to the case of Dutch Flanders accordingly.

3.1 General issues of existing approaches

Multiple authors describe traditional approaches to decline are aiming at economic growth and ending the decline of population, including cases in the Netherlands (Beunen et al., 2020; Christiaanse, 2020; Dax & Fischer, 2018; Küpper et al., 2018). Instead of accepting decline, some municipalities tried to 'solve' the issue by large scale investments, constructing new housing and business parks to attract people as a response to decline (Beunen et al., 2020; Haartsen & Venhorst, 2010). These approaches differ in their level of success, as they largely depend on their context (Beunen et al., 2020). Yet, anticipating on these changes is necessary, as not responding to for example population decline, can challenge existing strategies and policies, putting further pressure on the regional development (Beunen et al., 2020). Here, the challenge is to ensure a transition adjusted to future population levels and the economic needs of this size, which can require for governments to set new goals (Polèse & Shearmur, 2006). Therefore, looking for opportunities that reach beyond (economic) growth can be an alternative strategy for regions facing decline (Dax & Fischer, 2018; Küpper et al., 2018).

3.2 Opportunities and approaches: changing demographics and employment

As some regions are naturally declining, the risk of vacancies is present as mentioned earlier. Some regions have been trying to attract new inhabitants from economically stronger regions with new concepts of housing for example, but this has generally not been a successful strategy and increased competition between municipalities in the declining region instead (Verwest et al., 2009). In their research they also describe a set of strategies. One is demolishing the least attractive housing stock, based on the housing preferences which also provides room for new types (Haartsen et al., 2014; Verwest et al., 2009). Other strategies are the restructuring of neighbourhoods, decreasing the number of plans for new, additional construction and the change of functions of vacant housing stock to avoid structural vacancies and decay of neighbourhoods, which is also described to be an opportunity in Dutch Flanders (Nistal & Schep, 2013).

Regarding education, new systems for financial support should not be based on extra support for smaller schools, as currently a financial trigger exists for keeping the number of students limited. Instead, the aim should be on triggers for collaboration to allow schools of sufficient size to remain present in declining places (Haartsen et al., 2014). Concerning the out-migration because of higher education, there is a challenge to attract return migrants or newcomers to the region who can bring in new human and social capital in return, if regions manage to provide them with opportunities in the secondary, tertiary and quaternary sectors of employment (Thissen et al., 2010). For secondary education, it is important to have educational facilities present in the region that fit their economic activities (Nistal & Schep, 2013). This alginment can, in combination with a more diverse economy as is described in §3.4, attract new employees and lead to a more highly educated population (Haartsen et al., 2014; Nistal & Schep, 2013).

Additionally, if connectivity improves, the opportunities to work outside the region while living inside, can be an opportunity to maintain and attract a more diverse population, including migrants from surrounding (metropolitan) areas, to this region (Haartsen et al., 2014; Meijers et al., 2018; Nistal & Schep, 2013). Especially the in-migration from Flanders in Belgium, shows a diverse population is attracted to the region which can increase diversity and is beneficial for the demand for amenities, and shortages in employees in the region (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; Nistal & Schep, 2013).

Finally, migration is described as a potential opportunity against decline. While, as mentioned earlier this section, attracting new people from outside the region has not always proven to be the most successful strategy, attracting the population that left for education (Haartsen et al., 2014; Meijers & van der Wouw, 2019) for example, or people looking for unique qualities of the region, can be an opportunity (Bijker et al., 2012; Dax & Fischer, 2018; Nistal & Schep, 2013). However, to attract the population that out-migrated for education, mainly the aspect of an existing social network, the presence of amenities (Bijker et al., 2012) and the image of the region (Bijker & Haartsen, 2012) are of importance. Attempts for keeping them should, besides the image and social attachment, focus on educational and employment opportunities and residential qualities within the region (Thissen et al., 2010).

3.3 Amenities and perception: relations to demographics and physical reconfiguration

The previous paragraph describes that presence of amenities is important for attracting population that out-migrated for education Bijker et al. (2012). The next paragraph also includes strategies to concentrate amenities (Meijers & van der Wouw, 2019). This requires careful consideration as economically it might be more beneficial, regarding the other values of amenities like social impact, well-being and perception of the region there are risks, as mentioned earlier (Christiaanse, 2020; Christiaanse & Haartsen, 2017; Kinossian, 2018; Meijer & Syssner, 2017). Despite, Meijers & van der Wouw (2019) describe in their research that amenities cannot be of high quality if they were aligned according to the size of their population in this region, which makes concentration and improved connectivity to maintain accessibility still a possibly more feasible option as will be elaborated on in the following paragraph.

3.4 Opportunities of physical reconfiguration

Regarding the physical configuration of declining regions, improved connectivity is the most prevalent, especially in the peripheries of a country like the region of Dutch Flanders. This can reposition the area as an important transport axis and connect to larger economic networks (Meijers & van der Wouw, 2019). In Dutch Flanders, this would not only mean more affordable travelling through for example the tunnel by eliminating the toll, also improved public transport and the addition of a motorway for extending the transport axis of Dutch Flanders to the Randstad metropolitan area (Meijers & van der Wouw, 2019). Meijers & van der Wouw (2019) describe three planning strategies that can be implemented.

The first strategy is ‘borrowing size’ through improving infrastructural and organisational networks for gaining agglomeration benefits of surrounding metropolitan areas, like Antwerp and Ghent, as well as more distant areas like the Randstad. This is especially important on an (inter)national level, as only stronger regional connectivity does not necessarily contribute to more metropolitan functions for the region and could even form competition rather than ‘borrowing size’ (Meijers et al., 2016). Especially if the economic benefits would also attract ‘new’ secondary, tertiary and quaternary types of industries for diversification besides the primary sectors, this could be an opportunity (Dax & Fischer, 2018; Haartsen et al., 2014; Thissen et al., 2010). In Dutch Flanders this can also relate to consumptive economies, which are able to attract employment in these ‘new’ sectors like tourism or gastronomy (Thissen et al., 2010).

Meijers & van der Wouw (2019) also describe the possibility of urban concentration, meaning the amenities, population and investments in the region should focus on certain urban centres functioning as the cores in the region. This approach would aim at increasing efficiency and the benefits of economies of scale for cities through shared infrastructure, lower production costs and a diverse group of expertise (Christiaanse, 2020). However, Christiaanse (2020) and Kinossian (2018) also describe concentration brings the risk of losing jobs, places for social interaction and loss of choice, which should be considered in areas with especially more vulnerable or less mobile groups.

Thirdly, improvements in networks between different (smaller) urban centres can lead to benefits of agglomeration as they would function more coherently, as if they were one urban centre with larger political and economic weight (Meijers & van der Wouw, 2019). Especially this approach could fit the Dutch Flanders region as this aims to overcome the fragmentation of the region and improving connectivity, which is previously described to suit this region. After all, selecting each of the approaches would require infrastructural improvements in for example road connectivity and public transport, to allow for sustained accessibility of (urban) areas and amenities (Christiaanse, 2020).

3.5 Governance strategies in planning

In order to realise the earlier approaches, improvements in governance and use of the cross-border potential in Dutch Flanders are needed. Instead of competition, cities and municipalities would benefit from complementing each other (Dax & Fischer, 2018; Küpper et al., 2018; Meijers & van der Wouw, 2019), and present regional diversity as an important value (Haartsen et al., 2014). Haartsen et al. (2014) describe municipalities need the national and provincial government to take the lead in approaches regarding the restructuring of housing stock for example, due to this competition and fragmentation.

Additionally, it would be important for regional governments to develop strategies that are not only based on economically more prosperous periods and economic growth (Beunen et al., 2020). This is to avoid unrealistic scenarios and loss of resources in unfeasible plans, as in only a few regions a strong economic potential or ‘engine’ is present (Kinossian, 2018). Yet, Dutch Flanders might have such potential, as it is located in between the Dutch and Flemish economic core regions (Meijers & van der Wouw, 2019; van den Berghe et al., 2020). Dax & Fischer (2018) describe in their research it is important to consider institutional, social and cultural development of a region and better respond to these more local conditions and the opportunities this provides, as developments of these differ in many regions from just economic decline. These differences and the need for more locally adjusted approaches is supported by (Christiaanse, 2020; Christiaanse & Haartsen, 2017). In their research, they describe other aspects have become increasingly important, like the value of amenities as described earlier (Meijer & Syssner, 2017), place-specific social innovation through allowing for local participation in declining areas, as described to work for especially smaller developments by Küpper et al. (2018), and the importance of quality of life and well-being as key drivers for

regional development. However, a more local-based or bottom-up approach, would still have to be supported by a higher level of government as they can provide a platform for this (Küpper et al., 2018).

On the cross-border aspect, a similar approach to governmental lead and collaboration, as presented earlier, exists. De Vries (2008) describes instead of only looking at the national interest based on what separates these countries (like culture, law and policy (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020)), it would be more beneficial to look at existing relations instead. Regarding leadership in governance, for cross border cooperation no central actor exists, so in here, collaboration on the same hierarchical level is needed. An opportunity for this is governance from a European level, through for example cross-border visions and research on this type of collaboration through independent institutions (de Vries, 2008). These new, external actors could also lead to more innovative approaches (Küpper et al., 2018).

In some sectors in the region, cross-border collaboration already exists. The North Sea Port, combining the Ports of Vlissingen, Terneuzen and Ghent, is one example. Especially this example is relevant, as these ports are owned by mostly local governments, which shows cross-border collaboration can succeed (van den Berghe et al., 2020). Another example is the collaboration with hospitals for specialised healthcare (Meijers & van der Wouw, 2019; Slenter et al., 2015); van der Heijden, 2019). However, this requires careful consideration, as it can negatively affect accessibility for clients in some cases (Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020), and can cause competition in healthcare, education and leisure activities (Nistal & Schep, 2013) in the case of policy misalignment (van der Heijden, 2019). Finally, the opportunities to work across the border as described earlier, would need additional policy and provision of information as it requires a more individual approach, because companies and employees are often not aware of the potentials, or suffer from the lack of support, for cross-border employment (Haartsen et al., 2014).

In this section a selection of approaches for regions in decline has been presented. Existing approaches focusing on growth have in many cases not proven to be successful, but can be, in regions with stronger economic potential. Physically, regions can focus on the concentration of amenities and/or improved connectivity within or towards surrounding areas for agglomeration benefits. Dutch Flanders can use its position between economic core regions by improving the connections on an institutional and physical level. This would allow for a larger diversity of economies to be present in the region, which can in return attract possible employees and stimulate migration, and improves the possibilities to combine working and living in different regions. For this, the alignment between educational possibilities and economies in the region is of importance, as well as restructuring of real estate in the region. A central institution for collaboration on both the regional, as well as the (inter)national level to overcome competitive positions and strategies, would stimulate further cooperation and could increase the benefits for all actors for a more balanced development of the region.

4. Conclusion

This essay aimed to provide an overview of the origins of-, and approaches to regional decline and to use the region of Dutch Flanders to describe the results for a specific case area in the Netherlands, in order to answer the following research question: *'What are the origins of regional decline and what approaches can successfully react to this phenomenon in the case of the Dutch Flanders region?'*. The literature review has shown that the origins of decline are often a cumulation of different forces from the region and its context. The availability of employment is both at the origin as well as a result of the regional decline. This has in many regions resulted in a lack of diversity

in employment, amenities and further population decline (Haartsen & Venhorst, 2010; Kupper et al., 2018; Thissen et al.,2010), also affected by a negative perception in the case of Dutch Flanders (Meijers et al., 2018; Meijers & van der Wouw, 2019; van Oostvoorn, 2018). In Dutch Flanders, misalignment of education, (cross-border) policy and employment have been a factor in the decline of the region. This also caused the lack of institutional force and collaboration on different scales and the issues of connectivity on both a physical and institutional level (Haartsen et al., 2014; Meijers et al., 2018; Meijers & van der Wouw, 2019; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020; van Zwet & van Vuuren, 2016). Opportunities are present in gaining agglomeration benefits through improved connections, both within regions and towards the surrounding regions. Investments in amenities like education, local social and cultural aspects, restructuring of real estate and diversity in employment, can be applied in Dutch Flanders to approach decline. Additionally, the alignment and cooperation of governmental institutions in policies and strategies is of importance for the successful implementation of the proposed approaches that consider other aspects besides economic growth. For Dutch Flanders, it could use this governmental enforcement for exploiting the value of its position between economic core regions and achieving a more diverse economy and population. This could be beneficial for all complementary actors and municipalities in the region for a more balanced development of the region.

To reflect, in the essay a selection of origins and approaches is made that could apply to a (Western) European context. This means the results presented in this research can differ from other locations and have limitations in giving a general overview of decline. Regarding the research for the Dutch Flanders case, not all literature is specifically been aimed at this region. Therefore, a selection of origins and approaches of existing research in this region is combined with general research on regional decline. Further research is needed on the specific mechanisms, in for example the context of history, economy and demographics, that lead to regional decline, for which in this essay an overview of possibilities has been described. Additionally, further research could be done on the effect of the presented approaches to the image and perception of the region, which has been described to be of importance in regional decline in general and in the case of Dutch Flanders.

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Theory essay

Theory essay

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Port of Antwerp as seen from Dutch Flanders (Author, 2020)

5.
Transition of the Scheldt Delta

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Introduction to the chapter

In this chapter, the regional transition of the Scheldt Delta is discussed. The region aims to become a climate resilient Delta, which has been accelerated on a political level by the climate agreement of Paris (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). Based on this agreement, greenhouse gases are planned to be reduced by 95% by the year 2050 (Arthur D. Little, 2020; Smart Delta Resources, 2020). The Scheldt Delta region and North Sea Port within, are envisioned to be an important node for sustainable energy, international transport and potential location of new companies, which is competitive due to the diversity of (complementary) sectors (Gebiedsoverleg Zuidwestelijke Delta, 2020; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a, 2020b; Ministerie van Economische Zaken en Klimaat, 2020; Smart Delta Resources, 2020). Additionally, the competitive character of (international) industries, energy intensive industries and spatial possibilities for sustainable development create the opportunities for the transition the region needs at a high level within the Netherlands and Europe (van Lieshout et al., 2018).

This chapter includes a review of different scenarios from recent policies on the regional and national level, as well as the implications of these scenarios for the region. The first section reviews the opportunities provided for sustainable energy production and -use. The second section will contain the transition to a circular economy in the Scheldt Delta. The third section includes the aspect of climate change in relation to the region, after which in section 4 the implications of these scenarios and interventions to the region are presented. In here, scenarios and impact of transition for both a short- and long-term conceptual vision is elaborated on.

5.1 Sustainable energy transition

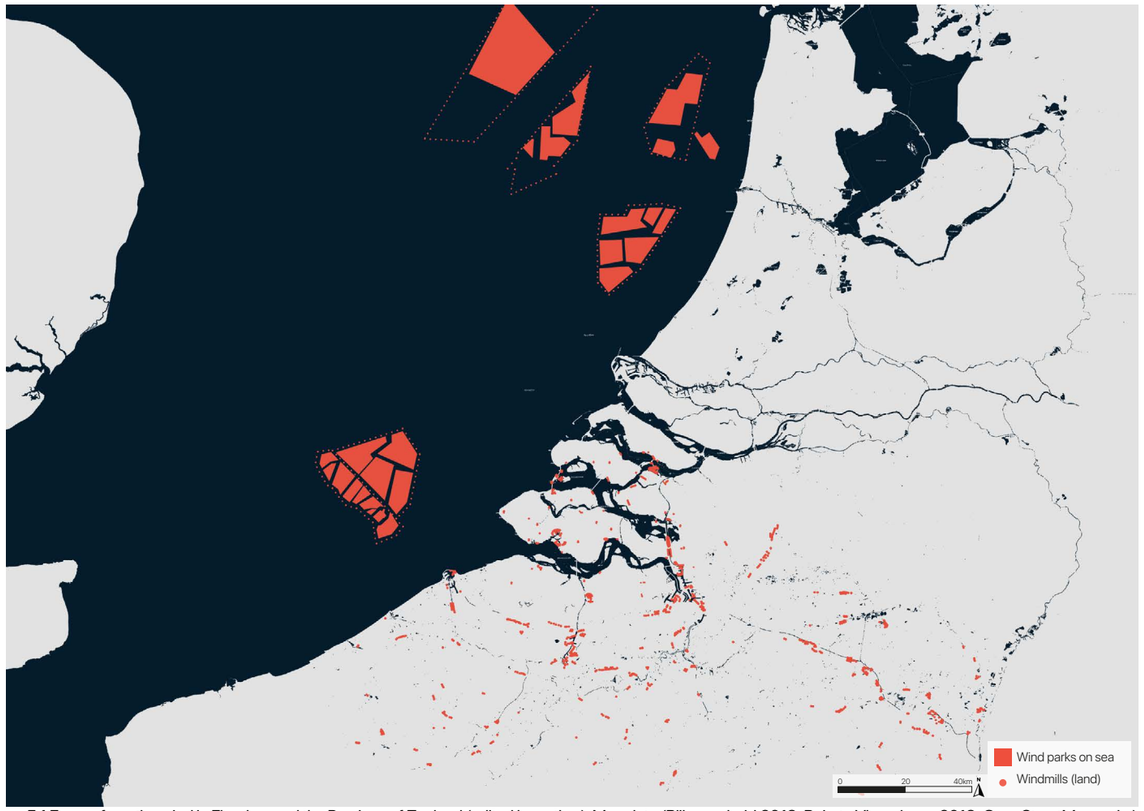
In the Scheldt Delta, many energy-intensive industries are located (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a; van Lieshout et al., 2018). At these clusters of industries, the urgency and need for a sustainable transition is high. The Scheldt Delta, and specifically the industries of the North Sea Port and surroundings, are potential important nodes for sustainable energy because they are intensive users, but also because of their position near transport networks and the sea. Renewable energy from wind parks on sea for instance, needs small transport distances in order to be efficient and to avoid underground cables at land that affect the landscape and energy costs. As the North Sea Port is in close proximity and a large energy user, they can provide the infrastructural landing and form a node for energy from the sea. Additionally, other resources like hydrogen, geothermal and solar energy are a potential that are elaborated on in short in this section.

5.1.1 Energy from the environment: Wind, water, heat, solar & biomass

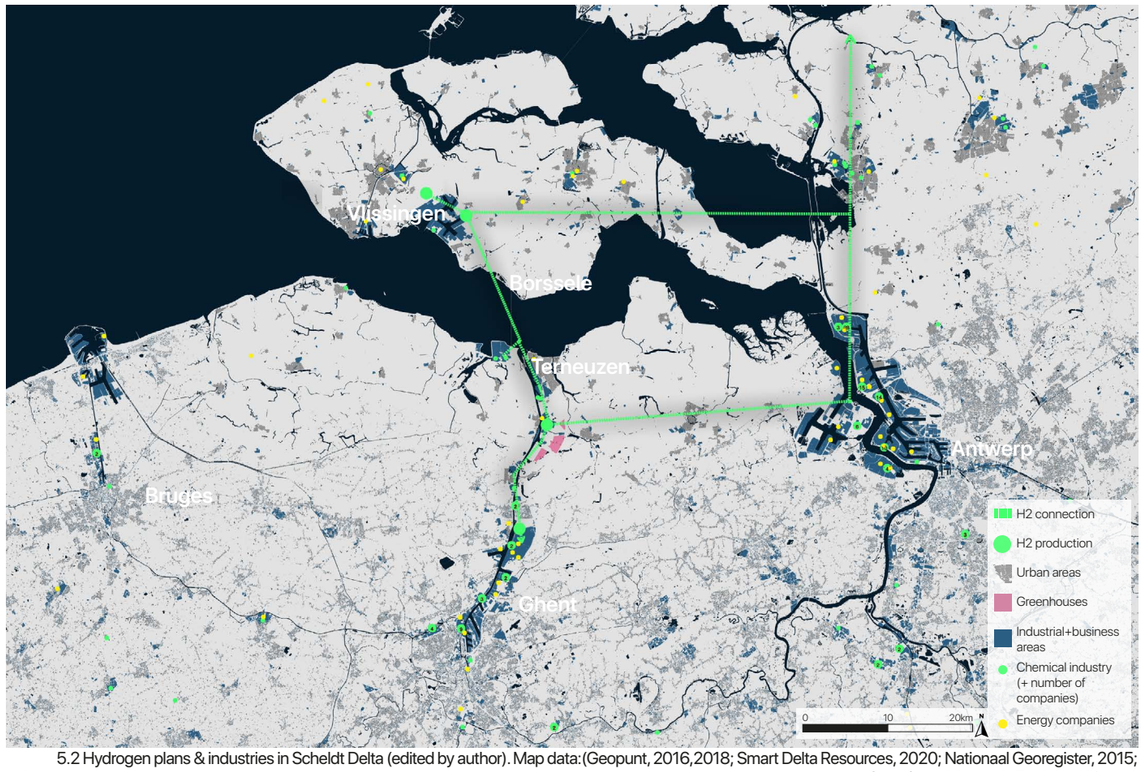
Regarding wind energy, several parks are planned and under construction, of which two parks in the North Sea will be connected to the region (Smart Delta Resources, 2020), as can be seen in Figure 5.1. These can be used for powering the industries and urban areas present (van Lieshout et al., 2018), but are also needed for the production of hydrogen and sustainable forms of transport as will be explained later. Other sources suitable for the Scheldt Delta are tidal energy, energy from waves, sweet-salt water, geothermal and solar energy (Gebiedsoverleg Zuidwestelijke Delta, 2020; Smart Delta Resources, 2020; Stuurgroep RES Zeeland, 2020). Yet, the first three examples are currently not profitable and not generally applied, as these are dependent on the specific demands and scale of users (Smart Delta Resources, 2020). Geothermal energy is possible if temperatures are increased with additional resources like heat pumps, as most industrial processes in the region require higher temperatures than regular geothermal energy offers (Smart Delta Resources, 2020).

Solar energy can be applied in the built environment as is mostly preferred, as well as on less fertile agricultural lands or at sea. An opportunity for the Scheldt Delta region would be to integrate the energy transition by integrating the production, storage and transport of energy in the transition in other aspects like those of climate change, for which adjustments are proposed to the coastal landscape (Gebiedsoverleg Zuidwestelijke Delta, 2020). Spatially, wind energy from sea doesn't affect the mainland, besides the landing of cables and other infrastructure. However, in the region of Dutch Flanders, the electricity network is currently at its limits, and is therefore in need of adaptation by enlarging the capacity or using surrounding connections (Smart Delta Resources, 2020). Another spatial effect is the storage of energy from wind and infrastructure regarding mobility, like charging hubs and possible locations for shared mobility as will be explained later in this chapter.

Finally, biomass is an opportunity for the transition as a more sustainable resource of both materials and energy. In the North Sea Port, industries related to biomass area already present (Vanelslander et al., 2011; Vlaams-Nederlandse Delta, 2016). During the transition towards more sustainable resources and energy carriers like renewable electric energy and hy-



5.1 Energy from the wind in Flanders and the Province of Zeeland (edited by author). Map data:(Rijksoverheid,2018; Ruimte Vlaanderen, 2013; OpenStreetMap, n.d.)



5.2 Hydrogen plans & industries in Scheldt Delta (edited by author). Map data:(Geopunt, 2016,2018; Smart Delta Resources, 2020; Nationaal Georegister, 2015; OpenStreetMap, n.d.; Regiobedrijf, n.d.;)

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drogen, biomass can be an alternative for fossil fuels in order to reduce emissions. However, production of biomass in the Netherlands and Europe is limited, which causes the risk of increasing emissions because of large transport distances by importing biomass (Ketelaars, 2020; Ministerie van Economische Zaken en Klimaat, 2020). By 2050 the aim is to reduce the use of it as an energy resource, as it can be replaced by the previously mentioned resources that do not emit CO_2 (Ministerie van Economische Zaken en Klimaat, 2020).

5.1.2 CO_2

In order to also reduce the CO_2 emissions in the region to contribute to the earlier mentioned reduction of greenhouse gases, also CO_2 can be reused and exchanged. Two opportunities exist for CO_2, Capturing and (re)using carbon emissions (CCU) and storing carbon (CCS) in for example empty gas fields. Like the use of hydrogen, additional (pipeline) infrastructure is needed for transport between different industries. A more sustainable option however is reuse in other sectors like agriculture. For example greenhouses can use CO_2 that industries emit for their production, including production of energy (Smart Delta Resources, 2020; van Lieshout et al., 2018).

5.1.3 Hydrogen

Another source of energy and a potential proposed for this region is hydrogen. This can be used as storage or a carrier of energy. It can also be used as resource for industrial processes present in this region as well as heating and mobility, which could also serve the urban areas (Arthur D. Little, 2020; Ministerie van Economische Zaken en Klimaat, 2020; Smart Delta Resources, 2020; van Lieshout et al., 2018). In the Scheldt Delta region, already 33% of all hydrogen in the Netherlands is produced (Smart Delta Resources, 2020). The Scheldt Delta has this potential because of the availability of energy from the Borssele wind parks and the required steam reforming processes at two industrial locations in the region. Additionally, the present industries already produce and use hydrogen, which makes local sustainable production suitable as it also reduces transport distances (Architecture Workroom Brussels, 2020; Smart Delta Resources, 2020). The use of energy from a sustainable resource is needed as predominantly steam methane reforming is used. This requires fossil energy sources and emits CO_2, while currently only 1% of hydrogen is produced through the use of electric energy by electrolysis. (Arthur D. Little, 2020; Vlaams-Nederlandse Delta, 2020). Additionally, hydrogen in the region is predominantly used for feedstock of the industries, and not yet for mobility. Currently, the production costs are often too high to be profitable, but are expected to be reduced due to the increased scale of production in the Scheldt Delta that is expected by 2050 (Ministerie van Economische Zaken en Klimaat, 2020). Hydrogen demand is expected to more than double, while at the same time the production of this has to become 'green' (Arthur D. Little, 2020). For the reduction of greenhouse gases of 95% by 2050, the transition to renewable energy resources for the region, including H_2 production, requires about the same energy as two and a half times the Borssele wind park (Smart Delta Resources, 2020).

In addition to wind energy from sea, solar and wind energy from land is required. Based on current policies, this is expected to equal the energy provided

by the Borssele wind park in the province shortly after 2030 (Smart Delta Resources, 2020; Stuurgroep RES Zeeland, 2020). This means additional production is needed between 2030 and 2050 in order to have fully renewable energy supply for the demand of the region.

Regarding the energy for the electrolysis, (Arthur D. Little, 2020) propose the landing of the energy from wind in Borssele as a location, in addition to one just across the Belgian border. This energy can then be transported to hydrogen production facilities. Hydrogen can be transported through the existing gas network in the Netherlands. Additional pipelines between the industries of the regions are proposed as can be seen in Figure 5.2. Between Terneuzen and Ghent, a hydrogen train could be used for transport between both ports (Architecture Workroom Brussels, 2020). Additionally, current naptha pipelines between Zeeland Refinery in Borssele, can be converted into H_2 pipelines, before a backbone to the facility in Flanders is constructed (Arthur D. Little, 2020). This connection could serve the whole port area of the Scheldt Delta region eventually. The section on transport and logistics will elaborate further on the different types of infrastructure possible in the transition.

Conclusion

The Scheldt Delta has potential for production of sustainable energy and can directly use it for its industries and urban areas as they are in close proximity and connections are present. The most suitable resources are energy from wind, geothermal energy and solar energy, which can be used to produce hydrogen as a renewable resource. For this, additional infrastructure is needed to transport both electric energy and hydrogen, as well as improvements to the existing network. Hydrogen has a high potential for use as it can serve multiple purposes like carrying and storage of energy, as well as being a fuel itself, for mobility as well as the built environment and industries. Hydrogen production eventually would be sustainable if the emissions like CO_2 could be eliminated by using only sustainable resources, which requires a large increase of renewable energy production in the region to be developed on land in the coming years.

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5.2 Circular economy

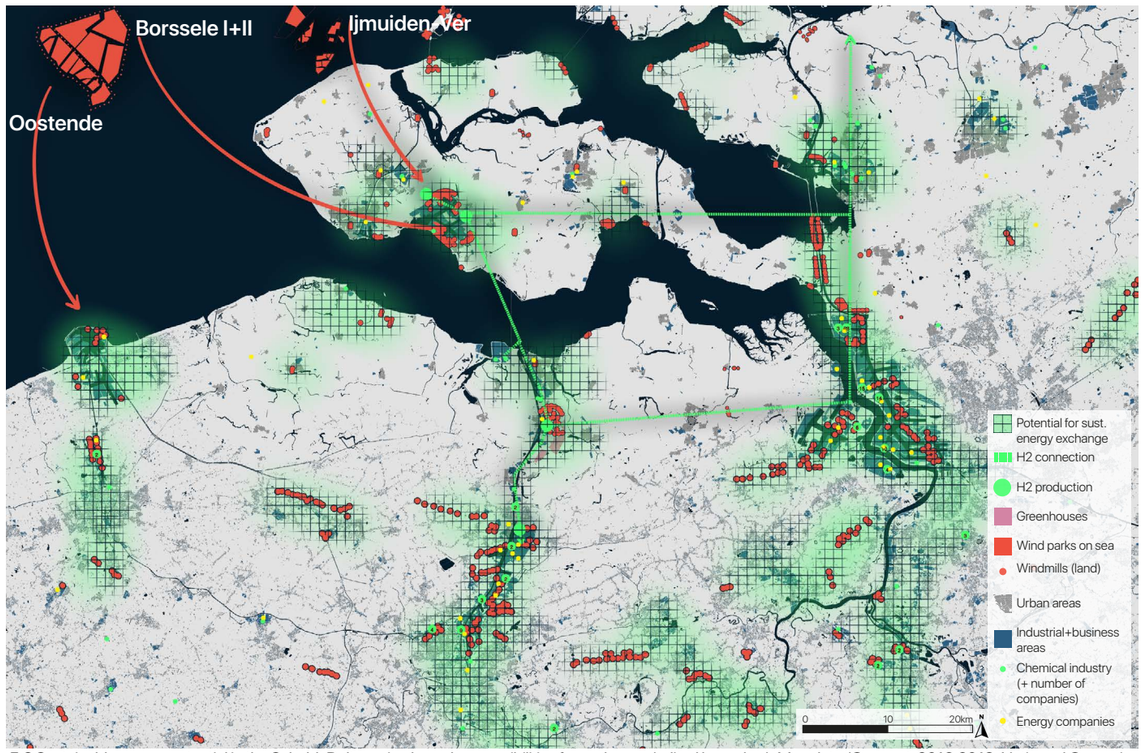
A part of the transition and challenges of the Scheldt Delta is the transition to a circular economy. This will include both the industrial areas and facilities as well as the urban and agricultural areas of the region. The national aim for 2050 is to have a 100% circular economy, based on the Paris climate agreement (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). The economies in the Netherlands and Flanders, including the Scheldt Delta, are to a large extent based on transport and distribution of resources and goods (Architecture Workroom Brussels et al., 2018). As the availability of these resources is decreasing, these economies are expected to transform, which requires renewable energy and reuse of resources. Potentials in the region also exist for exchange of resources and energy between the different activities and areas, which is elaborated on in this section on circular economy as part of the Scheldt Delta transition.

5.2.1 Circularity in industries

As introduced previously, the industries in the Scheldt Delta could exchange their resources and energy with other industries, the agriculture industry and the urban areas for heating (Gebiedsoverleg Zuidwestelijke Delta, 2020; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a; Ministerie van Economische Zaken en Klimaat, 2020). In order to close the loops of companies, opportunities are presented in policy such as the use of effluent water from sewerage, waste electricity, salt recycling and hydrogen exchange (Gebiedsoverleg Zuidwestelijke Delta, 2020). Some industries in the region also produce hydrogen as a by-product and can therefore also transfer this (waste) resource to other industries that use hydrogen. However, hydrogen demand is higher than these industries produce, so additional production is necessary (Arthur D. Little, 2020). Additionally, the oxygen that becomes available at producing hydrogen, can also be reused, which contributes to a circular system (Smart Delta Resources, 2020).

Exchange of heat is already present in the Scheldt Delta region. Heat from for example greenhouses is used in the industries of Dutch Flanders, and residual heat from the Vlissingen North Sea Port area is used in the nearby industries, which mainly reduces CO_2 emissions (Smart Delta Resources, 2020). Mainly, it depends on the scale of the demand and offer of energy whether connections for exchange and cascading use of heat are profitable. The potentials for exchange of sustainable energy resources are shown on the map in Figure 5.3. The map shows the clusters of energy-producing, urban-, industrial- and agricultural (greenhouse) areas in which a potential for offer and demand and exchange of energy is present.

Besides exchange of energy and resources, storage at peak-moments is also part of a circular transition (Gebiedsoverleg Zuidwestelijke Delta, 2020). To be completely circular, transport of resources and products over land and water should also be part of the transition, which requires sustainable fuels like hydrogen. Additionally, the policy for the North Sea Port District (Architecture Workroom Brussels, 2020) describes also railways should get additional attention in order to further reduce emissions. Hydrogen can then also be transported efficiently between the industries and ports of Terneuzen and Ghent.



5.3 Sustainable energy potential in the Scheldt Delta region based on possibilities for exchange (edited by author). Map data:(Geopunt, 2016,2018; Nationaal Georegister, 2015; OpenStreetMap, n.d.; Regiobedrijf, n.d.; Rijksoverheid,2018; Ruimte Vlaanderen, 2013; Smart Delta Resources, 2020)

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5.2.2 Circular agriculture

In agriculture, circularity means a transition towards less losses as part of a circular (food)system according to the National Environmental Vision for the Netherlands (NOVI) (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). In this vision, circular agriculture is about closing loops in the smallest levels of scale, ranging from regional to national and possibly international, for example in the case of a border region. Primarily, the aim is to (re)use agricultural flows of resources and energy, to keep circularity within the sector. An example is residual produce which can be used as biomass for energy production or biobased materials (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a; Vlaams-Nederlandse Delta, 2016). Additionally, use and production of renewable energy at agricultural locations and production and strengthening regional distribution and sales, is an aim in circular agriculture. For this collaboration between the different farmers in the region is important (Gebiedsoverleg Zuidwestelijke Delta, 2020). However, also between different sectors, exchange of for example effluent water and heat is possible, like reusing heat from greenhouses in industrial processes, or vice versa (Gebiedsoverleg Zuidwestelijke Delta, 2020). These systems should be adapted to the local conditions of the water system and soil, as well as nature and biodiversity, and the presence of possibilities for exchange of flows with other functions in the region (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a).

5.2.3 Connecting circularity to the urban environment

While circularity is often described in processes and flows of production, these flows can also be connected to the urban areas and the built environment. The previously described geothermal energy is an example of this, where energy from demanding users like the industries, cascade to less demanding users like households. Similar processes are already taking place in the region, like the steel-industry and waste-processing which connect to respectively the city of Zelzate and the University Hospital in Ghent (Smart Delta Resources, 2020). Yet, the profitability of such connections depends on the scale of offer and demand as described earlier (Smart Delta Resources, 2020). A solution that could create sufficient demand would be a heat network in the Scheldt Delta. In this, residual heat coming from industries could be combined with geothermal heat, in order to supply urban areas (Gebiedsoverleg Zuidwestelijke Delta, 2020). In the long term, Architecture Workroom Brussels et al. (2018, p.46) sketch additional scenarios for the urban areas, in which production and industries inside urban areas will return and become more on-demand. This will transform the current cities and villages and their societal, economic and physical networks and requires additional space (Architecture Workroom Brussels et al., 2018, p.52). Opportunities are existing in closing loops of urban resource flows on the scale of cities and villages. Yet, not all production would be able to take place within cities, so connections for exchange of resources, energy and goods are needed towards larger scales as well, which will be elaborated on in section 4.

Conclusion

In order to achieve a reduction of greenhouse gas emissions and scarcity of resources, the transition to circular economy can contribute. Currently the in-

dustries and ports in the region are largely dependent on the use and transport of resources and goods, for which they are likely to face a transition. The industries and built environment can exchange their excess energy and resources. However, in many cases additional production of for instance energy is needed still. The exchange of energy can also help reduce peaks of demand and offer to the energy infrastructure, as each other's excess energy is used and can be stored. For this, collaboration between different sectors, individuals and organisation is needed in order to develop the infrastructure for the exchange of resources. Besides the organisational, it also depends on the physical circumstances whether a certain type of circular intervention is possible. Currently, especially the exchange of electric energy, hydrogen and heat have large potential in the Scheldt Delta. In order to successfully being able to implement these systems, the number of resources to be exchanged, as well as the scale, proximity and number of users in the network are of importance.

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5.3 Environmental change

As a delta region, the effects of climate change will be present in the Scheldt Delta and have to be anticipated on. A climate resilient delta is therefore also part of the strategies in the National Environmental Vision (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). The effects of climate change and opportunities of direction for transition in relation to the natural and urban landscape in the Scheldt Delta are presented in this section.

5.3.1 Natural, agricultural & urban landscape perspectives

The landscape of the Scheldt Delta is well protected against the water. However, protective measures like construction of dikes, sand extraction and reclamation of land have also impacted the natural landscape and qualities like biodiversity in the region. This makes sustainable recovery of the balance between safety, economy and ecology a central issue for the Delta (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a, 2020b). The regional program for the South-Western Delta area (Gebiedsoverleg Zuidwestelijke Delta, 2020) describes five perspectives related to the landscape transition, in order to reach a connected Delta.

The first perspective is a *strong and attractive coastal area*. This includes using sand for protection of the coast while improving the natural and landscape qualities to be able to use the coast and hinterland recreationally as well. This is aligned with the strategies of safety of coastal areas and creating an attractive landscape (Architecture Workroom Brussels, 2020; Vlaams-Nederlandse Scheldecomissie, 2013). Additionally, the interventions of the energy transition, like storage, transport and production should be integrated in these landscapes and be part of the process of realisation.

Secondly, *dynamic dike areas* are and opportunity for the region. Currently dikes are predominantly linear elements in the landscape. Rising the level and using the zones between the main dike and secondary dikes that are still present, while opening parts to the water, could offer opportunities for a dynamic landscape with improved biodiversity and possibilities for new types of agriculture, nature and recreation, as well as commercial areas and housing. In addition to this, Architecture Workroom Brussels et al. (2018, p.229) describe a part of this could be giving back vulnerable agricultural lands to nature, if agriculture in the most fertile areas can be intensified and urban agriculture and nutrient production is realised in the long term. The image of Figure 5.9 shows these potential areas between dikes, which are part of the potential areas selected in Figure 5.10 and 5.12. These are based on the water issues discussed in the next section, and the location of less fertile (sandy) soils as can be seen in Figure 5.4.

The third perspective describes the importance of *vital polder and creek landscapes*. In this, freshwater supply (management) is central, which is needed for agriculture, industries, recreation, drinking water and nature itself. The locations for freshwater supply in Figure 5.7 have been used for selecting the potentials of Figure 5.9. The map of Figure 5.7 shows that of the areas in Dutch Flanders that are not affected by salination (Figure 5.6), a large share of land is protected for extraction and supply of freshwater.

Finally, the perspectives of v*ital sandbanks, mudflats and salt marshes* and a *healthy and connected estuary* describe the importance of restoring and maintaining the na-

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tural areas. The Westerscheldt estuary is a Natura 2000 area (also see Figure 1.27), which means it is important for protecting endangered species and ecosystems (Architecture Workroom Brussels, 2020). Besides providing natural quality, the areas also affect water safety, the shellfish industry and (connection to) port industries in the Scheldt Delta region (Gebiedsoverleg Zuidwestelijke Delta, 2020). Especially the port of Antwerp is dependent on the access through this water, which affects the ecology through for example deepening and widening of waterways. This means that if nature and biodiversity doesn't recover or keeps decreasing, more focus on the North Sea Port could be a strategy for development, to reduce the pressure on the rest of the Westerscheldt water (Architecture Workroom Brussels, 2020).

5.3.2 Water

The Scheldt Delta is dependent on its location at the water. The Delta works in the region provide safety for parts of it, but the interventions like dams and sluices also cause water quality problems. The Westerscheldt is directly connected to the North Sea, yet nature and water quality is also under pressure due to reclamation, extension of waterways, sand extraction and wastewater (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). The National Environmental Vision (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a) describes several policy documents are combined in the earlier mentioned Regional Program for the South-Western Delta (Gebiedsoverleg Zuidwestelijke Delta, 2020), concerning water safety, freshwater supply, spatial adaptation, water quality and nature, and economy. The five perspectives this provides have been elaborated on in the previous paragraph. In the Scheldt Delta, sea-level rise requires additional protection, but also causes other challenges like salination, affecting the agricultural lands and freshwater supply for urban areas and industries (Architecture Workroom Brussels, 2020). Additionally, stormwater runoff and riverflows will become more extreme and cause major fluctuations in natural supply of freshwater and issues of drought (Gebiedsoverleg Zuidwestelijke Delta, 2020; Vlaams-Nederlandse Scheldecomissie, 2013). The issues of salination and risk of flooding can be seen in the maps of Figure 5.6 & 5.8 in relation to agriculture and the natural and recreational areas, a potential exists for transformation of agricultural land and buffering of water, as mentioned in the previous section. Due to the increased extremes, buffers are needed like storage of rainwater for use in periods of shortages. Also, the rise of temperatures during both night and day, affects the ecosystems, agriculture and urban areas, increases urban heat and causes additional evaporation (Gebiedsoverleg Zuidwestelijke Delta, 2020). On the water, larger tidal differences affect the transport to the ports, as deeper waters cause increased waves from ships, which affects the natural environment and water safety. Finally, sediment and sludge increased in the water of the Westerscheldt, which causes a hyper-trouble water system, affecting both ecosystems due to less oxygen and increased waves, further accelerating the effects of the tidal differences (Vlaams-Nederlandse Scheldecomissie, 2013). Opportunities for these issues are partly described in the previous paragraph and will be introduced in the following chapter on strategic interventions. For example new types of agriculture can take place in more salinized areas and the dynamic dike zones can

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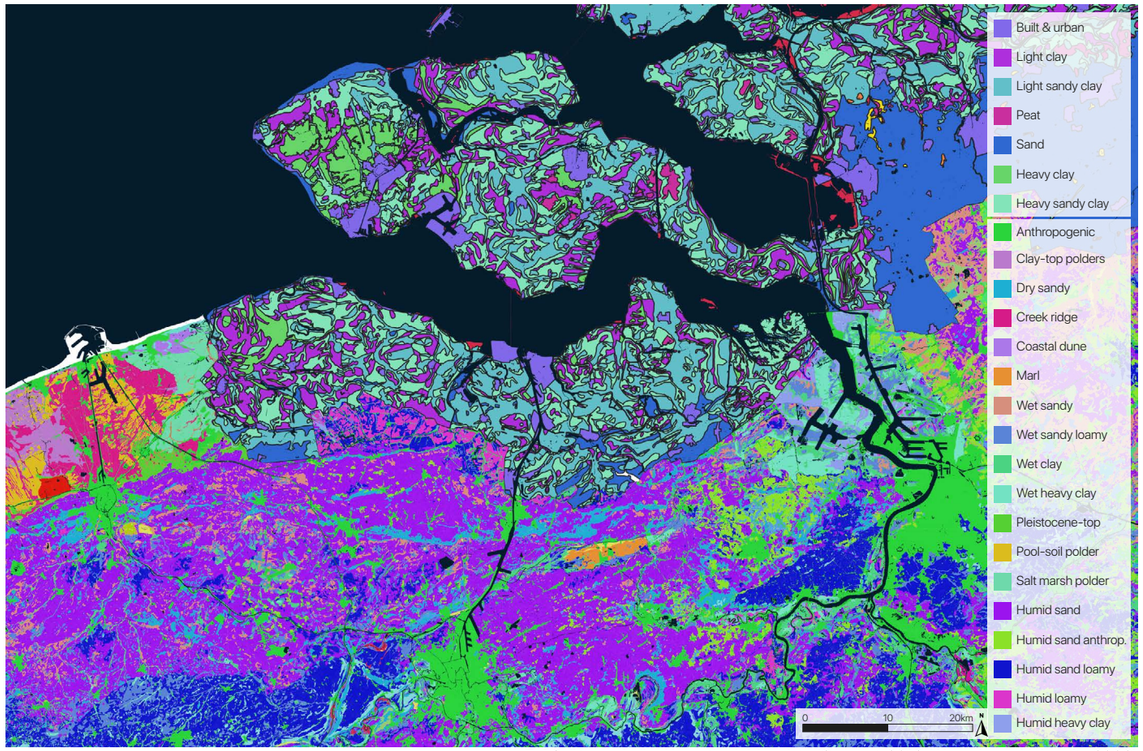
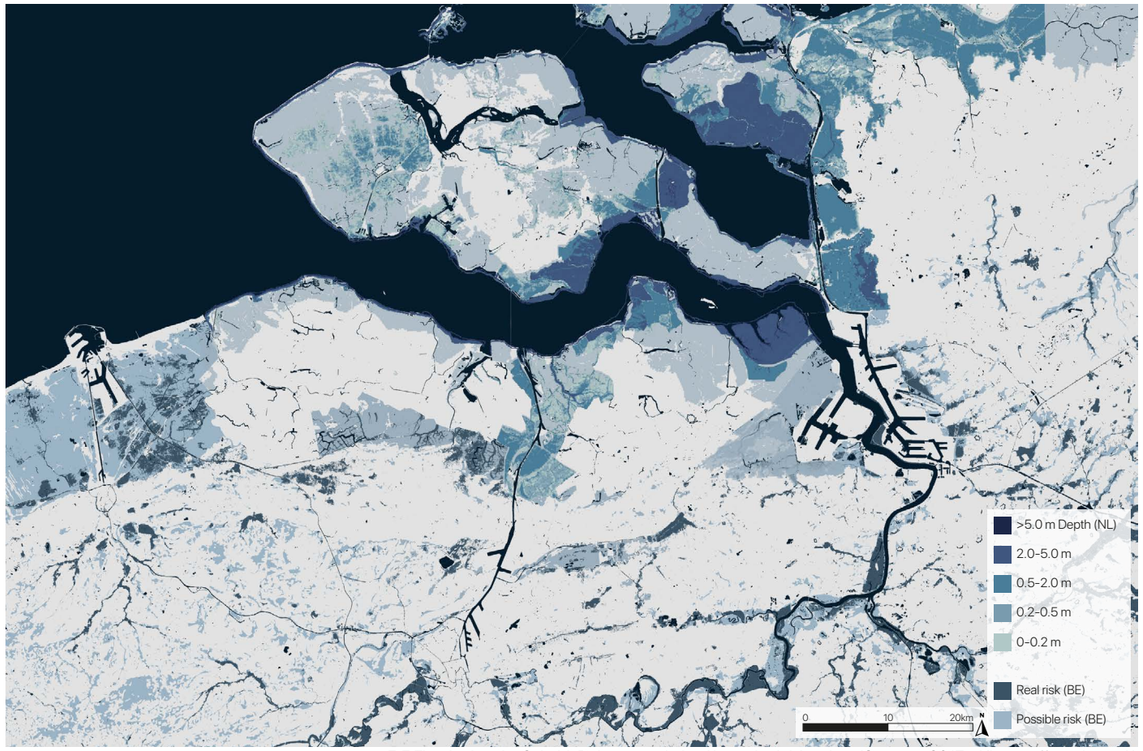
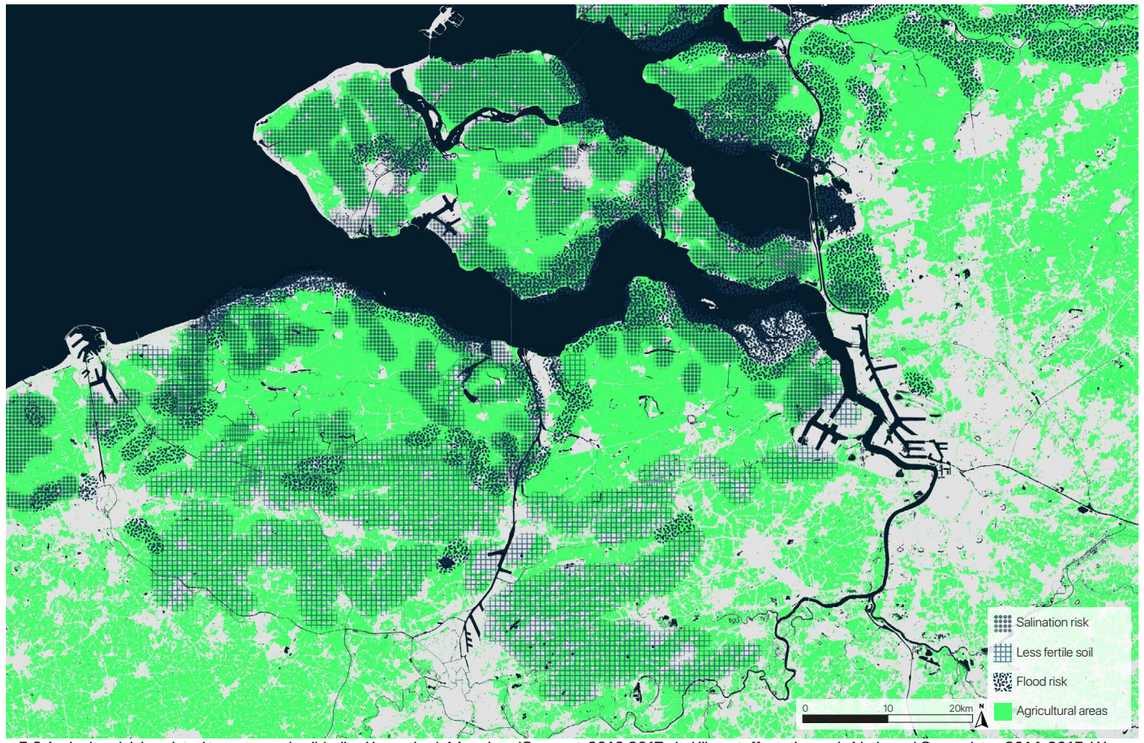


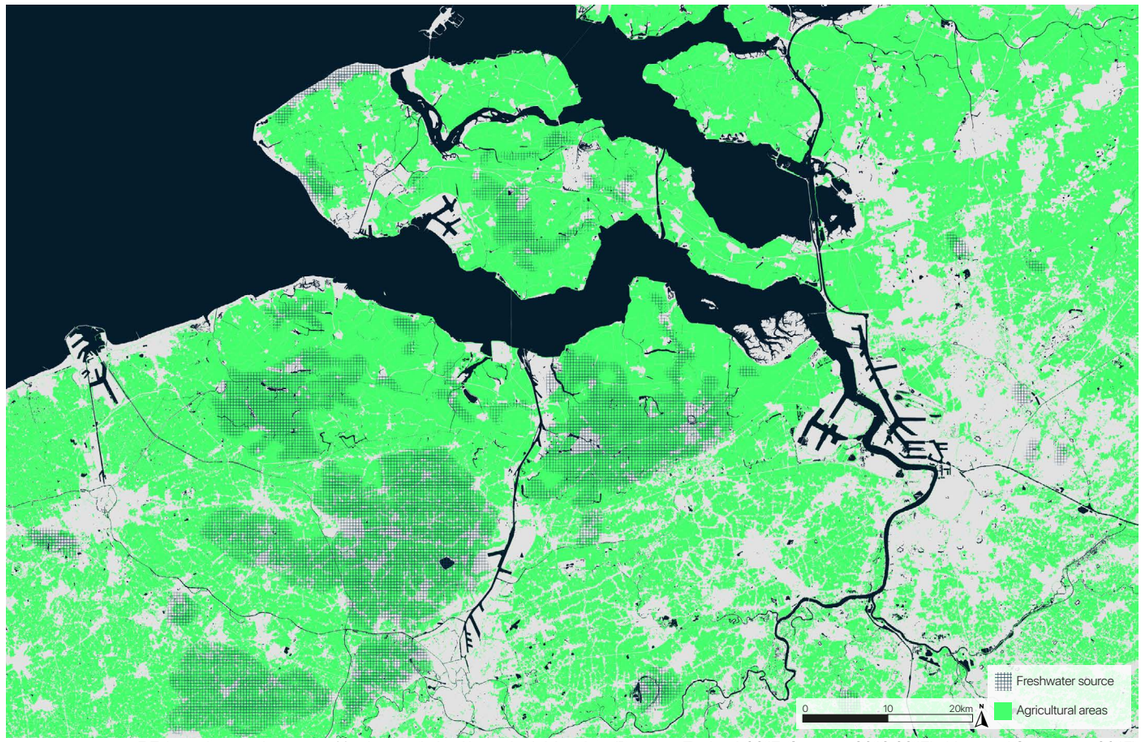
5.4 Soil types (edited by author). Map data:(Geopunt, 2016; Wageningen University, 2006)



5.5 Flood risk in the Scheldt Delta region (edited by author). Map data:(Geopunt, 2017a; Klimaateffectatlas, n.d.)



5.6 Agricultural risks related to water and soil (edited by author). Map data:(Geopunt, 2016,2017a,b; Klimaateffectatlas, n.d.; Nationaal Georegister, 2014, 2015; Wageningen University, 2006)



5.7 Agriculture and sources of freshwater (edited by author). Map data:(Provincie Zeeland, 2017; Geopunt, 2016,2017b; Nationaal Georegister,2015)

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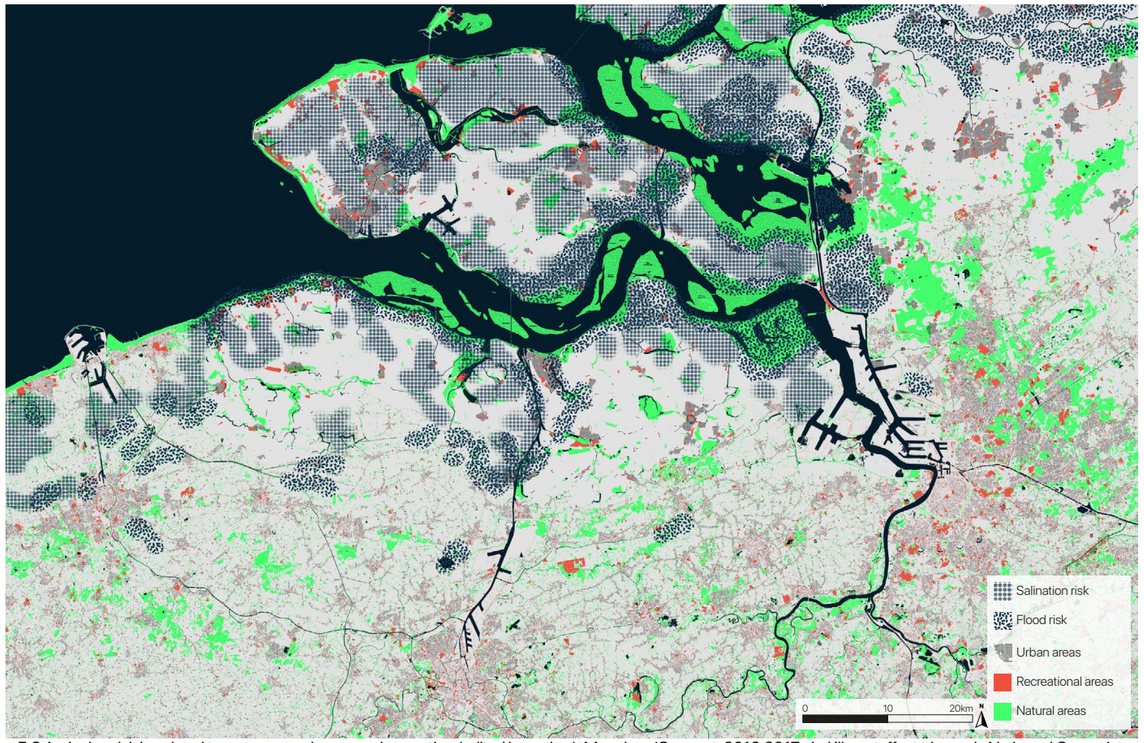
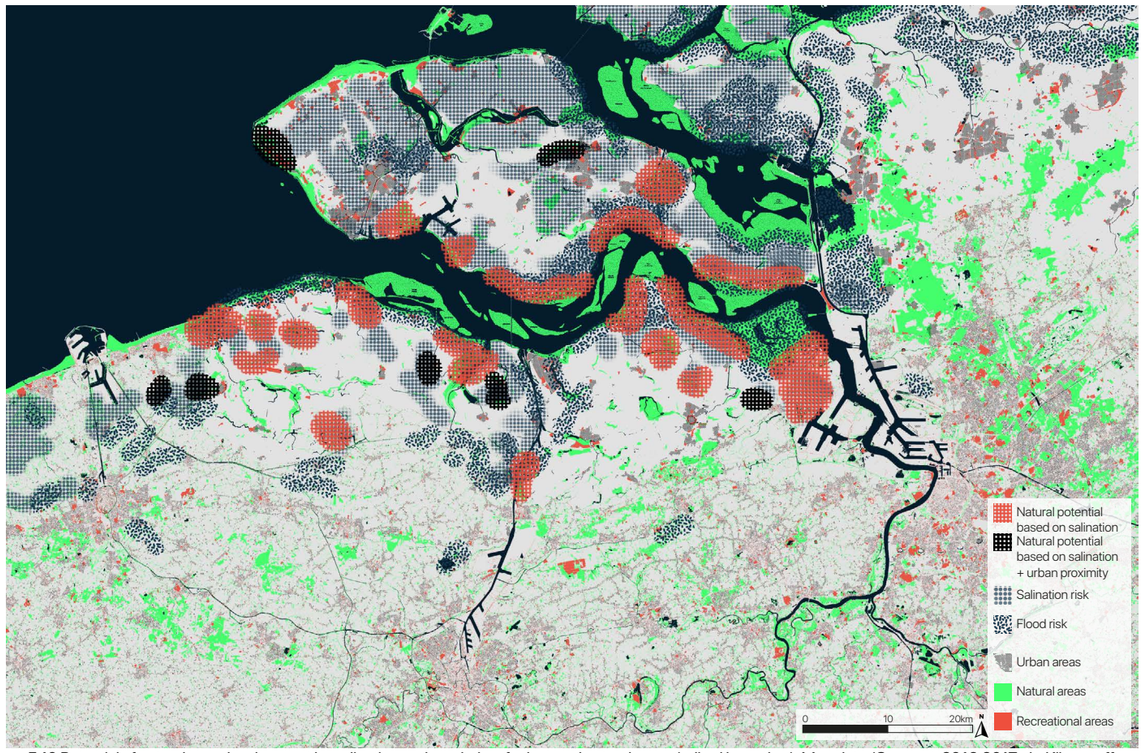
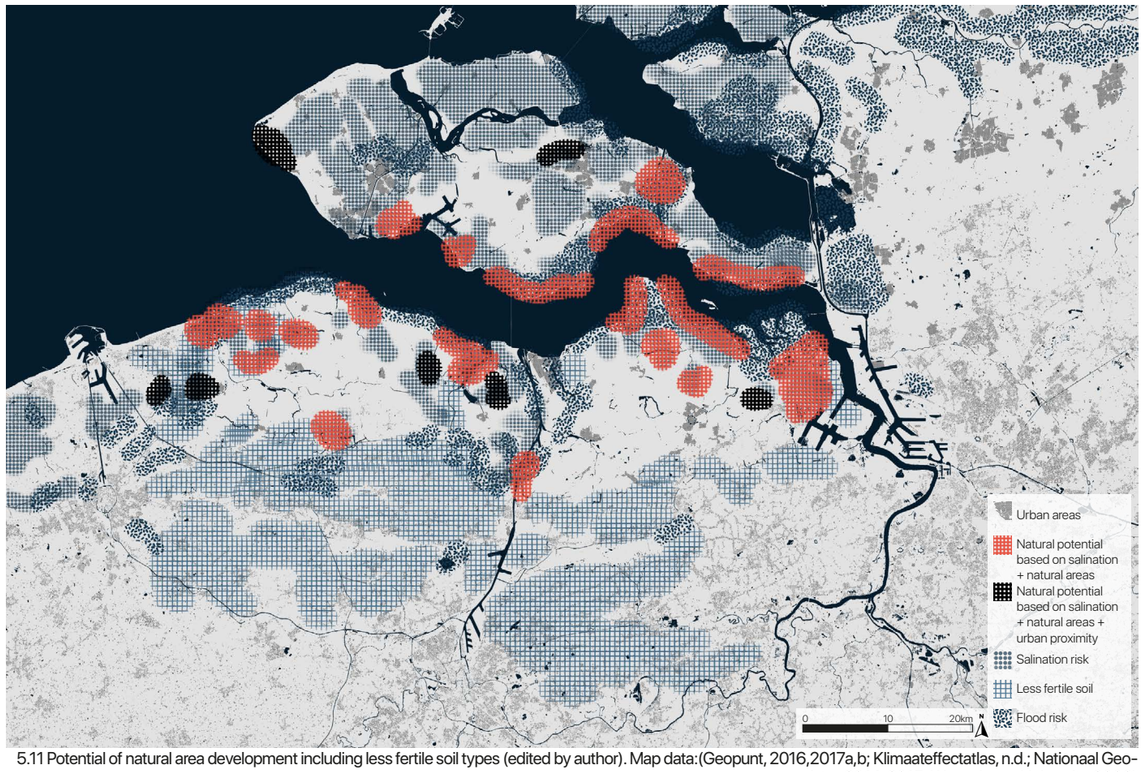


5.8 Agricultural risks related to water, natural areas and recreation (edited by author). Map data:(Geopunt, 2016,2017a,b; Klimaateffectatlas, n.d.; Nationaal Georegister, 2014, 2015)

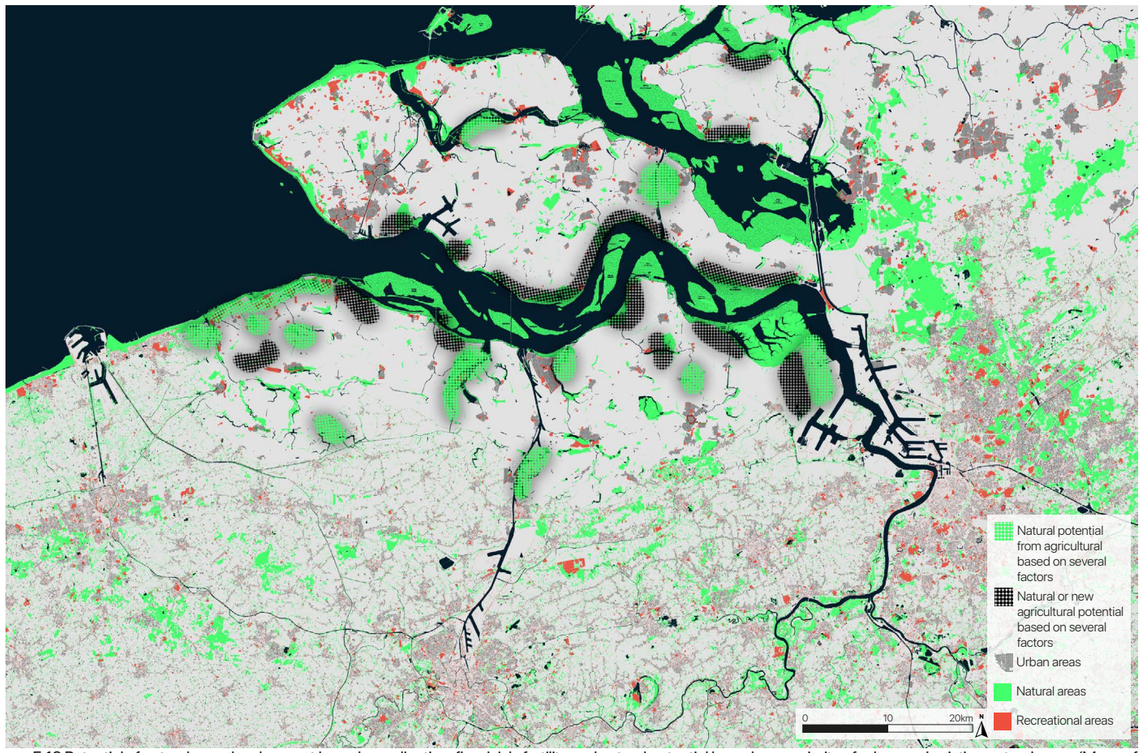
5.9 Area of land between two dikes: potential of natural development or new types of agricultural production and species. (Author, 2020)



5.10 Potential of natural area development by salination and proximity of urban and natural areas (edited by author). Map data:(Geopunt, 2016,2017a,b; Klimaateffectatlas, n.d.; Nationaal Georegister, 2014, 2015)



5.11 Potential of natural area development including less fertile soil types (edited by author). Map data:(Geopunt, 2016,2017a,b; Klimaateffectatlas, n.d.; Nationaal Georegister, 2014, 2015; Wageningen University, 2006)



5.12 Potential of natural area development based on salination, flood risk, fertility and natural potential based on proximity of urban and existing natural areas (Maps of Figure 5.10 & 11) (edited by author). Map data:(Geopunt, 2016; Nationaal Georegister, 2015)

also be used for storage of freshwater as a buffer, as can be seen in the potential maps of Figure 5.10, 5.11 & 5.12. Additionally, increased infiltration of water and capturing (rain)water are strategies for these water problems (Architecture Workroom Brussels, 2020; Gebiedsoverleg Zuidwestelijke Delta, 2020).

Conclusion

As a Delta region, the water and (natural) ecosystems provide challenges in relation to the human interventions that have taken place over the years. The increased transport in size and number in the Westerscheldt has affected the natural areas and ecosystems of the water and surrounding natural areas. This is a potential for the North Sea Ports as it requires less transport through the Westerscheldt estuary. Additional natural areas in the coastal areas and hinterlands on less fertile or salinized areas can help restoring ecosystems while also protecting against the water. A combination of natural areas and agriculture is also possible at these locations, with new methods and species that adapt to for instance more salinized areas. They can also be used for buffer storage of rainwater and freshwater, recreational purposes and more climate resilient types of housing that adjust to the local circumstances. This resilience is needed as the natural areas, industries, agriculture and urban areas face issues like salination, stormwater flooding, freshwater scarcity, but also increased (urban) heat and periods of drought due to increased extremes as part of climate change.

Themes	Strategy/Intervention	Implication/application	Feasibility	Short-term	Long-term
Sustainable Energy	- Energy from wind on land - Borssele Ijmuiden wind park connections	- Electric infrastructure needed on land - Location impact on surroundings - Largest resource for sustainable energy in SD	+	■	■
Energy from the environment	- Tidal energy - Energy from waves - Energy from sweet-salt water	- Requires location in proximity of moving water and/ or salt-sweet separation and large scale - Infrastructure in water needed	-	□	■
	- Geothermal energy	- Heat networks between urban-industry-agriculture -Additional heating with external resource needed for many industrial purposes	+	■	■
	- Energy from biomass	- Requires import if applied to large scale - Emissions of greenhouse gas when used (local) - Existing locations for processing present in NSP	+/-	■	□
	- Solar energy on roofs - Solar energy on land (parks) - Solar energy on water	- Energy on roofs has priority, landscape and water if no alternatives present, close to built environment or integrated in landscape.	+	■	■
CO2	- Carbon capture and storage (CCS)	- Carbon emissions can be store in layers of soil or empty gas fields for a short term reduction of emissions	+/-	■	□
	- Carbon capture and (re)use (CCU)	- Producing emission-free has priority, CCU is preferred over CCS, reuse contributes to circularity and can be applied in the industries and agriculture in the region	+	■	■
Hydrogen	- Hydrogen as material resource	- Hydrogen is a by-product of many industrial processes - Requires infrastructure between industries and/or production for exchange (pipes, trains, trucks)	+	■	■
	- Hydrogen for storage of energy	- Hydrogen can be used to (temporarily) store excess electric energy, through (reverse) electrolysis -Requires connections main electricity network-H2 Plant	+/-	■	■
	- Hydrogen as a fuel	- H2 can be used as fuel for mobility, transport &heating - Existing gas network + additional (charging) points - Production requires additional energy resources	+/-	■	■
Circular economy	- Exchange of resources industry-industry & agriculture (like hydrogen (H2), CO2, wastewater)	- Infrastructure & transport for exchange needed - Feasibility depends on scale, amount of resources, offer & demand & infrastructural requirements	+	■	■
Industries	- Exchange of heat, industry-industry, agriculture & urban environment (cascading: to greenhouses, heating of homes)	- Infrastructure & transport for exchange needed - Feasibility depends on scale, amount of energy, offer & demand & infrastructural requirements	+	■	■
Agriculture	- Closing material loops of production	- Reuse & exchange of (waste) materials - Exchange of waste materials between farmers - Exchange of resources with industries (CO2)	+	□	■
	- Local production & use of energy	- Own production (solar & wind) - Exchange of energy with industries (heat) - Biomass as resource for energy & material	+	■	■
	- Adapt & integrate local conditions	- Systems of circular production integrated & adapted to soil, water system, conditions of biodiversity & ecosystems (local conditions)	+	□	■
Urban environment	- Reuse of heat, industry-urban, industry-agriculture-urban (cascading: to greenhouses, heating of homes) + upgrading with geothermal energy	- Heat network in Scheldt Delta region - Feasibility depends on scale, amount of resources, offer & demand & infrastructural requirements	+	■	■
	- Closing material loops of urban areas	- Reuse of waste (water, material) - Local repurpose, reuse, repair - Network of local distribution + large connections	+/-	□	■
	- Local production (manufacturing)	- On-demand production in cities and villages - Fine network of local distribution & ports to hinterland + connections to larger scale for additional resources	+/-	□	■
Climate change	- Strong and attractive coastal areas	- Protecting from flooding - Restoring nature & landscape, also for recreation - Integrating energy transition in landscapes	+	■	■
Perspectives of natural, agricultural & urban areas	- Dynamic dike areas	- Rising level between main and secondary dikes - Opening parts for natural (re)development, new types of agriculture, housing, commercial purpose & recreation	+/-	□	■
	- Vital polder & creek landscapes	- Water management optimised, adapt to natural supply - Safeguarding freshwater supply for demand: agriculture, industries & (urban) drinking water	+	■	■
	- Vital sandbanks, mudflats and salt marshes	- Restoring of natural areas (Natura 2000) - Protecting endangered species & ecosystems affecting water safety, fishing industries and port connection	+	■	■
	- Healthy & connected estuary	- Restoration of natural areas of importance as port access depends on these areas, focus on closer North Sea Port as opportunity if areas do not recover	+	■	■
Water	- Solving water-related issues: quality, waste, salination, freshwater supply, sea-level rise, tidal differences, drought and stormwater (flooding)	- Storage and buffering of water for extremes - Infiltration possibilities & reduce urban heat - Shift to less transport &new purpose of vulnerable areas	+	■	■

5.13 Overview of the interventions coming from the earlier described policies. The feasibility and terms of implementation are based on the scenarios, challenges and critical notes provided in the policies discussed in this chapter.

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5.4 Effects on the space, role and organisation of the Scheldt Delta

The several aspects of the Scheldt Delta transition relating to sustainability aspects, originating from environmental change, have been discussed in the previous sections. This section will discuss the more general role and transition of the Scheldt Delta and will specifically elaborate on the spatial and spatial-organisational implications of the previously described aspects.

5.4.1 The role of the Scheldt Delta

The policy documents that have been reviewed for this chapter all provide different emphasises on the direction of transition of the region. However, generally these are aiming for a balance between economic development, affecting the inhabitants and industries, and natural development as they influence each other. The Scheldt Delta region is seen as an important node for sustainable energy, as well as for international transport (Gebiedsoverleg Zuidwestelijke Delta, 2020; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). Antwerp and Rotterdam are envisioned to remain global containerhubs and become more connected to the hinterland trough smaller regions of distribution, where additional processing can take place as well (Vanelslander et al., 2011). Additionally, the ports can become one large-scale petrochemical industrial and energy-producing complex that is focusing on sustainability, efficiency, knowledge and spatial quality through the proposed transition (Ministerie van Economische Zaken en Klimaat, 2020; Vanelslander et al., 2011). Another element is knowledge and highly skilled labour, which can be a competitive factor for the Delta region. This can attract companies to settle in the region in combination with proper infrastructure and its geographical position (Ministerie van Economische Zaken en Klimaat, 2020; Vanelslander et al., 2011). Especially knowledge-based industries, innovation and Research & Development are relevant, as the service-based economy and knowledge based sectors are currently still growing and it benefits the competitive position of the Scheldt Delta, both globally (Vanelslander et al., 2011), and towards other European regions (Vlaams-Nederlandse Delta, 2020).

For all the different functions in the region, ranging from education and research, to transport and production, it is important that ports and smaller regions will have complementary functions (Architecture Workroom Brussels et al., 2018; Gebiedsoverleg Zuidwestelijke Delta, 2020; Smart Delta Resources, 2020; Vlaams-Nederlandse Delta, 2017). Platforms for connecting education and labour (Architecture Workroom Brussels, 2020) knowledge (Vanelslander et al., 2011) and the several ports through harbour networks, can help strengthening the collaborative network and (inter)national position for the Scheldt Delta, while maintaining the individual complementary functions and activities (Vlaams-Nederlandse Delta, 2017).

5.4.2 Networks and spatial organisation

The previously described scenarios for the transition of the Scheldt Delta will affect the region spatially through the (re)location of new functions networks of logistics, transport and energy.

The transition to sustainable energy resources requires for instance infrastructure of charging points for ships and trucks for electricity supply as well as for the use

of hydrogen (Architecture Workroom Brussels, 2020). Additionally, in the region of Dutch Flanders the network of electricity is currently at its limits (Arthur D. Little, 2020). It requires additional infrastructure or the use of an alternative like hydrogen between the largest users of these resources, as is proposed for hydrogen already (Figure 5.2). This can be pipelines for hydrogen supply and heat exchange between producers and users (industries) and between different users, in case the current gas network is does not meet the requirements.
Additionally, if adaptations are made to the railway connection between Ghent and Terneuzen (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020b), this can be used for transport of hydrogen, as well as goods and transport of people eventually (Architecture Workroom Brussels, 2020). This also contributes to the strategies for fast and efficient (public) transport between different nodes in the region, for employment as well as goods (Vanelslander et al., 2011). For transport of people, shared mobility requires central locations for service, transfer to other means of transport and supply of energy for these forms of mobility. If all forms of mobility are adjusted to each other, this can eventually reduce the total infrastructure needed (Architecture Workroom Brussels et al., 2018, p.38-39). Especially urban areas outside of centres could have central locations for mobility access. Both inside and outside urban areas, these central locations could also serve as central locations for amenities (Architecture Workroom Brussels, 2020) which fits the strategies for declining areas as described in chapter 4. The program for the North Sea Port district also describes these central locations of mobility could be located near for instance natural areas that have a connection with industry or that have unique natural qualities. Here information could be provided which contributes to attraction of visitors and presenting the qualities of the region.
In the long term, sustainable resources require additional spatial adjustments in planning too. Energy production facilities like wind turbines and solar parks require strategic location for efficiency and reducing negative externalities (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). Regarding urban structures, the use of geothermal energy for housing and exchange of hydrogen would be more efficient if industries and housing are clustered, close to each other and the location of production of these resources as can be seen in Figure 5.3. In the urban environment, these can be neighbourhoods of interconnected households that exchange heat, electricity and produced energy and are close to external energy production locations, (Architecture Workroom Brussels et al., 2018, p.149-167). This interconnectedness can also be applied on the large scale, as some regions have excess production of energy, while others demand more than they produce at certain moments in time (Architecture Workroom Brussels et al., 2018, p.169). Clusters can also be combined with education and for example addition of housing to ports, if future functions allow for it. (Architecture Workroom Brussels, 2020). This would also fit the strategies of connecting education to employment in the region, and providing sufficient housing as described in Chapter 1 & 4.

5.4.3 Changing scales of networks

Additionally, in order to become a global hub, have competitive global ports and move to sustainable me-

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5.14 Current focus on expansion of ports and becoming a global hub: sluice extension in Terneuzen as part of The North Sea Port developments

5.15 Challenge for integrating sustainable energy production in the landscape and overcoming differences in dynamics between the urban and industries & ports.

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ans of transport, proper connections are needed for distribution to the hinterlands (Gebiedsoverleg Zuidwestelijke Delta, 2020; Vanelslander et al., 2011). In the short term, towards 2040, additional port capacity is required as the ports are expected to grow. Architecture Workroom Brussels et al. (2018, p.303-312) describe in a long-term perspective the transition to a circular economy would require different ways of distribution. As transport of fully assembled products is expected to decrease, new opportunities for the port-areas emerge like the transformation to resource areas, where materials and recycled products are traded and processed and assembled more locally. Ports will then have different functions and could also include for example harbour and industrial tourism, in addition to the previously described natural tourism (Architecture Workroom Brussels, 2020).

Additionally, education and locations for innovation can become part of the new functions of ports after transition. These could be strategically located within the ports in order to contribute to the activities and connect to larger educational and research institutes in the region (Architecture Workroom Brussels, 2020; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). The more local approach can also be applied to agriculture, through for example food-producing industries for non-land-based agriculture within cities and agriculture serving nearby cities (Architecture Workroom Brussels et al., 2018, p.42-43; p.225-229). This requires a fine network of connections to these locations of production.

Also the smaller urban areas and villages can play a role, especially when close to former industrial (port) areas that have been replaced by more sustainable alternatives. In here, the existing infrastructure can be valuable for distribution of the resources needed for more local production (Architecture Workroom Brussels et al., 2018, p.303-312; Vanelslander et al., 2011).

5.4.4 Cross-border perspectives and governance.

For implementing the interventions to the large challenges and (climate)transition effectively and efficiently, cross border cooperation is required to make the region function as one coherent Delta (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a; Smart Delta Resources, 2020). This is of importance as the interventions work on different scales, connecting national functions, but also for making small scale (circular) systems work near or across the border which requires national governance support as well as more local collaborations (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). The presence of the border is still an issue, as employment-related and economic traffic on both sides are mainly separated due to different approaches and systems (Architecture Workroom Brussels, 2020; Vlaams-Nederlandse Delta, 2020). While the North Sea Port is an example of a cross-border company structure (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a), the presence of a Eurodelta as one element is not yet commonly present in the discourse of inhabitants and public administrators, which limits the potential for development (Architecture Workroom Brussels et al., 2018, p.20). Overcoming the border-related issues is especially important as most employees are not available in the direct surrounding of industries, which is important for a healthy labour market and attractive settlement locations. A result is that foreign employees from outside the region are needed currently (Architecture Workroom Brussels, 2020). Platforms for

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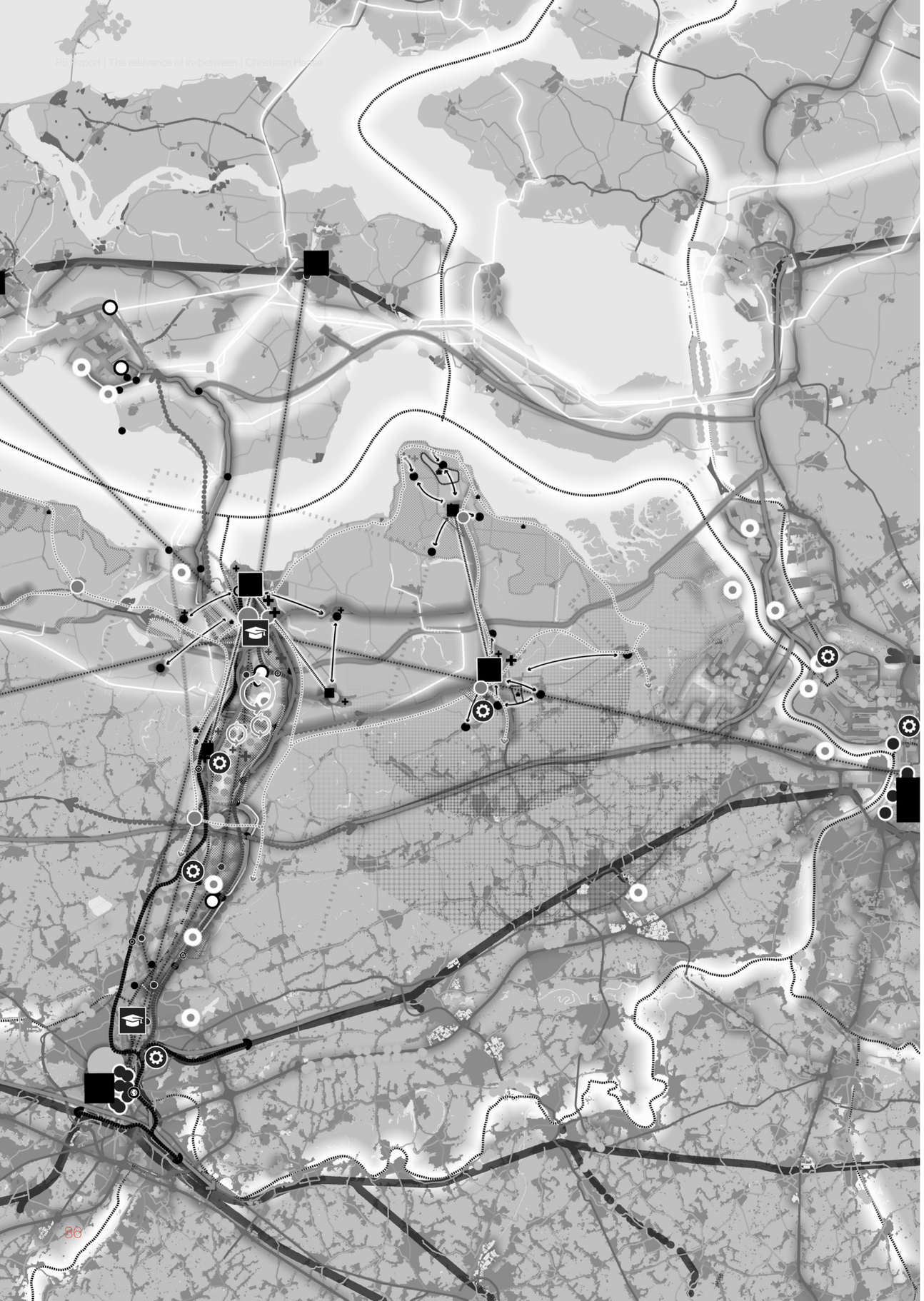
innovation, connecting education and the regional working environment, could also contribute to overcoming these separations (Architecture Workroom Brussels, 2020). Additionally, it is important to translate and balance the success in economic activities to the society in the region. This is for both a support base and involvement (Gebiedsoverleg Zuidwestelijke Delta, 2020), as well as liveability in the region, like the effect of industries on housing nearby (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a) and to overcome the differences of highly dynamic ports and industries and low dynamics in urban areas (Architecture Workroom Brussels, 2020).

Conclusion

The Scheldt Delta is in many policy documents envisioned as an important node for sustainable energy and international transport. Sustainability of industries and ports can, in combination with highly skilled labour and presence of education and research on innovation, be a competitive factor of the Scheldt Delta region. Collaboration between industries, ports, but also governments and inhabitants through for instance collaborative platforms is needed in order to have coherency and complementary functions in the region. The interventions needed for sustainable energy, a circular economy and climate change require additional infrastructure and transformation of existing infrastructural networks. In transformation, complementary use of this infrastructure and future application such as passenger transport using industrial railways and charging and fuelling infrastructure for current and future mobility should be taken into consideration. On the short term, the port-infrastructure could be expanded through main routes and mobility services for instance for charging trucks along them. These routes should be connected to, or be located in proximity of the production and resources of the energy and fuels like hydrogen that they use for efficiency. On the long term however, the infrastructure of distribution is expected to expand on a smaller scale through fine networks and more local interconnected points of distribution, production and exchange of energy and resources. Large-scale infrastructure will then be used to connect flows between regions. Finally, the transition to a competitive and sustainable Delta region with a more circular economy requires (cross-border) governmental and organisational collaboration as currently borders of countries and sectors are limiting full use of the potential like cross-border employment and exchange of resources, as will be needed in the future scenarios. Also, a connection between education and practice of the industries is important in order to connect and positively have impact on the living environment in the region and overcome differences in dynamics of the industries and urban environment. This could eventually change the discourse and unlock the potential of a coherent, connected and sustainable Delta.

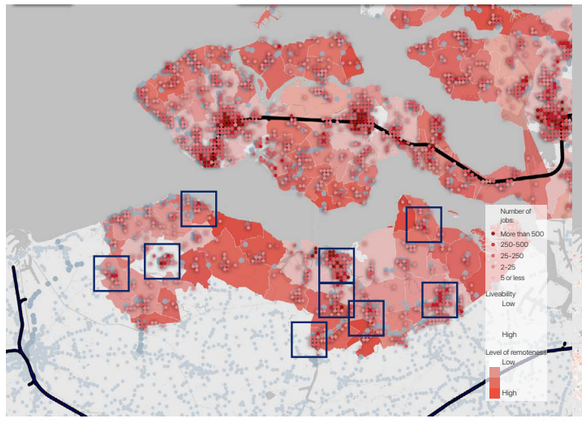
Industries in transition in the North Sea Port near Ghent (Author, 2020)



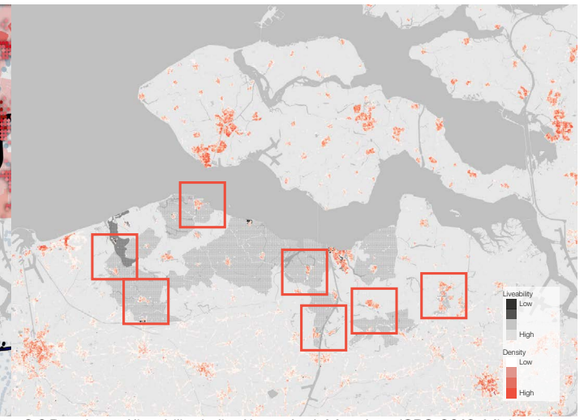
6.
Vision

This chapter consists of the development of a strategic vision for the region of Dutch Flanders. It aims to, in combination with the chapter on regional transition, provide an answer to the second research question '*What are the strategic opportunities that Dutch Flanders can seize based on the ongoing economic, social and environmental transitions in the Scheldt Delta?*'. The first steps of the vision development are based on the approaches derived from the theory essay on regional decline of Dutch Flanders, the spatial analysis of the region and the approaches presented in the section on the transition of the Scheldt Delta region.

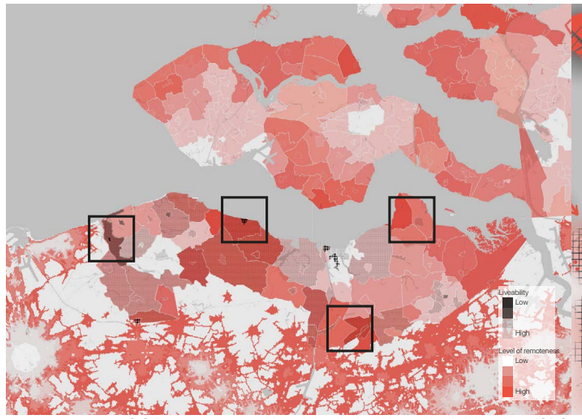
After the definition of this main outline, additional analysis is used to support and construct the regional vision.



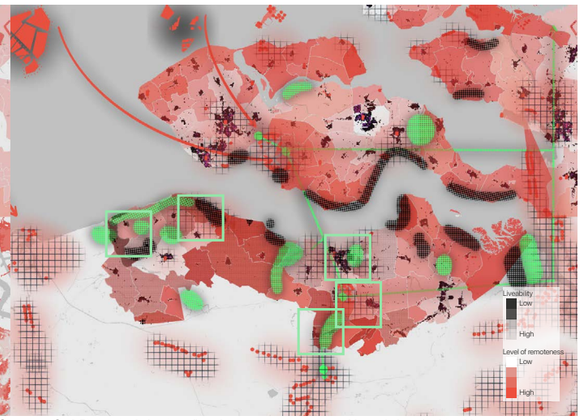
6.1 Remoteness and provision of employment (edited by author). Map data:(CBS, 2018;2019a;2019b; PBL, 2020)



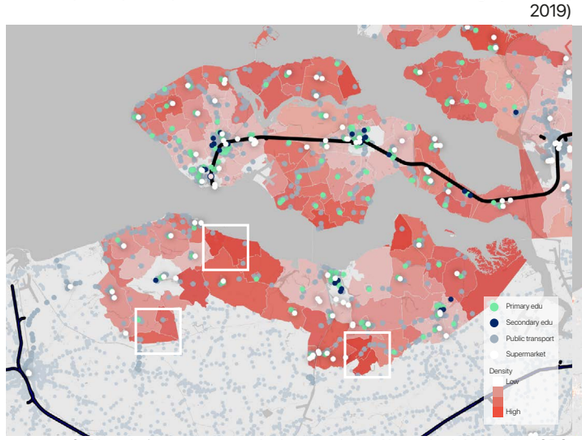
6.2 Density and liveability (edited by author). Map data: (CBS, 2019; Ministerie van Binnenlandse Zaken en Koningkrijksrelaties, 2019)



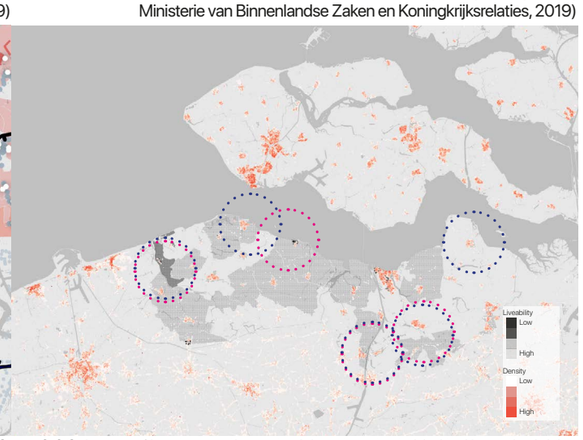
6.3 Remoteness and liveability (edited by author). Map data:(CBS, 2018;2019a;2019b; Ministerie van Binnenlandse Zaken en Koningkrijksrelaties, 2019)



6.4 Potential, (natural) risks, remoteness and liveability (edited by author). Map data:(CBS, 2018;2019a;2019b; Ministerie van Binnenlandse Zaken en Koningkrijksrelaties, 2019)



6.5 Level of remoteness and education (edited by author). Map data:(CBS, 2018;2019a;2019b; Geopunt, 2020a; OpenStreetMap, n.d.; Rijksuniversiteit Groningen, 2017)



6.6 Selection of locations with most risk/most postential (edited by author). Map data:(CBS, 2019; Ministerie van Binnenlandse Zaken en Koningkrijksrelaties, 2019)

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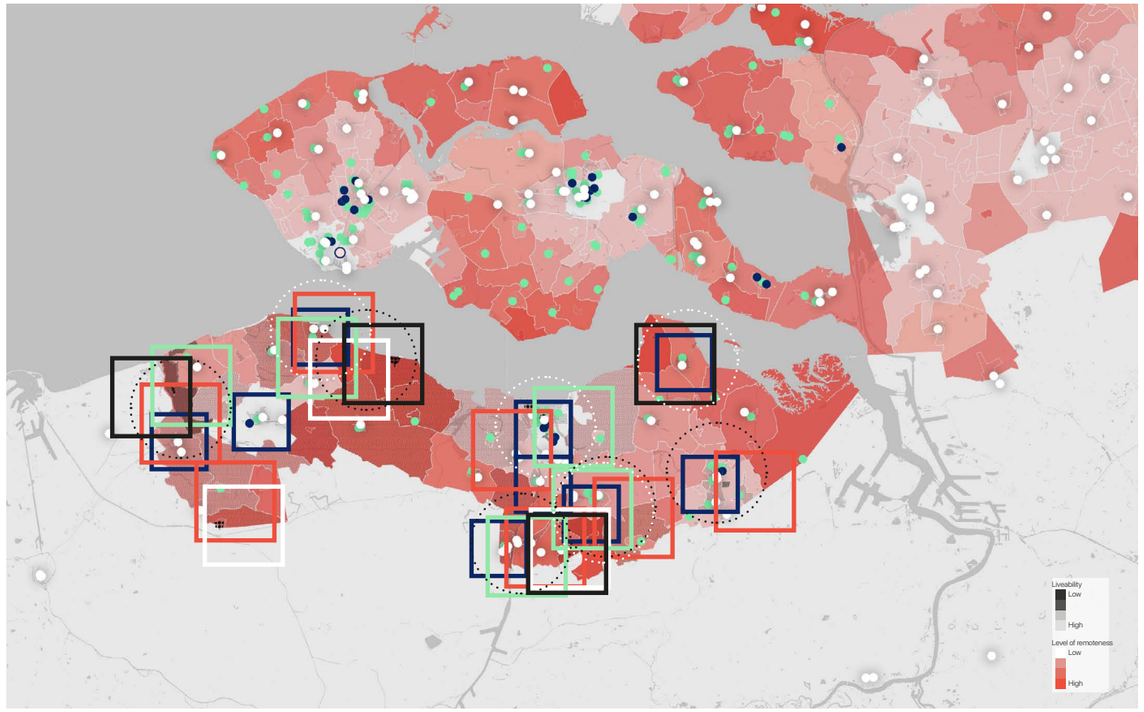
Vision analysis



6.7 Combination of selections of locations and all risks and potentials (edited by author).Map data:(CBS, 2018;2019a;2019b; Geopunt, 2020a; Rijksuniversiteit Groningen, 2017; Ministerie van Binnenlandse Zaken en Koningkrijksrelaties, 2019)

6.1 Selection of clusters

In order to define the areas with the most potential within the region, a combination of individual layers of the most potential locations based on their risks and development possibilities has been made. Out of these, a selection of six cities and villages was made that have been further analysed. The analysis of these (appendix I) has shown that urban areas facing the most risks related to liveability and economy, were also less diverse in (number of) functions. In addition, the total amount of urban area next to housing was less compared to cores facing less of these risks, which is in line with the outcomes of earlier theoretical research.

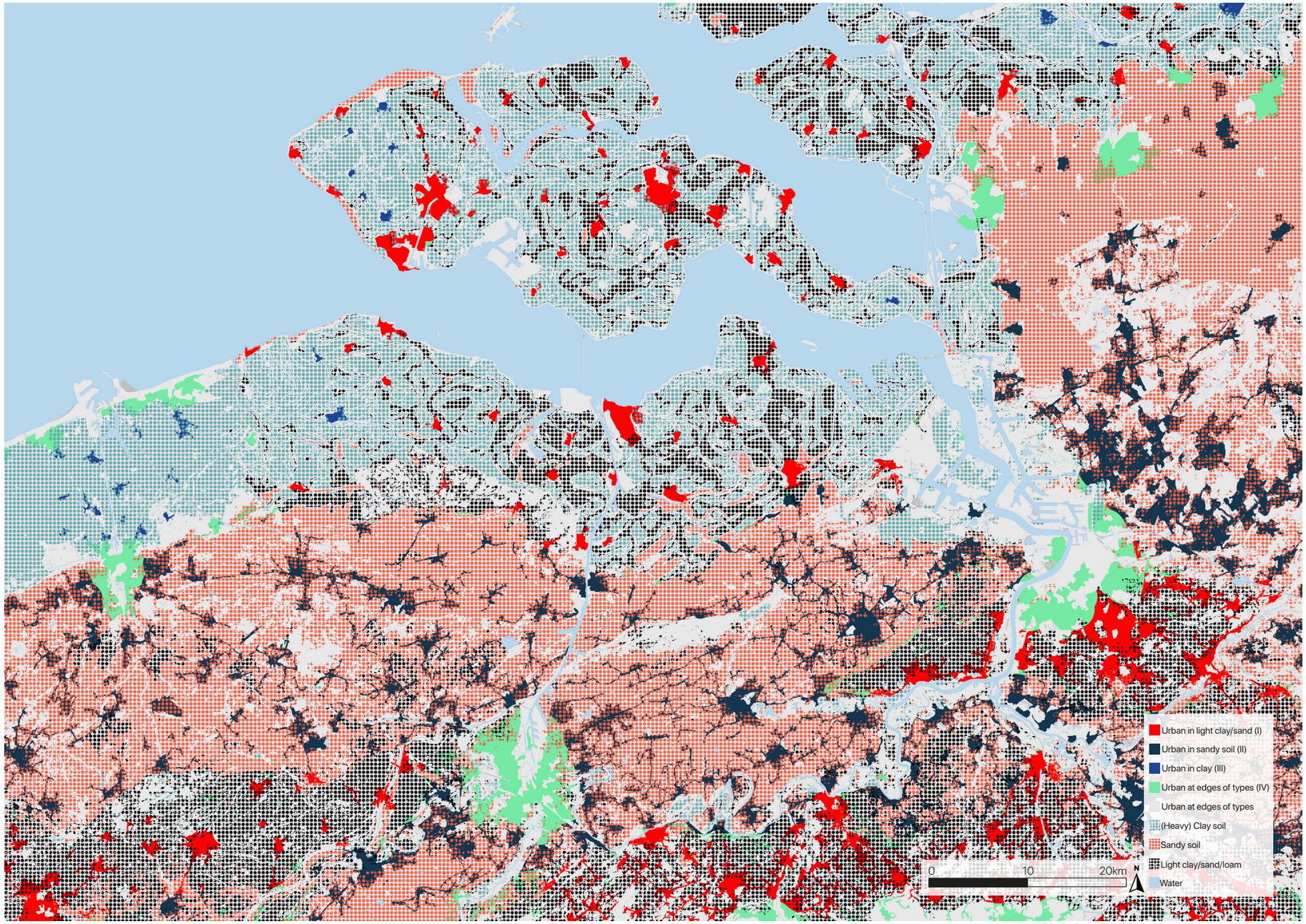
The combination of these potentials and risks has lead to the development of a vision consisting out of three clusters: the coastal in the west of the region, industrial cluster in the heart of Dutch Flanders and an agricultural cluster in the eastern part. For these three, an overview table is developed that shows the differences between the current conditions, policy approaches and future potentials for the themes of liveability, sustainability and economy. All three clusters share possibilities for specific future developments, but in different configurations. Eventually, the specific locations with most development potential, will be used in the strategic part of the vision in Chapter 7. In this chapter, the spatial implementation on the urban scale and and governance implementation of the vision is elaborated on.

Indicator	COASTAL CLUSTER	INDUSTRIAL CLUSTER	AGRICULTURAL CLUSTER
Liveability			
Current demogr. change	Strong decline (mainly in coastal-border villages, replaced by second home ownership)	Decline, mainly in the smaller urban areas outside cores	Increase (mainly from migration) in both urban and rural.
Expected demographic change	Continues to decline and second-home ownership if no measures are taken. Attraction of especially knowledge-sector employees for unique qualities of living in the in between if new typologies can be created there to maintain population.	Possible increase if new measures are taken in canal zone to attract employees from outside and keep from within the region.	Prognosed increase and then stagnation, more focus on the central cluster eventually.
Population density	Spread, higher in cores of Oostburg, Breskens	High in Terneuzen core, spread to urban size	Hulst large core, Kloosterzande medium core and other places have very small population
Number of households	23168 inhabitants (Gemeente Sluis, n.d.) 11278 households	25273 inhabitants (Gemeente Terneuzen, 2018) 11985 households (Gemeente Terneuzen, 2018)	27576 inhabitants (Gemeente Hulst, 2021a 12668 households
Public transport	Bus stops, spread and concentrated in coastal zone	Bus stops spread, concentrated in cities	Bus stops spread, concentrated surrounding core city of Hulst
Education	1 secondary education in Oostburg core, primary spread	4 secondary education in Terneuzen, primary education spread and multiple in cores	3 secondary locations and 4 primary in Hulst core, primary spread in other places
Education-in policy	Demand for higher education (MBO4+) and employees. Currently mainly level MBO1&2 levels of employment present, that fit the current economic activities. Agriculture and tourism	Decentral issues prevent attraction of higher educated while there is high demand in the region for these employees. Industrial employment is limited to few locations, lacks	Need for agricultural sector transformation. Schools in border suffer from Belgian alternatives. (Gemeente Hulst, 2011)
	sector provide the main employment in the municipality currently (Gemeente Sluis, 2015)	diversity. Housing and connectivity level doesn't suit these groups well. (Gemeente Terneuzen, 2010; Gemeente Hulst, Sluis en Terneuzen, 2014; Nistal & Schep, 2013)	
Supermarkets	Spread in cores	Spread in cores and concentrated in canal zone, in larger cores and around the border.	Spread in cores
Liveability	Problems in coastal (strong), edges (strong) and empty polders	Problems in main city (strong in core), and empty polders	Problems only in main city of Hulst, surrounding (peri)urban areas are not facing these issues
Liveability-in policy	Local approach-participation in shrinking areas: shrinkage or decline of population is not only negative if guided aligned with needs for liveability.	-	Participation creates liveability due to neighbourhood centres etc. Not only the number of of amenities defines liveability.
Urbanisation Policy+vision	Has possible urbanisation potential: Mainly upgrading of declining properties (large number and low energy labels present) (Gemeente Sluis, 2015). Focus on internal increase and not expanding outside urban areas as much. Currently 20% is additional (incl. second-home) above official number of households. Quality upgrades in recreation make sure its becoming more year round usage. This positively benefits the urban areas.	Has urbanisation potential due to educational connection. Municipal vision includes historical connection but is outdated. Current focus would be industries. Unlike the expectations, households increased. Restructuring of stock in worst condition needed+ expansion in central (activity/development potential) locations	Has urbanisation potential due to connection to knowledge and partly practice. Mainly restructuring. Currently mainly row housing (not always the preferred type for desired target groups), decrease of number and other types of housing through restructuring: newbuilt of specific types (like lifetime housing, smaller households) needed instead on the long term. Currently mostly housing villages, with good connections. Mainly liveability due to initiatives from villagers themselves and neighbourhood buildings, sports etc. Liveability not only due to the amenities, also community is largely involved. About 100 new homes per year netto. 45% in Hulst city, Perkpolder 20% (all newbuilt plan) and smaller cores like Sint Jansteen, Kloosterzande, Heikant and Graauw (35%) (Gemeente Hulst, 2011). For the Perkpolder plan a good connection to the services in Kloosterzande would be needed.
Urbanisation Vision+	Urbanisation: restructuring potential in Centres, Sluis (international retail), Oostburg, Breskens Newbuilt only for specific demands and new types.	Urbanisation potential in centres and close to them + restructuring	Urbanisation potentials in centres of Hulst and Kloosterzande + smaller urban plans: restructure
Other Policy points	Lots of second home ownership in villages too, prohibited until 2014 due to issues with controlling this, but is now causing issues pressure again (van der Werf, 2020b). In contrary, a risk of vacancies and decline of conditions is present if no demand was present (Gemeente Sluis, 2021). Circumstances have changed and number of houses needs to increase due to decreasing size of household configurations. Quality of recreational needs to be upgraded and is most important to avoid temporal use only. And increases the benefits for inhabitants. Current housing policy focuses on reducing number of houses. There is a risk present for putting even more pressure on housing for permanent residents because the policies of reducing the total number and allowing for second home ownership are still active.		Focus on Saefthinge natural park as a connection and the central natural polders between Hulst and below + Perkpolder plan. Need for transformation of agriculture: natural management and broadening the functions of agro companies. New types of species, scale, specialisation are important.
Sustainability			
Energy potential	Wind, solar, biomass production	Wind, geothermal, heat exchange, H2, biomass processing	Solar, biomass production
Added energy potential	Solar on built>land+ wind energy in dedicated area at Breskens commercial	Solar energy + wind energy in industrial areas	Solar energy built>land
	areas instead of excessive commercial land availability.		
Economy			
Employment locations	Spread, small concentrations	Concentration in cores	Spread, concentration in cores
POTENTIAL-map locations	At border edges and in coastal-agricultural areas	In canal zone and border areas.	In two core areas and agricultural areas
Economic added potential	Recreational (services)- agricultural	Industrial-educational-commercial (services)	Agricultural-recreational- practical education-distribution (services)
Tourism		Industrial tourism	
	Natural area development: expansion/exploitation	Natural area expansion	Natural area development:expansion, exploitation/agro
	Historic cities		Historic cities/for structure
Border attraction	Attracting temporary visiting Belgians a lot (recreational) +culinary	Attracting employees from Belgium a lot (and region and other parts of Zeeland/NL)	Attracting Belgian visitors in Hulst core. Attracting permanent Belgians, predominantly housing (migration, about 10% of total inhabitants (Gemeente Sluis, 2020) + culinary

6.8 Table of comparison of clusters

6.2 Space: vision analysis

The following part of the research consists of a more detailed spatial and functional analysis of the region. While the maps shown in the first part of the vision chapter concern a more theoretical representation of the current situation, these maps are aimed at translating the theoretical outcomes and concepts of the research from Chapter 1,4 and 5 to a more spatial representation of the region. When combined, this is aimed to provide a base layer for a more detailed development of the vision on the regional scale.



6.9 Map of soil and types of urbanisation (edited by author). Map data:(EEA, 2018; Geopunt, 2016; Wageningen University, 2006)

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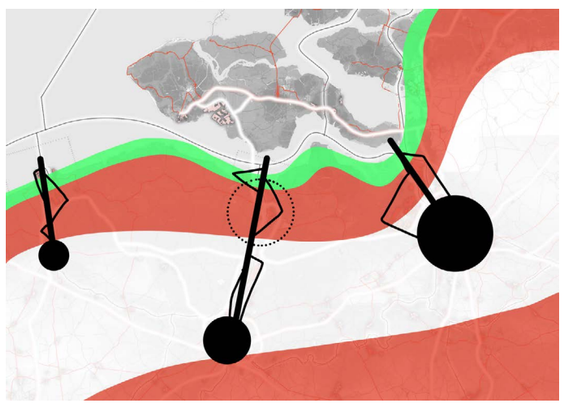
Vision analysis

Soil|Urbanisation

The environmental conditions and risks that were introduced in Chapter 5 are represented in the following maps in order to find out where exactly new developments can be located as part of the ongoing transition within the region. One of the reasons for Dutch Flanders being different to Flanders in Belgium, is due to the type of soil where urbanisation has taken place on. In Dutch Flanders and the Belgian coastline, more fertile soils are found. The type of urbanisation is more compact on these, as it shows in the map, while on the sandy type of soil, urban sprawl is much more prevalent. The location of urbanisation within the more fertile soils is on the sandier types of clay. The value of soil for production of food could be one of the reasons for this compact type of urbanisation. This is something that should be considered in the spatial development of the region. Another outcome of this analysis is the location of port cities on the edges of different types of soil. Possibly due to the opportunities as a stable layer for heavy port-related activities on the port's quays. There is one exception, the city of Ghent is located at the second shift in soil type seen from the sea, along the canal. By nature, there is another possibility for development along the first edge that is located within Dutch Flanders, as can be seen in the image below.



6.10 Abstraction of urbanisation pattern and port-canal structure.

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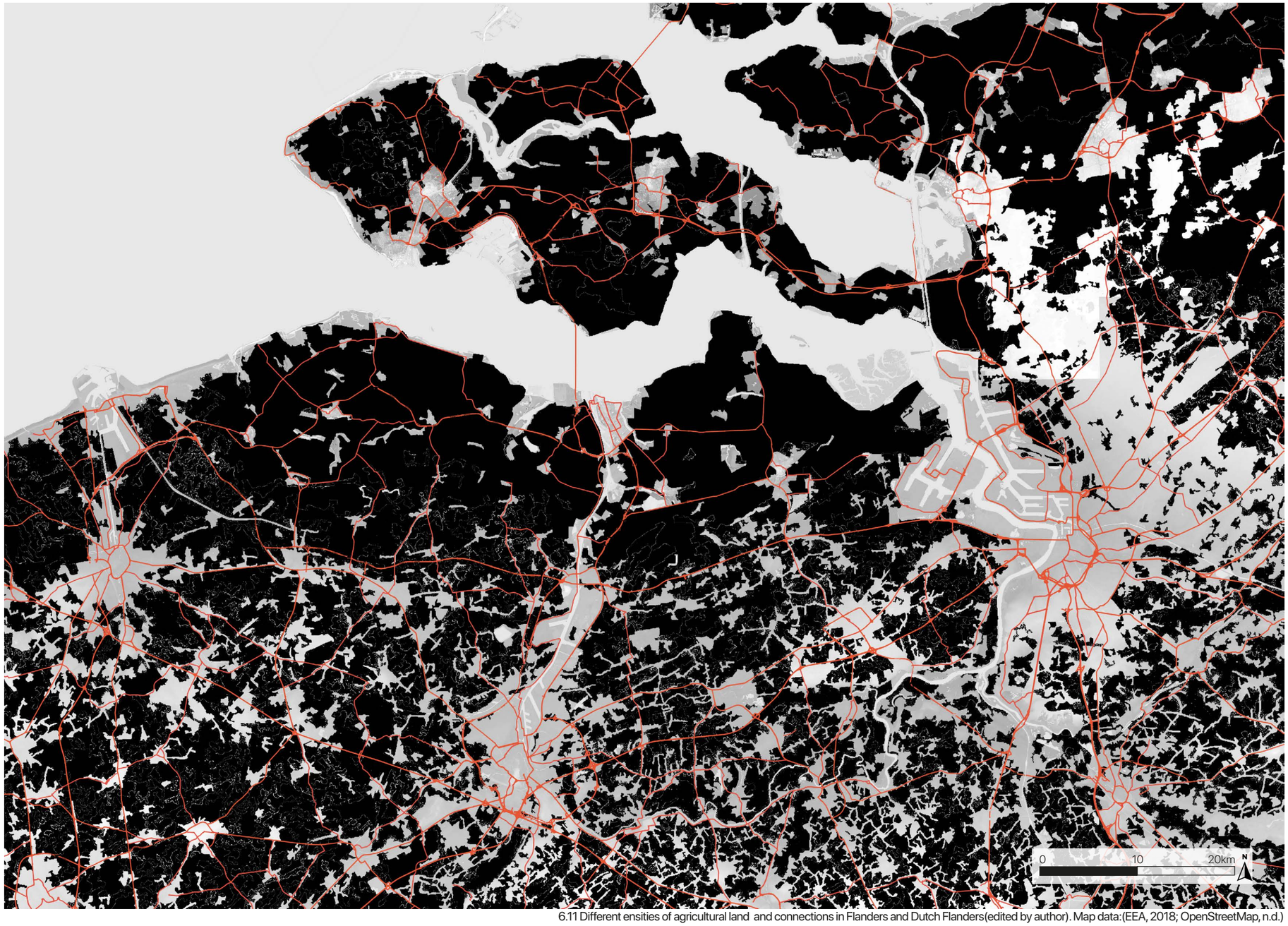
Vision analysis



6.11 Different ensities of agricultural land and connections in Flanders and Dutch Flanders(edited by author). Map data:(EEA, 2018; OpenStreetMap, n.d.)

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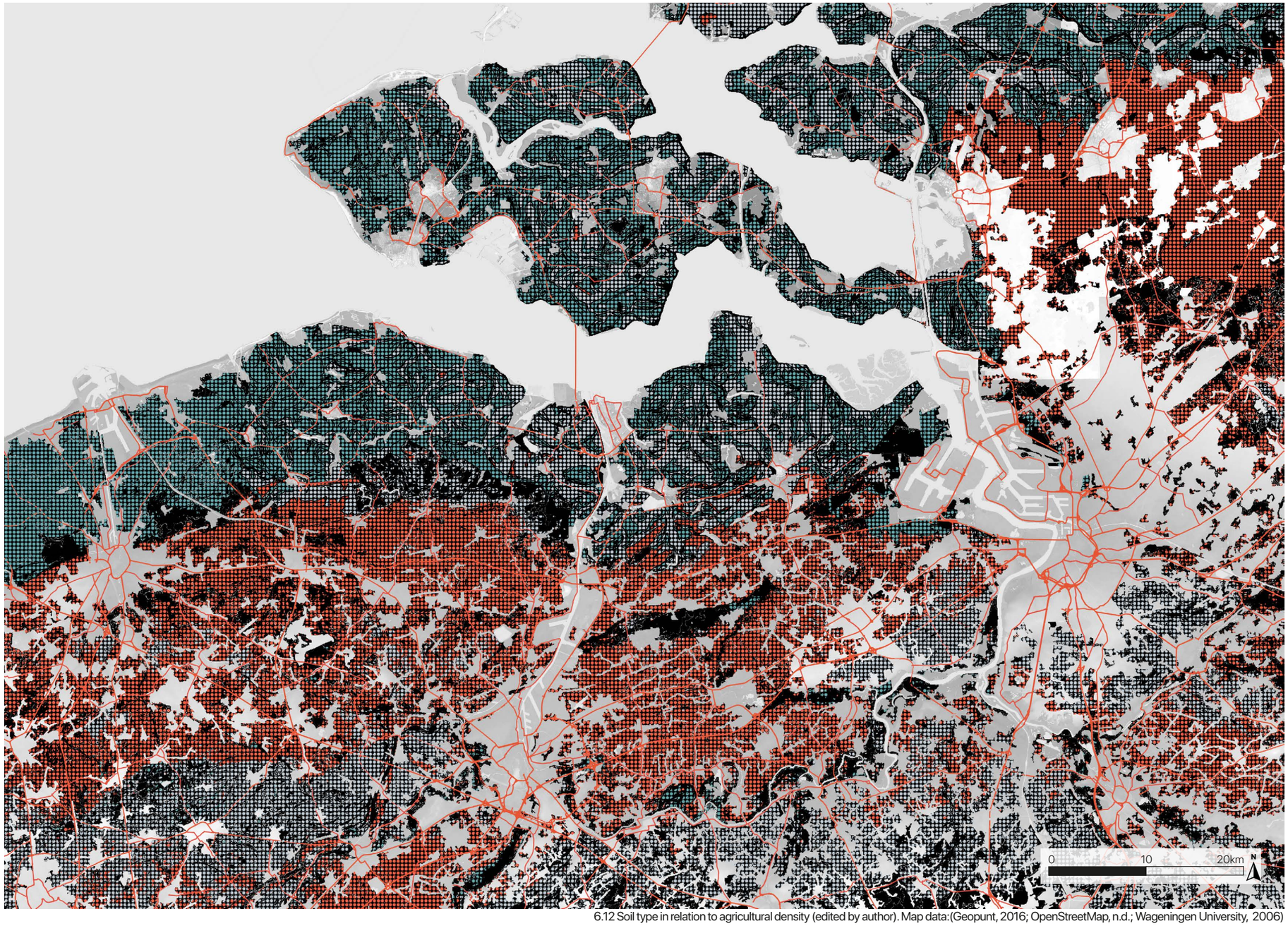
Vision analysis

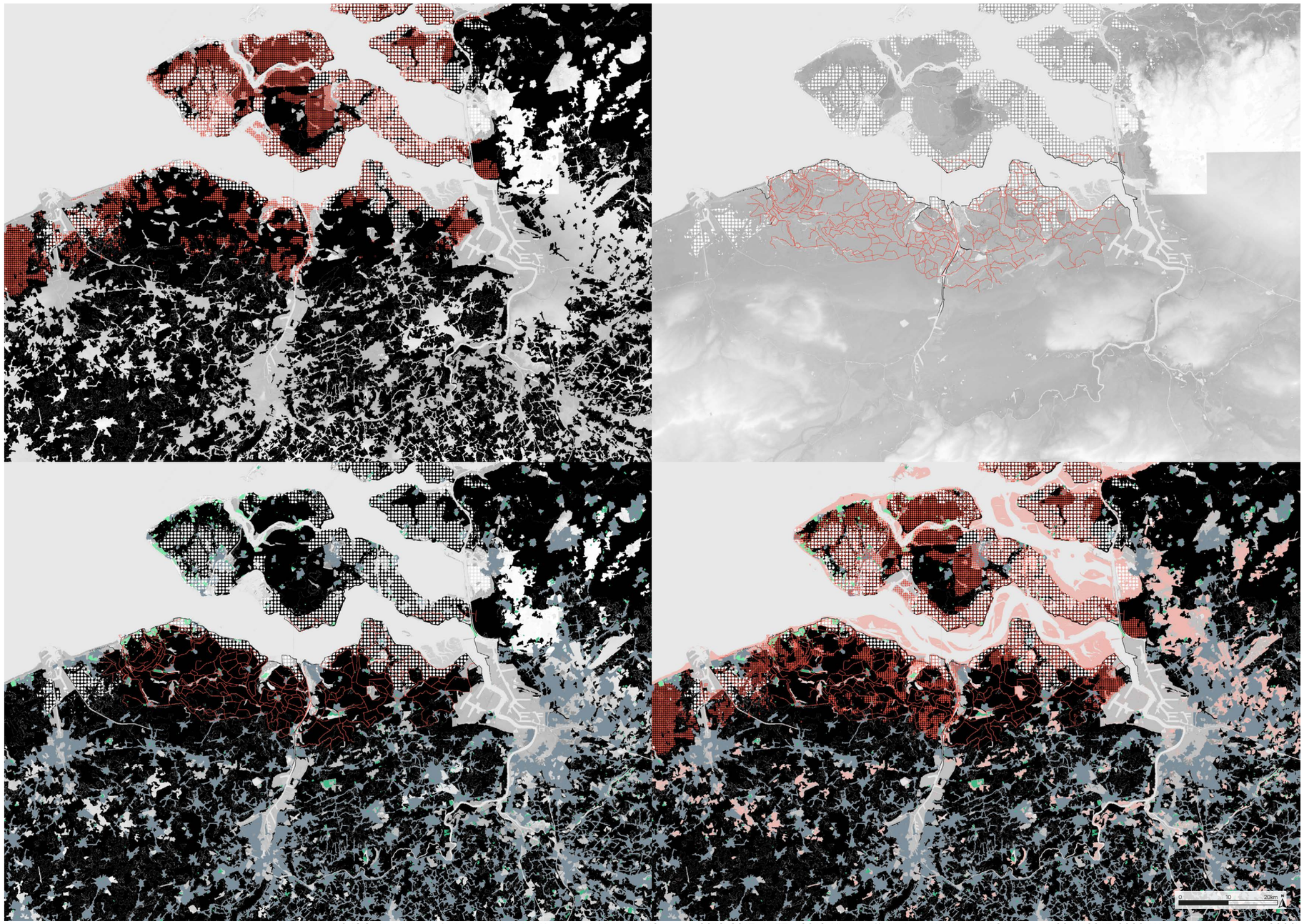
Vision analysis



6.12 Soil type in relation to agricultural density (edited by author). Map data:(Geopunt, 2016; OpenStreetMap, n.d.; Wageningen University, 2006)

Soil|Agriculture

When the previous two maps are combined, the following map shows the main reason for the difference in density of agricultural land is likely due to the type of (fertile) soil. This can explain the differences in density of agricultural land and differences in urban sprawl. For future development, an optimal location to maintain agricultural production would be in these more fertile lands, while other developments could replace agricultural production on less fertile soils. For instance, increase of natural areas to reduce the pressure of agriculture on biodiversity would be more suitable on the sandy soil-types.



6.13 Soil and types of urbanisation (edited by author). Map data:(Geopunt, 2016; 2017a,b; EEA, 2018; Klimaateffectatlas, n.d.; Nationaal Georegister, 2014; 2015; 2020; Wageningen University, 2006)

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Vision analysis

Agriculture|Water|Natural risks

In order to find specific potential locations for urban, natural and agricultural development, the most vulnerable locations are represented in these maps. In addition to the soil types, the risk to flooding and salination of the soil are of importance for (re)locating agricultural, natural and potential urban functions. The risk of flooding is present at almost all regional edges bordering the water, but is most prevalent in the Eastern part. This risk is based on the opportunity of occurance once in a 1000 years. This chance increases as temperatures and sea-levels rise as part of environmental change. When looking at the map of dikes, it appears this risk is most often present in the zone between the sea dikes and secondary dikes behind them. In the Eastern part however, this risk is present more inwards as well, which causes additional risk in case of flooding. This is in contrast to the risk of salination, which is mostly present at the edges and the Western part of the region. These could be potential locations for development of different types of agriculture and nature, suiting these conditions, as described in Chapter 5. In addition to salt- and water-tolerant agriculture, alternative types of urbanisation can take place here. These can be in combination with natural and agricultural areas and be both recreational and permanent housing. As can be seen on the maps, in the coastal part of the region, the majority of natural areas in the region is found. Current recreational functions are located in proximity to these. Future developments are aimed at focusing on quality instead of quantity, to which the natural areas and unique combinations of built, natural and agricultural landscape can contribute. This can ensure a more constant occupation (Gemeente Hulst, 2015), which improves liveability in the recreational areas and surrounding urban areas and can benefit the amenities present, as mentioned in Chapter 2 and 4.

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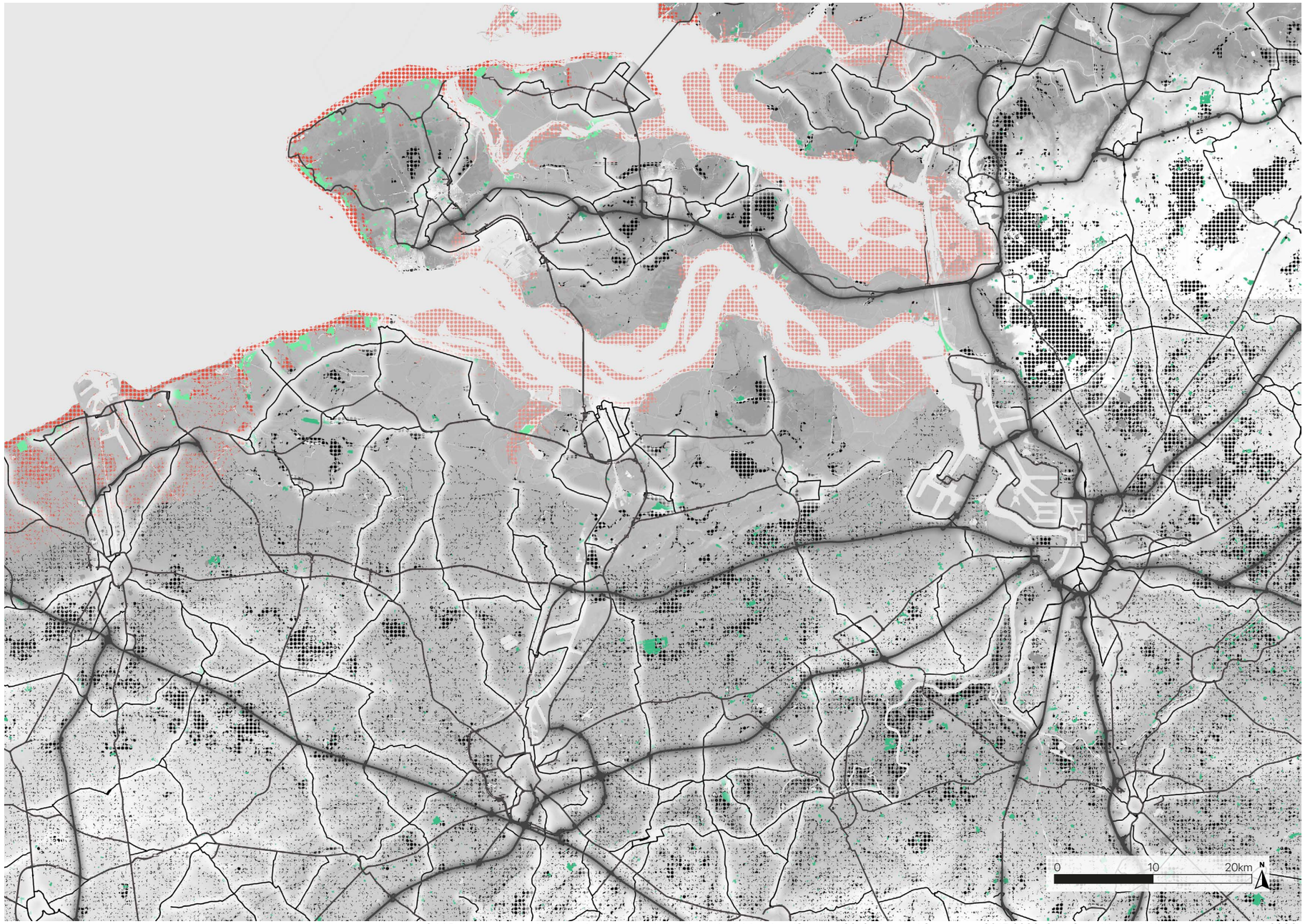
Vision analysis

Vision analysis



6.14 Recreation, natural areas and connectivity (edited by author). Map data:(Geopunt, 2016; Nationaal Georegister, 2015;2020; OpenStreetMap, n.d.; Wageningen University, 2006)

Recreation|Connectivity|Natural areas

The following map shows the larger recreational sites in the Scheldt Delta region. The majority of these is found in the coastal areas and in proximity to natural areas. The main connections to these currently are the regional (secondary) roads. These connect most of the recreational sites, however, a potential for improving connections to larger natural areas in the eastern part of the region and including other types of mobility is one of the opportunities for development.

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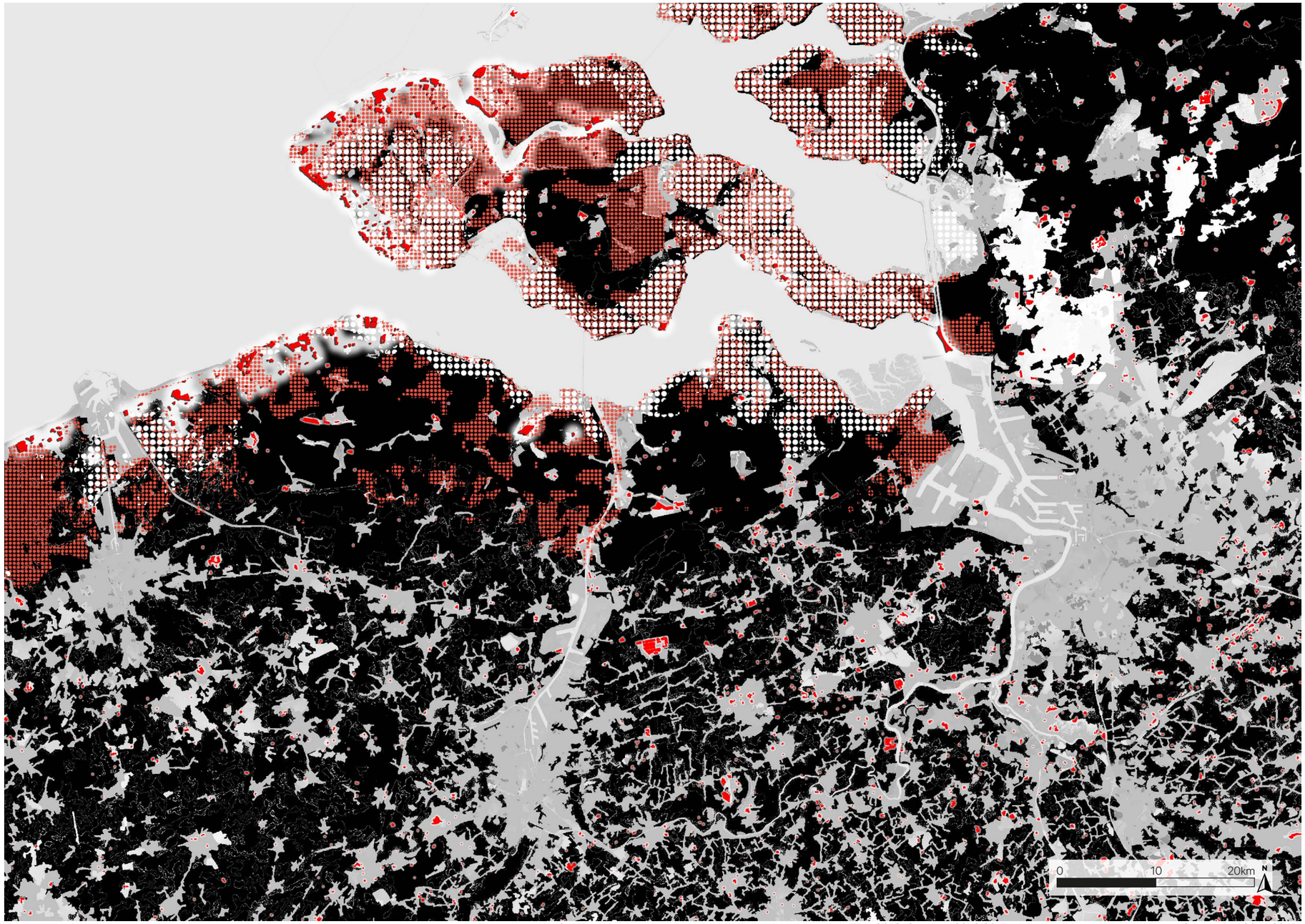
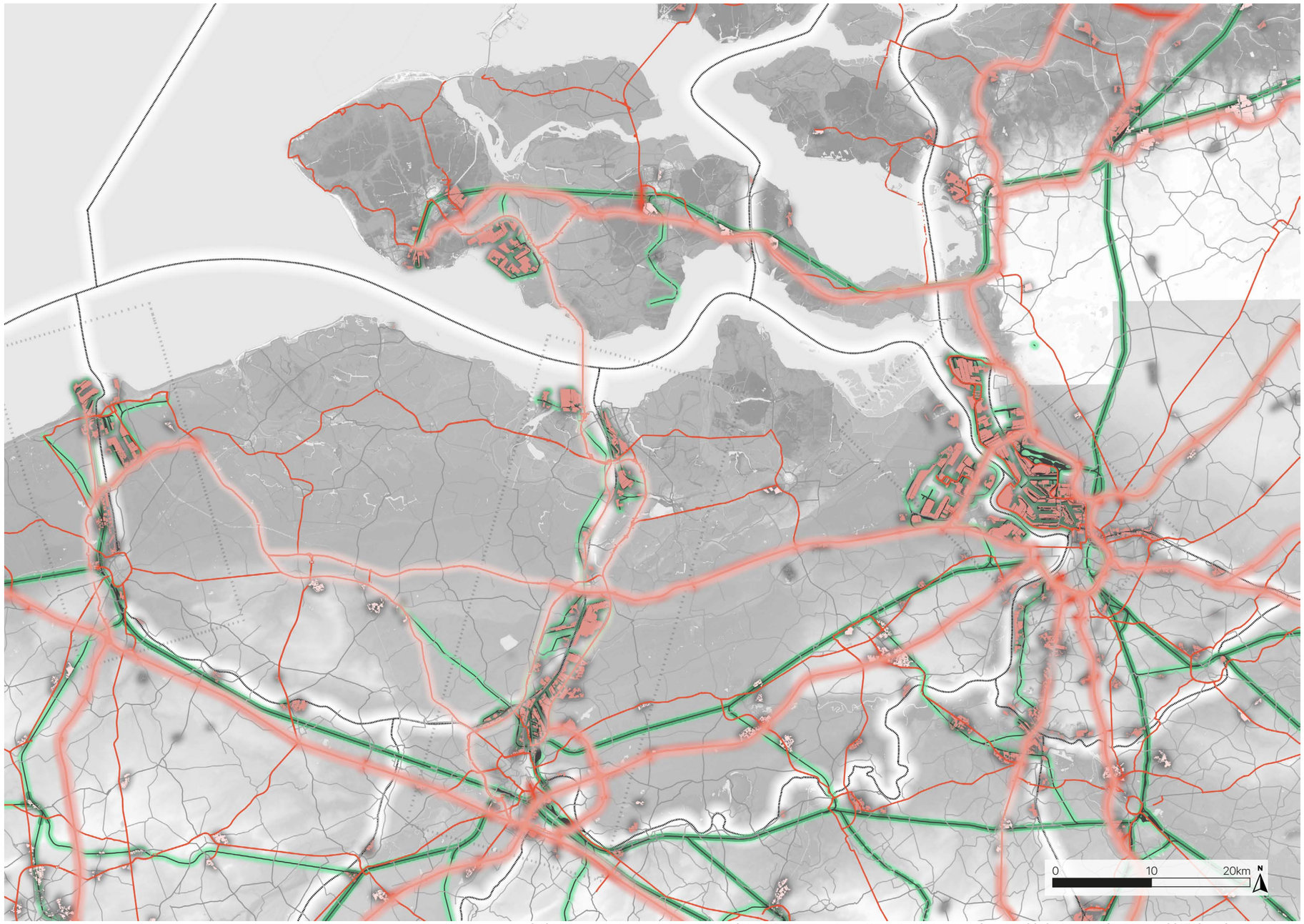
Vision analysis



6.15 Recreation, water and soil (edited by author). Map data:(EEA, 2018; Geopunt, 2016;2017a; Klimaateffectatlas, n.d.; Nationaal Georegister, 2014;2015)

Recreation|Water|Soil

In addition to the previous map, the recreational sites that are water-related are combined with the agricultural risks in order to locate potential development locations in proximity to existing recreational sites.



6.16 Industries and their main routes in the Scheldt Delta region (edited by author). Map data:(Geopunt, 2016; Nationaal Georegister, 2015, OpenStreetMap, n.d.)

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Vision analysis

Industry|Connectivity

For the industries in the region, connectivity is among the most important factors for settlement. In this map, the industries and business parks and their networks of distribution are shown. In the region of Dutch Flanders, the railways at the canal zone are used for commercial transport only. The map shows the industries and business parks mainly concentrate around the waterway connections, as well as in close proximity to highways and provincial and regional roads. The majority of industrial areas also spread around (public) railway connections, while larger industrial sites are connected by their own, industrial railway infrastructure which connects them to the larger international network. This shows these connections are of importance and should be considered when relocating new or similar functions in the region. East of the canal zone in Dutch Flanders there is a missing railway link for commercial transport. Public railways are not present in the Dutch Flanders region. Development could benefit the developments along the industrial canal zone while also benefitting the competitive position of the urban and industrial areas to which (public) railways connect to.

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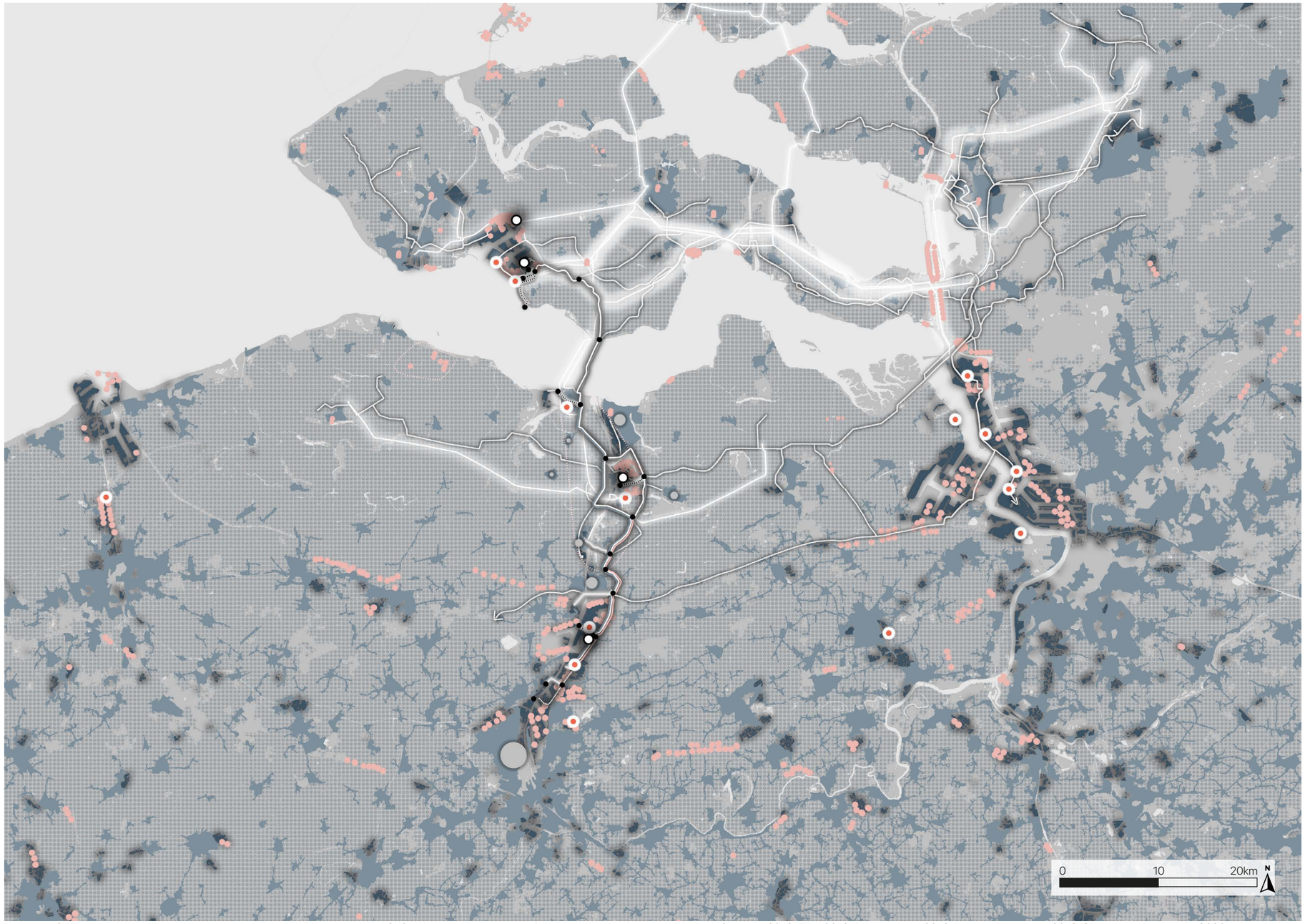
Vision analysis

Vision analysis



6.17 Industries, the electricity network, proposed hydrogen, heat and Co2 network and production of energy. (edited by author). Map data:(Geopunt, 2016; EEA, 2018; Rijksoverheid, 2018; Ruimte Vlaanderen, 2013; Smart Delta Resources, 2020; van der Niet et al., 2020)

Industry|Sustainability|Network

In order to have a circular economy by 2050, the use of hydrogen is mentioned as a potential for the industries in the region of Dutch Flanders (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a; van der Niet et al., 2020) propose a network of different connections. The network consists of a combination of existing networks for transport of CO2 and gas. It also includes transport of residual heat in some parts of the network, which is connected to the greenhouses can be connected to urban areas and greenhouses. This is most suitable in urban areas that are in close proximity to the production locations, due to the losses that come with longer distances of transport. Proposed locations for hydrogen production through electrolysis are located in the industrial areas along the canal zone in the heart of the region. Two other locations are located in the industrial across the water, north of the region. Here, the landing of energy from the planned wind parks at sea is located. For this production, a proper network of electricity is needed. Currently, this is only present in Flanders in Belgium and the middle part of the province. In Dutch Flanders, upgrades will be needed in order to facilitate the production of Hydrogen and the production of electric energy from other sources within the region, like solar energy and additional wind energy. The location of production locations within the region means a concentration of related industries is favourable to overcome the issues of (energy) loss and to connect to urban areas for exchange of energy and resources.

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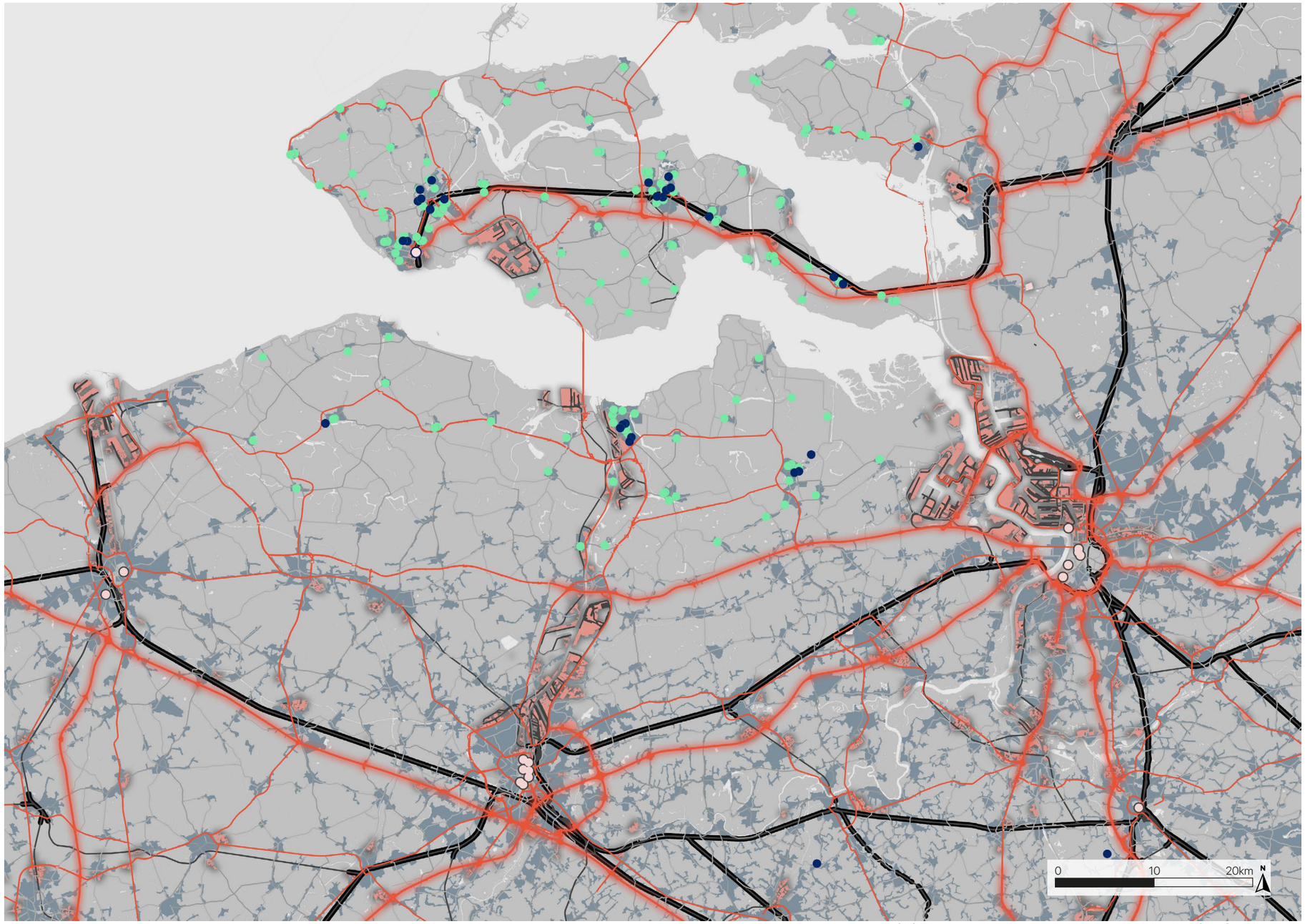
Vision analysis

Vision analysis



6.18 Education and connectivity (edited by author). Map data: (OpenStreetMap, n.d.)

Education|Connectivity

Many educational institutes concentrate around well-connected urban areas. In Dutch Flanders this is visible through connectivity via roads. In the surrounding larger urban cores, higher education is present. These all have access to public transport by train. In Dutch Flanders, the railways that are currently present only have industrial purposes. Existing plans (van der Werf, 2020a) propose to transform these into a public connection that connects the region to the large cities in its surroundings. Location of an educational institute that fits the industries and the proposed transformation of these, is an opportunity that can be connected through public railway infrastructure. In this way, such an institute can attract students from larger distances and create improved connections to, and alignments with the surrounding facilities for higher education.

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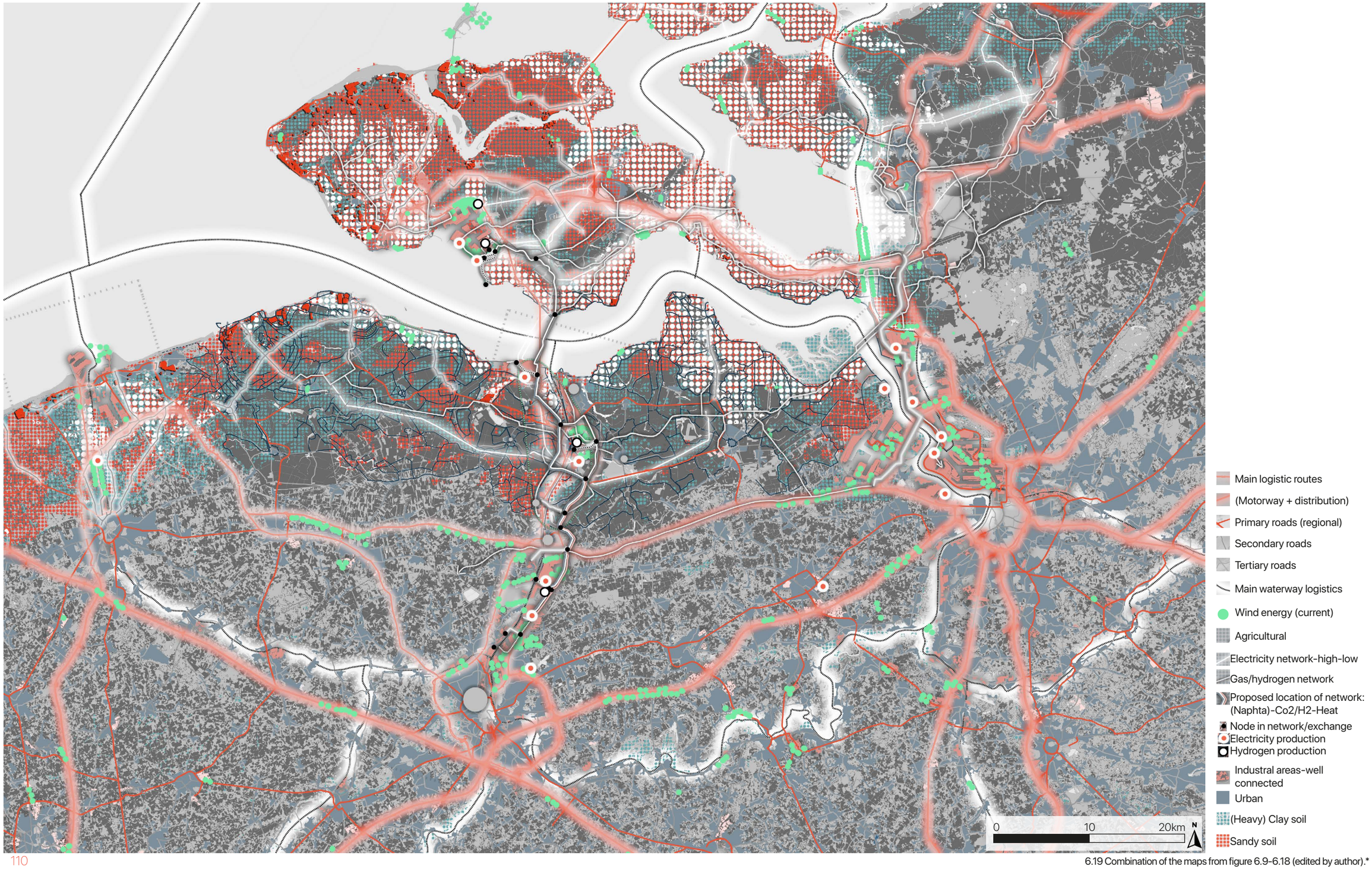
Vision analysis

Vision analysis



6.19 Combination of the maps from figure 6.9-6.18 (edited by author).*

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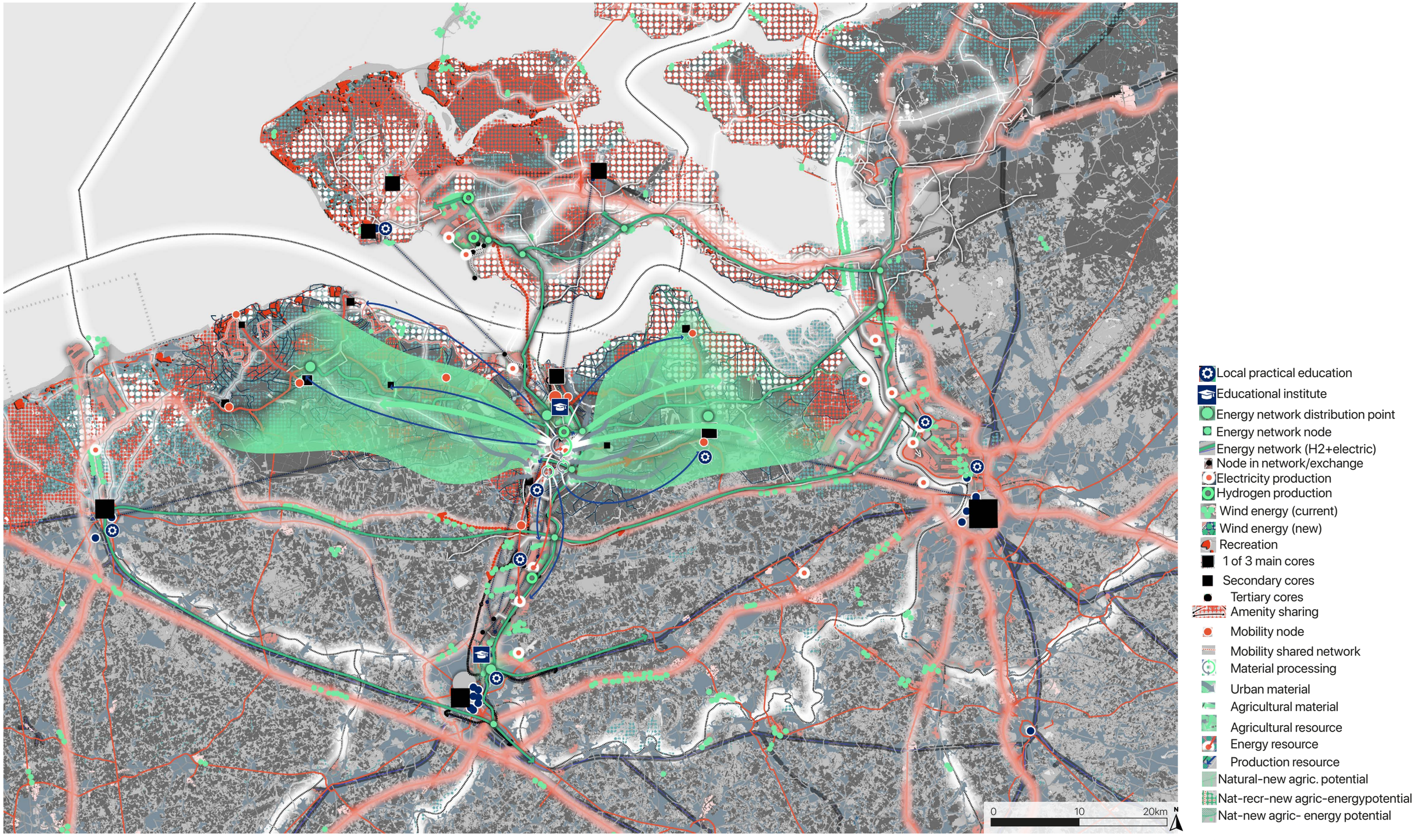
Vision

Vision



6.20 Combination of regional vision concepts and spatial analysis (edited by author). Map data:(Geopunt, 2016; Wageningen University, 2006)

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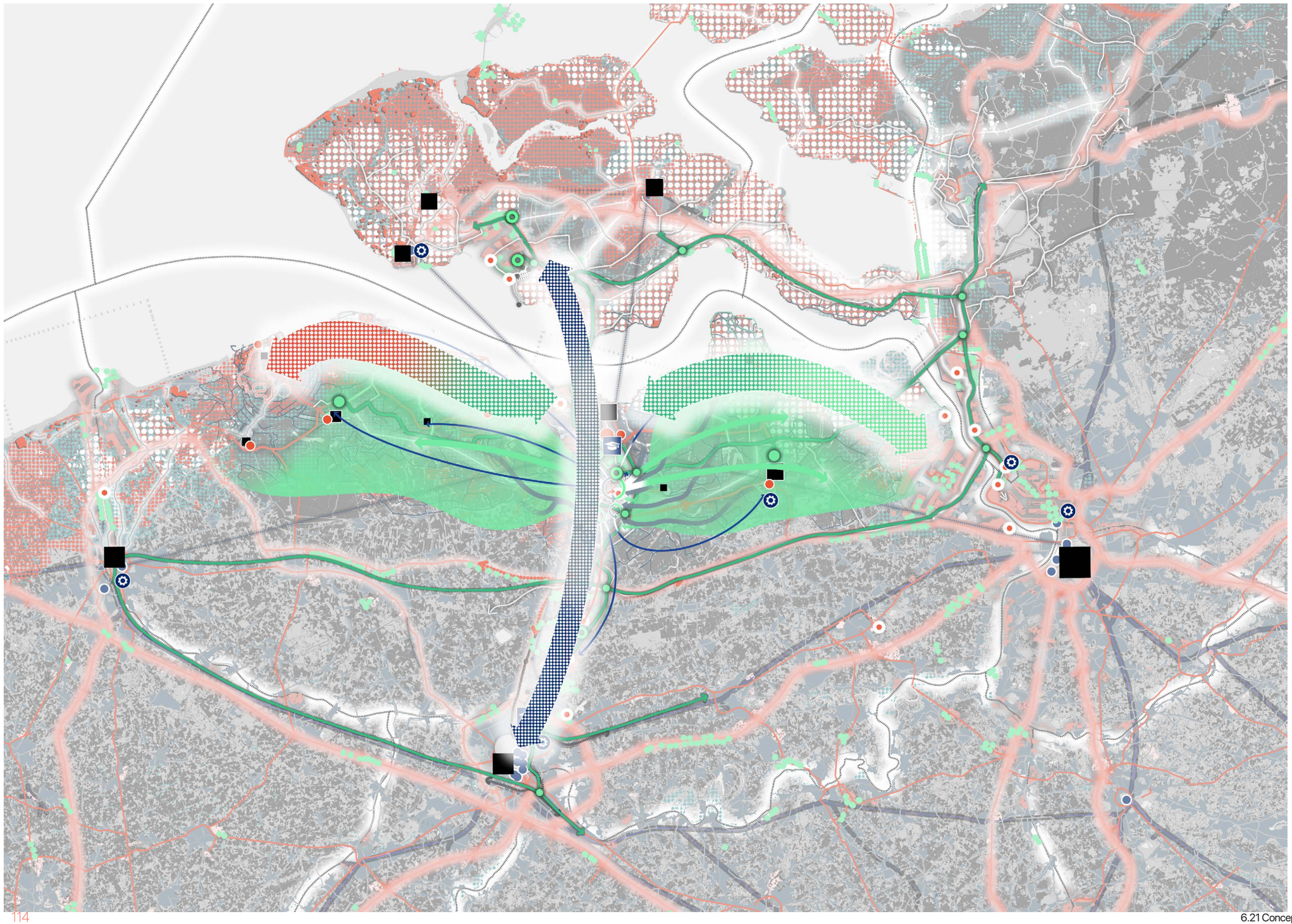
Vision



6.21 Concept of the three clusters within the vision

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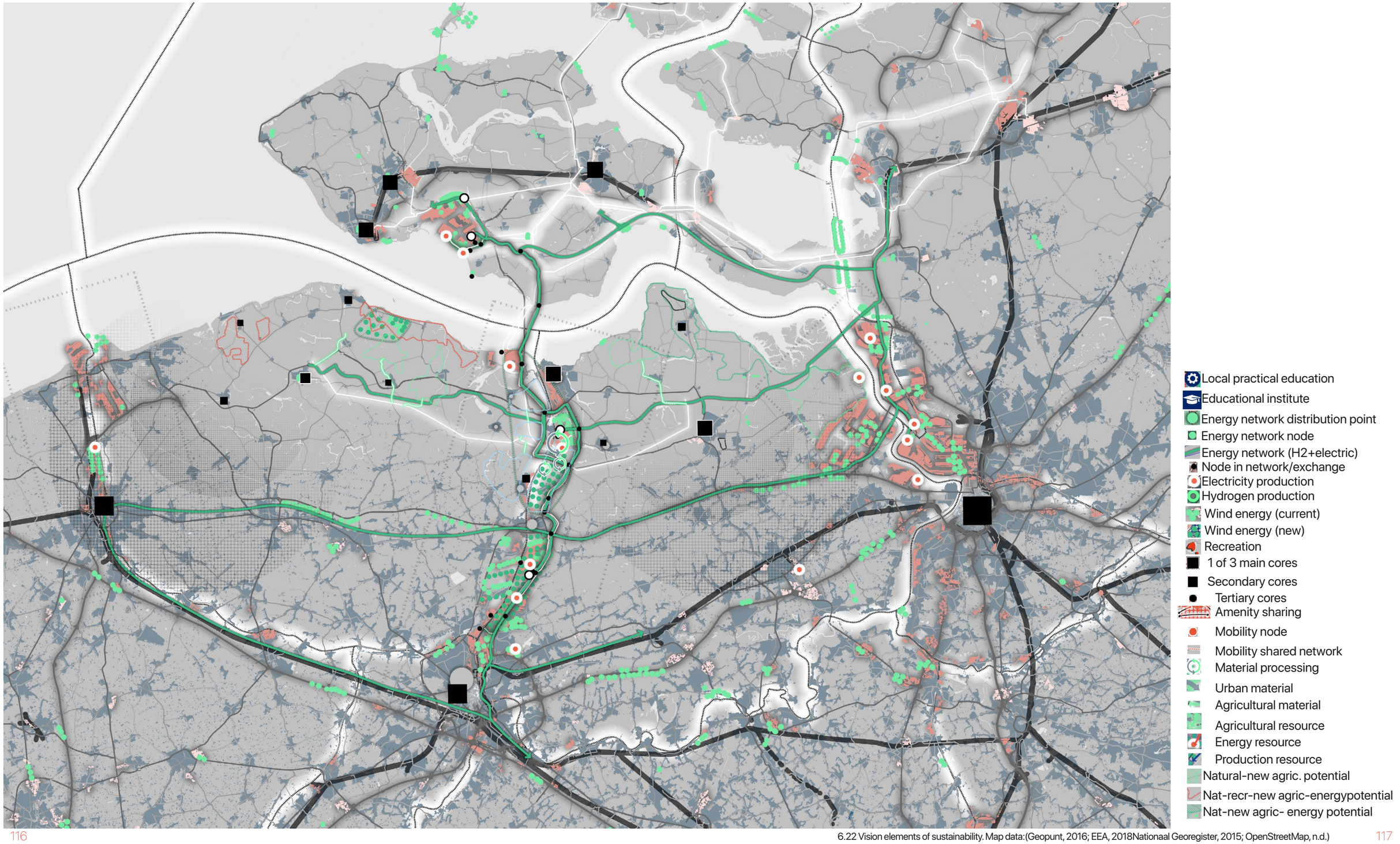
Vision

Vision



6.22 Vision elements of sustainability. Map data:(Geopunt, 2016; EEA, 2018Nationaal Georegister, 2015; OpenStreetMap, n.d.)

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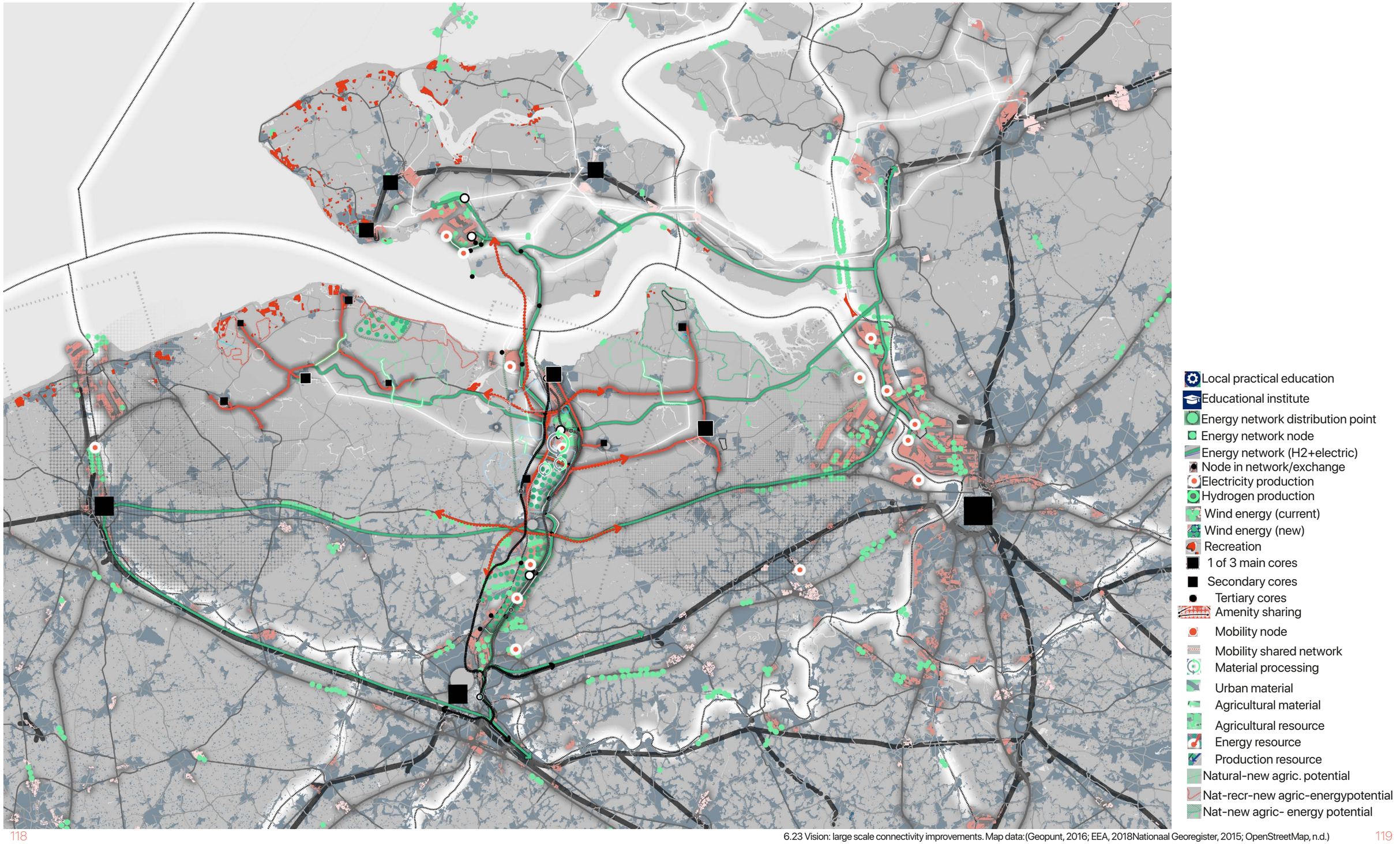
Vision

Vision



6.23 Vision: large scale connectivity improvements. Map data:(Geopunt, 2016; EEA, 2018Nationaal Georegister, 2015; OpenStreetMap, n.d.)

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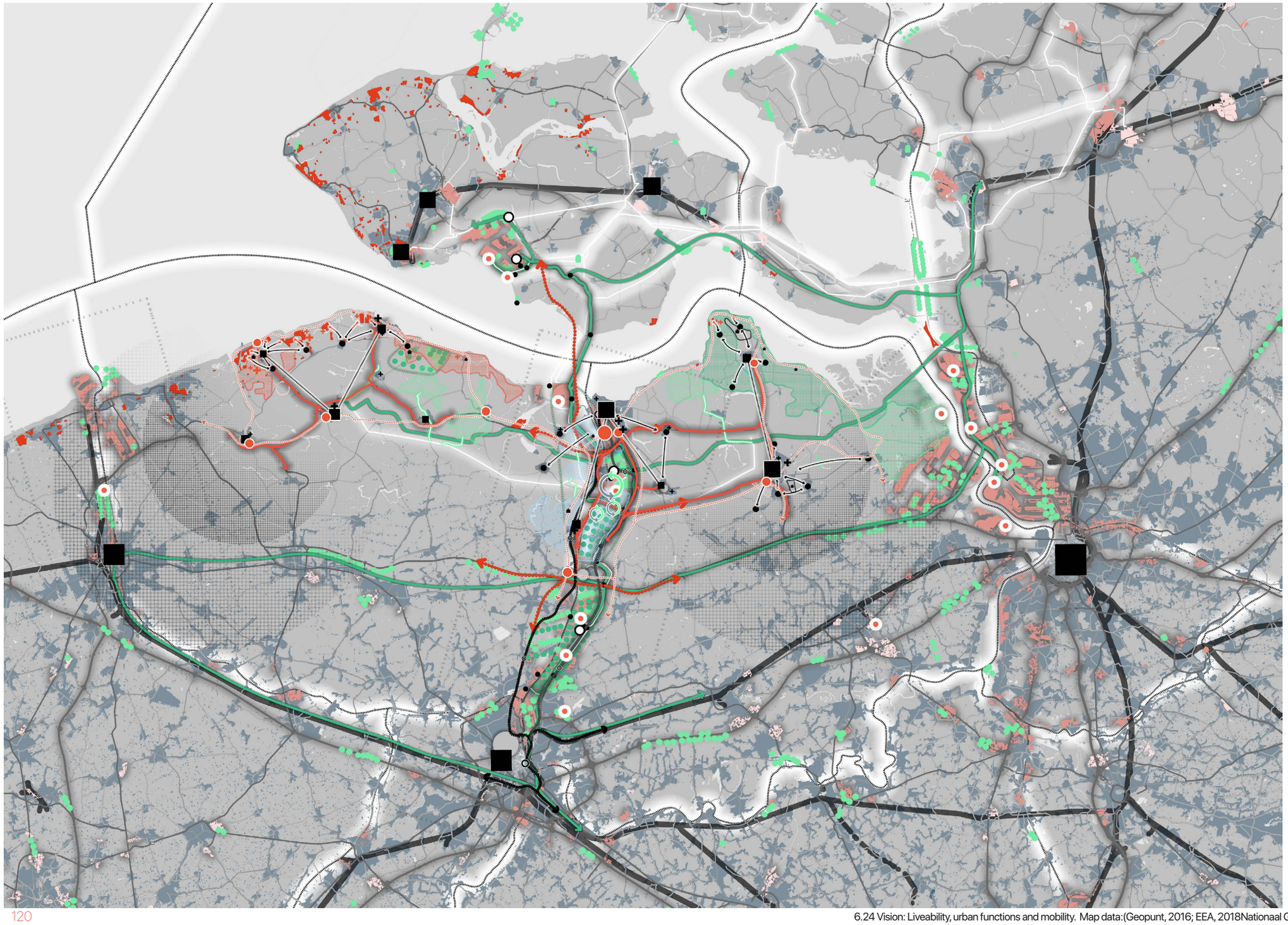
Vision



6.24 Vision: Liveability, urban functions and mobility. Map data:(Geopunt, 2016; EEA, 2018Nationaal Georegister, 2015; OpenStreetMap, n.d.)

Vision

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Vision

6.25 Regional vision for Dutch Flanders. Map data:(Geopunt, 2016; EEA, 2018Nationaal Georegister, 2015; OpenStreetMap, n.d.)

6.3 Regional vision

The region of Dutch Flanders is at the tipping point between further regional decline and a future (economically) sustainable region that uses its valuable position in-between the large urban and industrial cores of the Scheldt Delta. In the coming two decades, the vision for this region is to be able to exploit its valuable position, and the opportunities its landscape and urbanisation provide, in a sustainable way. The region consists of three unique municipalities, each covering a different functional emphasis and spatial landscape.

The coastal cluster will focus on a higher quality of recreational residences, natural areas and unique types of housing, concentration of amenities in several core areas and sharing amenities between different urban and recreational functions for increased liveability.

The industrial cluster is envisioned to transform into a diverse zone along the canal towards the port of Ghent. In here, a combination of industrial production, manufacturing, recycling, energy production and education will take place. While focused on the industries at first, the educational institute is aimed at developing into a knowledge institute which connects to- and attracts companies related to innovation and research and development suiting the commercial functions in this cluster. The connections between education and diverse locations in practice allows for students to follow higher education within their own region, and can attract students and companies from outside as well. This combination will also support the transition towards sustainable industries within the Scheldt Delta, specifically in Dutch Flanders.

In the agricultural cluster, new types of agricultural production are envisioned to take place in the areas most affected by environmental changes. The polders adjacent to the Westerscheldt water will, next to new agricultural functions, also be developed as natural areas and combined with small scale recreational and housing. The urbanisation focus in this area is in the two larger cores, consisting of both restructuring and expansion due to high demands from migration and development of the industrial clusters, which provides additional opportunities for employment. These agricultural cores themselves will also provide locations related to these industries for secondary functions like distribution, and provide (practical) education on a smaller scale.

In all clusters, a crucial element is connectivity. Large scale connectivity to other regions and large cores in Flanders and the Netherlands is important for especially the industries. For this the elimination of toll in the Westerscheldetunnel, direct connections from industries to the highways in Flanders and connecting the industrial railways from Dutch Flanders toward Ghent will contribute. The introduction of public use of the railways contributes to the attraction of employees, students and the settlement of the educational institute and companies, and is beneficial for the inhabitants of Dutch Flanders as well. Several mobility nodes within the region allow for shifting between different modes of transport for inhabitants, commuters and visitors. Improved connectivity by bike routes contributes to the developments in especially the agricultural and coastal cluster, where the natural areas and recreation are directly connected.

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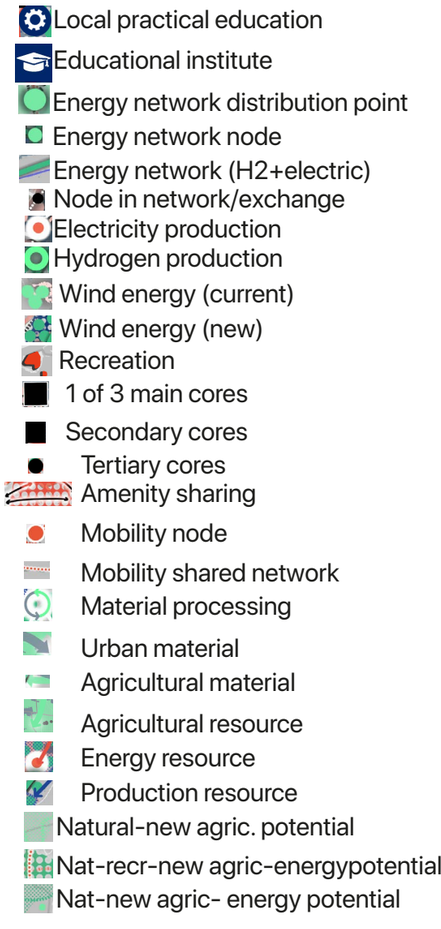
Vision

Together, the three clusters will provide room for 2000 additional households by restructuring the outdated housing stock and providing newly built housing in unique configurations and locations. This ensures the attraction of employees and provides for younger groups to remain in the region for employment in combination with the provision of education within Dutch Flanders.

Governance alignment for facilitating education, connectivity improvement and intra- and interregional- and national developments is required to guide this transition. The region of Dutch Flanders can in this way take the opportunity of the transition of the Scheldt Delta and translate it into a revalued position of the regions natural and agricultural landscape and urban facilities, while taking the lead in the industrial transition. This is an opportunity to both create and sustain long-term employment opportunities within the region, while also facilitating improved housing and education to provide for a sustainable future for both the local economy and the regions' inhabitants.



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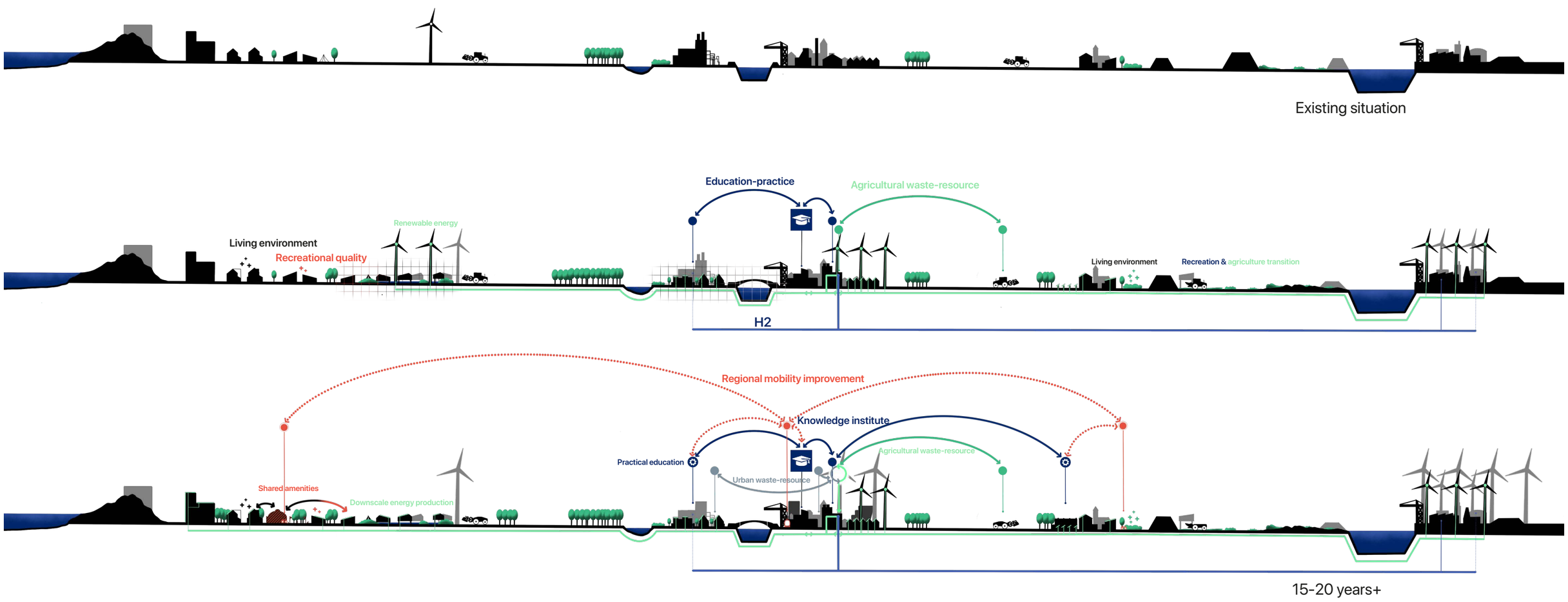
Vision

Vision



6.26 Main vision points of transition in regional section

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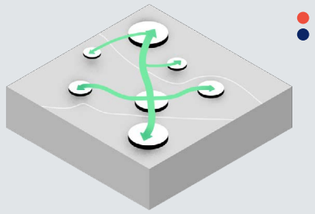
Vision-strategy

Vision-strategy

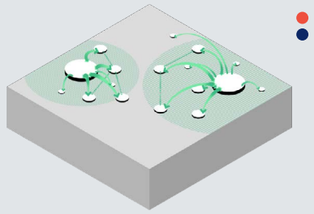
Connectivity between interregional cores



- Improvements in public transport
- Road connectivity
- Toll-free tunnel

- Knowledge platform
- Highway connections
- (Public) transport
- Institutional connection

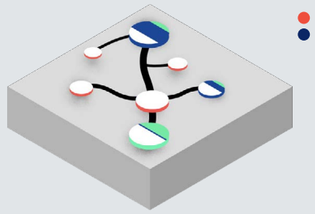
Concentration in regional cores *



- Agglomeration benefits
- Benefits of scale
- Economic sustainability

- Central amenity locations for supermarkets and supporting functions for daily needs
- Improving accessibility to these (f.e. mobility node
- Improving the local conditions

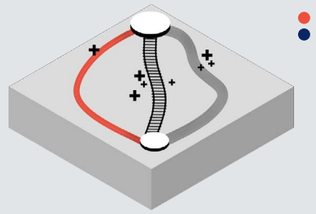
Differentiating function of places



- Avoiding competition
- Enhancing specific qualities
- Stronger individual diversity

- In housing, employment, recreation, (natural) landscape

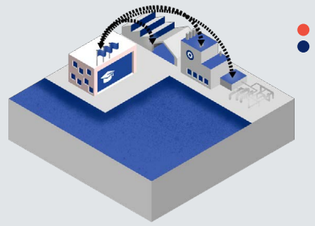
Improved (intra and extra) regional connectivity *



- Increasing liveability
- Improving economic position

- Railway
- Highway connections
- Bike routes for tourism & local commuting
- (Public/shared) transport nodes in central location

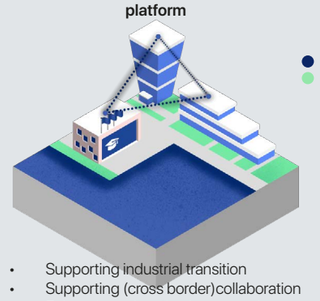
Education-practice alignment *



- Serving students within region
- Supporting industrial transition

- Connections to both locations
- Insitutional connections
- Connections to the urban

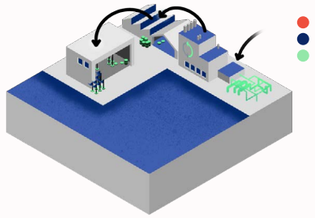
Educational-research institute and platform *



- Supporting industrial transition
- Supporting (cross border)collaboration
- Enhancing education by research

- Central location
- Well connected location
- Insitutional connections
- Proximity of business (area) and education & practice

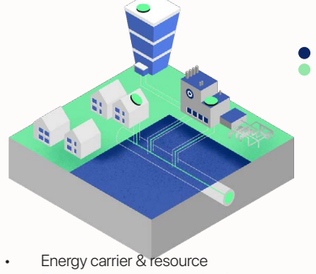
Industrial transition *



- Sustainable resources
- Circularity
- Local production

- Room for more locoal manufacturing
- Room for housing for employees
- Alignment in education

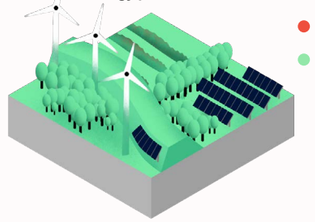
Hydrogen network *



- Energy carrier & resource
- Regional renewable production
- Transport fuel

- Hydrogen production facility
- Accompanying business & employees
- Water, road connections
- housing for employees

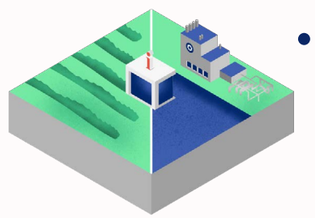
Landscape integration of renewable energy production



- Natural, urban & agirultural landscape

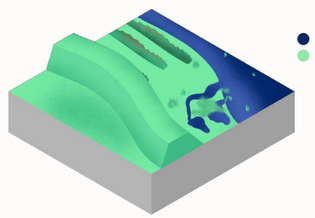
- In temporary locations
- In industrial locations (
- On new built + existing housing & industries
- On open water

Agrotourism & industrial tourism



- Recreation & visitors
- Recreational routes

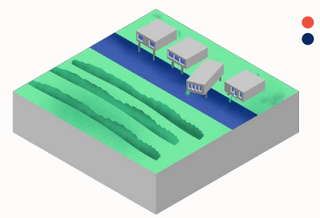
New types of agriculture and natural development



- New production methods
- Introduction of new species
- Dynamic coastal zones

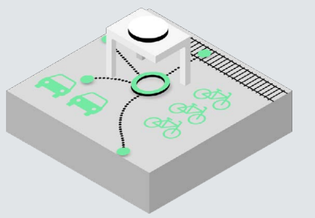
- Using water-salination (risk) based soil
- Hybrid between natural landscapes
- Circular production & use, combination with industrial & energy production

Combining recreation/housing and agriculture



- Unique types of accomodation
- Secondary function of landscape

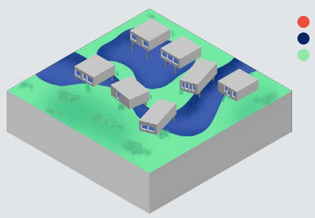
Mobility nodes



- Improvement in connectivity per scale
- Focus on shared mobility

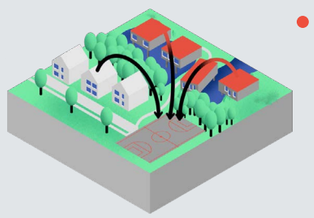
- In central locations and Points of interest
- Accessible for the in-between

Qualitative recreation *



- Focus on quality of accomodation
- Integration in natural landscape
- Climate adaptation

Sharing amenities



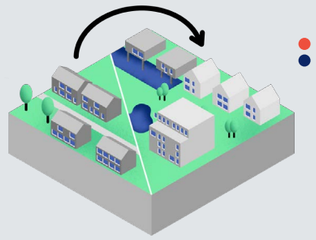
- Improving access and maintaining of amenities in areas with small population
- Between small urban cores and recreational locations

Upgrade of liveability in non-core areas *

- In declining urban areas
- Maintaining locations for interaction

- Slow mobility routes & mobility points.
- Amenities & environmental quality

Housing (type) restructuring *



- Attraction and remaining of target groups for desired economy
- Expansion aligned with landscape
- Restructuring of existing stock

* Key intervention

Liveability Economy Sustainability

6.27 Strategic interventions for the vision

7.
Strategy

In this chapter, the strategic design for realising the opportunities presented in the vision is elaborated on. This aims to contribute to answering the research questions: *'What spatial interventions are needed to help the urban and peri-urban 'in-between' areas of Dutch Flanders unlock their potential and take advantage of the identified opportunities?'* and *'What is the role of spatial planning and governance in implementing these interventions and successfully repositioning the region of Dutch Flanders?'* as part of the phase of intervention and implementation in the research framework. The chapter includes a design strategy on the scale of the three clusters that were defined in the previous chapter. Based on earlier and additional research, strategic designs on the scale of the clusters and smaller urban locations were made that support the regional strategy. These are the accelerators of the developments and implementation of the regional design. The designs and local strategies are followed by a concluding section for the strategy and research questions.

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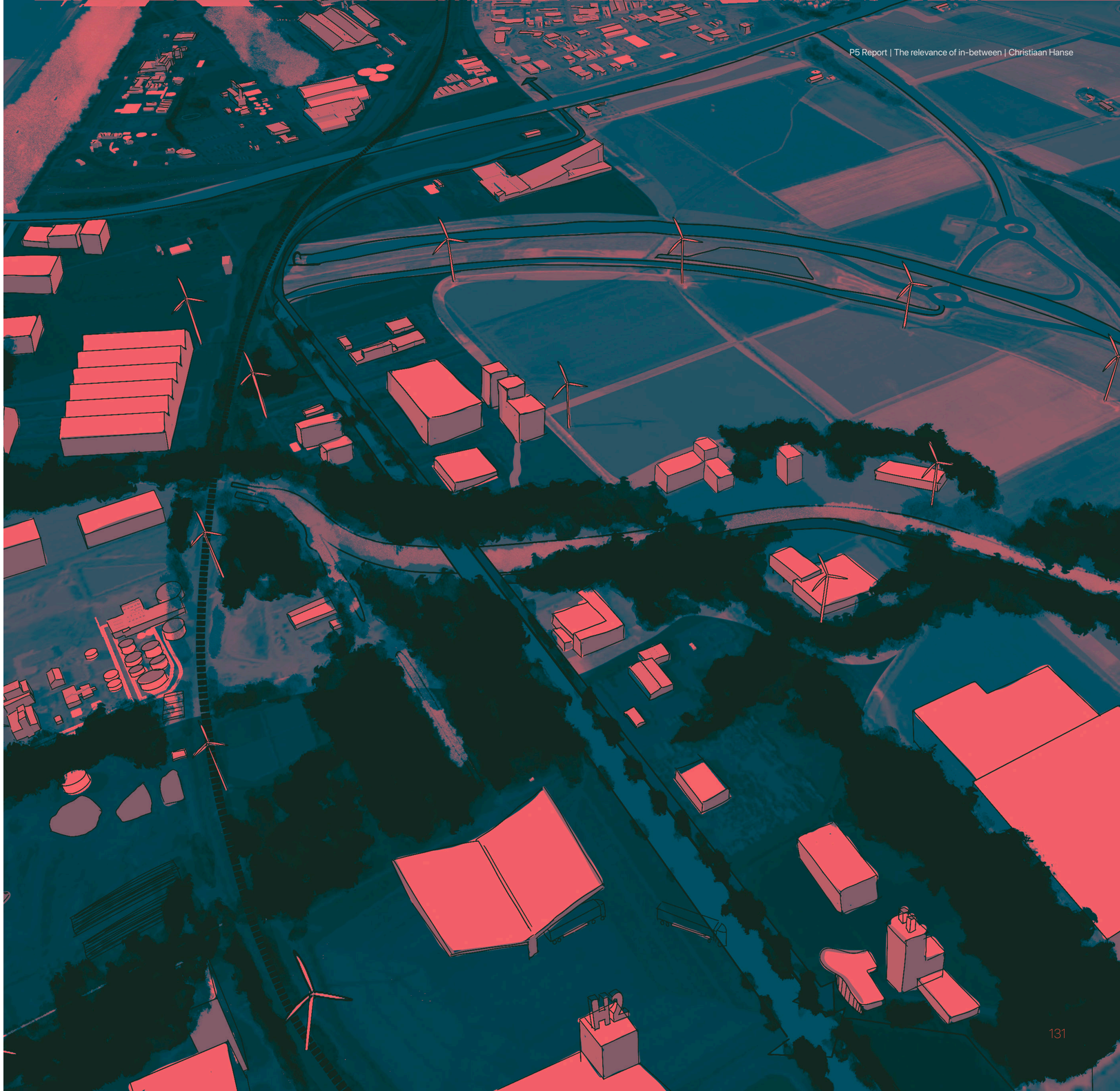

7.1 Regional strategy

The vision results in the definition of three clusters with their own emphasis on urban functions and on the aspects of the strategy and vision addressed in these clusters. As explained in the previous chapter, these are the Coastal, Industrial and Agricultural cluster for each of the three municipalities in Dutch Flanders. The selection of different clusters results in different emphasis for each of the three municipalities. This contributes to the strategy of avoiding competition and complementary functions within the region (Dax & Fischer, 2018; Haarsten et al., 2014; Küpper et al., 2018; Meijers & van der Wouw, 2019).

In order to support the realisation of the vision, key interventions are selected from the previously presented set of vision interventions, on which the designs for the three clusters are based. For each of the clusters, the strategic planning and stakeholder relations to the interventions are defined. In addition to the design on the cluster-scale, key design events on the urban (local) scale will be elaborated on in detail in each of the sections.

The strategy focuses on developing a system of actions resulting in different design interventions to support the main aim of this research: to improve the position of the in-between urban areas and the Dutch Flanders region.

Based on the maps used for selecting the different clusters in the previous chapter, representative locations for both the issues and potentials defined earlier in this research are selected: The village of Cadzand and Cadzand-Bad (Coastal-Sluis municipality), The Canal Zone (Industrial-Terneuzen municipality) and Kloosterzande (Agricultural-Hulst municipality). Together with the regional strategic proposals coming from the vision, they can function as accelerator and facilitate related projects as the designs are aimed at showing a way to implement the regional strategies to scale of real urban locations.

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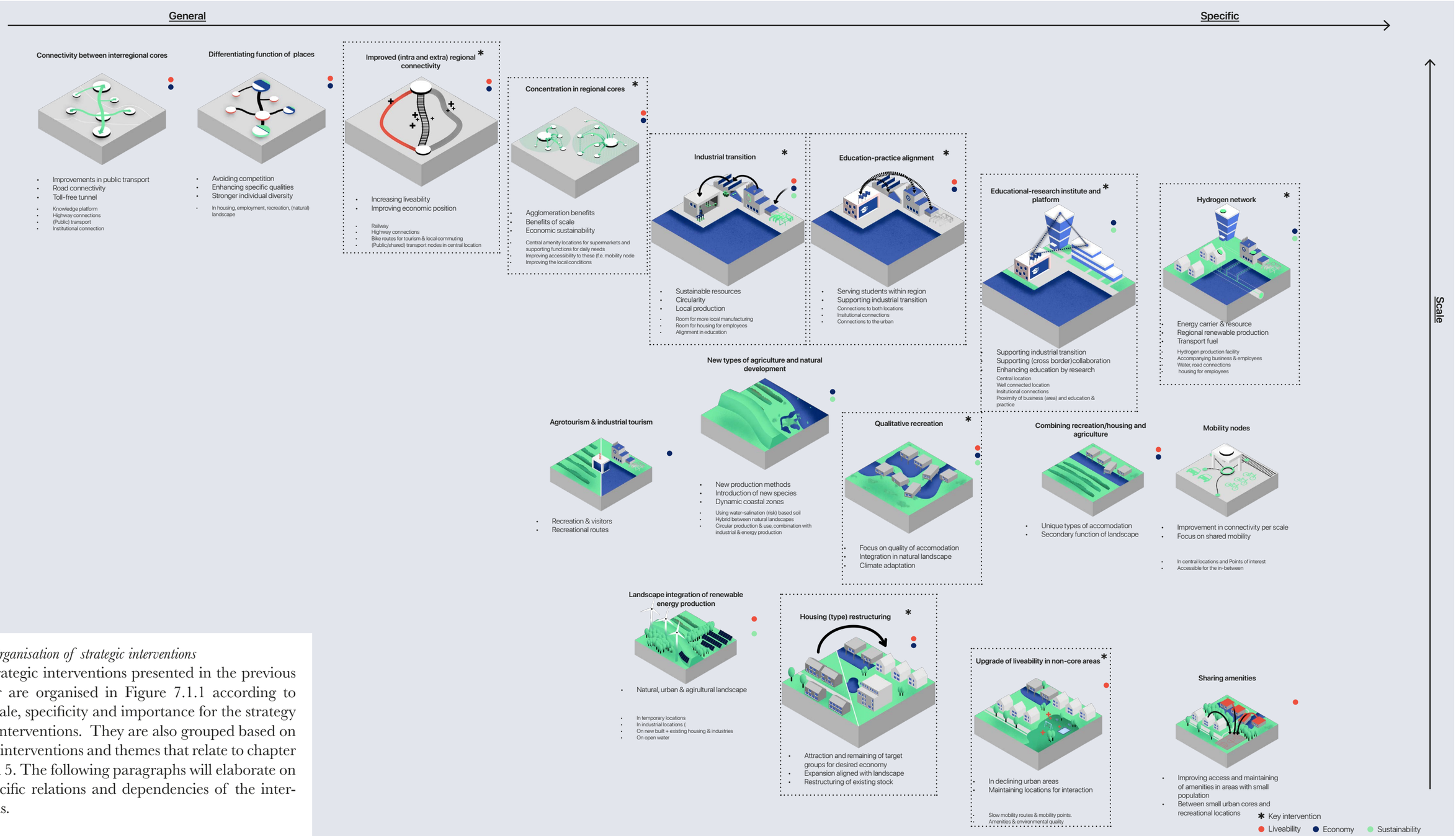
Strategy



7.1.1 Organisation of strategic interventions

The strategic interventions presented in the previous chapter are organised in Figure 7.1.1 according to their scale, specificity and importance for the strategy as key interventions. They are also grouped based on related interventions and themes that relate to chapter 1,4 and 5. The following paragraphs will elaborate on the specific relations and dependencies of the interventions.

7.1.1 Strategic interventions organised to scale, specificity and importance for the strategy (size) (Author, 2021)

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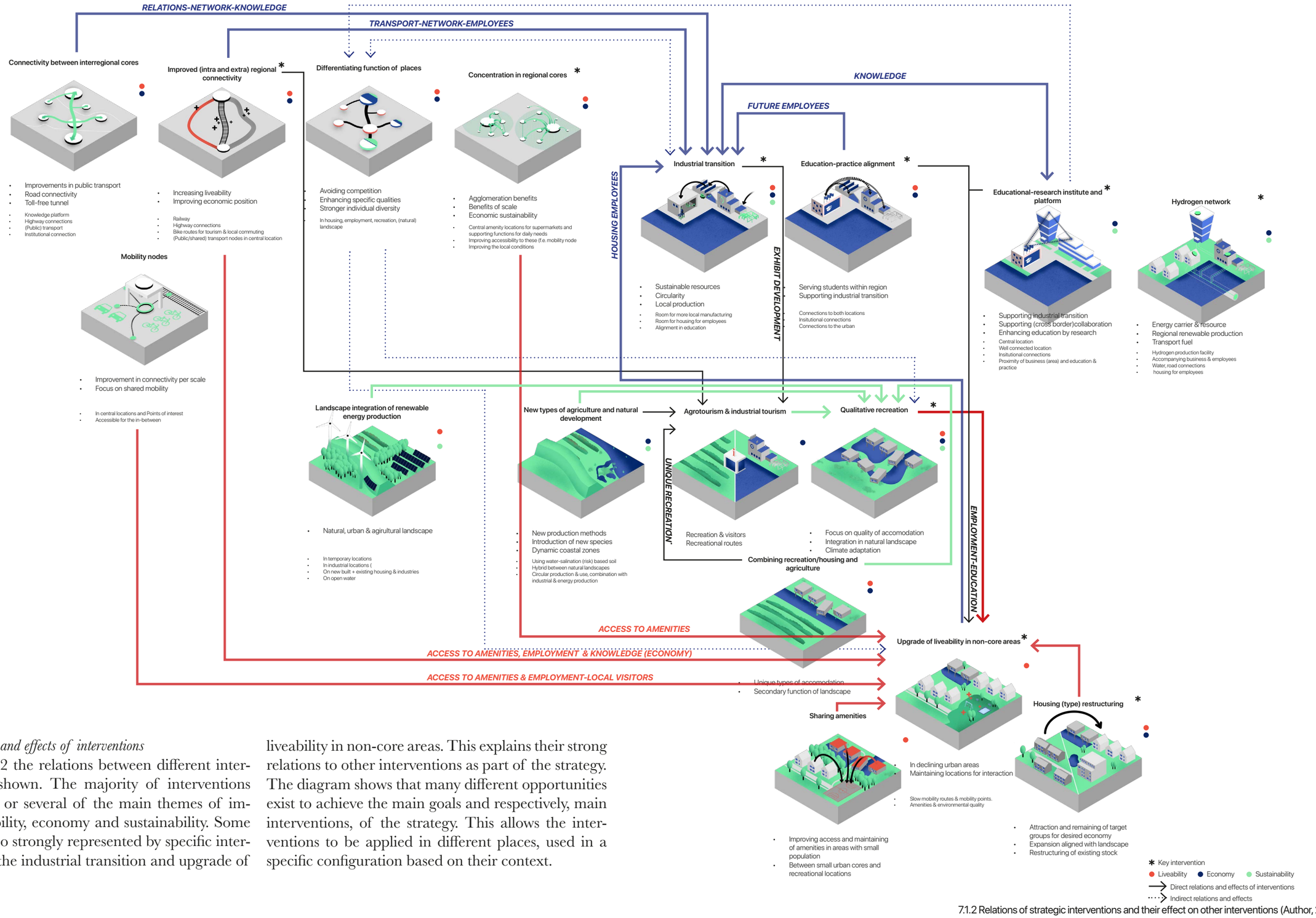
Strategy

Strategy



7.1.2 Relations of strategic interventions and their effect on other interventions (Author, 2021)

7.1.2 Relations and effects of interventions

In Figure 7.1.2 the relations between different interventions are shown. The majority of interventions relates to one or several of the main themes of improving liveability, economy and sustainability. Some themes are also strongly represented by specific interventions, like the industrial transition and upgrade of liveability in non-core areas. This explains their strong relations to other interventions as part of the strategy. The diagram shows that many different opportunities exist to achieve the main goals and respectively, main interventions, of the strategy. This allows the interventions to be applied in different places, used in a specific configuration based on their context.

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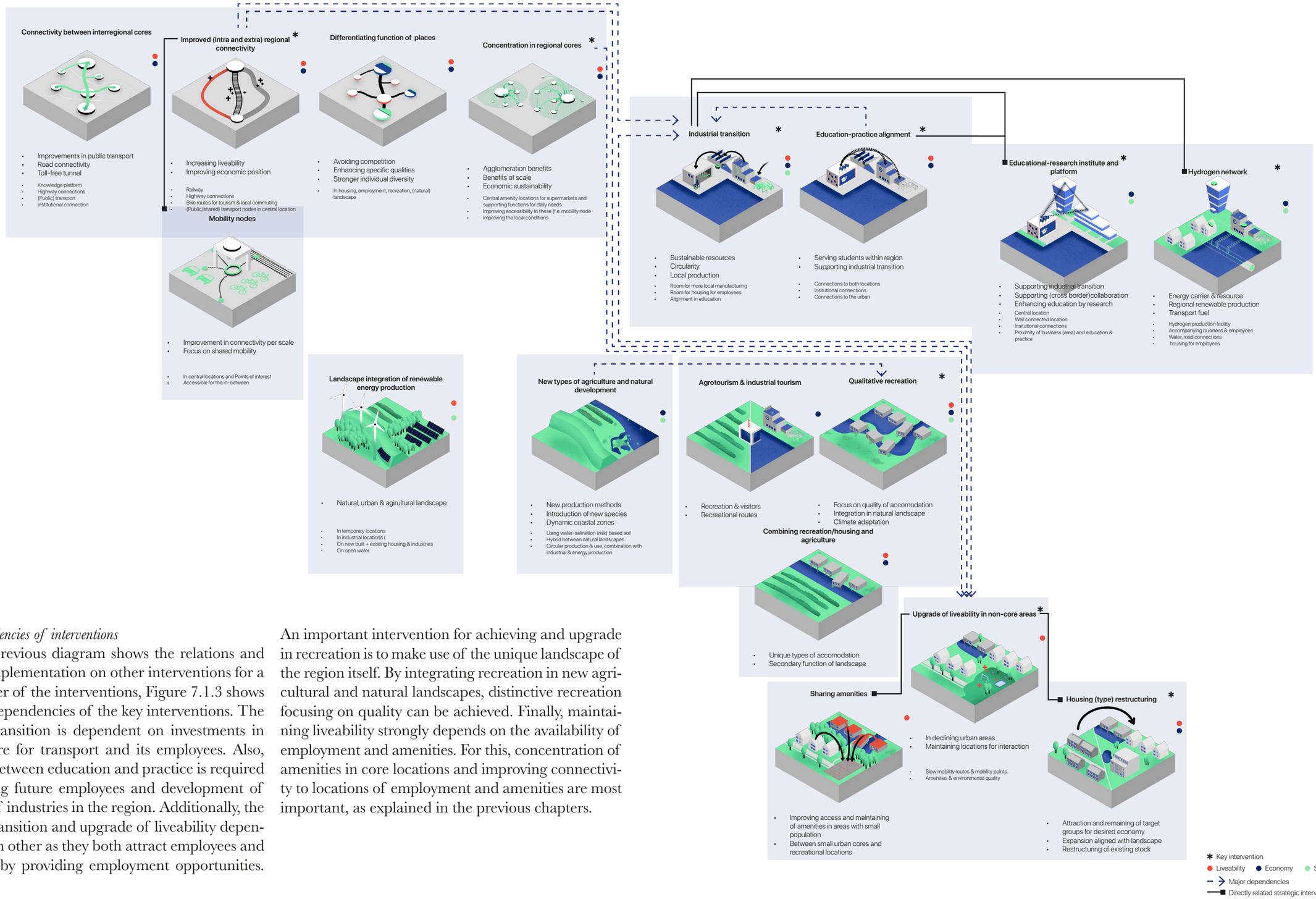

7.1.3 Major dependencies and directly related interventions (Author, 2021)

7.1.3 Dependencies of interventions

While the previous diagram shows the relations and effects of implementation on other interventions for a large number of the interventions, Figure 7.1.3 shows the major dependencies of the key interventions. The industrial transition is dependent on investments in infrastructure for transport and its employees. Also, alignment between education and practice is required for attracting future employees and development of new types of industries in the region. Additionally, the industrial transition and upgrade of liveability dependent on each other as they both attract employees and serve them by providing employment opportunities.

An important intervention for achieving and upgrade in recreation is to make use of the unique landscape of the region itself. By integrating recreation in new agricultural and natural landscapes, distinctive recreation focusing on quality can be achieved. Finally, maintaining liveability strongly depends on the availability of employment and amenities. For this, concentration of amenities in core locations and improving connectivity to locations of employment and amenities are most important, as explained in the previous chapters.

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Strategy

7.1.4 Strategic planning

The timeline of the strategy introduces the main developments that are proposed for the different clusters and the regional strategy. Similar to the key interventions from the vision, key strategic events or designs are indicated in this overview. On the regional scale, the improvement of (inter)regional and local connectivity and upgrade of tourism focusing on quality and the local landscape, are shared in the designs. In addition, as part of an economic strategy, the improvements in connectivity, restructuring of housing and urban expansions are aimed at supporting the preferred urban conditions for (future) employees and are in synergy with the proposals for the industrial transition.

7.2 Strategic planning for regional strategy (Author, 2021)

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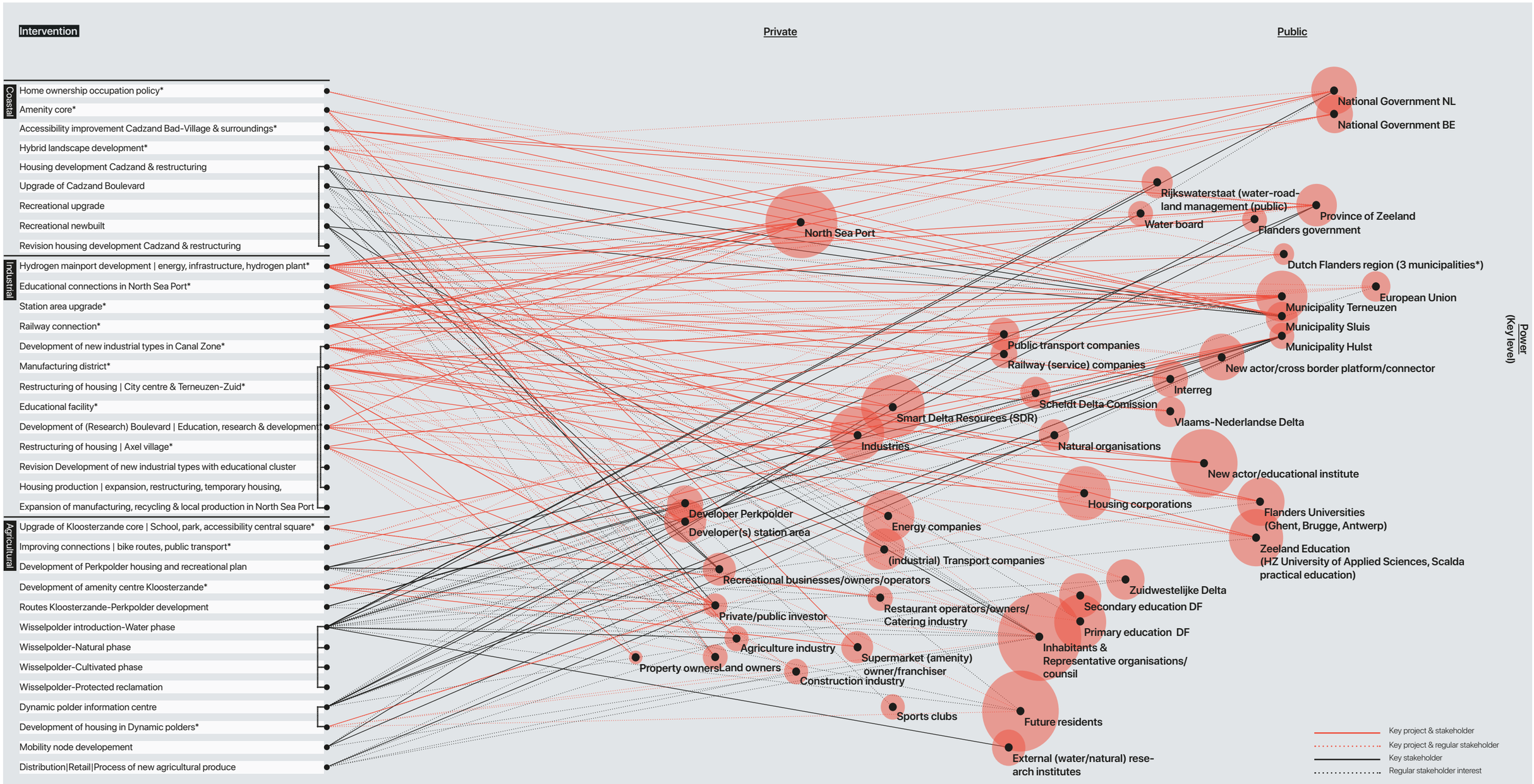
Strategy

Strategy

7.1.5 Stakeholders involved in strategic projects

For the regional strategy, important actors are the industrial organisations and authorities like the North Sea Port. On the Public side, the municipalities play a large role in facilitating the individual projects by support through governance and policy. On larger public scales, the national government and especially the Province of Zeeland have a role in the repositioning of the region within their (regional) surroundings, as aspects like tourism, a hydrogen hub and the industrial transition have large-scale consequences. They require decision-making and support on these scales in order to facilitate local and regional implementation.



7.3 Overview of stakeholders involved in regional strategy (Author, 2021)

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Strategic projects

7.4 Sketched designs for strategic projects (Author, 2021)

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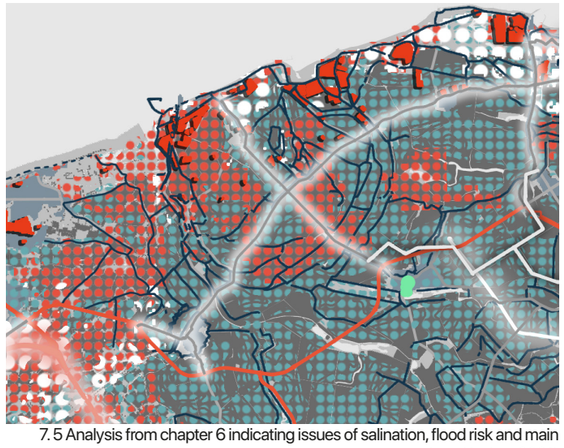
Strategy

7.2 Coastal cluster | Cadzand (bad)

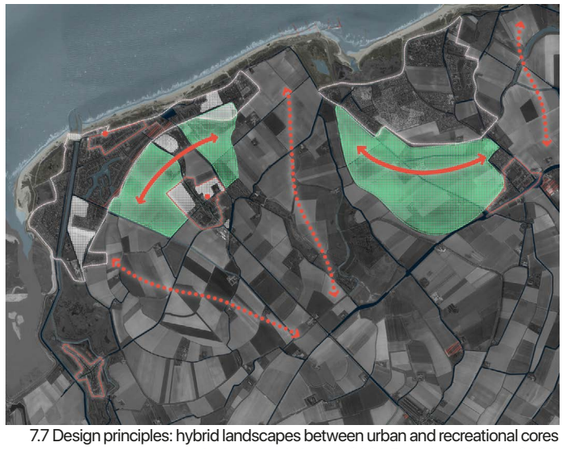
The village of Cadzand is a well-known seaside resort by both Dutch and Belgian visitors. Is is selected as one of the most potential locations due to issues of liveability, natural risks present and for the presence of large-scale recreational facilities that are in contrast to the smaller urban areas. The municipality of Sluis in which these are located, is facing issues of liveability because of ageing, which are present in these villages too. In addition, the presence of large-scale recreation is causing pressure on facilities and the local housing market. Mainly the provision of housing for starters is at risk. This is due to the policy that allows for second home ownership within the urban areas, which makes living in Cadzand and Cadzand-Bad unaffordable for these groups due to increasing price levels, which causes them to move to other places within the region (van Doorsselaer & Steketee, 2021; Maes, 2020). However, a shift in the focus of recreation towards higher quality can result in flows of occupancy that are consistent throughout the year (Haartsen & Venhorst, 2010). In Cadzand this means there are opportunities for expansion, but offering unique types of recreation and facilities is needed.

To serve both the urban and recreational functions and surrounding villages, concentration of some functions in Cadzand is proposed. Together with improving the accessibility between two urban cores and surrounding villages and the policy intervention for home ownership, these are the first actions in order to improve liveability in Cadzand (Figures 7.7,8,15,16,17). Subsequently, the landscape between the recreational functions can be transformed as a buffer between the two urban functions and a connector for slow types of mobility. This landscape, which is currently at risk of issues of flooding and salination, is transformed towards other types of agriculture, and can be combined with the development of housing and recreation on the edges as can be seen in figure. Additionally, the upgrade of the boulevard and extending the route along culinary locations contributes to the upgrade of recreational quality and economy of the villages.

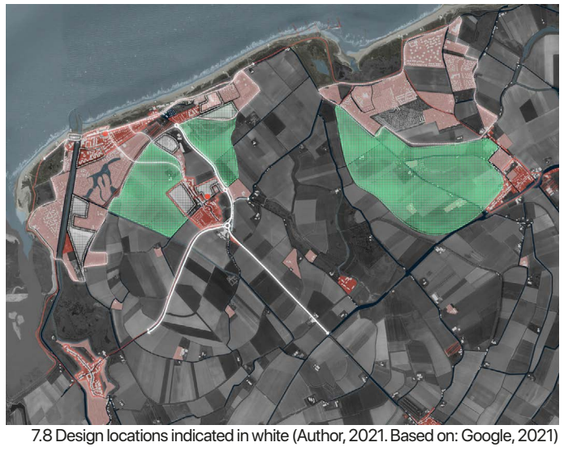


7. 5 Analysis from chapter 6 indicating issues of salination, flood risk and main connections (Author, 2021)

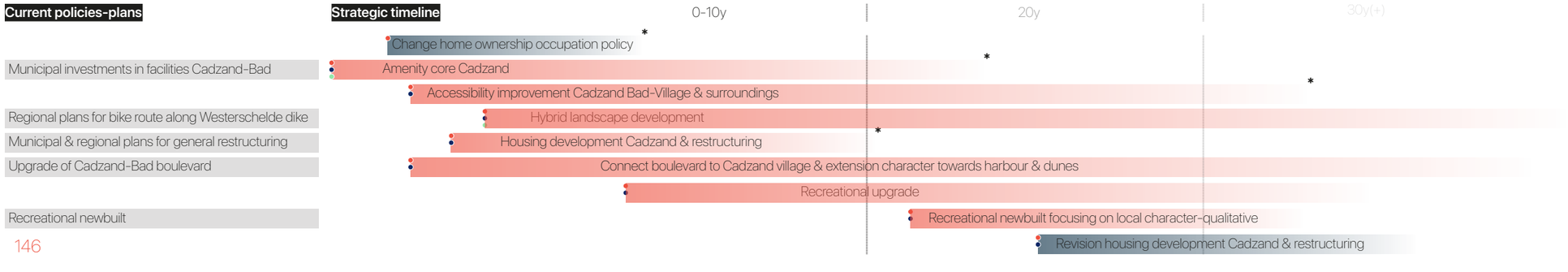
7.6 Current urban areas, recreation, bike routes and roads (Author, 2021. Based on: Google, 2021)



7.7 Design principles: hybrid landscapes between urban and recreational cores separated by agricultural land (Author, 2021. Based on: Google, 2021)



7.8 Design locations indicated in white (Author, 2021. Based on: Google, 2021)



7.9 Strategic timeline for coastal cluster (Author, 2021)

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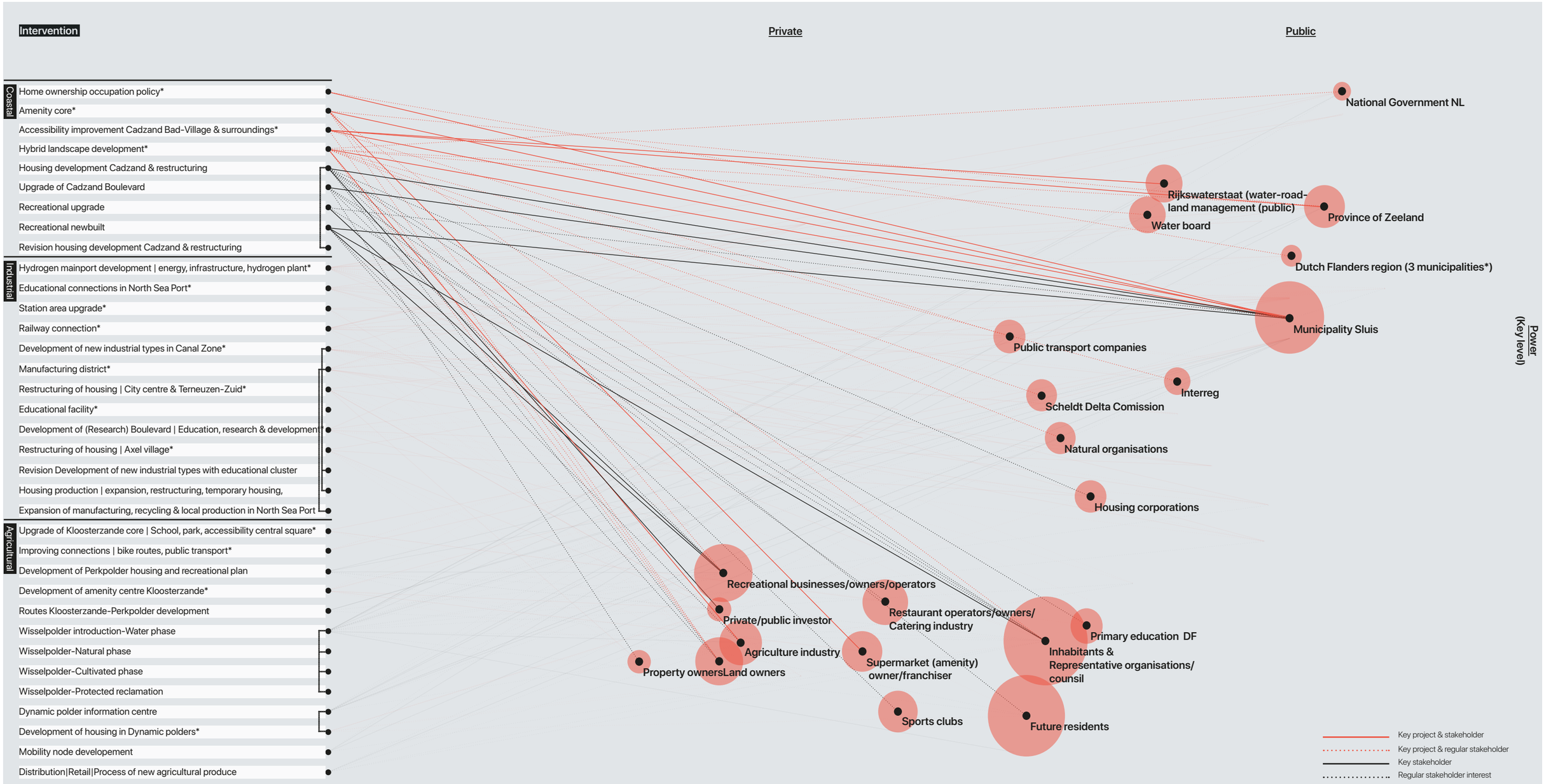
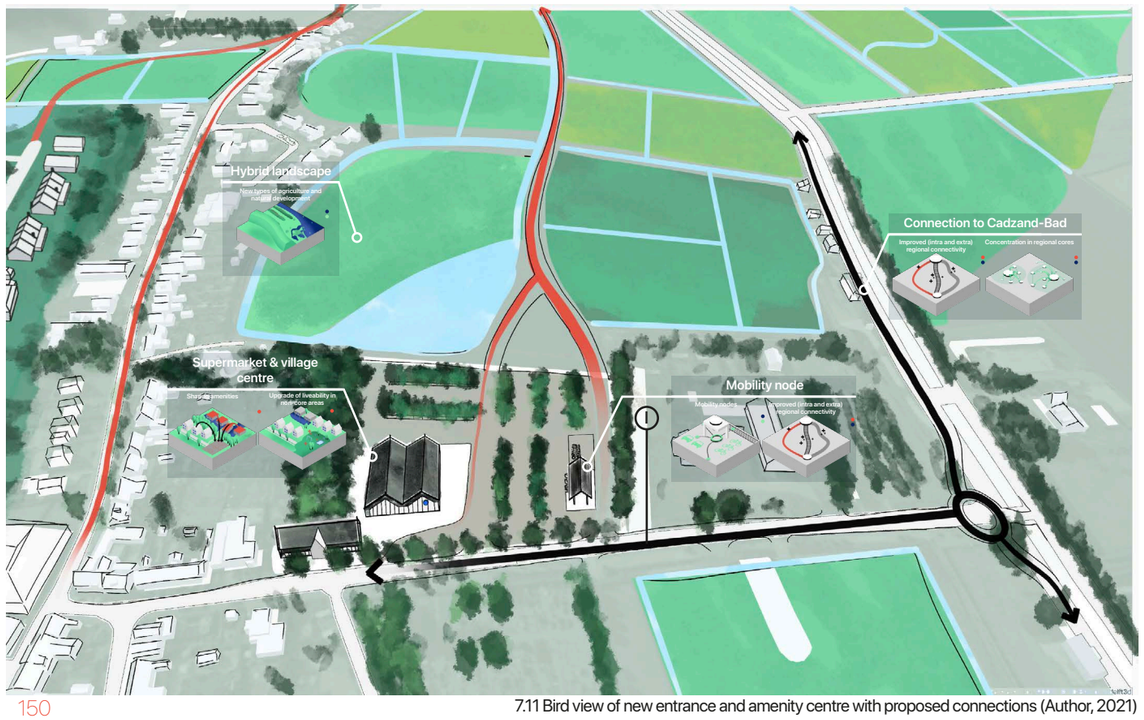
Strategy



7.10 Overview of stakeholders involved in coastal developments (Author, 2021)

7.2.1 Strategic design event Cadzand centre

One of the opportunities defined earlier in this chapter is to concentrate amenities. Cadzand has the potential to be one of these locations due to its central position for the coastal villages and its existing proper road connections. For Cadzand the location of a supermarket and building for the inhabitants, in combination with a function for housing and direct connections for cyclists are proposed. In addition, the connectivity towards surrounding areas and the coastal village of Cadzand-Bad, infrastructure should be upgraded to allow for safe connections. In addition to the supermarket and multifunctional building for inhabitants, a mobility node is proposed which provides access to shared forms of mobility such as bikes, cars and conventional public transport. This will not only benefit the proposed functions, but also the urban area as a whole in terms of liveability as this is positively influenced by accessibility (Christiaanse, 2020).



7.11 Bird view of new entrance and amenity centre with proposed connections (Author, 2021)

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7.12.1 Impression of current entrance (Author, 2021)

7.12.2 Impression of Cadzand entrance upgrade & amenity centre: community location, supermarket & mobility node (Author, 2021)

7.2.2 Strategic design Cadzand hybrid landscapes & urban development

In order to avoid younger people moving out, attract residents to unique locations for housing and provide room for the increasing demand on housing in the villages a new location for housing is proposed. A crucial element for the success of this intervention is the policy for ownership which is meant to avoid existing and newbuilt homes in urban areas to be sold as second homes. The type of buildings is therefore more urban compared to its recreational surroundings and is meant to integrate in the surrounding landscape. This former conventional agricultural land is transformed to a hybrid of natural area and alternative agriculture to overcome the issues of salination and lack of biodiversity. In addition, these function as a buffer and create conditions for unique types of housing and recreation, which is meant to attract a diverse group of residents besides the main target groups like local starters and elderly.

7.13 Bird view of hybrid landscape, urban developments and connections (Author, 2021)

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7.14.1 Current situation at location of hybrid landscapes (Author, 2021; Based on: Google, 2021)

7.14.2 Impression of hybrid landscape and housing developments (Author, 2021)

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7.14.3 Current recreational types in Cadzand-Bad in former neighbourhood (Author, 2021)

7.14.4 Types of recreation focusing more on quality and surrounding landscape (Author, 2021)

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7.14.5 Impression of waterfront at sea in Cadzand-Bad (Author, 2021; Based on: Google, 2021)

7.14.6 Impression extended culinary Boulevard in Cadzand-Bad (Author, 2021)

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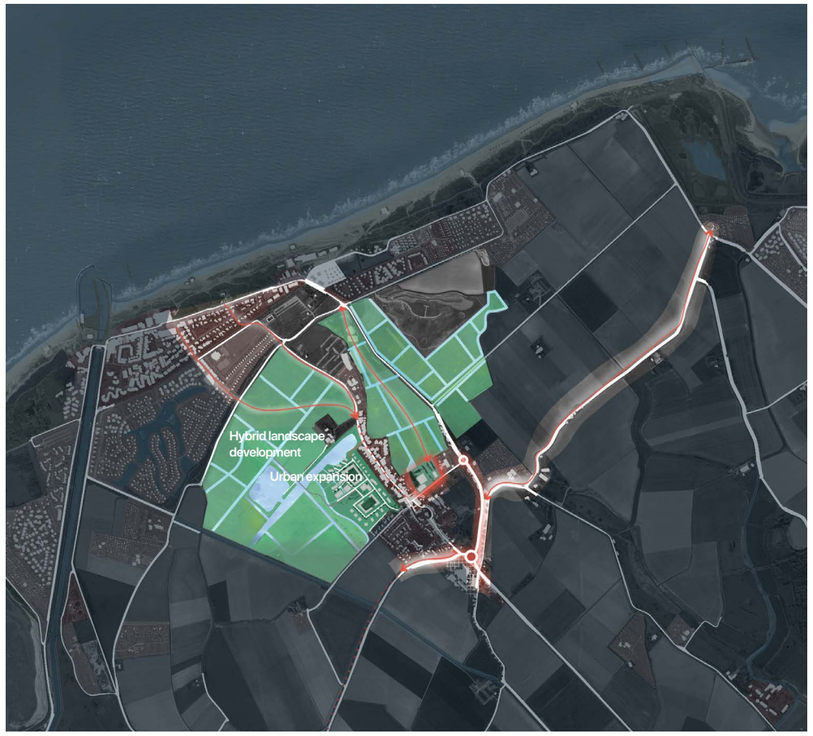
7.2.3 Other strategic interventions Cadzand

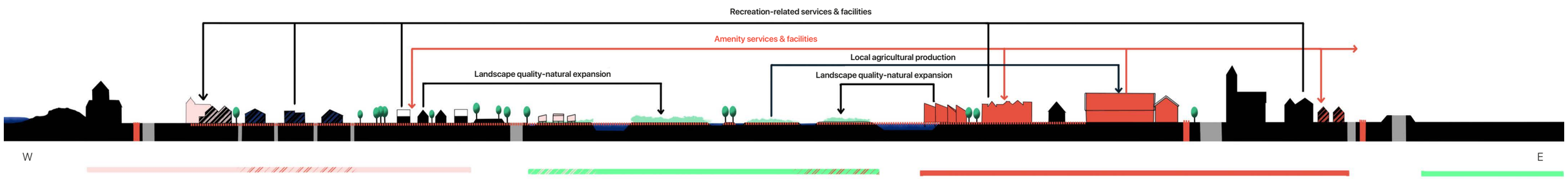
Besides the urban expansion and amenity centre, in other locations in Cadzand and Cadzand-Bad interventions are proposed. Figure 7.14.3-6 show the restructuring of existing recreational facilities to upgrade towards more qualitative recreation. In addition, the upgrade of the boulevard in Cadzand-Bad can be extended towards the harbour of the village. Along this boulevard, several gastronomic locations are present. By extending it towards the water, this can be a unique element of the village to attract visitors, and contribute to a distinctive character for the village of Cadzand and Cadzand-Bad.

7.15 First step of development: amenity centre & connections to Cadzand-Bad & surroundings (Author, 2021)



7.16 Development of in-between hybrid landscape and urban expansion (Author, 2021)

7.17 Extension of Cadzand-Bad boulevard and recreational upgrade & expansion (Author, 2021)



7.18 Section including different flows and urban, recreational and agricultural landscape & functions (Author, 2021)

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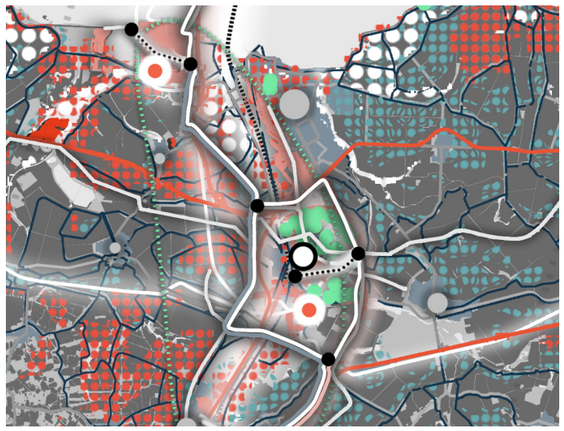
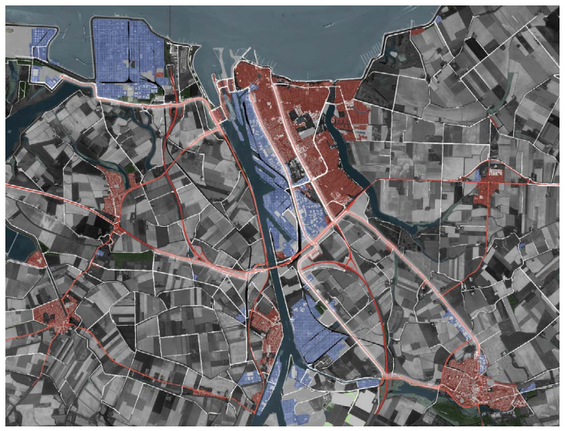
7.3 Industrial cluster |Canal zone Terneuzen

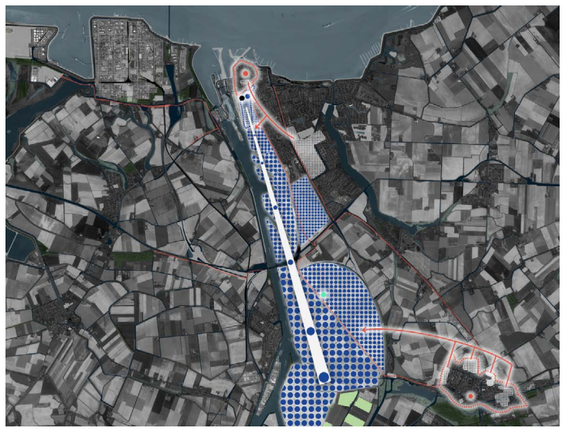
The Canal Zone is an industrial area ranging from the city of Terneuzen towards Ghent in Belgium. It is part of the North Sea Port. The main opportunities for this area are the industrial transition and location of hydrogen production and distribution as part of a national and regional strategy (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2020a). In order to facilitate the transition, educational connections, infrastructure upgrades and urban (re)developments are proposed (Figures 7.21,22,29,30,31). As part of this transition, the industries along the canal are envisioned to transform to suit their surroundings, based on industrial and urban functions such as proximity of housing or the exchange of industrial resources. The introduction of educational connections and establishment of educational facilities and a research institute in a later stage should contribute to the realisation of new industries, keeping employment within the region and facilitating long-term transitions through interaction between the research, education and practical knowledge. Like the industrial transition, this is supported by the (re)development of housing and improved connectivity like the elimination of toll for the tunnel and public railway connection.



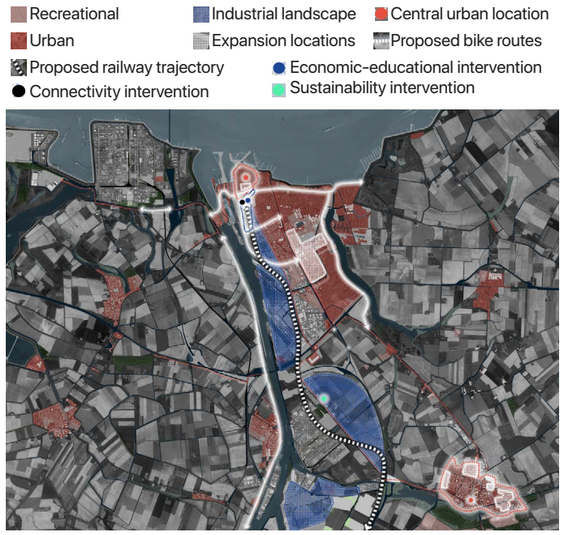
7. 19 Analysis from chapter 6 indicating risks of water, industrial potentials and main connections (Author, 2021)



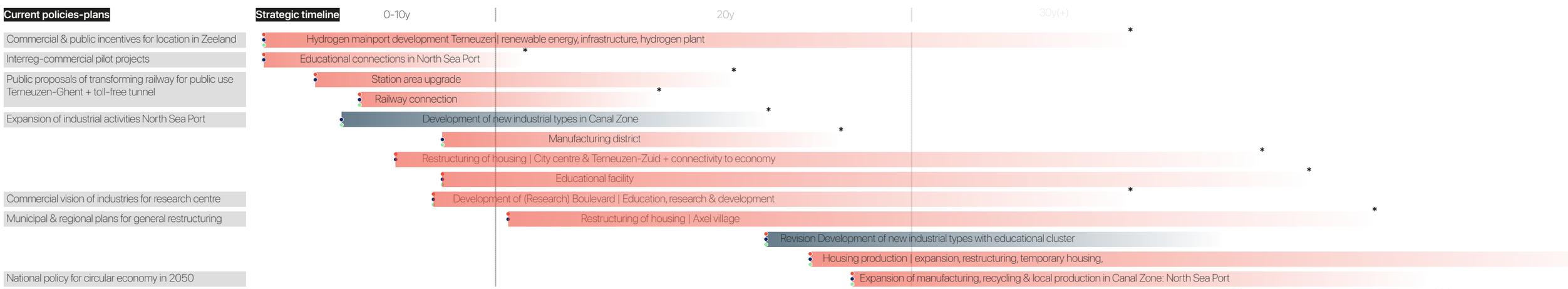
7.20 Current urban areas, industries, bike routes and roads (Author, 2021. Based on: Google, 2021)



7.21 Design principles: industrial size increase, core developments and transport and relation of urban development to industrial economies (Author, 2021. Based on: Google, 2021)



7.22 Design locations & interventions indicated in white (Author, 2021. Based on: Google, 2021)



7.23 Strategic timeline for industrial cluster (Author, 2021)

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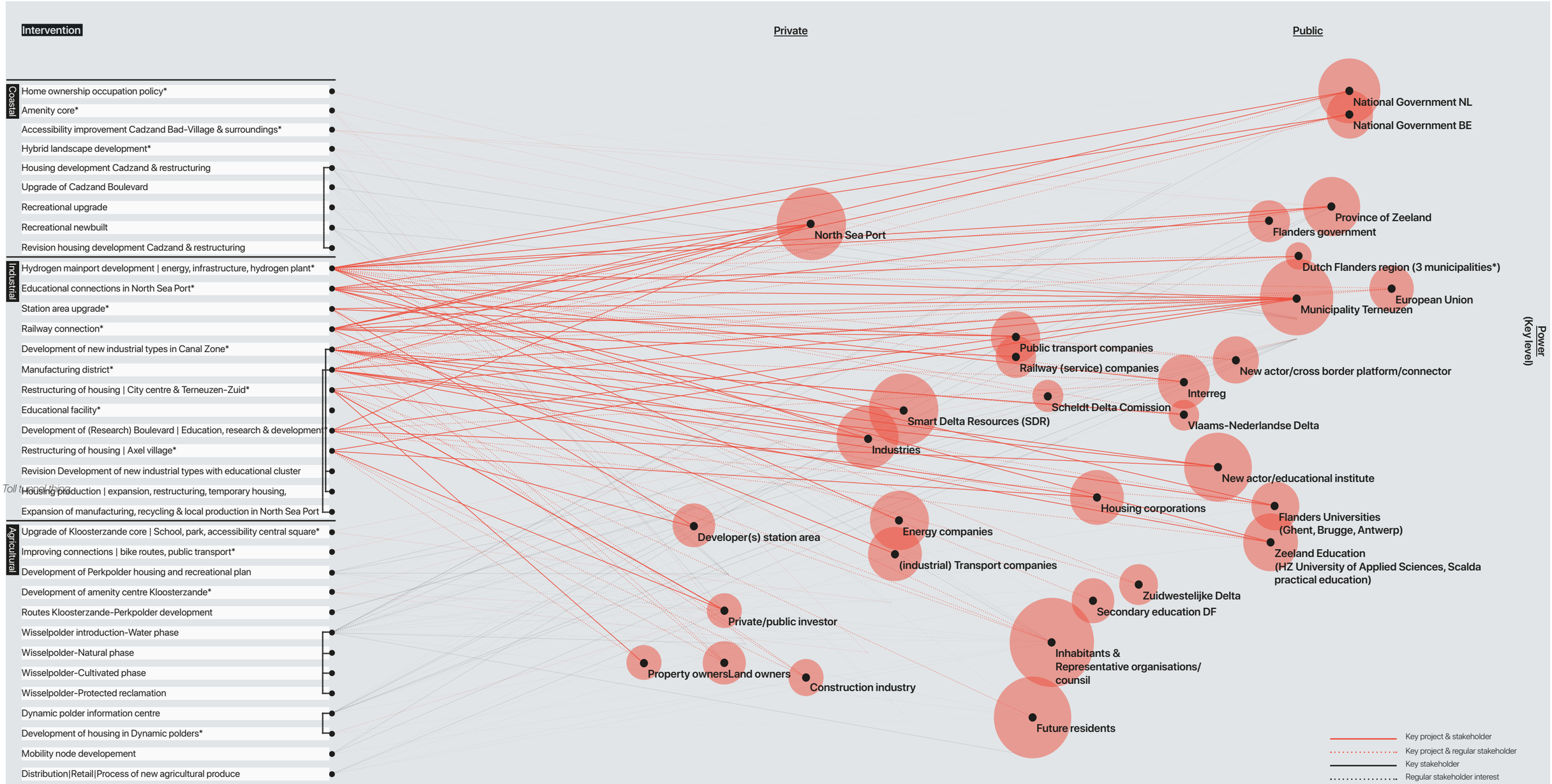
Strategy

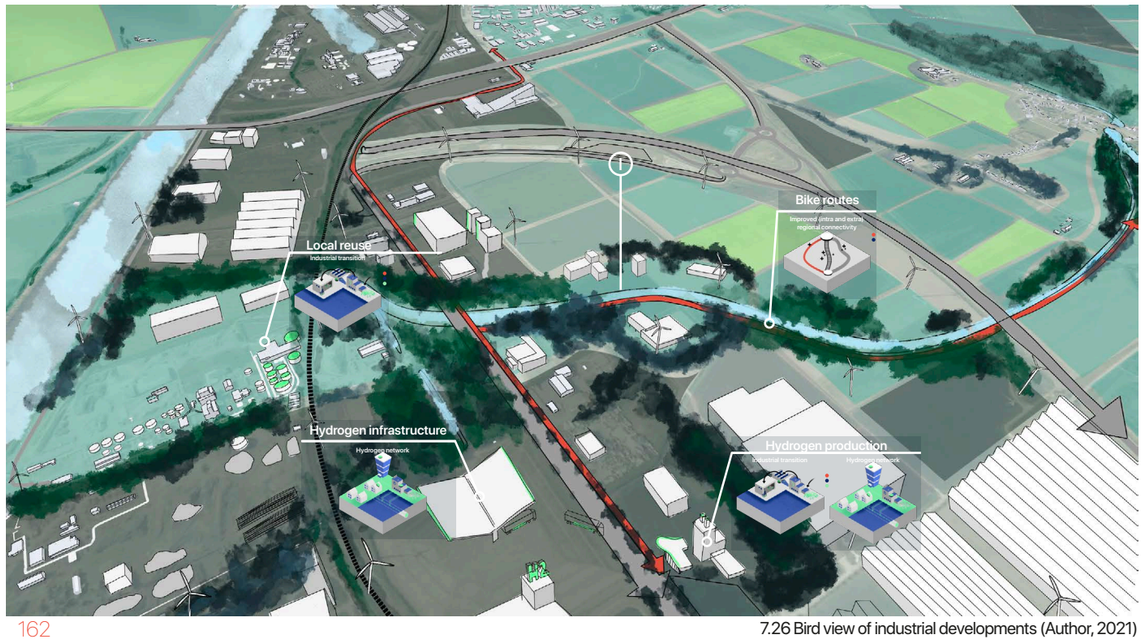


7.24 Overview of stakeholders involved in industrial developments (Author, 2021)

7.3.1 Industrial transition

The location of a hydrogen plant allows for industries that have cleaner production. Together with development of circular industries this is an opportunity to change the image of industrial sites. As mentioned earlier, the industries can develop from a smaller scale next to urban areas, towards large scale facilities moving southwards along the canal.

More local production is part of the strategy towards circularity. Therefore, a manufacturing district is proposed in addition to the current industries. As part of this, local production of materials for the restructuring of- and newbuilt housing is proposed in the Canal Zone. This location is suitable for circular production as a diverse set of residual flows is present for exchange between industries, agriculture, horticulture and manufacturing.



7.26 Bird view of industrial developments (Author, 2021)

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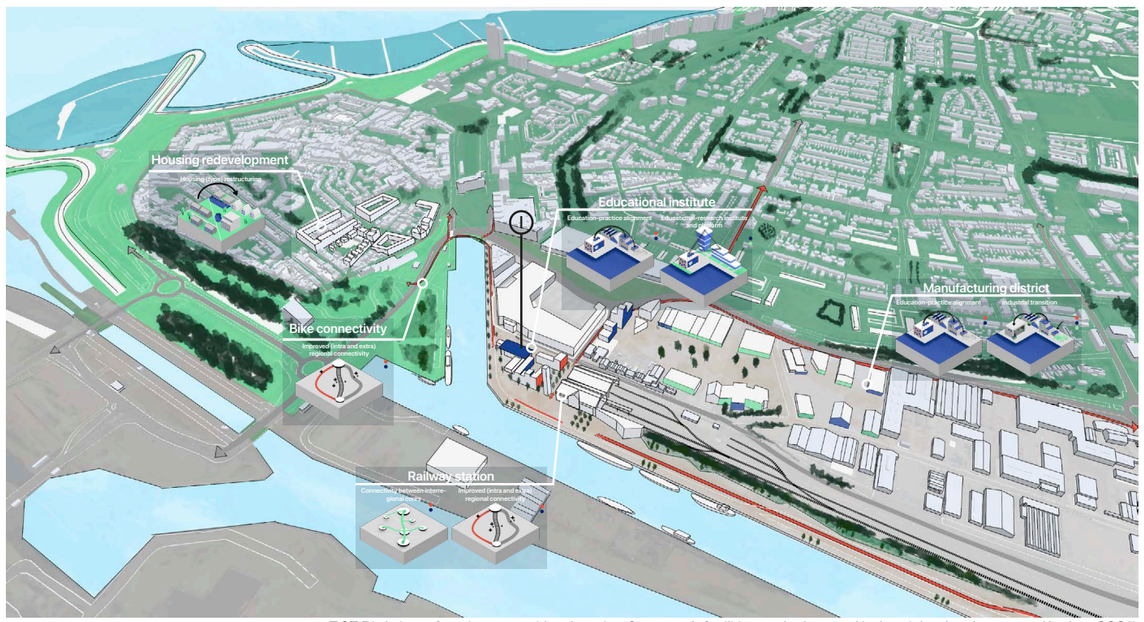
7.25.1 Impression of current industrial landscape (Author, 2021)

7.25.2 Impression of industrial landscape and bike routes (Author, 2021)

7.3.2 Terneuzen station area development

For the public railway connection, the development of a station is needed. This is proposed at the end of the current railway, south of the city centre of Terneuzen. This location provides room for additional urban developments like the educational facility and accompanying research, innovation and port-related businesses to form a small campus. The educational facility should also function as a platform that connects to other educational facilities and industries in the Scheldt Delta region. South of this location there is room for the smallest scale of manufacturing, such as atelier production and workshop areas (Figure 7.28.3). This suits the more urban character of the surrounding area and fits the concept of circularity and local production which is likely to take a larger role in employment in the future. In this way the area becomes an extension of the existing city centre. In order to improve liveability and facilitate the industrial and educational developments by providing housing, an upgrade of the neighbourhood in the city centre is proposed, as well as redevelopment of a large neighbourhood (Figure 7.28.6) in order to provide a more suitable living environment for these target groups.



7.27 Bird view of station area with education & research facilities and urban and industrial redevelopments (Author, 2021)

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7.28.1 Impression of current situation at station area (Author, 2021)

7.28.2 Impression of station area (Author, 2021)

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7.28.3 Impression of current commercial area near the station (Author, 2021; Based on: Google, 2021)

7.28.4 Impression of proposed manuufacturing district (Author, 2021; Based on: Google, 2021)

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7.28.5 Impression of housing type in need of restructucturing to fit the needs of new and current inhabitants (Author, 2021; Based on: Google, 2021)

7.28.6 Impression of proposed restructuring of urban area in Terneuzen(Author, 2021; Based on: Google, 2021)

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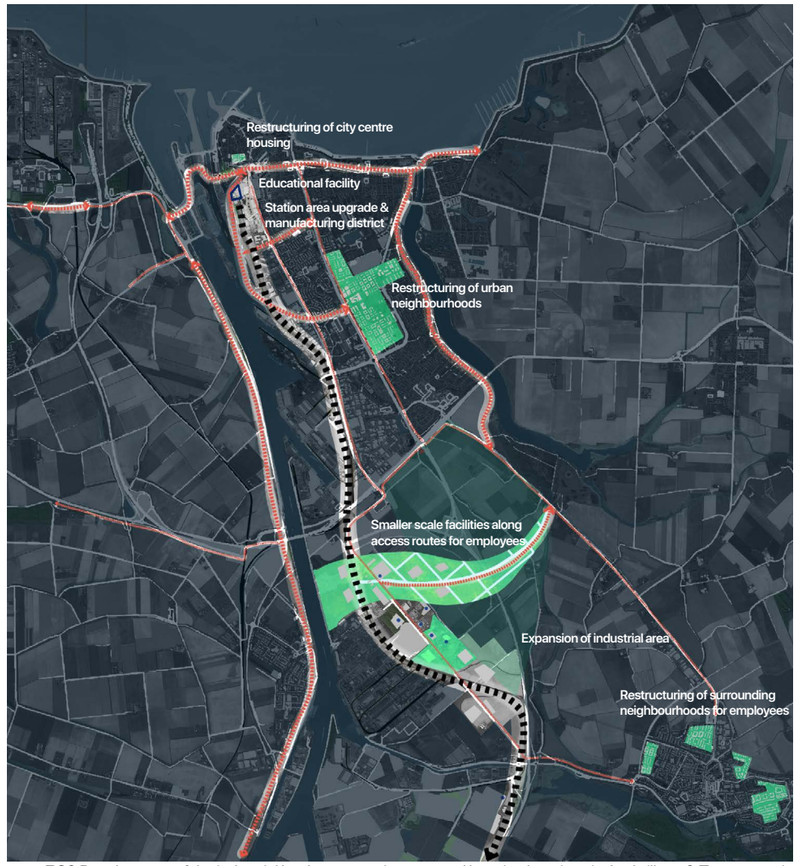
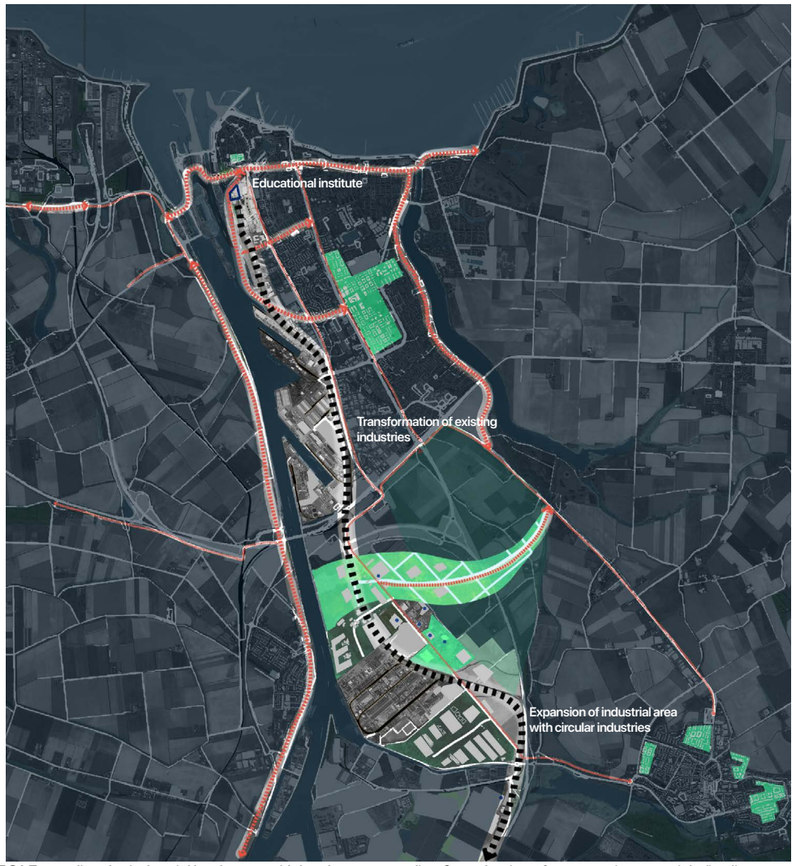
Strategy

Strategy

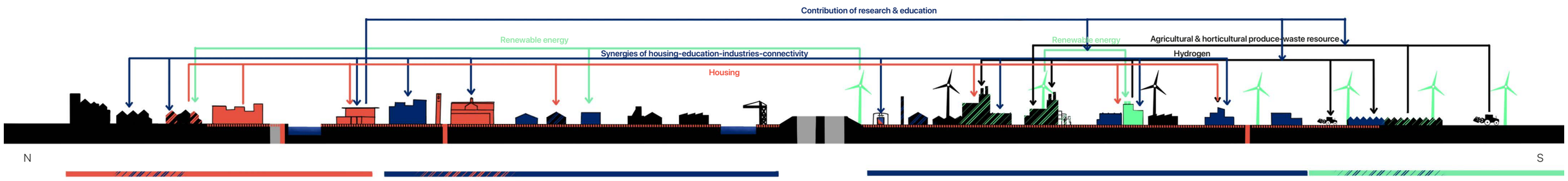
7.29 Improving connectivity by train & bike and hydrogen production facilities (Author, 2021)



7.30 Development of the industrial landscape, station area and housing locations in Axel village & Terneuzen city (Author, 2021)



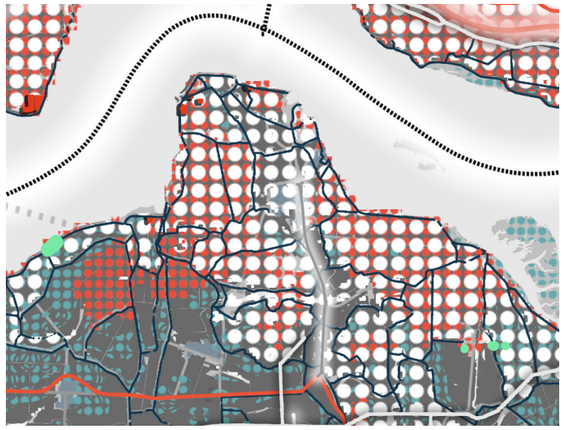
7.31 Expanding the industrial landscape with local reuse, recycling & production of construction materials (in alignment with agricultural cluster) (Author, 2021)



7.32 Section including different flows and urban, industrial and agricultural landscape & functions (Author, 2021)

7.4 Agricultural cluster | Kloosterzande & Perkpolder

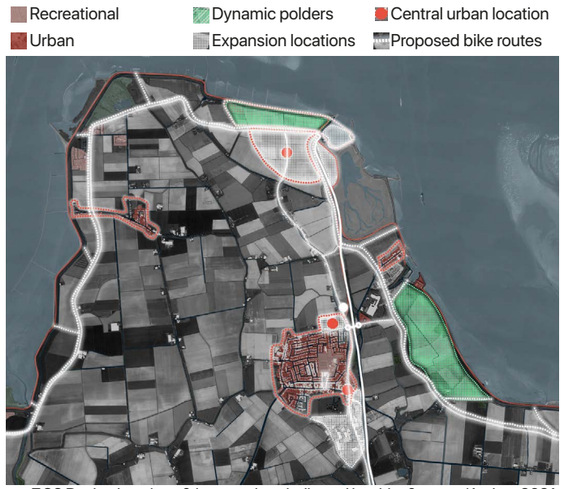
The village of Kloosterzande is selected as it is central to the more rural places in the agricultural cluster. Unlike in the other clusters, liveability is sufficient in the majority of the cluster. Therefore, in this cluster the focus is on development of distinctive types of housing, partly based on exisiting strategies, and on the high demand for housing in this municipality (Gemeente Hulst, 2011; Omroep Zeeland, 2021; van Doorsselaer, 2021). The strategy is to strengthen the position of Kloosterzande as a core area by improving accessibility of amenities. As flows of traffic and pressure on the village will increase due to the new developments, a new location for this is proposed between Kloosterzande and Perkpolder (Figure 7.35,36,42). The new Perkpolder is aimed at becoming a secondary core location focussing, which provides more services and facilities for recreation and visitors. As the areas are facing several issues related to the water, including the risk of flooding, the concept of dynamic polders is introduced. The polders surrounding Kloosterzande are among the lowest and most salinated of the region (van Belzen et al., 2021). Dynamic polders, a translation of the Dutch term for the concept 'Wisselpolders', are a way to develop a climate resilient landscape that protects against the water (de Mesel et al., 2013; van Belzen et al., 2021). This concept facilitates natural height increase of the coastal defence line by letting the polders partially flood, allowing it to transform by natural sediment carried by the water, after which the land can be reclaimed again (Figure 7.41,42,43,44). This provides an opportunity for distinctive housing and recreation while also offering opportunities for adaptive agriculture and natural development, as these coastal areas currently suffer from salination. Due to the temporality of dynamic polders, reuse of materials and circular construction are part of the strategy. For this, a production facility for processing agricultural waste materials to construction material is proposed on the long term, as a local facility of the circular production locations in the canal zone (Figure 7.35,36,44). This contributes to closing the loops within the cluster and dynamic polder developments and is a strategic contribution to the (re)positioning of this cluster on the regional scale. In-depth steps of these phases and the integration or urban functions will be visualised on the following pages.



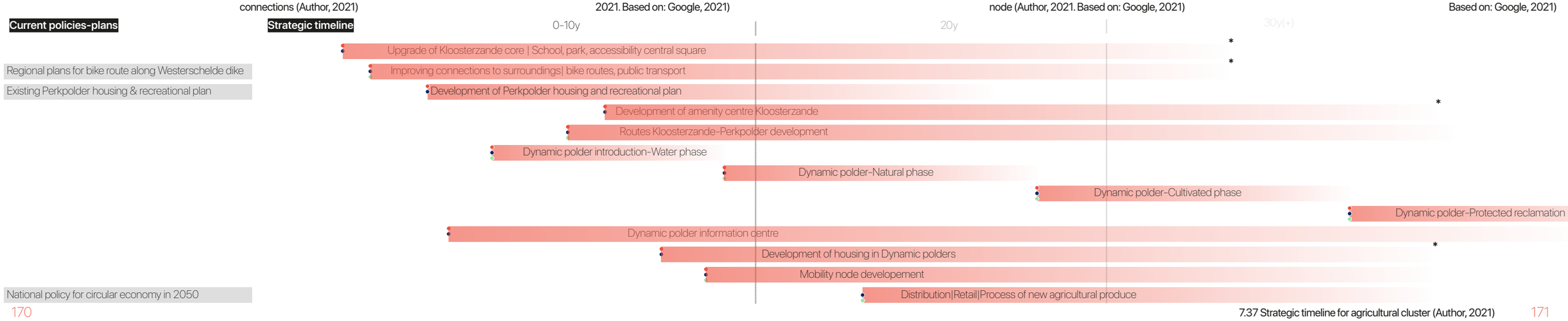
7. 33 Analysis from chapter 6 indicating risks of flooding, salination and main connections (Author, 2021)

7.34 Current urban areas, industries, recreation and bike routes & roads (Author, 2021. Based on: Google, 2021)

7.35 Design principles: dynamic polders, core urban locations and central mobility node (Author, 2021. Based on: Google, 2021)



7.36 Design locations & interventions indicated in white & green (Author, 2021. Based on: Google, 2021)



7.37 Strategic timeline for agricultural cluster (Author, 2021)

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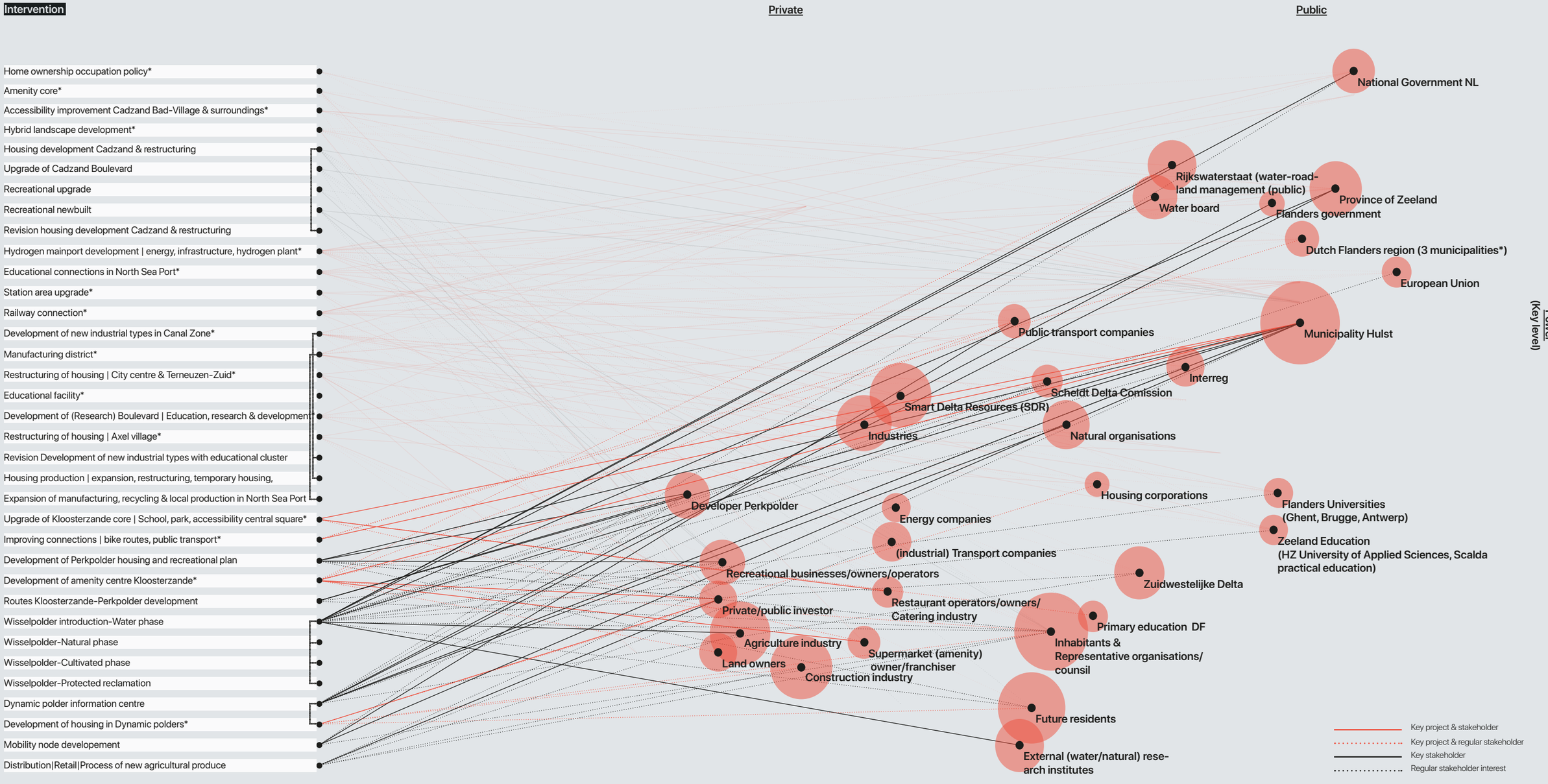
Strategy

Strategy

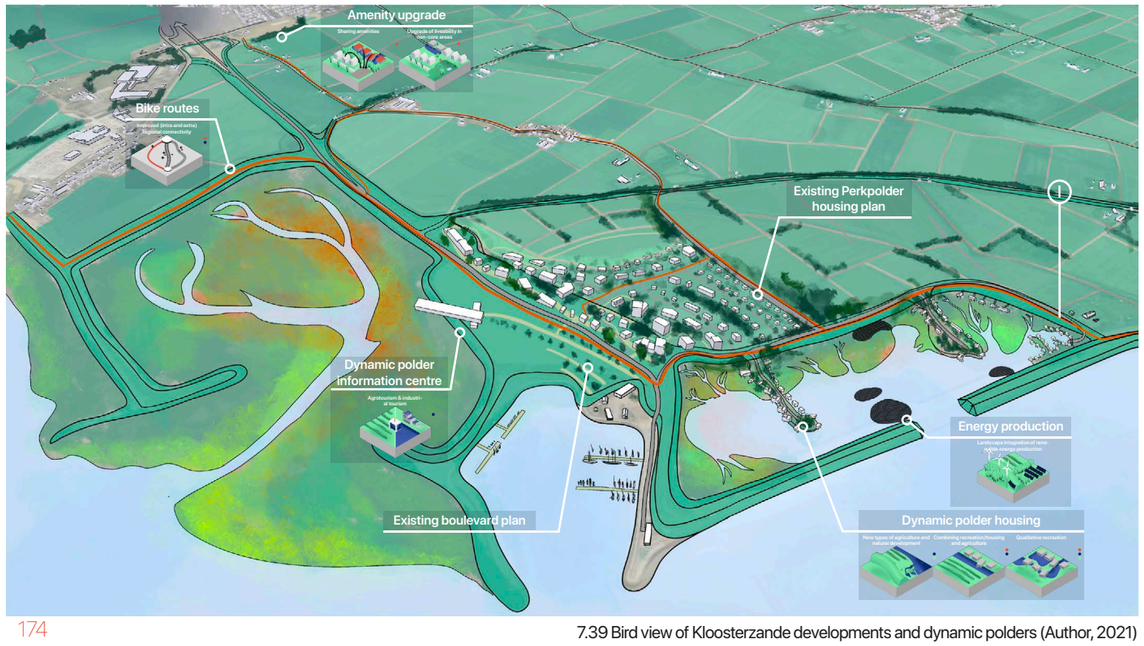


7.38 Overview of stakeholders involved in developments of the agricultural cluster (Author, 2021)

7.4.1 Dynamic polders Kloosterzande

A part of the strategy is to attract visitors to the regional (bike)routes, developing hotspots at several locations along the dikes of the Westerscheldt water. In the proposal for this cluster, an information centre is proposed that is added to the current plans of a boulevard for the Perkpolder urban development (HAZ & LiPS, 2019). In the dynamic polders, permanent housing and recreation are proposed as they offer unique landscape qualities and will be in continuous transformation. In the phases where no agricultural production can take place, parts of the landscape can be used for renewable energy production. As the dynamic polders have a temporary character, the type of construction should have that too. This provides opportunities for pilot concepts and temporary forms of housing, based on current and future economic, environmental and planning conditions.

As presented on the following pages, the first phase of the dynamic polders involves strengthening the system of secondary dikes, in order to protect against the water that is let in from opening the primary dikes. Due to tides and sediment, these are will gradually increase in height and develop from water only towards natural landscapes. Housing can take place in both phases. In the third phase, the land can be used for agricultural production, for example species that are resilient to flooding and salt water. Finally, the dikes can be closed and the land is reclaimed as a large protective zone that can be used for agricultural production again.



7.39 Bird view of Kloosterzande developments and dynamic polders (Author, 2021)

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Strategy

7.40.1 Impression of main dike at location of information centre(Author, 2021)

7.40.2 Impression of Dynamic Polder information centre *DPi* (Author, 2021)

Strategy

7.41.1 Impression of current polder landscape and final stage (Author, 2021)

7.41.2 Impression dynamic polder landscape in water phase (Author, 2021)

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Strategy

7.41.3 Impression dynamic polder landscape in natural phase (Author, 2021)

7.41.4 Impression dynamic polder landscape in cultivated phase (Author, 2021)

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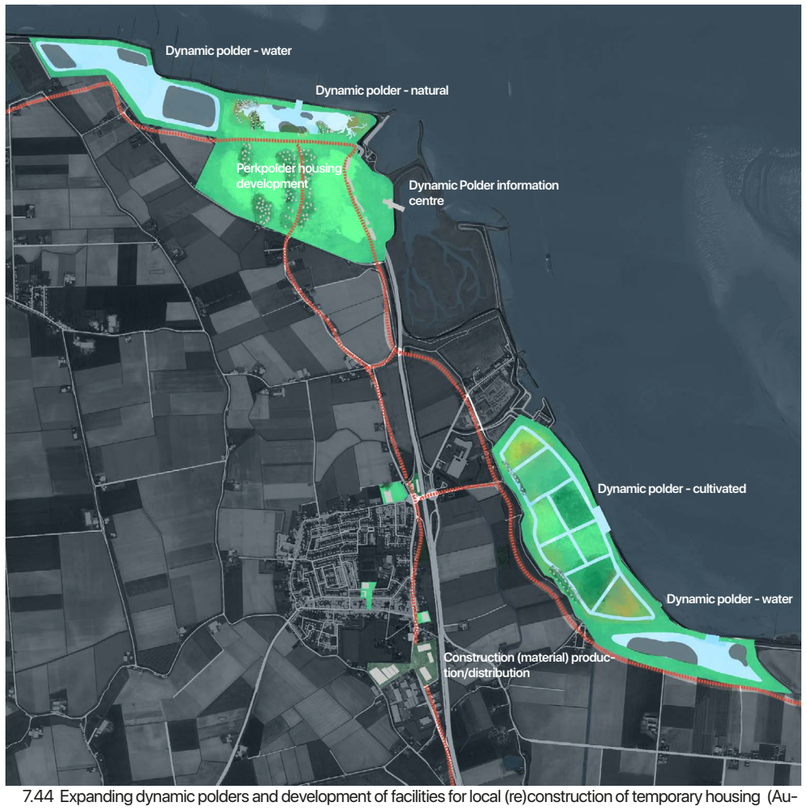
Strategy

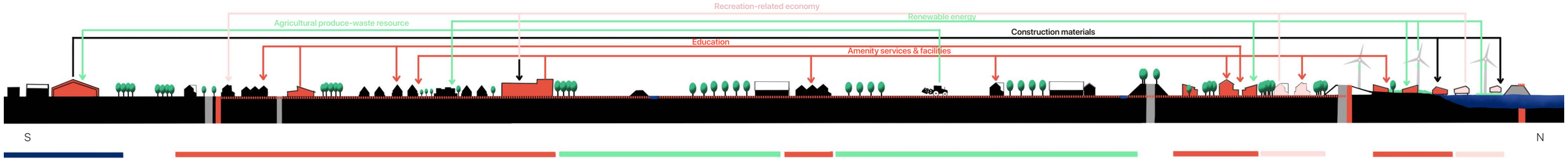
Strategy

7.42 First phases of dynamic polder: water & natural area. Upgrade of Kloosterzande centres and connections to Perkpolder developments (Author, 2021)

7.43 Second and third steps in dynamic polder phasing: natural area & cultivated land (Author, 2021)



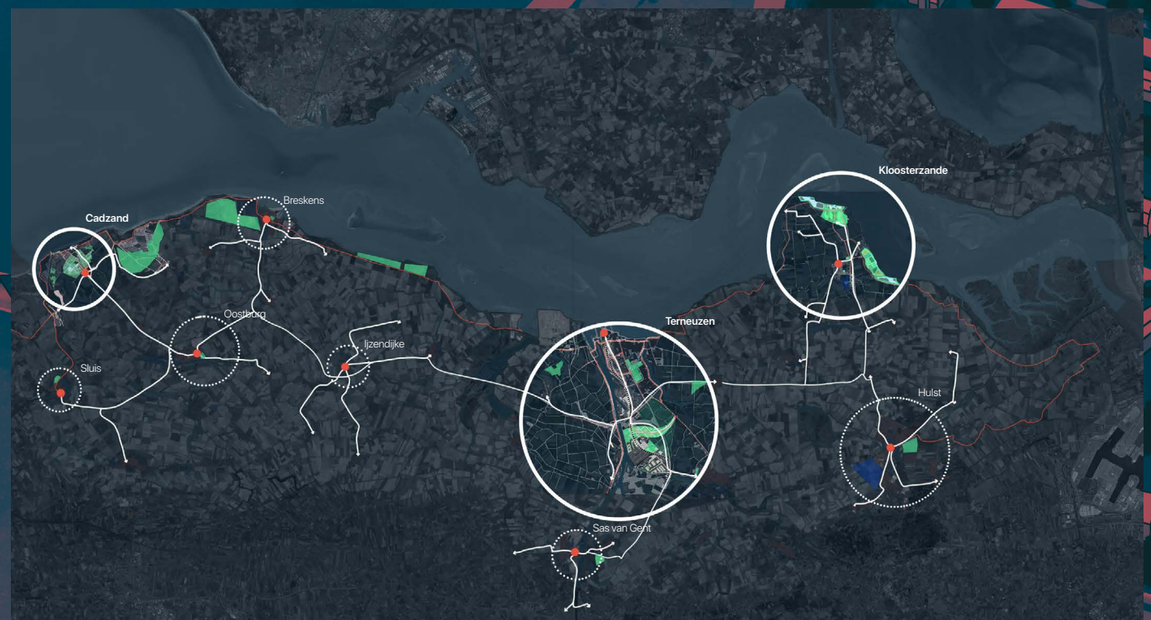
7.44 Expanding dynamic polders and development of facilities for local (re)construction of temporary housing (Author, 2021)



7.45 Section of agricultural cluster including different flows and industrial, urban, agricultural and recreational landscape & functions (Author, 2021)

7.5 Conclusion

The presented interventions are aimed at showing different design implementations of the concepts developed in the vision. For each cluster, similar locations are indicated to be redeveloped as one of the central locations in the map below. While each of them require different interventions based on the local conditions, this strategy provides a direction is for the selection of interventions based on the cluster these are in. The strategy aims to facilitate the repositioning of the region by the enforcement of industries, education, accessibility and liveability and integrate sustainability in this adjusted to three clusters. By this, the strategy aims to improve the attractiveness of the region for current as well as future residents and facilitate the settlement of these people and new economies.



7.46 Application potentials of the strategy in similar locations in Dutch Flanders (Author, 2021)

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Strategy

8.
Conclusion

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At the start of this thesis project, three main theories were defined related to the issues and opportunities for the Dutch Flanders region. These are: regional decline, border frictions and regional transition. The region is suffering from a negative image, decline of population and liveability due to physical and institutional peripherality as well as the presence of a border. The first theories propose the regional transition of the larger Scheldt Delta region as a solution for developing a stronger position for Dutch Flanders in between the different economic cores in Flanders and the Netherlands. This is meant to benefit the urban areas and by that the inhabitants of these places in-between. From this, the main research question was defined: ***'How can the Dutch Flanders region reposition the economic, social and environmental role of its urban and peri-urban areas as part of the larger functional transition of the Scheldt Delta?'***.

The four sub-questions that are developed concern research on the origins, of the imbalances, strategic opportunities coming from the Scheldt Delta transition, the spatial interventions needed for this and the implementation through spatial planning and governance.

Regional decline in Dutch Flanders is partly caused by the physical peripherality and the presence of the border. However, the issues of decline are directly related by the origins of this, being limited connectivity, misalignments between different governments, education and economy within the region and imbalances in benefits of sectors like tourism and the port-industries. Improvements can be made by governance, through alignments between different sectors and complementary functions. In addition, spatial interventions such as improved connectivity and concentration of amenities in several well-connected centres are opportunities to counter the issues of decline.

The transition of the Scheldt Delta is a crucial opportunity for the region of Dutch Flanders to reposition itself within its surroundings. The production of renewable energy resources, especially hydrogen, is a potential for the region as infrastructure is present in the surroundings of the region and the development is supported on different scales of governance. For this, collaboration of industries and governments across borders is required. In addition, the transition to a circular economy provides opportunities for the North Sea Port area that is partly located in the region, for new employment and collaboration between different sectors for long-term (economic) sustainability. An important element for this is the connection to research and education. For Dutch Flanders, the development of connections between education and employment is an opportunity to distinguish its port area from others and improve employment opportunities within the region. In addition to circularity, environmental change also affects the landscape of this region. The redevelopment that climate change requires can be combined with unique types of housing and recreation that support the economic developments and environmental resilience of the region. Through infrastructural improvements, cross-border perspectives and transition of the urban, industrial, natural and agricultural landscape the region can take the opportunities of the Scheldt Delta transition for a repositioning strategy.

To develop a strategy, a regional vision was developed that is based on the presence of risks and potentials present at different locations in the region and the previous theoretical research. Three clusters are developed, each with their own emphasis on the coastal economies, industries and agricultural landscape. This is to avoid competition and to be able to select specific interventions for each cluster. Respectively, the three clusters are envisioned as providing high quality of recreation, housing and providing amenities for increased liveability (coastal), local industrial production, energy production and distribution, education and international connectivity by a railway (industrial) and new types of agricultural production, recreation and housing in a dynamic landscape (agricultural). On the regional level, providing large scale connectivity and connectivity between the different cores is crucial for liveability and economic feasibility of the interventions.

As part of the strategy, several representative locations for the cluster have been selected to show the opportunities of applying the strategy and design interventions. The concepts used for these can be applied to other locations within the region, for which a specific configuration of design interventions can be used to further implement the vision. With the three different characters of each part, the region translates the opportunities to counter decline and strategically use the Scheldt Delta transition to reposition itself. This can result in long-term employment opportunities, liveability and (economic) sustainability to benefit both the local economies and the regions' inhabitants and counter the development of regional decline.

9.
Reflection

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Process

Personal reflection on process

At the start of the thesis I made the decision to focus on regional decline, which originated from a personal perspective and the discourse shared by a large part of the Netherlands. At first this perspective led to doing research on issues caused by decline and how to overcome them. Gradually, I discovered much research has been going on about the region which includes many potentials for the region to develop, rather than emphasising the issues caused by a perspective of decline. Many (future) stakeholders have invested in research on the region mostly driven by the economic potentials. This changed the emphasis of the thesis and allowed to move beyond curing the current issues only, by taking the opportunity coming from the position of the region and potentials from both the surroundings and the region itself.

From the definition of opportunities for the region, I have learned to use knowledge of the spatial characteristics to translate these concepts into a vision that applies to the region specifically. The combination of spatial and socio-geographical analysis has helped to define exact locations that have potential for intervention. In return, this definition has contributed to doing additional research on these locations which further enhanced the implementation of the vision into representative designs.

For the realisation of the vision, not only spatial interventions are needed. Governance through policy proposals is needed to guide and facilitate the proposals. Urban design and planning can often only influence decision-making by design, which can influence the process of realisation, but not decide for the outcomes. I have learned it is possible through showing these potentials to contribute to solving spatial, social and economic issues in these environments. A (strategic) design can inspire and reveal potentials to the institutes in charge of realisation. However, while the decisions for local projects are often made on the scale of municipalities, they do often not have the means for realisation themselves. Here, the development of the thesis has made me consider another purpose of vision and strategy-making. These are to encourage stakeholders on the larger scales as well, as often these products include multiple scales. On this scale, more (economically) powerful stakeholders from the public and private sectors are involved. To develop strategies on the larger scale allows for integration and balancing of the developments in smaller scales, and connects these to the larger scale. In this way, urbanists can facilitate local developments through their designs and own strategies.

Project

Methodology

In this research project, elaborate research on the scales of the Dutch Flanders region and interregional Scheldt Delta has provided input for the designs on both the regional and urban scale. Analysis on the regional scale allowed to show where exactly issues are present within the region and provided input for interventions and further analysis on the urban scale. Regional decline however is a problem which is based on the accumulation of both problems on this urban scale, as well as governance on different levels. The main research problem of this project can therefore not only be solved by intervening at these scales, but requires a strategy to connect interventions on different scales. The methodology has incorporated these different scales by proposing the development of a strategy by selecting several representative locations in which the general design and governance principles can be implemented.

The selection of these specific locations allows for representing and evaluating the proposed strategies. Although a representative set of locations has been used, similar locations in the region can not all undergo the same type of interventions, as local conditions and needs differ. For applying the strategy to other locations, a set of general interventions was developed. From the transferability maps, unique combinations of interventions can be applied to the other urban areas in order to support the strategy on the regional scale.

Another limitation of the used research methods is the focus on the regional scale for spatial analysis, while research on the context and discourse has been done on other scale to define certain problems. As an example, neighbourhood specific problems have not been thoroughly researched on the urban scale, as the proposed interventions originate from the regional vision and strategy on the regional scale instead. Therefore, the final designs have to be perceived as just showing one of different design possibilities for the urban locations, in which the implementation of the regional strategy to the urban scale is central.
Additionally, the theories that have been described in the research framework of the methodology do not propose only spatial interventions. Most of these describe that many problems originate from issues of governance. Thus, the spatial interventions that are proposed in the designs of this project can only facilitate or catalyse development. Most of these depend on supporting governance interventions, as presented in the strategy, to succeed in their aims.

The project focuses on the region of Dutch Flanders, as it is declining unlike its surrounding regions. However, Dutch Flanders is inseparable from the lager Scheldt Delta region and the Eurodelta system this is part of. The interventions proposed require strategic investments in, and alignments in function with these surrounding regions too in order to guide a successful transition. As the scope and timeframe of the project is limited, the decision has been made to focus on the strategic spatial interventions in Dutch Flanders. However, as part of the vision and governance strategy, this larger scale is considered and therefore part of the outcomes of the project.

Data collection

For this project many data from international sources have been used. As the Scheldt Delta region is a cross-border region, the data for the regional analysis often consists of multiple parts. While many data is available in the Western-European context of the project, most spatial and (socio)geographical data differs in terms of quantities, margins, typologies, indicators and categories. For this project, the most accurate data has therefore been selected. Out of this original data, conclusions have been made that are used to visualise the results in a coherent way, which is derived from the original data. This means a certain level of detail is lost eventually. For this project, the data from

original sources has been evaluated in the conclusions from the merged data by the author in order to develop outcomes as precise as possible, while also being able to translate these to conclusions for the project.
Additionally, many data on governance is dated. Many of the visions by municipalities, interregional governance documents and national visions on different themes are currently revised and updated, or have been published during the establishment of this thesis. The updates have been taken into account by adjusting the proposals. However, for the most dated documents, interpretations are made by the author. These translate (governance) principles to the current spatial, environmental, economic and social conditions by consulting literature, governance documents from different levels and policies from different organisations.

Additionally, analysis on the current conditions and needs of the urban areas and region is based on discourse from newspaper articles, policy documents and (position) literature. For this project, the aim has been to evaluate these different sources by gathering different perspectives, sources of information and (inter)national literature that is related to the themes discussed. For the conclusion of this, the aim has been to avoid individual perspectives and instead looking at the benefit for the greater region and its inhabitants in the strategy.

Generalisisng the outcomes
The research executed in this project can be used for other areas facing regional decline. While the interventions on the urban scale are limited to those that represent the regional strategy, the implementation of (inter)regional interventions on the urban scale is presented in this project. It is important to note that these are one of the many possibilities for implementation. The way these are implemented depends on the individual urban and regional context of these locations. For municipalities, designers and policy-makers, the proposed designs can be used as examples, as the concepts and principles that are used are more generally applicable and link to a larger societal, economic and climatological issues. Yet, many of the proposed interventions to counter decline are based on the unique location between different strong economic cores, port cities and a Western-European context. As these conditions are relatively unique, adjustments to the proposed interventions have to be considered, in addition to the differences in urban context for implementation as explained earlier. While generalising the design outcomes requires adjustments to context, the theoretical framework in the project can function as a base for developments in other contexts. In this, theories are described that are based on a more diverse set of contexts and include more general (design) concepts. To conclude, the theories and the possibilities of implementation of theory in design through the proposed design principles can be applied elsewhere, but it depends on the context what the configuration of the final design and strategy will be.

Considerations and further recommendations, ethical and general issues of practical implementation
The choice for urban areas to partly be expanded, next to restructuring and additional recreation is based on the theories of increased capacity due to the focus on quality instead of quantity for these expansions. Theories describe a qualitative approach limits the negative externalities of recreation to some extent, while for housing it can attract, and keep, the desired target groups that fit the future economy of the region. There is a level of uncertainty concerning the justification of these expansions. The current economic and demographic conditions show high demands for housing and recreation in general due to shortages and for example the COVID pandemic. These pressures have gradually expanded towards the outer parts of the Netherlands, including Dutch Flanders. It is unsure whether the natural demand, which is not influenced by the proposed interventions, from both the Dutch and Belgian side will sustain on the long term. However, the proposed interventions are aimed at realising this demand in combination with the added potentials for employment.

Additionally, the project is largely influenced by the decision for taking a leading role in the transition of the industries in the Scheldt Delta. While a part of the strategy is taking place on a smaller scale and is less dependent on the industrial investments, major economic improvements that indirectly result in liveability improvements, which are at the core of the vision, depend on these choices. They require support on both a national and international level. This research project does not include a detailed policies or economic analysis on the viability of these proposals but uses theories from literature to support this choice instead.

As mentioned in the ethics section of the chapter on methodology, the implementation of some of the proposed concepts required economies to change. In addition, some design proposals done in the strategy require (temporal) changes in land, business and home ownership in order to implement the strategy and provide flood safety (dynamic polders) or (economic) sustainability. In the process of realisation, it requires careful consideration and compensation to the affected parties, as only interventions that serve a larger ethical or societal purpose, such as protecting against flooding because of climate change, can be justified.

As the research done in this project is executed in a limited timeframe, the level of detail differs per scale. One of the possibilities for future research is to thoroughly analyse the urban sites that were proposed for the interventions in the strategy in order to balance the designs with local needs, as currently for this regional data is used. Additionally, further research can be done on the role of other (port) cities within the Scheldt Delta region, for which in this strategy certain functional roles are defined. This could elaborate on the implementation of the design principles coming from this strategy and develop a set of additional principles specifically dedicated to the role these cities will have in the proposed regional strategy. Finally, further research can investigate the feasibility and economic and legal implementation of the proposed strategies. The current research project can only present a set of opportunities for these themes, while for the implementation of the plans research on these themes can further contribute to the final realisation of it.

Reflection on societal relevance
The aim of this research has been to contribute to

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Reflection

Reflection

societal challenges based on the perception that the region is declining and the frictions of being located at the border. At first, a general concept of repositioning Dutch Flanders and the in-between within their surroundings was developed. While the improving the situation of the in-between of Dutch Flanders is the main target, the scale of these alone is too small to intervene without considering a larger purpose. Therefore, rather than curing social issues that emerge in these smaller places, a regional strategy was proposed that aims to facilitate developments aimed at directly, but mainly indirectly countering the issues on the local scale. The intermediate step of developing indirect interventions is crucial for economic and social sustainability of the in-between instead, as lack of economic activities, employment and education potential and limited accessibility have much larger effect on the situation in the in-between than just the negative effect of the perception of a declining region. In addition to this, the societal impact of improved cross-border relations does not so much benefit the relations between inhabitants, rather it is the result of collaborations that benefits the in-between through spatial and economic improvements.

Yet, this does not mean the local scale is not in need of intervention. In this research, the results of developing new concepts on a regional scale was translated to the local scale by integrating strategic interventions and local challenges in a combined design on the local scale. In this way, both local issues are considered, and long-term sustainability of the effects is facilitated as the interventions are supported by a regional strategy. A part of this long-term perspective is the introduction of circularity in the strategy, as this also contributes to local production and additional employment in the region, which benefits the position of the in-between as well. Through these long-term perspectives that provide economic and social sustainability, while allowing for flexibility in the selection of different interventions, this research has aimed to contribute to the position of the inhabitants of the places in-between and the Dutch Flanders region.

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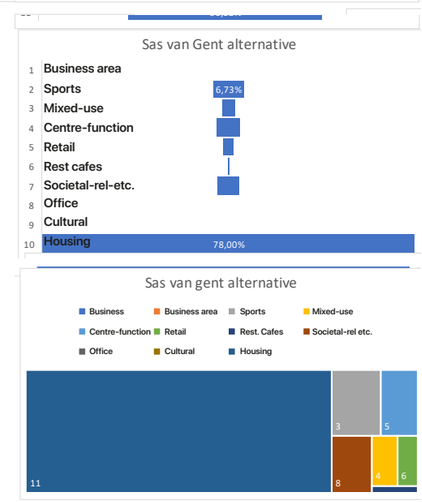
Appendix

Breskens
Sas van Gent*
Kloosterzande

More positive selection



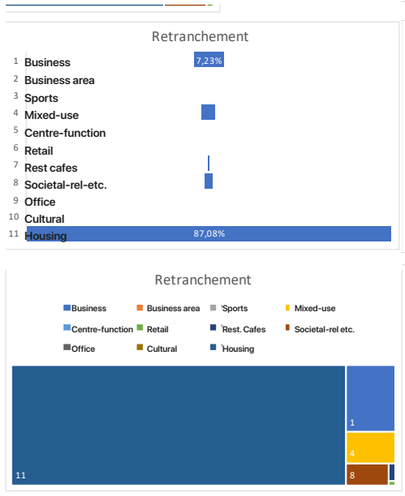
Analysis of urban locations and selection results for developing the selection of clusters in Chapter 6 (Author, 2021)

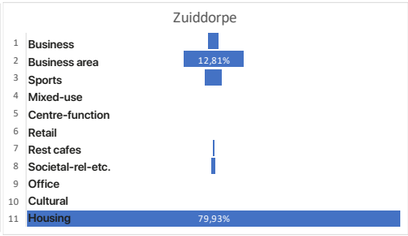
Retrancement*

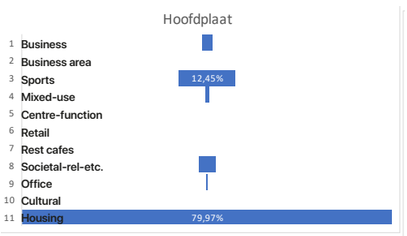
Zuiddorpe*

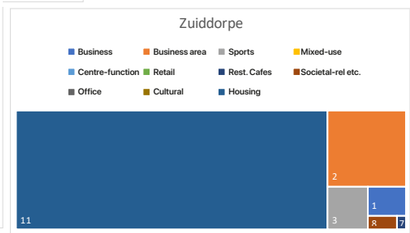
Hoofdplaat

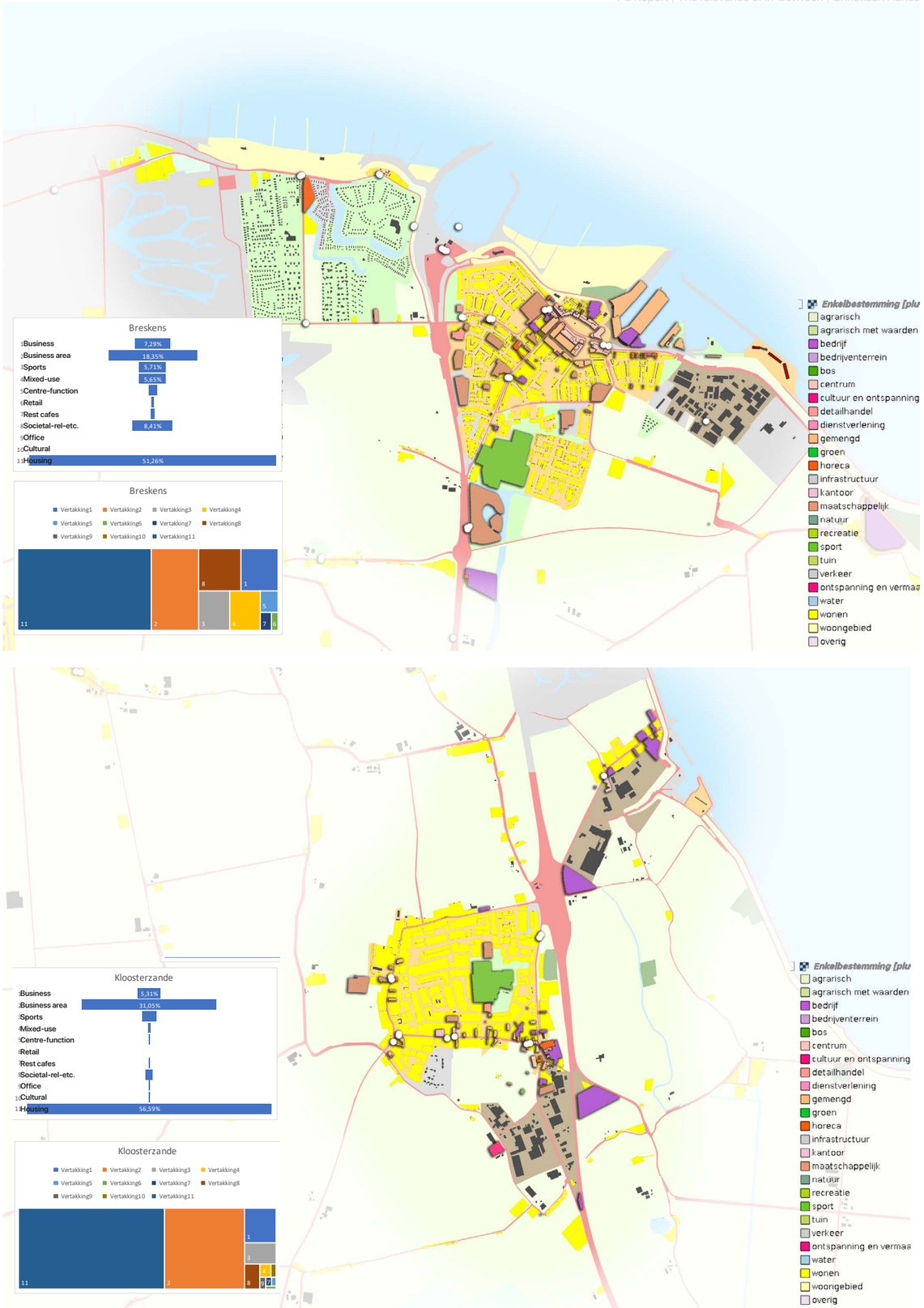
More negative selection





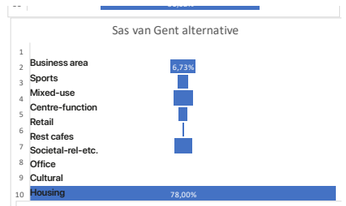




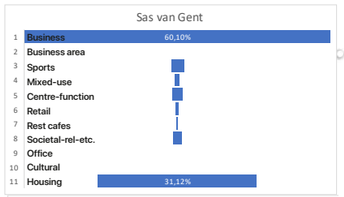


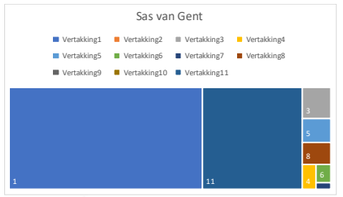
Analysis of urban locations and selection results for developing the selection of clusters in Chapter 6 (Author, 2021)

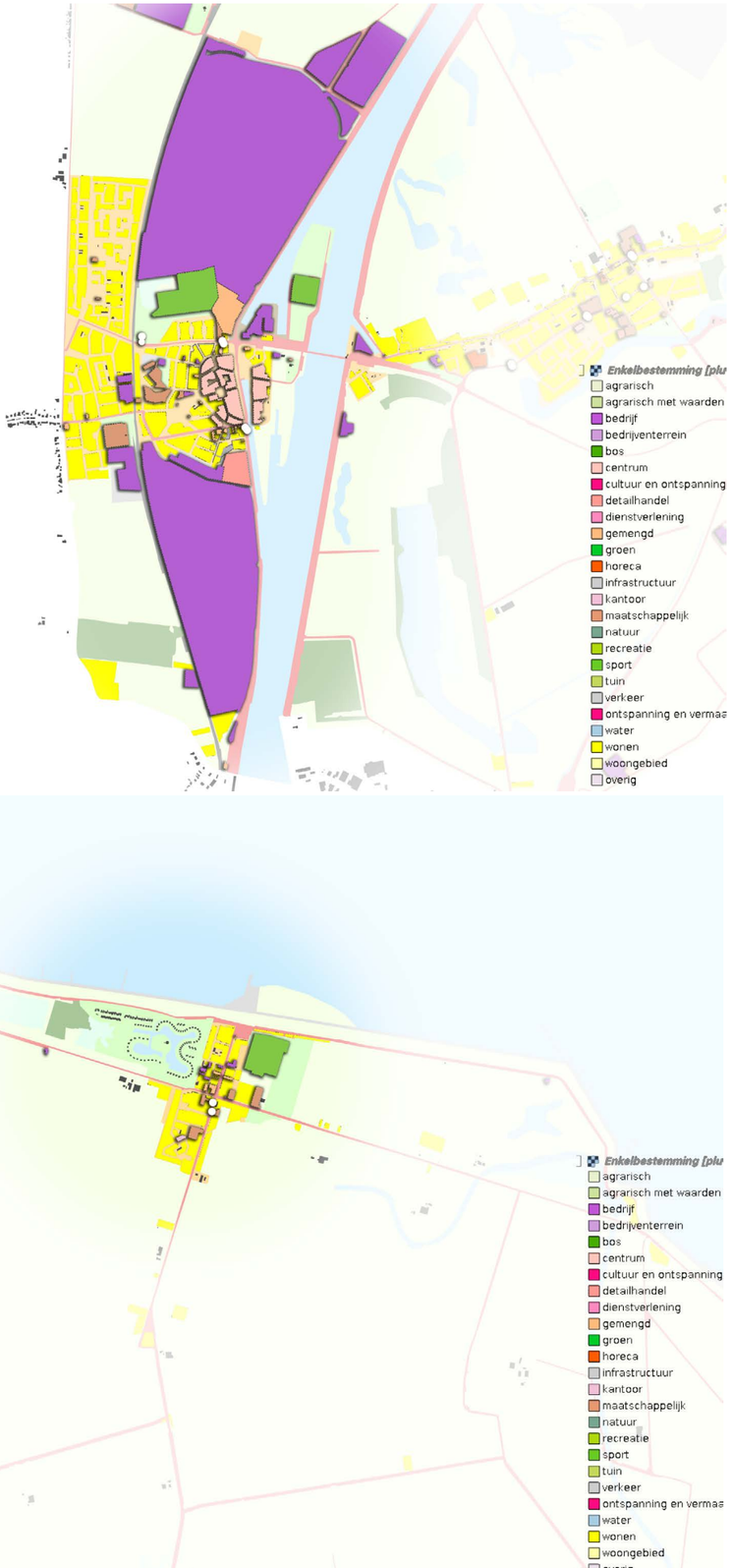
Analysis of urban locations and selection results for developing the selection of clusters in Chapter 6 (Author, 2021)

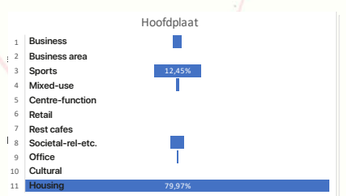

Sas van Gent alternative
Business area 6,73%
Sports
Mixed-use
Centre-function
Retail
Rest cafes
Societal-rel-etc.
Office
Cultural
Housing 78,00%


Sas van gent alternative
Vertakking1 Vertakking2 Vertakking3 Vertakking4
Vertakking5 Vertakking6 Vertakking7 Vertakking8
Vertakking9 Vertakking10 Vertakking11

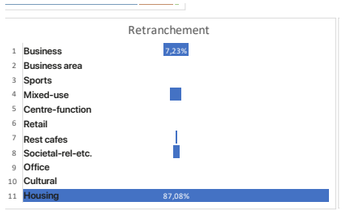

Sas van Gent
Business 60,10%
Business area
Sports
Mixed-use
Centre-function
Retail
Rest cafes
Societal-rel-etc.
Office
Cultural
Housing 31,12%

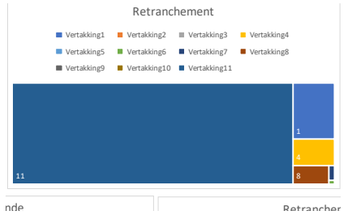

Sas van Gent
Vertakking1 Vertakking2 Vertakking3 Vertakking4
Vertakking5 Vertakking6 Vertakking7 Vertakking8
Vertakking9 Vertakking10 Vertakking11

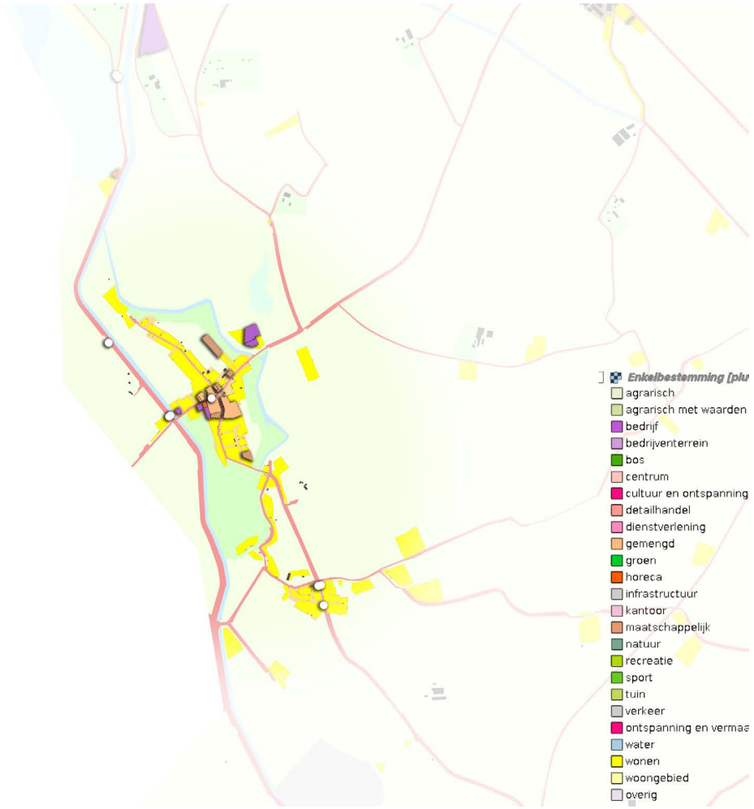

Enkelbestemming [plu
agrarisch
agrarisch met waarden
bedrijf
bedrijventerrein
bos
centrum
cultuur en ontspanning
detailhandel
dienstverlening
gemengd
groen
horeca
infrastructuur
kantoor
maatschappelijk
natuur
recreatie
sport
tuin
verkeer
ontspanning en vermaa
water
wonen
woongebied
overig


Hoofdplaat
Business
Business area
Sports 12,45%
Mixed-use
Centre-function
Retail
Rest cafes
Societal-rel-etc.
Office
Cultural
Housing 79,97%


Hoofdplaat
Vertakking1 Vertakking2 Vertakking3 Vertakking4
Vertakking5 Vertakking6 Vertakking7 Vertakking8
Vertakking9 Vertakking10 Vertakking11

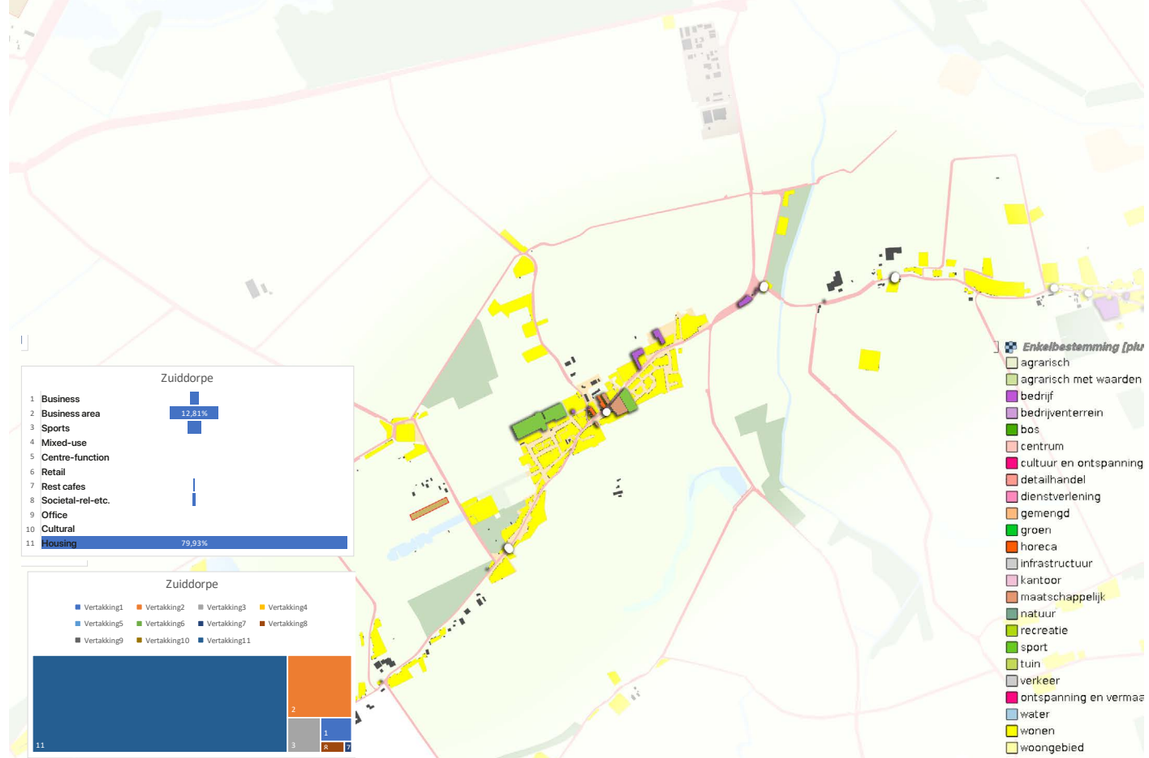

Retranchement
Business 7,23%
Business area
Sports
Mixed-use
Centre-function
Retail
Rest cafes
Societal-rel-etc.
Office
Cultural
Housing 87,08%


Retranchement
Vertakking1 Vertakking2 Vertakking3 Vertakking4
Vertakking5 Vertakking6 Vertakking7 Vertakking8
Vertakking9 Vertakking10 Vertakking11


Enkelbestemming [plu
agrarisch
agrarisch met waarden
bedrijf
bedrijventerrein
bos
centrum
cultuur en ontspanning
detailhandel
dienstverlening
gemengd
groen
horeca
infrastructuur
kantoor
maatschappelijk
natuur
recreatie
sport
tuin
verkeer
ontspanning en vermaa
water
wonen
woongebied
overig

Zuiddorpe
Business
Business area 12,81%
Sports
Mixed-use
Centre-function
Retail
Rest cafes
Societal-rel-etc.
Office
Cultural
Housing 79,93%

Zuiddorpe
Vertakking1 Vertakking2 Vertakking3 Vertakking4
Vertakking5 Vertakking6 Vertakking7 Vertakking8
Vertakking9 Vertakking10 Vertakking11


Enkelbestemming [plu
agrarisch
agrarisch met waarden
bedrijf
bedrijventerrein
bos
centrum
cultuur en ontspanning
detailhandel
dienstverlening
gemengd
groen
horeca
infrastructuur
kantoor
maatschappelijk
natuur
recreatie
sport
tuin
verkeer
ontspanning en vermaa
water
wonen
woongebied
overig

P5 Report | The relevance of in-between | Christiaan Hanse

Problem definition

Case analysis

Planning

Strategy development

Application in regional plan (case)

Diagnosis *Opportunities* *Intervention* *Implementation*

Reflection

Problematisation

Theory-essay

Methodology

Governance: policy analysis

Field work

Origins of problem

Site analysis: problems & definition of opportunities (vision)

Strategic approach & strategic projects

Implementation & design: strategy & governance

Reflection

Iterative

Graduation orientation
Motivation
Context
Problem statement
Methodology draft
Theory essay draft

P1: Context & Problematisation Report

Case analysis & theoretical research
Theoretical research: mechanism behind problem & possible strategic approaches
Location visit impression (results)
Methodology chapter
Theory essay

Theory paper 25-11

Chapter on Methodology 5-12

P2: Research: Diagnosis & opportunity + Methods + Theory Report

Strategy framework & reflection
Selection of approaches
Selection of strategic projects
Connecting the opportunities from theory & policy
Review of strategic opportunities
Start of regional design

P3: Progress, reflection & evaluation Report

Regional strategy & design
Strategic projects
Strategic design
Governance proposals

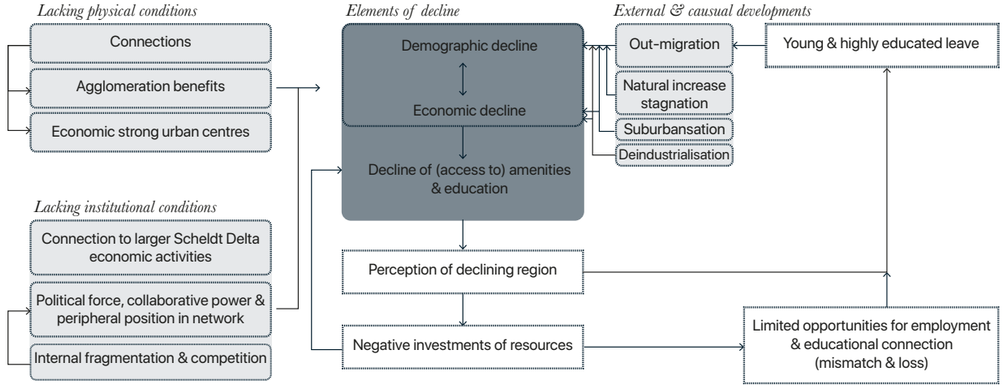
P4: Integrated (semi-final) Report

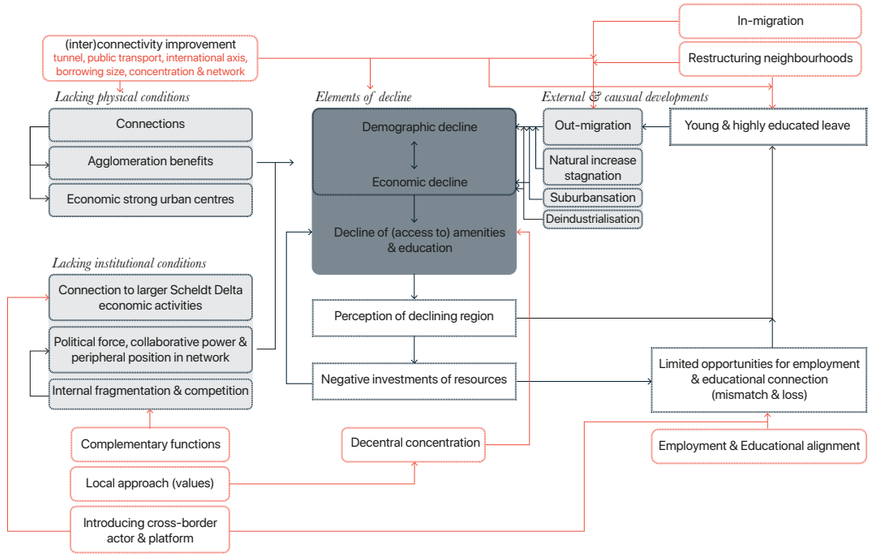
Final strategy & design
Conclusion
Discussion
Reflection

P5: Final report & presentation Report

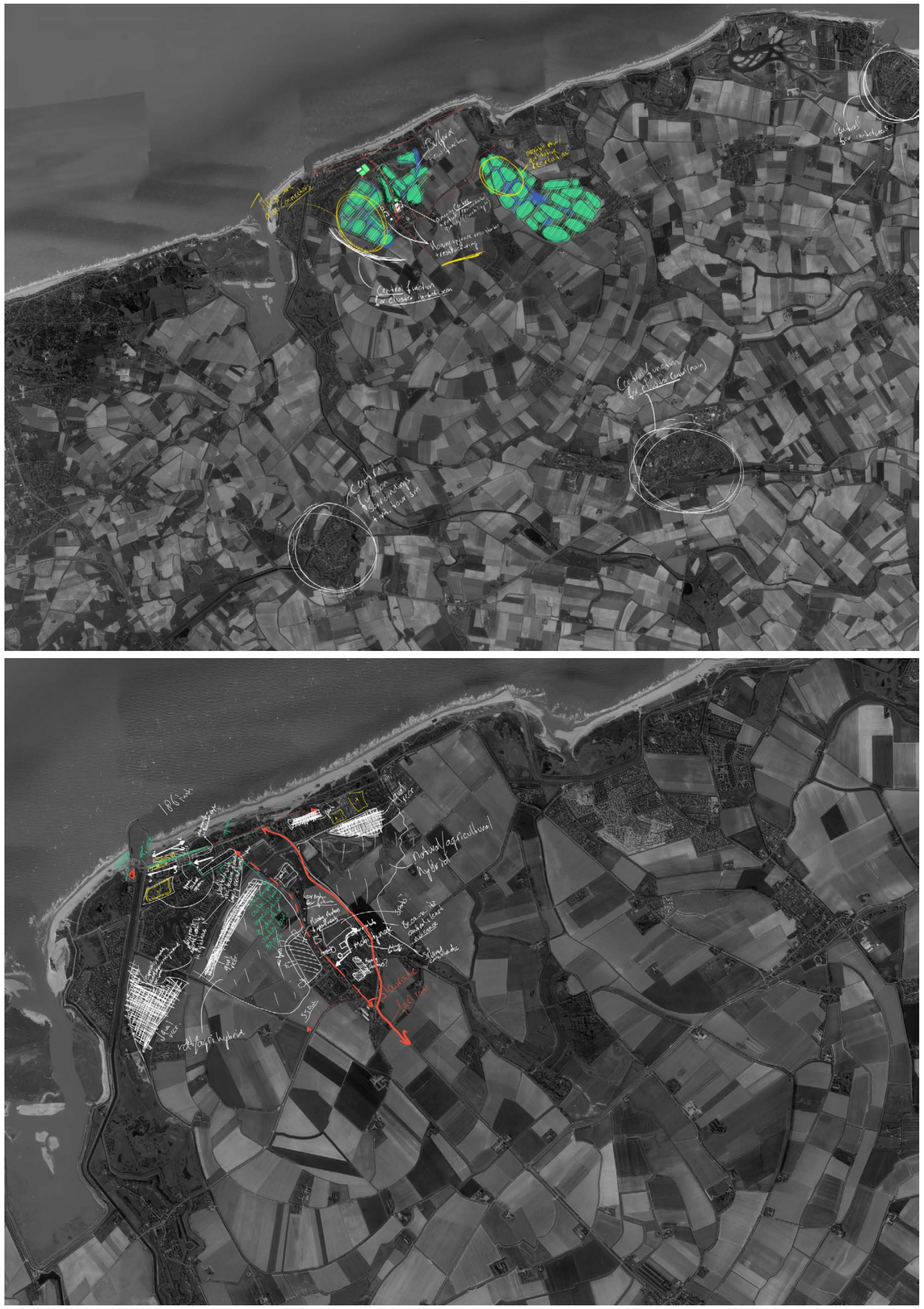
Sep Oct Nov Dec Jan Feb Mar Apr May Jun

Planning of thesis (Author, 2021)

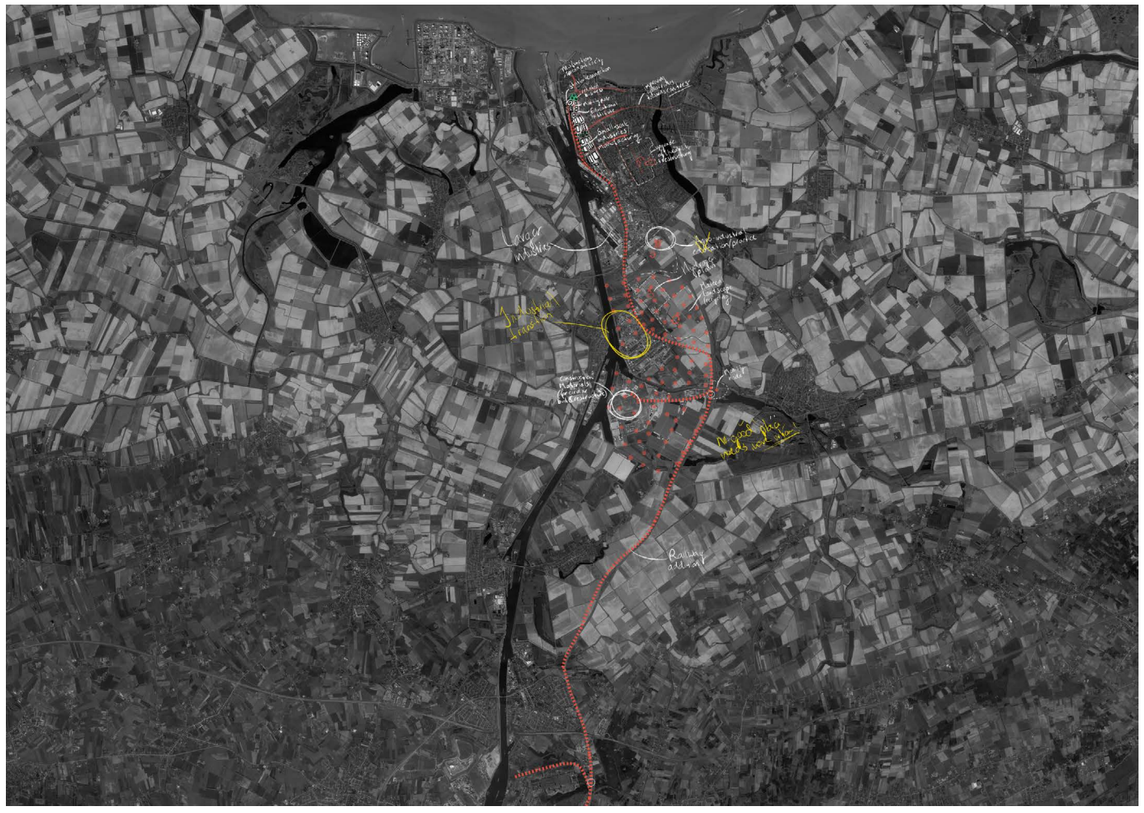




Challenges and strategies of decline based on theory paper (Author, 2021)



Design process sketches per cluster (Author, 2021)



Design process sketches per cluster (Author, 2021)

Design process sketches per cluster (Author, 2021)

The relevance of in-between

Christiaan Hanse