
From Glass City to Hybrid Landscape
The transformation of a historic grown glasshouse concentration in the Randstad

Msc4 Graduation Lab Urbanism

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Student : Sander Krul
Student # : 1297333
Email : S.P.Krul@gmail.com

With special thanks to,

Main mentor : Ir. I. Bobbink
Second mentor : Ir. F.F. Colombo
Third mentor : Dr. T. Schuetze

This report is an arrangement of the three main documents of my thesis.

Part A - Thesisplan (condensed)
Part B - Analysis
Part C - Structural vision

Part A

From **Glass City** to **Hybrid Landscape**

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Product	**: Thesisplan**
Status	**: Condensed**
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Student	: Sander Krul
Student #	: 1297333
Main Mentor	: Ir. I. Bobbink
Second Mentor	: Ir. F.F. Colombo
Third Mentor	: Dr. T. Schuetze

Topografische Kaart Westland
Source: Topografische Dienst, Emmen

Content

Part 1

Part 2

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01. Introduction

Thinking about the Westland, is thinking about glasshouses. Everybody who is acquainted with this area between Den Haag, Rotterdam and Hoek van Holland remembers the accumulation of glasshouses with its characteristic views and typical environment.
Since the end of the 19th century the glasshouse horticulture started to grow within this area. Outdoor farmlands with vegetable growth and orchards slowly disappeared and the horticulture underneath glass becomes more and more important. In the beginning mainly related to small scale horticultural activities with grapes and fruit but, because of the increasing demand of the surrounding cities and increasing competition with the south and east of Europe, the glasshouse horticulture changed into a professional and large scale business that today is focused on flowers, vegetables and potted plants. Because of this and the natural growth of the glasshouse companies, the total surface of the area that is filled with glasshouses is increased enormously.
Today the Westland is grown to one of the leading horticultural areas in the world with millions of square meters glasshouses. Nowhere in the world one can find a surface comparable with the Westland with such an amount of glasshouses. Glass is really dominating the image of the area. Therefore the Westland is often called the **'Glass City'**.

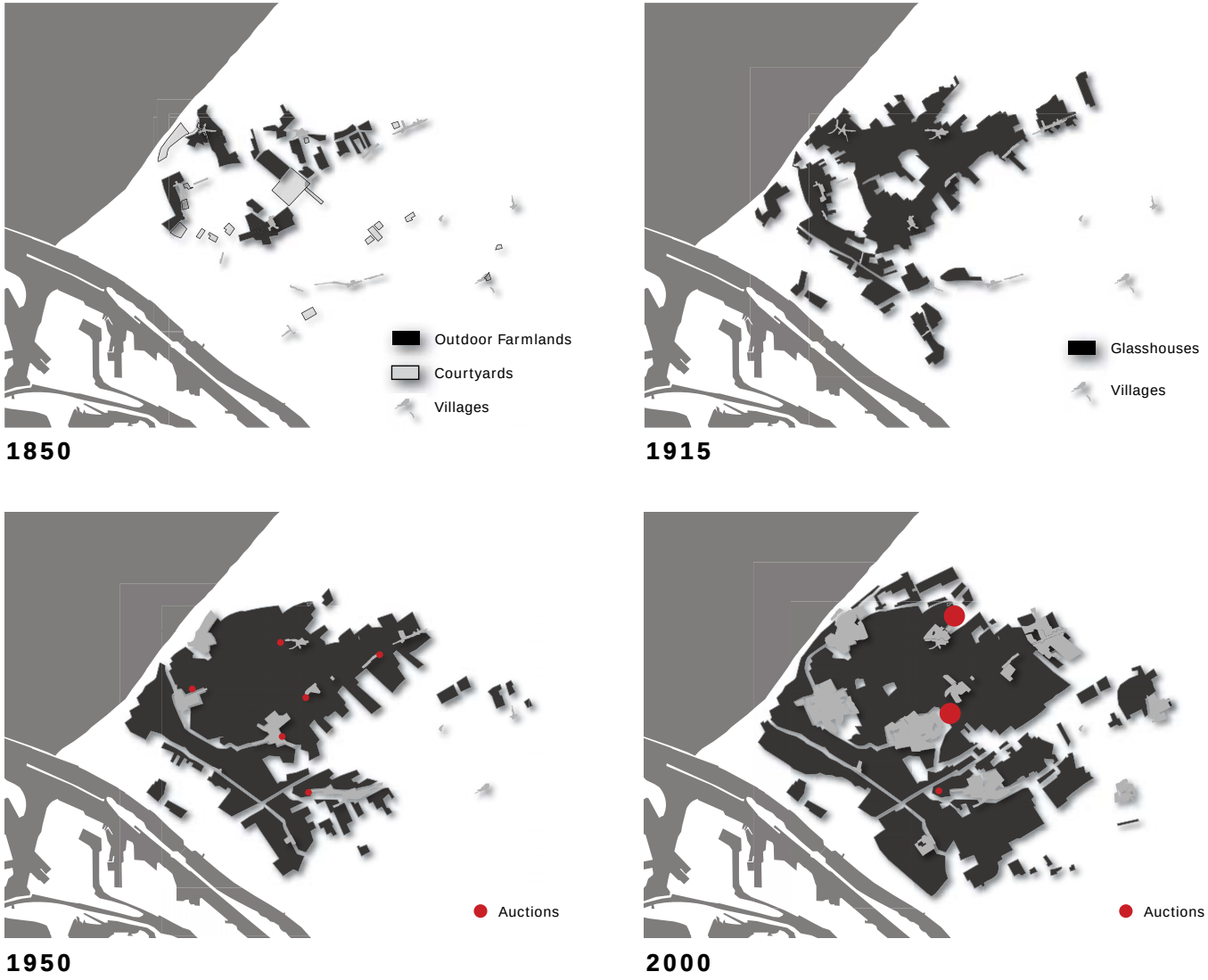


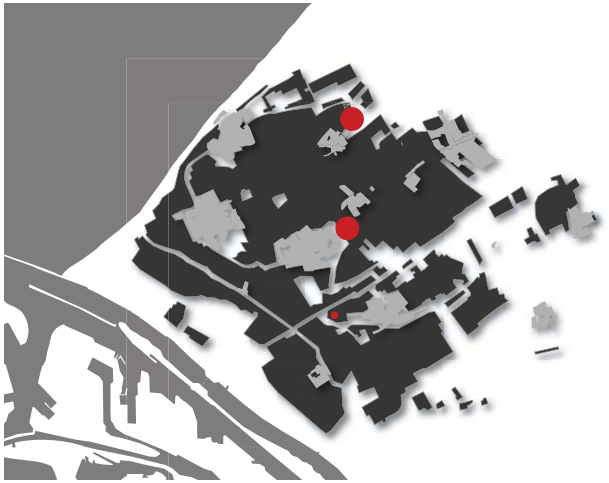
Figure 1 - 4: *Historic development glasshouse horticulture Westland*

02. Motive

However in the last 10 years the surface of glasshouse horticulture in the Westland is decreasing. According to numbers of CBS there has been a decrease of 261,3 ha net glass surface. The total net glass surface is decreased from 2757 ha in 1998 to 2495,7 ha in 2007 (CBS, Landbouwtellingen 1998-2007).

Because of the increasing urbanization in the west of the Netherlands the endless growth and expansion of historic grown glasshouse concentrations like the Westland has ended. Because of the trade, sales and mainly the distribution they are from origin situated near the bigger cities. The urban fabric grows and today these glasshouse concentrations are jammed within the high densed Randstad and becoming part of an overpressure area where on a relatively small piece of land the glasshouse concentrations must compete with other spatial functions like green, water, infrastructure and housing which becoming more and more important.
This situation leads to a **tension between economic and spatial demands**. On the one hand there should be emphasis on the reinforcement and development of the present horticulture concentrations but on the other hand there is an increasing pressure of other spatial functions like housing, green, water, recreation and infrastructure and the call for a better quality of the living environment. The spatial demands are high but the space is limited, especially in the Randstad.

The limited space within the glasshouse concentrations generates a restructuring of old glasshouse areas to maintain and reinforce their economic importance. Glasshouses become higher and wider and the individual companies grow also in terms of square meters by taking over their neighbours. The economic functioning of these transformed glasshouse areas becomes the main purpose and are at cost of cultural characteristics and values and historic elements in the landscape, like for example historic dikes, old waterways, horticultural housing and unique ribbon development, old allotment structures or characteristic views. Together with the increasing number of companies with a ‘closed’ façade and growth of the supporting installations, silos and water basins the huge uninterrupted glasshouse areas begin to look like
agro-industrial sites with a ‘monofunctional’ character.



2000

2010

Figure 5 & 6: *Decrease glass surface till 2010*

Height difference


Closed façades


Scale up supporting installations


Monofunctional character

03. Problem field

The growth, scale up and industrial and 'monofunctional' character excites a lot of **criticism** and leads to a lot of discussion about the spatial layout and the tenability of these glasshouse areas within the high densed Randstad. There is for example an increasing **social resistance** against light pollution, sound pollution (CHP-installations), low water quality, increasing transport and lack of green and nature. Besides this there are also some **spatial problems**. Because of the accumulation of glasshouses there is a lack of water storage that is causing different water problems, like for example flooded areas. At the same time it is hard to create more water storage to adapt to the predicted future climate change. Furthermore the infrastructural network is outdated and insufficient and there is a lack of green and open spaces. Signals that make clear that there is a need to change something.
One could conclude that the present spatial layout of the 'monofunctional' glasshouse areas in Westland does not fit to the **actual wish for multifunctionality** and the integration of conflicting actors and spatial demands within the high densed areas of the Randstad.

"*Looking to the intertwine with functions like housing and other business areas the historic grown horticultural concentrations like the Westland have from origin a certain level of multifunctionality. However this level is according to the present demands and the growing overpressure within the Randstad insufficient. The necessary space is with the growth of the glasshouse horticulture, the urban pressure and the call for a better quality of the living environment the limiting factor to transform these areas to the present day demands and a sufficient level of multifunctionality.*" (Alleblas et al, 1996, p. 140)

For a lot of people this insufficiency reflects a **lack of spatial quality**. According to the scope of spatial quality the glasshouse areas within the high densed Randstad should meet high requirements which are dealing with a lot of spatial demands and different actors.

However it is hard to meet these requirements. Something that enhances the tension between economic and spatial demands and the call for a better quality of the living environment.
Because of the enormous growth of the glasshouse horticulture in the Westland and the present scale, accumulation and (inter)national importance there are **huge economic interests** that makes it hard to achieve fundamental changes. According to restrictive and historic thinking important horticultural actors aiming for development and reinforcement of the glasshouse horticulture within the present day limited boundaries of the Westland and trying to **maintain as much glass as possible**.
Other spatial functions become inferior and the actual but minimal decrease of glass surface, generated by the increasing pressure of other spatial functions, is mainly because of inconsistent and short term interventions or small scale initiatives by individual horticultural actors instead of being the basis of a consistent and structural renewal on a larger scale. However as stated in the report 'Vier kassengebieden in Europa, Visie op ruimtelijke kwaliteit' "a partial solution by reconstructing small parts of the glasshouse concentration, will only have marginal effects on the spatial layout and vitality of the area." (Alleblas et al, 1996, p. 127)

Problem Statement
Because of the growth and reinforcement of the historic grown glasshouse concentrations in the Randstad the current glasshouse areas within these concentrations slowly transforming into agro-industrial sites with a 'monofunctional' character which are mainly focused on horticultural activities and actors.
However this 'monofunctional' character does not concede to the actual spatial demands that are required in the high densed areas of the Randstad which are dealing with an increasing number of non-horticultural actors, a big lack of space and growing overpressure.

In this perspective one could question how to deal with these glasshouse areas within the historic grown glasshouse concentrations in the future.

04. Field of project objectives

To solve the 'conflict' between the economic growth and prosperity of the glasshouse horticulture and the social and spatial pressure, in terms of other spatial functions like housing, water, green, recreation or infrastructure, of the Randstad, it is necessary to **improve the spatial quality** of the historic grown glasshouse concentrations.
The emphasis of this thesis will be on the improvement of the 'monofunctional' glasshouse areas. The future glasshouse areas in the high densed Randstad should contain a 'natural' **mixture of conflicting functions** in a **multifunctional set up** whereby spatial wishes and demands of all involved actors are taken into account. In this perspective it is important not only to focus on the horticultural activities and actors but trying to realise areas where (modern) glasshouses, residential housing and recreation can be combined on a more spacious, divers and integral way. At the same time space for green zones and water structures should be taken into account to interrupt the monotone glasshouse structure and to find in the end a **balance between social, spatial and economic functions**.

"*To meet these high spatial requirements, space for housing, water, green, recreation or appropriate infrastructure and space for modern horticultural glasshouse companies with an sufficient surface and shape must be created within the historic grown glasshouse concentrations by sacrificing glass*". (Alleblas et al, 1996, p. 140)

Because of the present accumulation of glasshouses, the huge economic interests and big number of horticultural actors and activities a lot of unpopular measures, like **sacrificing glass**, are necessary to come to fundamental changes. As result of an intensive lobby of important horticultural actors these necessary measures become inferior to short term, restrictive and historic thinking within the limited boundaries of the historic glasshouse concentrations. As already described this will lead to inconsistent and small scale interventions which do not contribute to the spatial quality and vitality of the glasshouse concentration.

However as pointed out within the motive of this thesis the surface of the glasshouse horticulture in the Westland is slowly decreasing. Combined with a lack of spatial quality and decrease of vitality this could lead in the end to uprooting of the glasshouse horticulture in the historic grown glasshouse concentrations.

"*By using the space in an other way, it is possible to realize a renewed concentration where glasshouse horticulture clusters combined with green zones, water and recreation giving the region a new appearance. On this way there will be a contribution to the demands of spatial quality which are mainly related to non-horticultural actors and activities and at the same time the strength and vitality of the concentration will be reinforced instead of undermined.*" (Alleblas et al, 1996, p. 129)

In this perspective the proposed transformation of the present glasshouse concentrations with a structural decrease of glass surface is mainly coming forward out of **non-horticultural actors** but is also in the interest of the glasshouse horticulture itself (**horticultural & horticultural related actors**). This can be confirmed by the following quotation:

"The tourists, people that pass by and non-horticultural inhabitants of the glasshouse concentrations in the Randstad have a negative judgement about the utility-, amenity- and future value. However also the horticultural companies, employees and horticultural related companies judge the utility- and future value relatively low." (Alleblas et al, 1996, p. 125)

"*If a historic grown glasshouse concentration within the Randstad, like Westland, still wants to be an area of horticultural importance but at the same time should deal with the need to integrate other spatial functions to concede the demands of non-horticultural actors and activities, a total restructuring of space is required.*" (Alleblas et al, 1996, p. 127)

Because of the present accumulation of glasshouses a **consistent and structural renewal** of the complete historic grown glasshouse concentrations is necessary to create a balance between conflicting functions and actors. As already described the emphasis will be on the improvement of spatial quality of the present glasshouse areas.

Within this structural renewal the **cultural-historic characteristics and elements** of the original landscape that were threatened by the scale up of the latest glasshouse horticultural companies will play an important role. Historic waterways, dikes, routes, height differences, green natural surfaces, ribbon development or old allotment structures determining the identity of a particular area and by restoring or enhancing these elements it can be a contribution to the spatial quality. These existing qualities will be important starting points for the structural renewal whereby the original landscape functions as an under layer for future transformations.
Besides this the present spatial problems related to the **insufficiency of the water-, green- and infrastructure** must be solved. These networks should be sufficient and must be tuned in to the future prospects and demands. Because these networks are related to horticultural and non-horticultural actors and activities the improvement of these networks will be the basis of improving the spatial quality. The **water network is in this case leading**. On the one hand because it is a necessity due to the out dated and insufficient structure, lack of (open) water surface / storage and necessity to adapt to the climate change. But on the other hand water (in combination with green) can be seen as a carrier of spatial quality. Improving, reinforcing and extending the water structure can therefore be an important step to improve the spatial quality.

The combination of these improved networks and the cultural-historic characteristics and elements of the original landscape determines a **new main structure or spatial framework** in which a 'natural' mixture of confliction functions and activities must be created.

It is important to keep in mind that, despite of the decrease of glass surface, glasshouse horticulture still will be part of the future program. Therefore it is also necessary to think about the meaning of these glasshouse areas within the (inter)national glasshouse horticulture and the consequences for the physical appearance of the individual glasshouse companies. This could lead to **new horticultural forms, functions and activities** which generate new possibilities to combine glasshouse horticulture with other spatial functions and activities.

At last it is also important to realize that it is **not desirable or realistic to mix the complete project area**. Of course, in the future situation there still will be small villages that are mainly focused on urban living, but there will also be places or areas which are mainly focused on glasshouse horticultural activities and functions. By thinking about the physical appearance of these areas, especially their edges, the integration within their context and the flexibility in time it is necessary to make sure that these areas do not come into conflict with other spatial demands.

However **unifying horticultural and non-horticultural functions and activities in a multifunctional set up** will be the main issue of this thesis. The emphasis will be on the nodal points and transitions where these conflicting functions and activities come together. In the end these points will determine the level of spatial quality.

Main Objectives

The main objective of this thesis is defining and elaborating a structural vision / perspective that aims for a better spatial quality of the Westland. This vision / perspective must lead up to a consistent and structural renewal with a fundamental sacrifice of glass surface and must guide the required transformation of the glasshouse concentration. The emphasis will be on the improvement of the present 'monofunctional' glasshouse horticulture areas which should contain a 'natural' mixture of conflicting functions and activities within a multifunctional set up.

On the one hand this mixture should still be related to the economic and spatial functionality of the glasshouse horticultural functions and activities to concede to the demands of horticultural actors, but should integrate on the other hand also spatial functions like green, water, infrastructure, housing and recreation to concedes to the spatial demands of non-horticultural actors, of which the number within the Randstad has increased enormously.

The Westland should not be anymore the 'Glass City' where uninterrupted and 'monofunctional' glasshouse areas with an agro-industrial character determine the image and dominating the landscape but must transform into a multifunctional area where glasshouses with an economic meaning become an attractive scenery within a more spacious and divers landscape that integrates at the same time non-horticultural functions and activities, like living, green, water or recreation.

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05. Theoretical Framework
06. Approach

05. Theoretical Framework

Spatial Quality (Theoretical Paper)

As described earlier in this thesis plan improving the spatial quality of the historic grown glasshouse concentration Westland will be the main issue of this thesis. Because there are a lot of interpretations and visions about spatial quality and the way of dealing with this abstract notion, it is necessary to **define the meaning of spatial quality** and explain how it can be applied and implemented to this project. This will be the main issue of the theoretical paper.

To come to a clear definition it is important to know more about the different interpretations and visions of spatial quality. By reviewing them it is possible to form an own opinion about spatial quality and find or compose the right definition that fits to this particular project. Therefore the theoretical (review) paper will give an overview of the most important Dutch interpretations and visions of spatial quality and should lead to a underpinned definition.
At the same time the theoretical paper aims to give a clear insight about **how spatial quality can be applied and implemented** to this particular project. Most of the time the definition stays rather abstract and leads in practice to a lot of confusion and problems to translate spatial quality into useful and practical design criteria. A clear definition is therefore not enough and the theoretical paper should provide a more concrete elaboration of spatial quality.

Without reaching a final conclusion a good example is described in a report of Habiforum that is called ‘Kwaliteit in Meervoud’ (Hooimeijer et al, 1991). Within this report spatial quality is defined as a combination of different values (utility, amenity and future) and interests (economic, social, ecological and cultural). By putting this into a **matrix** (Hooimeijer et al, 1991, p. 38), see table 1 next to this, and adding quality notions like for example accessibility, safety, heritage or flexibility the differential content of spatial quality is conveniently arranged and the abstract definition of spatial quality is brought to a more conceptual level.

	Economisch	Sociaal	Ecologisch	Cultureel
Gebruikswaarde	Allocatie-efficiency	Toegang	Veiligheid	Keuzevrijheid
	Bereikbaarheid	Verdeling	Hinder	Verscheidenheid
	Externe effecten	Deelname	Verdroging	Ontmoeting
	Multi-purpose	Keuze	Versnippering	
Belevingswaarde	Imago	Ongelijkheid	Ontsnapping	Eigenheid
	Attractiviteit	Verbondenheid	Natuurlijkheid	Schoonheid
		Veiligheid		Contrast
Toekomstwaarde	Stabiliteit/flexibiliteit	Insluiting	Voorraden	Erfgoed
	Agglomeratie	Cultures of poverty	Ecosystemen	Integratie
	Cumulatieve attractie			Vernieuwing

Table 1: *Matrix spatial quality*

As described within the report it is necessary to concretise the relatively abstract quality notions for each particular project and it depends on each situation which aspects of spatial quality can be useful and which not. The matrix will look for each project different and should serve as a flexible framework that can be adjusted or completed when necessary.
Appendix 1 includes an example that is used in the report ‘Kwaliteit in Meervoud’ (Hooimeijer et al, 1991, p. 83) and shows how this conceptual framework can be translated into more concrete design criteria.
Despite of the rather abstract quality notions the matrix can be a helpful tool to elaborate spatial quality in a more concrete way. By tune the matrix in to this particular thesis it could be a perfect way to apply and implement spatial quality in this particular project.

Conflicting Actors

As described in the problem field there is a tension between conflicting actors within the high densed Randstad. In fact these actors can be divided into two main groups. On the one hand there are **horticultural actors** which are at this moment dominant in the 'monofunctional' glasshouse areas and on the other hand there is a relatively big group of **non-horticultural actors** which are putting, in terms of other spatial demands like housing, green, water, recreation or infrastructure, a high pressure on these 'monofunctional' glasshouse areas.
Both groups have opposite wishes and demands, something that generates a constant tension between economic and spatial demands and leads in the present situation even to conflicts because the spatial layout of these glasshouse areas are mainly focused on horticultural activities and actors and do not fulfil the requirements of non-horticultural actors.

In the report 'Vier kassengebieden in Europa, Visie op ruimtelijke kwaliteit' published by the research institute LEI-DLO (Alleblas et al, 1996, p. 15) this tension is described and visualized into the following table:

	Three spatial quality aspects		
Groups of actors	Utility value	Amenity value	Future value
1. Horticultural population	■		■
2. Horticultural related companies	■		■
3. Non-horticultural companies	▒		▒
4. Non-horticultural population		■	▒
5. Tourists & people that pass by		■	

Table 2: *Intensity of the link between groups of actors and aspects of spatial quality*

■ Very strong link
▒ Strong link
Relatively weak link
Almost no link

The report makes a distinction between **five groups of different actors** and links them to three spatial quality aspects, which in this case determine the level of spatial quality. By colours the intensity of the link between the concerning group and the aspect of spatial quality is reproduced.
As can be seen in the table there is a **diversity in valuation of the quality aspects**. The utility value, related to the economic functioning of a glasshouse area, is for example strongly linked to the horticultural population and horticultural related companies, while it has a relatively weak link with the non-horticultural people and is barely of importance for tourist and people that pass by. The amenity value, related to the experience of the landscape, is on the other hand strongly linked to these last two groups while it has a relatively weak link with the horticultural population and horticultural related companies.

This contradiction in valuation of the different aspects of spatial quality will always lead to a certain tension between the groups of actors. However the spatial layout of the present horticultural areas is to much focused on the horticultural actors and leads to an unbalanced situation and a high tension between the horticultural and non-horticultural actors, finally resulting into a conflict situation.

The structural renewal and the final conclusion about spatial quality should be tuned in to this diversity in valuation. However it is important to take a rather objective instrument, like for example the described matrix of spatial quality, as main starting point instead of a more subjective approach based on the changing wishes and demands of opposite actors to prevent that one of the actors becomes more important than an other and several aspects of spatial quality are not taken into account.

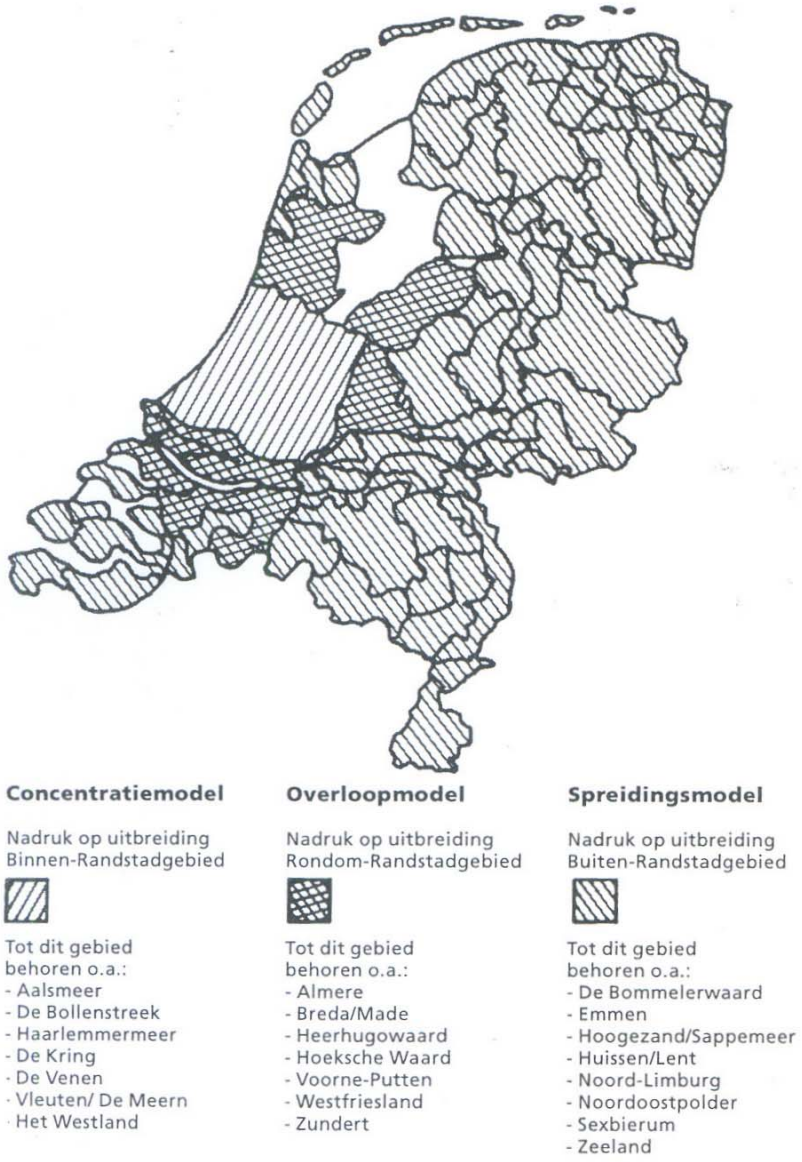


Figure 7: *Three spatial development models*

Dutch glasshouse complex

Improving the spatial quality of the historic grown glasshouse concentrations in the high densed Randstad will be at cost of glass surface. On the one hand to create space for other spatial functions like housing, green, water, recreation or infrastructure but on the other hand also to make sure that these concentrations keep their economic and horticultural importance.

As verified by research it is in the interest of the Dutch glasshouse horticulture to **spread the horticultural activities over the Netherlands** (Alleblas & Rodewijk, 1992). The possibilities of doing this are described in an other research report called 'Randstadglasnota' (RORO, 1993). Within this report the possibilities are linked to **three spatial models**: 'Concentratiemodel', 'Overloopmodel' and 'Spreidingsmodel'. These models define how the glasshouse horticulture could spread over the different parts of the Netherlands.

The report 'Vier kassen gebieden in Europa, Visie op ruimtelijke kwaliteit' (Alleblas et al, 1996, p. 90-98) describes and summarizes shortly the main issues related to the three spatial models, which are shown in figure 7 (Alleblas et al, 1996, p. 92), based on the research of the 'Randstadglasnota' (RORO, 1993).

The **'Concentratiemodel'** puts an emphasis on the maintenance and reinforcement of the existing and historic grown glasshouse concentrations within the Randstad. This model aims to keep as much glass as possible and, despite the increasing pressure of other spatial functions, tries to fulfil the demands coming forward out of the autonomous growth of the glasshouse horticulture within these overpressure areas.

The **'Overloopmodel'** puts an emphasis on the movement(overflow) of glasshouse horticulture towards areas surrounding the high densed Randstad. Within this model there is enough space to relocate horticultural activities. The autonomous growth of the glasshouse horticulture is foreseen in the surrounding (overflow) areas and the glass surface within the Randstad will not increase.

The **'Spreidingsmodel'** puts an emphasis on the spread of glasshouse horticulture over the Netherlands related to a movement towards areas on a relatively big distance from the Randstad. Within these areas there is a rather big development of glasshouse horticulture possible. The glasshouse horticulture within the Randstad will decrease within this model. The consequences on national level are for each model summarized in table 3 (Alleblas et al, 1996, p. 95) on the next page.

Nationaal Niveau	Binnen-Randstad	Rondom-Randstad	Buiten-Randstad	Opmerking
Concentratiemodel	opp. glas neemt toe	opp. glas neemt bepert toe	opp. glas neemt bepert toe	geen voorkeur (Alleblas & Rodewijk, 1992)
Overloopmodel	opp. glas blijft gelijk	opp. glas neemt sterk toe	opp. glas neemt bepert toe	vanuit toekomstwarde, i.c. toekomstige ruimtelijke druk riskant
Spreidingsmodel	opp. glas neemt af	opp. glas neemt bepert toe	opp. glas neemt sterk toe	-

Table 3: *Consequences of the three developmentmodels on national*

In fact the 'Concentratiemodel' corresponds with the present national policy that aims for a development and reinforcement of the historic grown horticultural concentrations. Within the so called 'Greenports' the emphasis is on the "spatial bundling of primary production, trade and distribution." (VROM, 2006)
However as described in the problem field of this thesis this spatial bundling resulting in a tension between economic and spatial demands. The demands are high but the space is limited, especially within the high densed areas of the Randstad. This lead to spatial conflicts between the increasing urbanization and autonomous growth and development of the glasshouse horticulture. On the one hand there is, because of the accumulation of glasshouses, no space for other spatial functions like housing, green, water, recreation or infrastructure and on the other hand there are almost no possibilities to expand or develop the glasshouse horticulture, something that could lead to uprooting of the glasshouse horticulture in these areas.

To deal with this tension and prevent spatial conflicts within the Randstad several newer glasshouse areas arise at the borders of the high densed areas. When it is necessary to move out of the Randstad most of the horticultural people prefer a new location nearby their former location and environment. **Social factors are in this case dominating rational and economic reasons.** In fact this spatial development corresponds with the described 'Overloopmodel'. However looking to the future value one could question if this is the desired development. Because of the increasing urbanization of the Netherlands the spatial conflicts between urbanization and glasshouse horticulture will appear in these areas as well. Besides that this model does not lead to a fundamental decrease of the glass surface in the horticultural concentrations within the Randstad, while in fact this is necessary to implement other spatial functions and activities and to ensure the vitality of these glasshouse areas in the future.

In this perspective it is of importance for the Dutch glasshouse horticulture to spread the horticultural activities over the Netherlands according to the **'Spreidingsmodel'** and aiming for a structural decrease of glass surface within the high densed areas of the Randstad, something that reflects the main conclusion of the 'Randstadglasnota' (RORO, 1993).

According to the report 'Vier kassen gebieden in Europa, Visie op ruimtelijke kwaliteit' (Alleblas et al, 1996, p. 115) the spread of horticultural activities will occur a shift from separate regional glasshouse concentrations towards one '**Dutch glasshouse complex**' that is not restrained to regional boundaries. In fact the central function will be on a **higher geographic scale level**. Restrictive and historical thinking and the preservation of strict regional boundaries will finally lead to uprooting of the glasshouse horticulture. To reach a healthy development of the glasshouse horticulture it is essential that the horticultural activities spread over the Netherlands.
The historic grown glasshouse concentrations like the Westland and Aalsmeer now act, more or less isolated from other areas, as important glasshouse concentrations in Europe. In the future this independent position will be diminished and they become more and more part of the 'Dutch glasshouse complex'. Of course the total glass surface within the concentration will decrease but according to the future prospects there still will be a relatively big part of the production areas left and a big part of the horticultural related companies including most of their head offices will be located in these areas. However if these areas still want to be of importance for the 'Dutch glasshouse complex' substantial and structural renewal is necessary to **ensure the vitality** of these glasshouse areas. (Alleblas et al, 1996, p. 118)
Of course it is not the meaning of the 'Spreidingsmodel' to generate a unlimited dispersal of glasshouse horticulture all over the country. A well thought coordination and spatial planning on national level is necessary to find the right place, size and spatial layout of new horticultural areas.

Within this thesis there will not be a further elaboration of the dispersal of glasshouse horticulture or the determination of the exact location for new concentrations. Based on the described aspects that are related to several sources the necessity and possibilities of dispersal is pointed out and underpinned. This shows that spatial problems within the Randstad can be faced by choosing an other spatial policy without loosing the regional economic importance and could lead at the same time to reinforcement and development of the (inter)national glasshouse horticulture.

Mono- and Multifunctionality

As described within the problem field the historic grown glasshouse concentrations in the Randstad are under pressure of spatial demands of non-horticultural actors and in fact a increase of the level of multifunctionality is required to prevent spatial tension and conflicts. Because there is a minimal decrease of glass surface and it is hard to come to fundamental changes because of the enormous economic horticultural intersts the glasshouse areas stay rather monofunctional and lead to tension between social and economic demands and spatial conflicts.
In the report 'Vier kassen gebieden in Europa, Visie op ruimtelijke kwaliteit' (Alleblas et al, 1996, p. 139-143) the required development of the historic grown glasshouse concentrations and the spatial tension (continuous arrow) based on the actual development is described and represented by figure 8 (next to this).

The presence of only one actor implies a low multifunctionality (or a high monofunctionality). When there will be more actors, the need of a new spatial layout will increase because of the necessity to implement and combine more functions in an area. Normally this adjustment occurs not directly but takes place with a certain delay (curved dotted arrows). If this delay becomes to big (see continuous arrow that symbolises the old glasshouse concentrations) this delay will cause enormous tensions and problems related to the spatial development of an area. Recovery of the balance could only take place by forcing drastic and fundamental interventions within the spatial layout.
Within the newer glasshouse areas the discrepancy between the number of actors and the required level of multifunctionality is much lower than in the old glasshouse concentrations because they are most of the time situated outside the high densed areas of the Randstad and are not loaded with high spatial demands as required in the old glasshouse concentrations.

As described the old glasshouse concentrations have from origin a certain multifunctionality because of the intertwine of functions like living and working. However this level is, according to the present day demands in the Randstad and the overpressure within these areas, not sufficient.

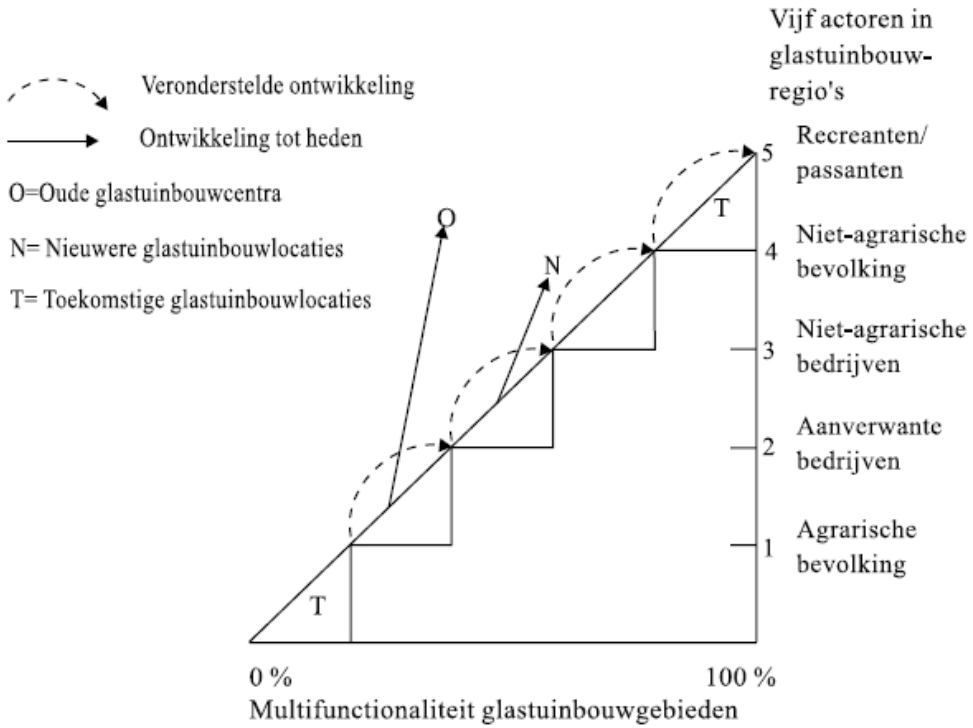


Figure 8: *Development direction glasshouse areas*

Mulitifunctionality can be seen as a functional phenomenon. It refers to a shape or spatial lay-out that is tuned in to the functioning of different (groups of) actors in a particular area. In practice the development towards multifunctionality will not be fluently and could cause spatial tensions or conflicts; the starting point of this development will be left corner at the bottom of the figure above.

The report 'Vier kassengebieden in Europa, Visie op ruimtelijke kwaliteit' (Alleblas et al, 1996, p. 140-141) describes at the same time the possibilities of future development of glasshouse areas on the basis of the following figure:

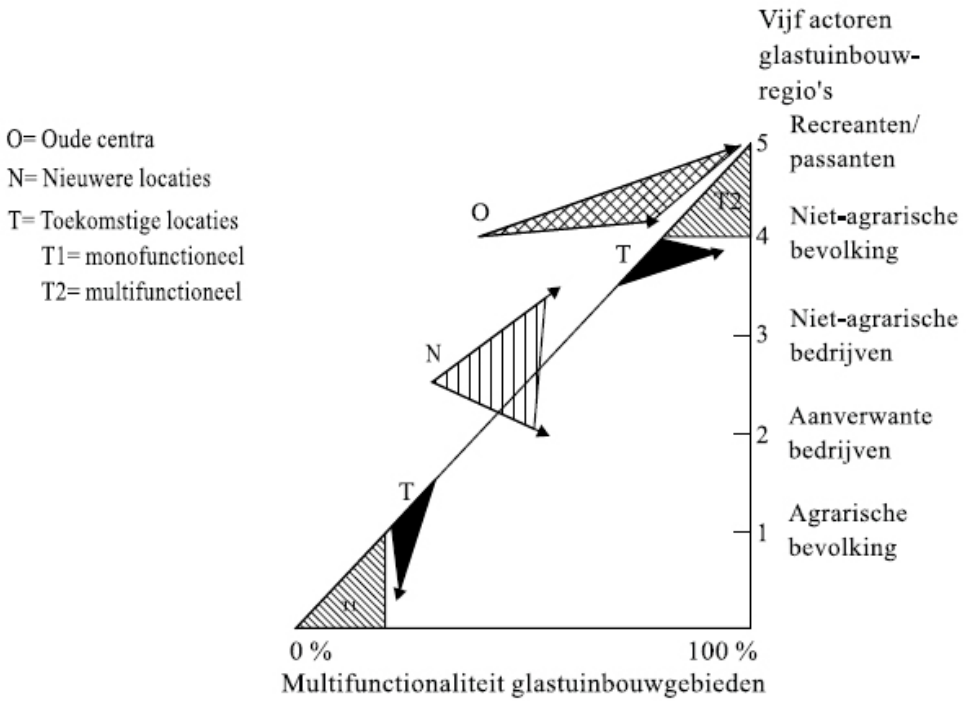


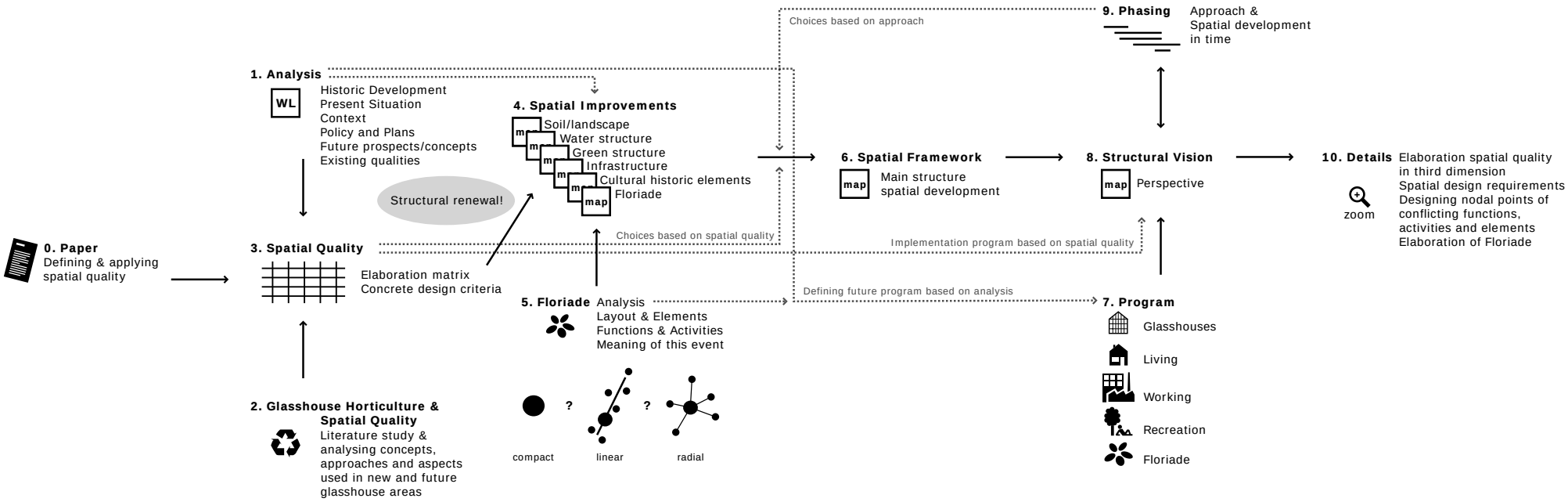
Figure 9:
Development direction in relation with level of (multi)functionality of glasshouse areas

As can be seen in figure 9 next to this the starting point for further future development of the traditional historic grown glasshouse concentrations and the level of multifunctionality lies around the middle of the continuum. This means that within the present spatial layout of the old glasshouse concentrations there is about an equal attention for multi- and monofunctional elements. According to the number of actors (in this case 4), there is a tension between the present spatial layout en the preferable spatial layout that deals with a full multifunctionality.
If the old historic grown glasshouse concentrations still want to be of importance in the future a structural renewal is necessary to reach sufficient level of multifunctionality for all actors in the area.

Figure 9 shows at the same time that within newer glasshouse areas, most of the time situated outside the high densed areas of the Randstad and corresponding with the glasshouse areas within the described 'Overloopmodel', also a development towards a higher level of multifunctionality is requested. Looking to the present spatial layout of these areas, which are most of the time focused on horticultural activities and not meant to be areas for non-horticultural activities or tourism, it is not naturally to reach the level of 100% or aiming for this.

The newest glasshouse areas, for away from the high densed areas of the Randstad and corresponding with the glasshouse areas within the described 'Spreidingsmodel', that should be realized within the future, for example within Flevoland, Noordoostpolder, Zeeland or the Northern provinces, can in theory be realized with almost a complete monofunctional or multifunctional layout.
A complete multifunctional area creates within the spatial layout of this area in advance a set of conditions (could be the elaboration of the matrix spatial quality) that adapt to the well functioning of four or five groups of actors.
A complete monofunctional glasshouse area consists of isolated horticultural areas which only providing workspace for horticultural actors. The horticulturist do not live anymore next to his glasshouse and non-horticultural actors do not have any spatial demands.

06. Approach



Schematic overview approach

Part B

From **Glass City** to **Hybrid Landscape**

The transformation of a historic grown glasshouse concentration in the Randstad

Msc3 Graduation Lab Urbanism

Product : Atlas
Status : Final
Date : 09-01-2009

Student : Sander Krul
Student # : 1297333

Main Mentor : Ir. I. Bobbink
Second Mentor : Ir. F.F. Colombo
Third Mentor : Dr. T. Schuetze

Content

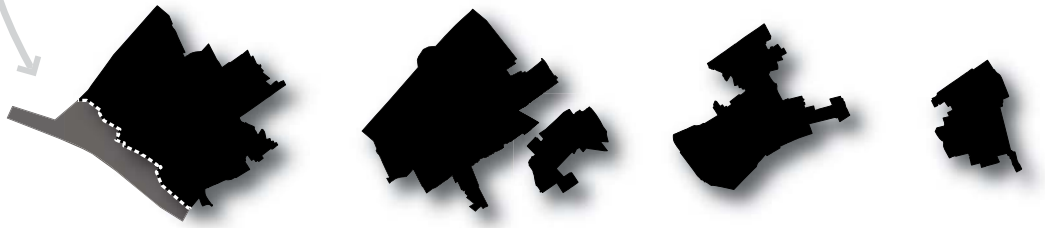
Source: Topografische Dienst Emmen (2004). Topografische Kaart Westland [map]

Introduction

Statistics

Hoek van Holland

surface (km2)	14,02
inhabitants	9.197



	Westland	Den Haag	Midden Delfland	Delft
surface (km2)	90,59	98,22	49,38	24,08
inhabitants	99.374	478.948	17.407	95.975
population density(inh/km2)	1.247	5.774	369	4.180
dwellings	39.361	232.429	6.628	43.847
dwelling density (w/km2)	494	2.820	140	1.908
glass surface (net ha)	2495,7			
percentage glass surface (%) of total surface	27,5			

Source: Centraal Bureau voor de Statistiek (2008). CBS Statline

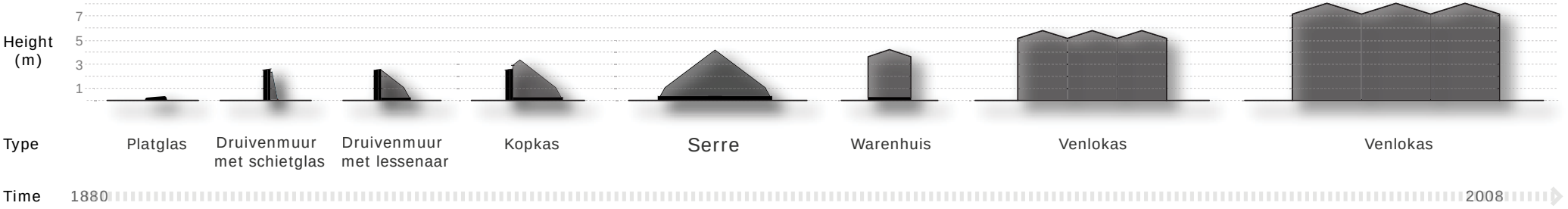
urban area (ha)	465
water (ha)	5490

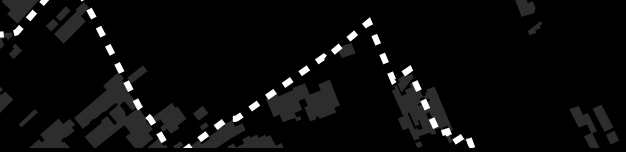
Source: Gemeente Westland (2005). Visie Greenport Westland 2020

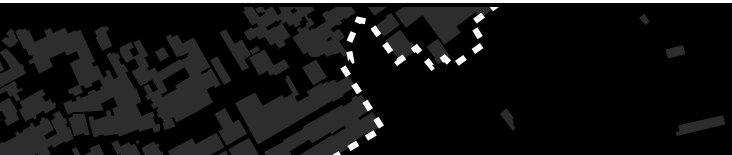
Context


Den Haag
Coast
Westland
HvH
Midden-
Delfland
Mainport
Rotterdam
City
Westland
HvH
Nature
City
Harbour

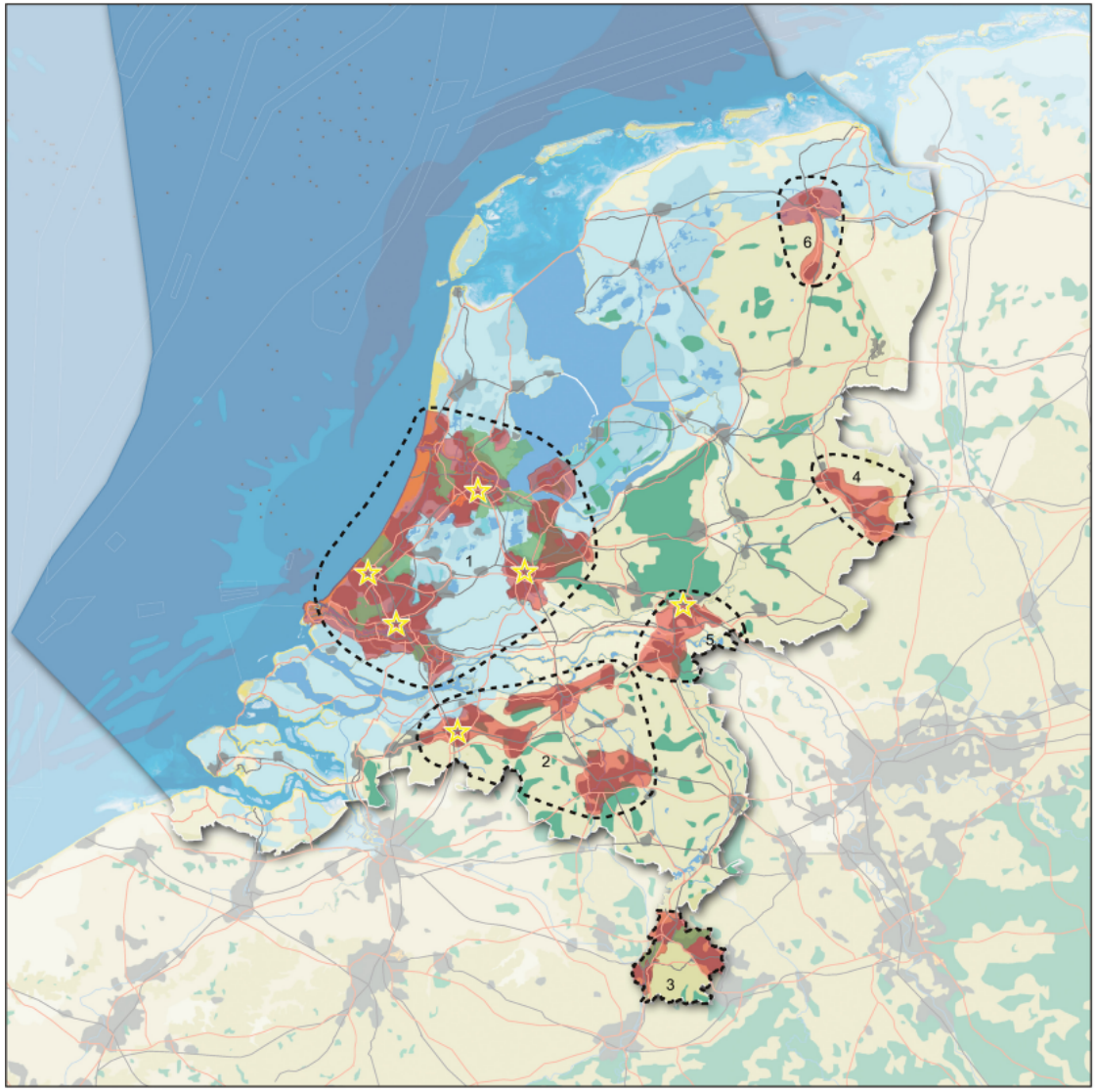
Transformation of the glasshouse concentration







Randstad



PKB –kaart 2: Verstedelijking

indicatief begrensd bundelingsgebied
Nieuw Sleutelproject
Nationaal Stedelijk Netwerk

1. Randstad Holland
2. Brabantstad
3. Zuid-Limburg
4. Twente
5. Arnhem - Nijmegen
6. Groningen - Assen

rijksbufferzone

ondergrond

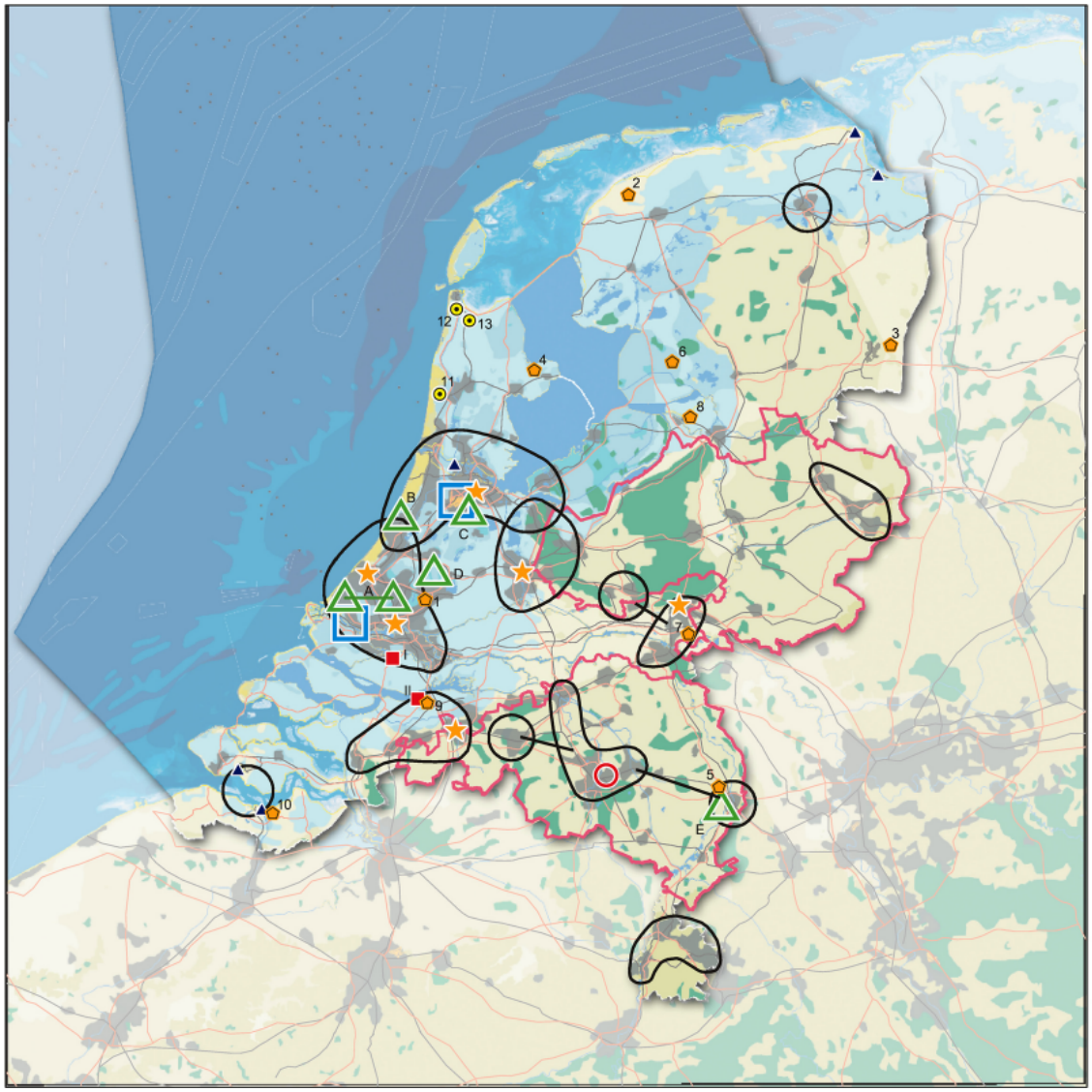
vereenvoudigde topografie
grens Exclusieve Economische Zone (EEZ) en 12-mijlszone

(1:1.500.000)

0 15 30 60 90 120 km

Het kaartbeeld betreft een indicatieve weergave van de in de legenda vermelde eenheden.

Greenport



PKB –kaart 1: Economie en landbouw

- economisch kerngebied
- Nieuwl Sleutelproject
- mainport
- brainport
- zeehaven
- grootschalig bedrijventerrein:
  - I. Hoeksche Waard
  - II. Moerdijkse Hoek
- landbouwontwikkelingsgebied glastuinbouw:
  1. Zuidplaspolder
  2. Berlikum
  3. Emmen
  4. Grootslag
  5. Californië / Siberië
  6. Luttelgeest
  7. Bergerden
  8. IJsselmuiden
  9. Moerdijkse Hoek
  10. Terneuzen
- landbouwontwikkelingsgebied bloembollenteelt:
  11. Kennemerland
  12. Noordelijk Zandgebied
  13. Hollandse Bloementuin
- greenport:
  - A. Zuid-Hollands glasdistrict (Westland en Oostland)
  - B. Bollenstreek
  - C. Aalsmeer e.o.
  - D. Boskoop
  - E. Venlo
- reconstructiegebied

ondergrond

- vereenvoudigde topografie
- grens Exclusieve Economische Zone (EEZ) en 12-mijlszone

(1:1.500.000)

0 15 30 60 90 120 km

Het kaartbeeld betreft een indicatieve weergave van de in de legenda vermelde eenheden.

LANDSCAPE

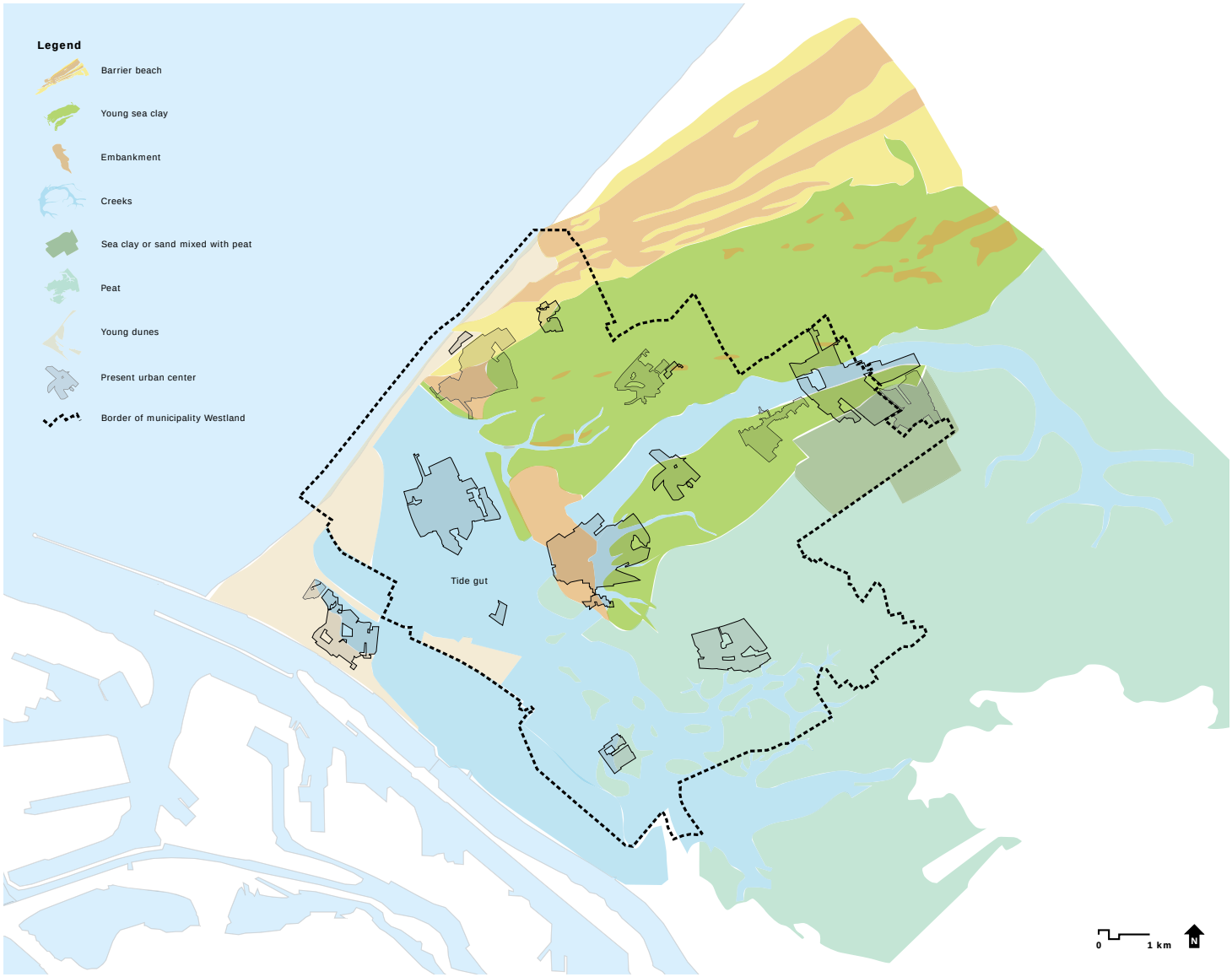
Geological situation

Delta landscape with a big diversity of the soil characteristics on a relatively small surface.

On the crossing of three main types of landscape:
South West - Sea clay landscape
East - Peat landscape
North - Barrier beach landscape

Because of the big tide gut and many tidal creeks the sea runs often into the hinterland and forms embankments and creek ridges because of sand that stays behind.

Landscape with a lot of relief mainly coming forward out of the big diversity of higher grounds (creek ridges, dunes or embankments) and lower grounds (peat or young sea clay).



Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

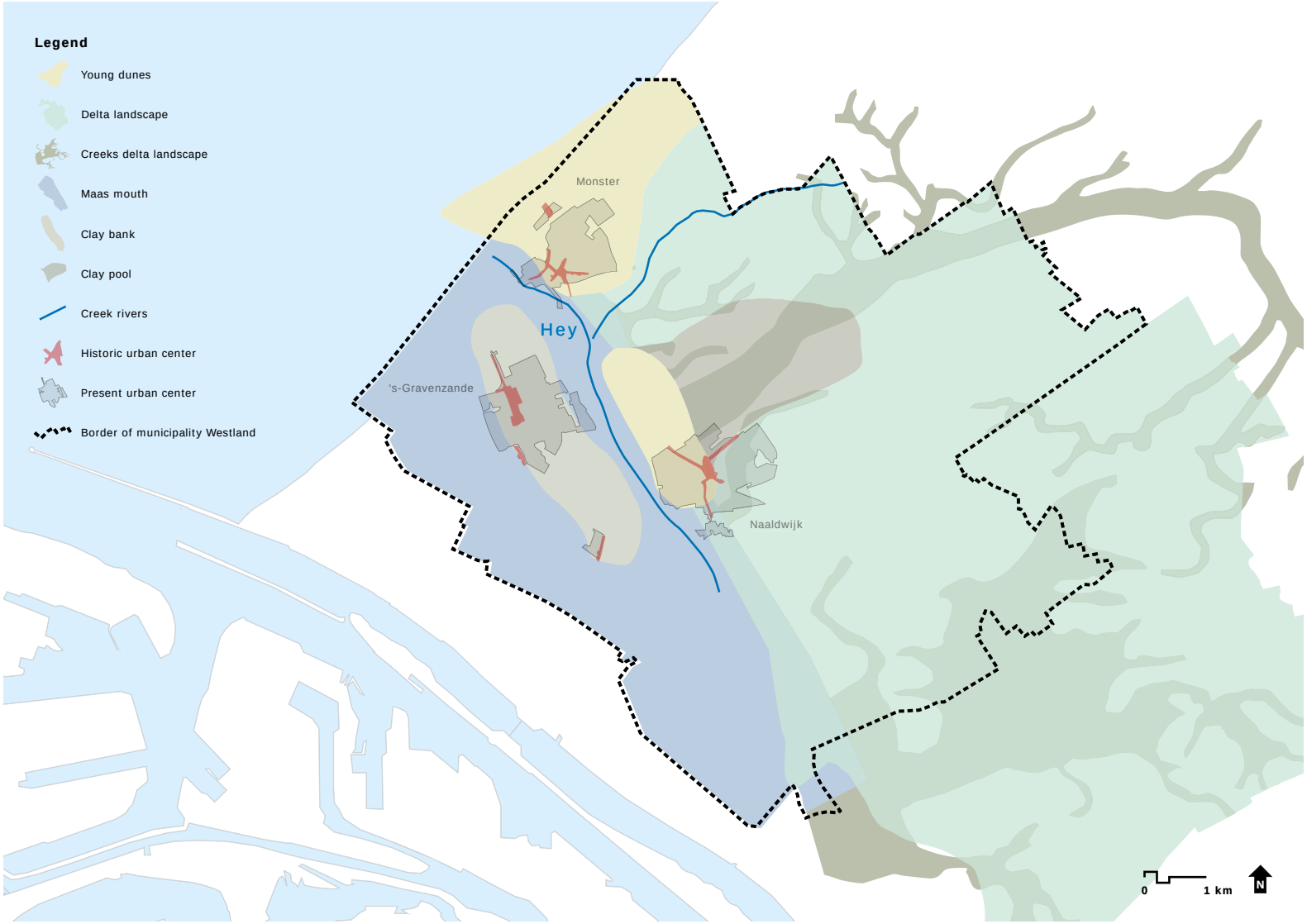
Landscape around 1100

Out of the river Hey the sea runs frequently into the hinterland.

Sand that stays behind forming separate sand riches (young dunes) and a clay bank comes into being in the tide gut of the former Maas mouth.

On the sand ridges the first settlements were built up.

The present urban centers like Monster, ‘s-Gravenzande and Naaldwijk are from origin founded on these higher grounds.



Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

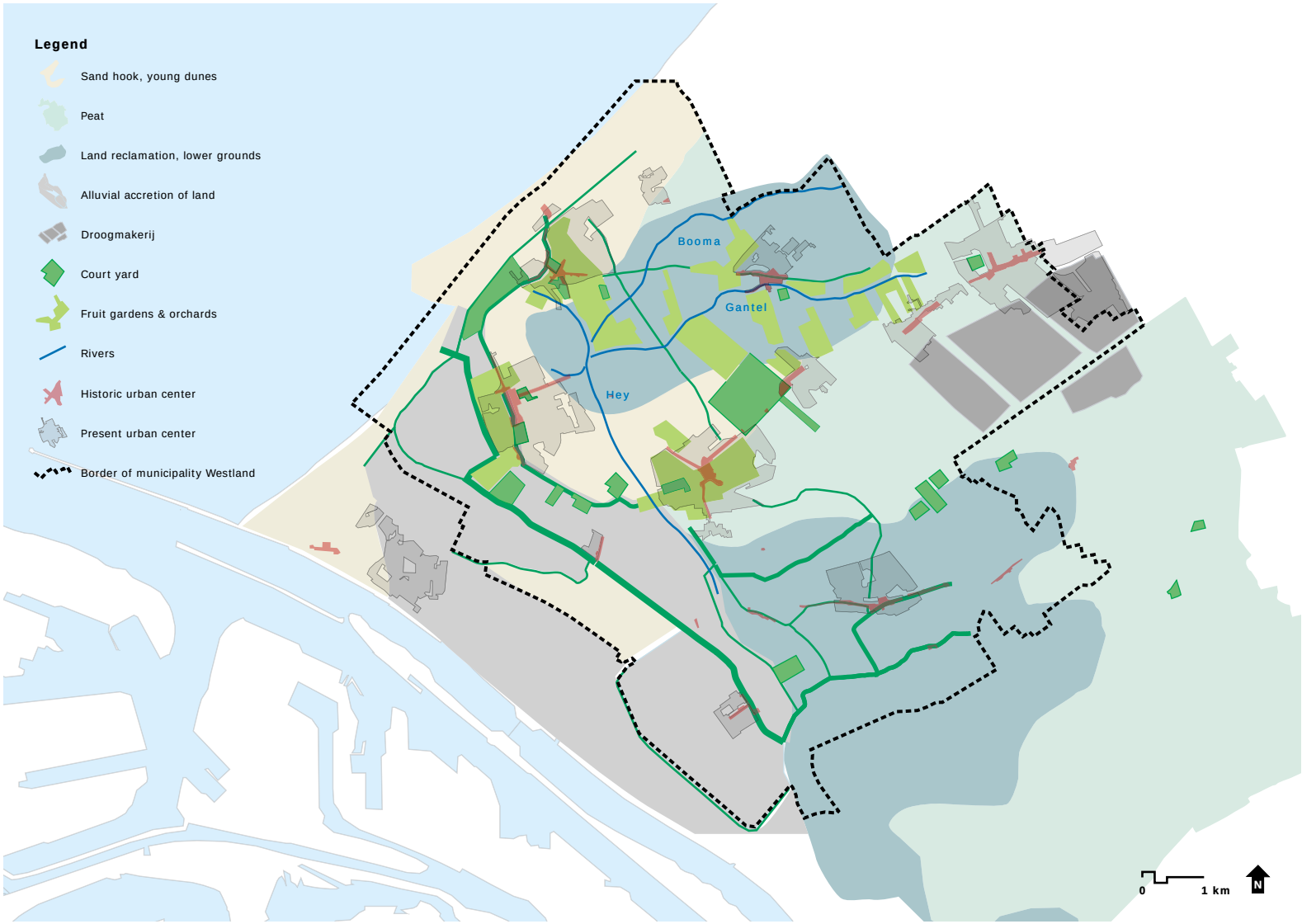
Landscape 1430-1850

Ever since the Middle Ages the sand ridges and embankments started to grow and becomes one sand hook which was separated from the former Maas mouth by alluvial accretion of land.

On this sand hook relatively big courtyards come into being and the first settlements started to transform into small villages.

The wet and lower inner area becomes reclamated and drained and next to the Gantel the first horticulture, mainly fruit gardens and orchards, started to grow.

In the end of this period the alluvial accretion outside the first dikes were dammed in and becomes reclamated as well.



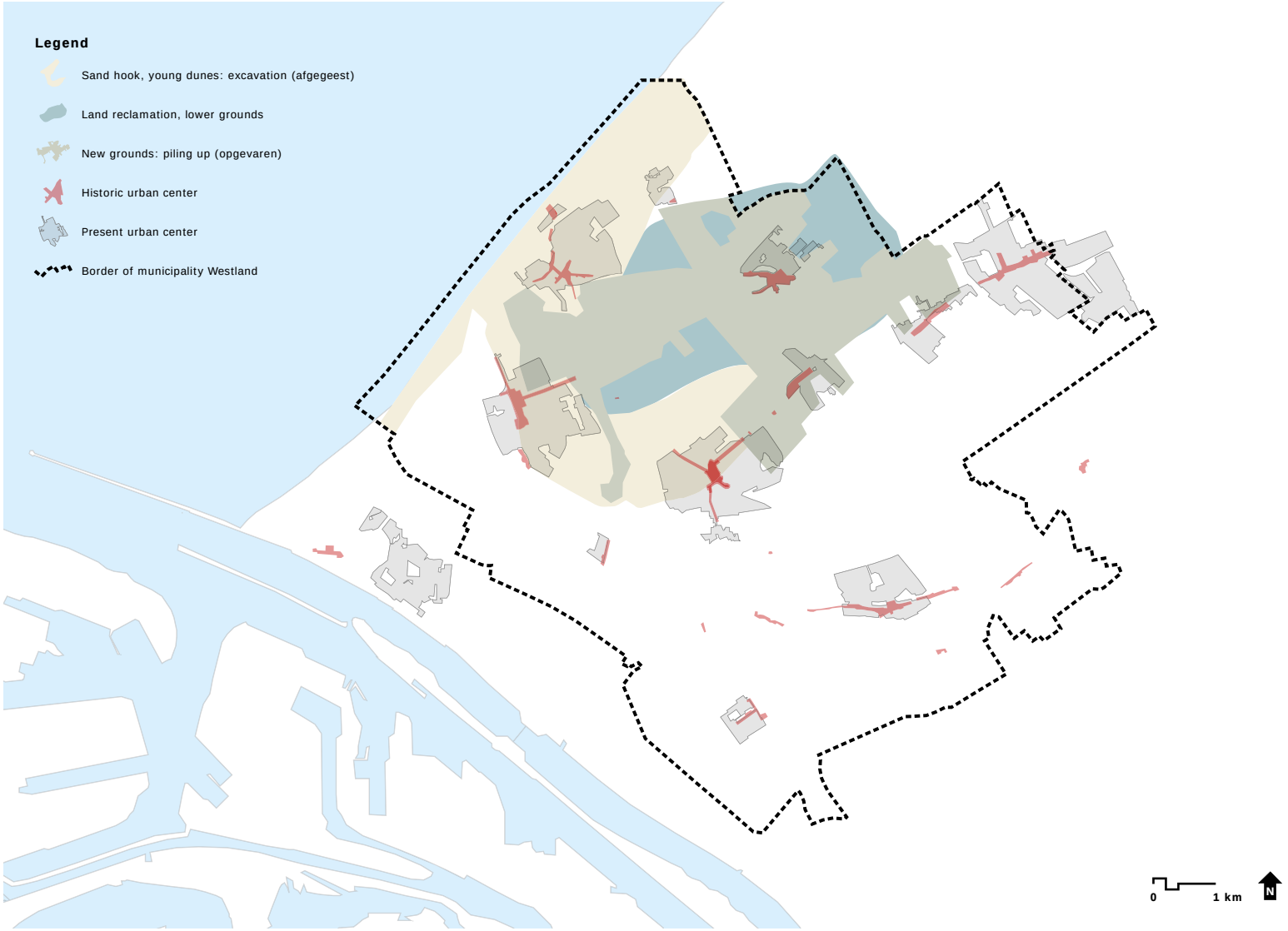
Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Bring back historic courtyards or create green open spaces in glasshouse areas where former fruit gardens or orchards were situated!

Landscape 1850-1950

To make the soil suitable for qualitative (glasshouse) horticulture the lower clay grounds were piled up and mixed with the higher sand grounds which were excavated.

Because of this process the historic geological relief of a big part of the Westland is vanished.

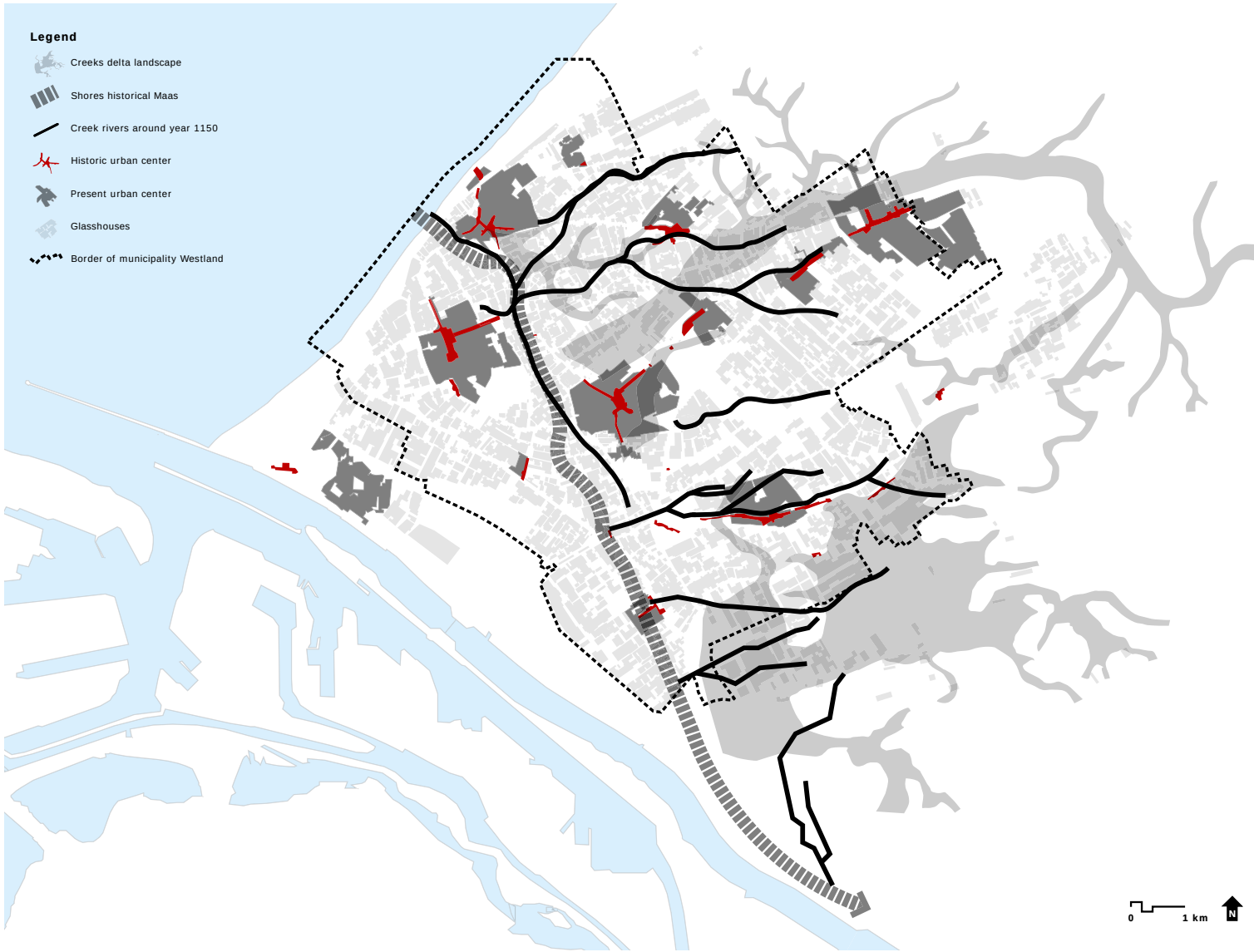


Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Bring back the relief of the area!

Historic creeks

The delta landscape of the Westland is characteristic because of the historic creek structure.
During a long period the sea runs out of the former Maas mouth into these tidal creeks and gives the landscape a dynamic character that looks every flood different. New creeks come into being and old ones disappear, but changed in a way the landscape and relief because of remaining creek ridges.



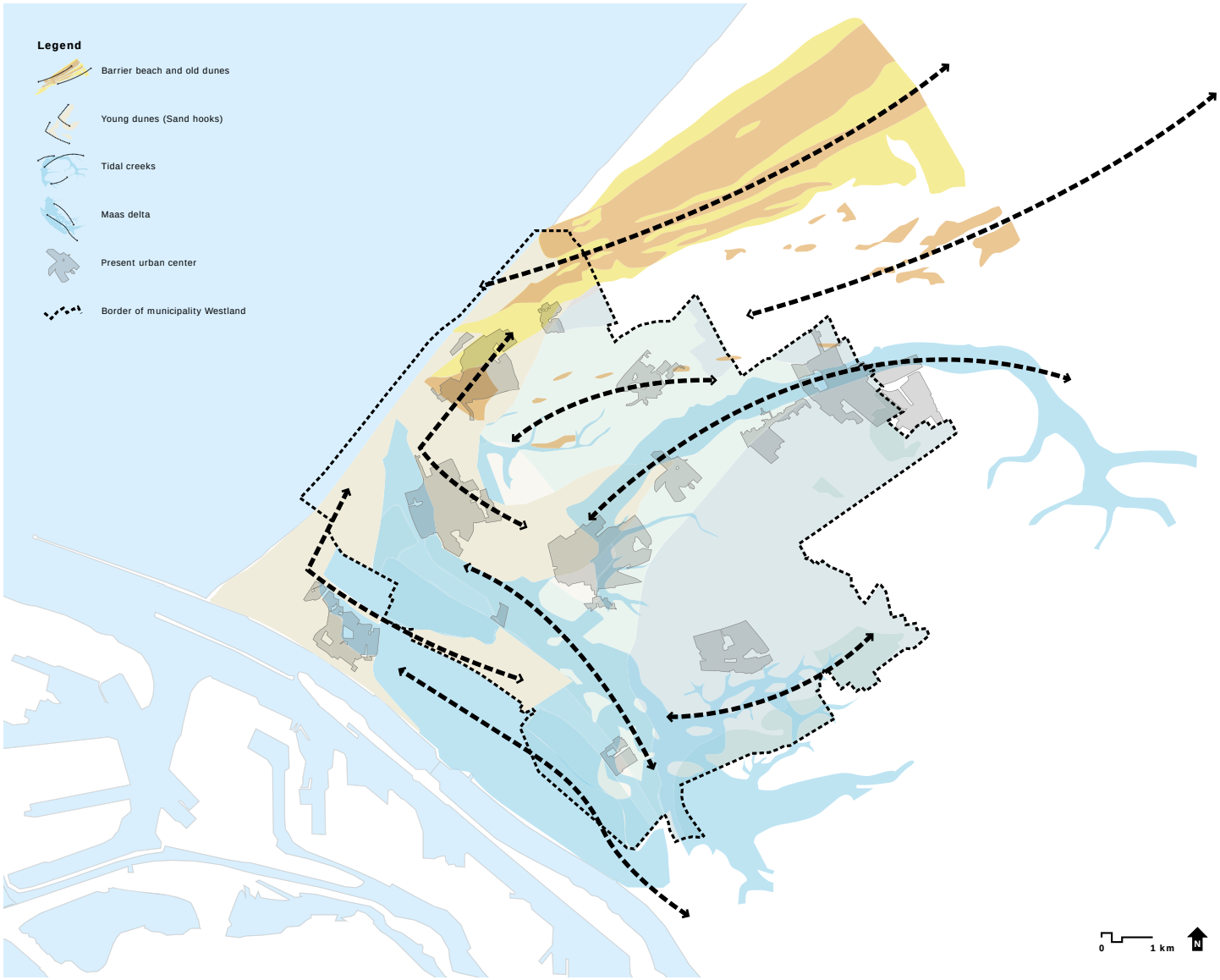
Source: Ven, G.P. (1993). Leefbaar laagland. Geschiedenis van de waterbeheersing en landaanwinning in Nederland. [Book]

Restore, complete and reinforce historic creeks that are still present or create new water ways on places of former creeks!

Link the variability and dynamic character of the historic creeks to the variability and dynamic character of glasshouse horticulture.

Structure of the landscape

The different geological elements and transformations of the historic landscape providing a divers image of landscape structures which could, and in fact must, be leading and determined for the present and future development of the Westland.



Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

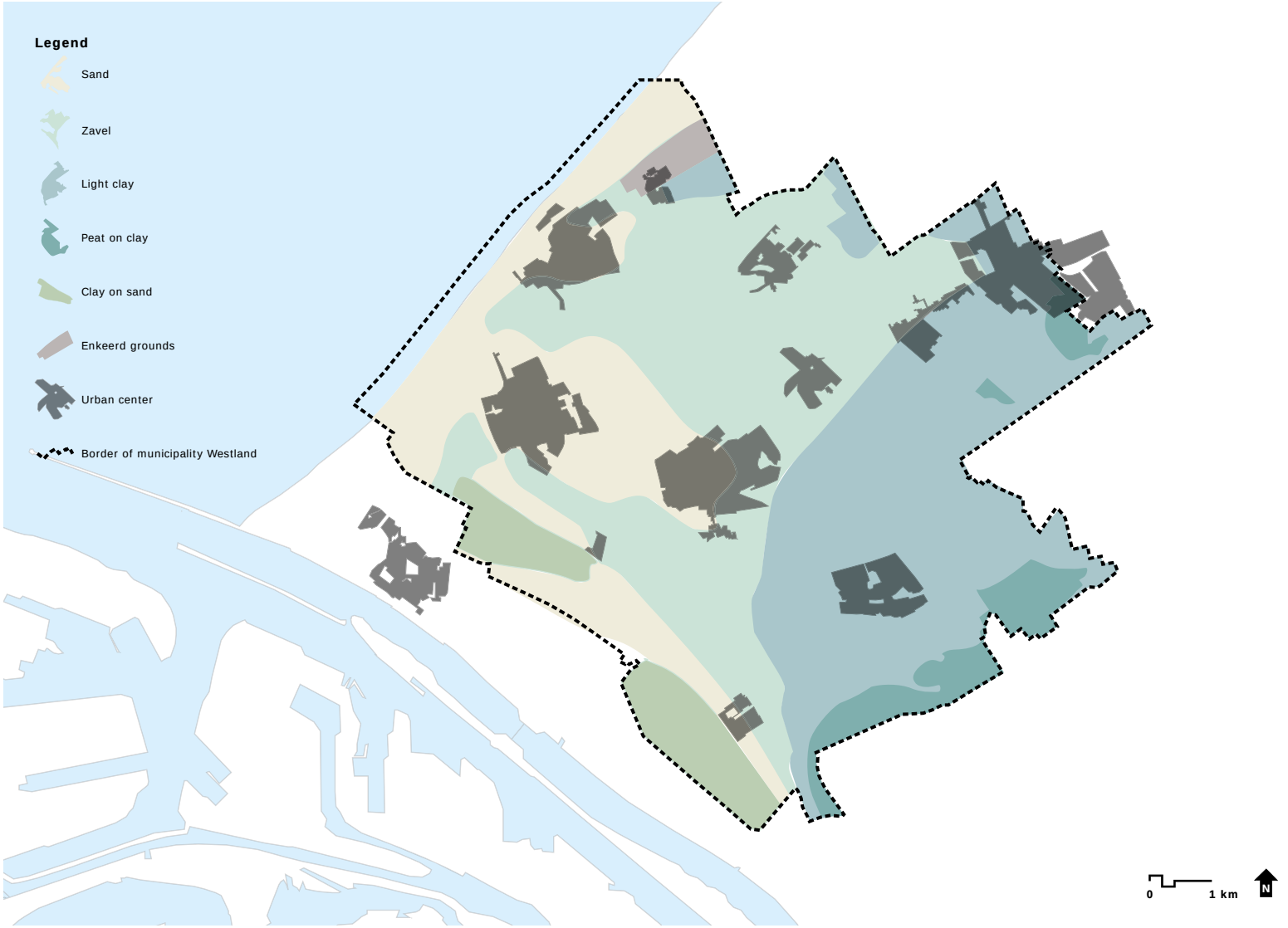
Follow the structure(s) of the landscape!

Present soil

Because of the (glasshouse) horticulture in the Westland the soil in a big part of the area consist out of Zavel (sand with a little clay) what is valuable, good to modify, humidity persistent and has a good radiculation.

The urban main urban centers like Monster, ‘s-Gravenzande en Naaldwijk are built on former sand ridges.

Most of the peat in the east is excavated and the soil in these areas consist nowadays mainly out of light clay.



Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Present allotments

In the Westland one could perceive three types of allotments:

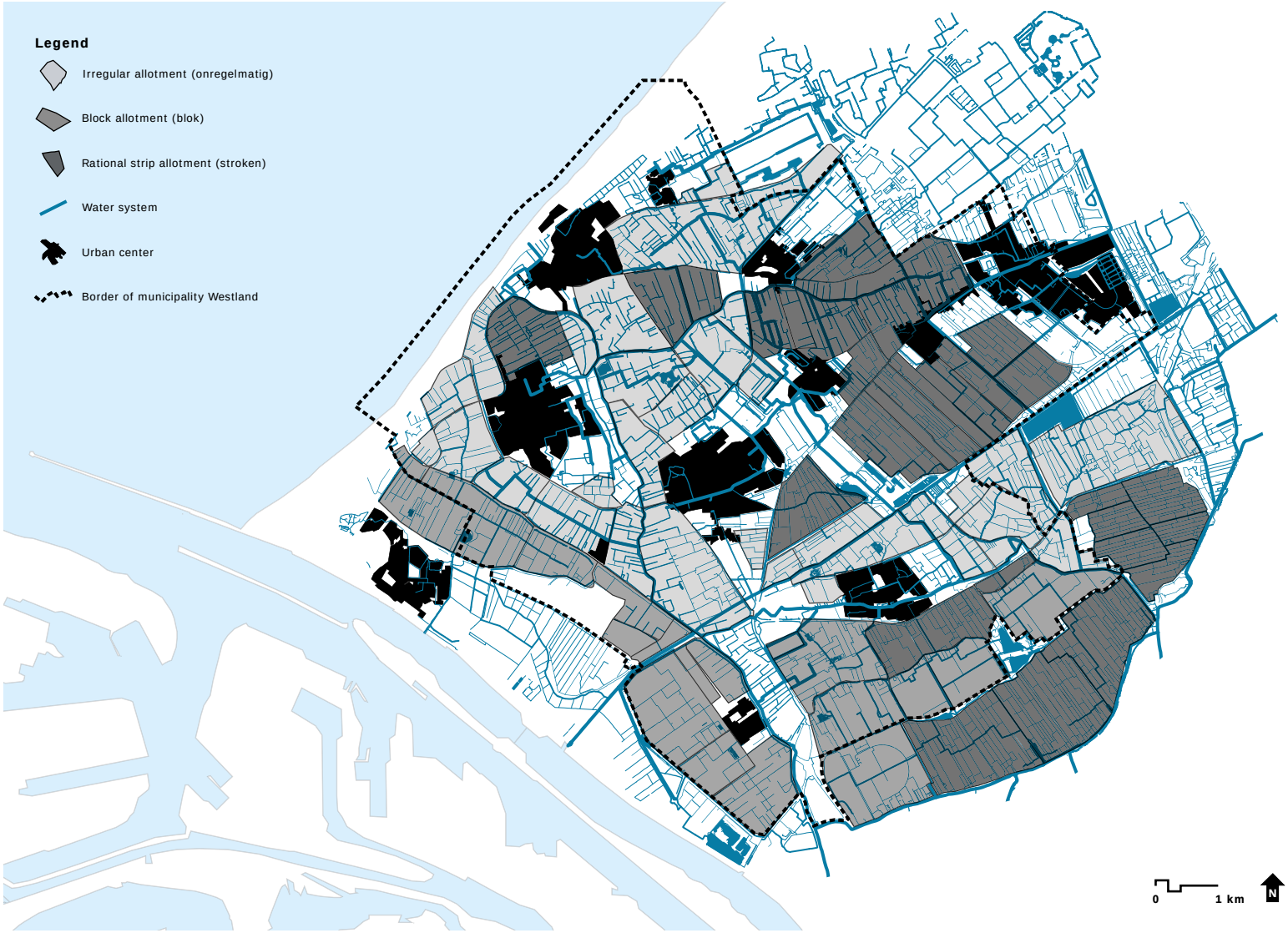
- Small scale irregular allotment
This type is strongly related to the former drains and historic (creek) rivers

- Block allotment
This type is mainly linked to the areas at the south of the Maasdijk because of the relatively young acclamation of these former alluvial accretion areas.

- Rational strip allotment (stroken)
This type is strongly linked to the former peat areas in the north east of the Westland.

The size of the allotments is/was leading for the scale of the glasshouse horticulture.
Because of the restructuring of old glasshouse areas and the scale up of company and glasshouse the size of the glasshouses will be determined by the existing landscape structure (waterways, green structures and ribbons).

The size of the allotments could also be linked to the type of horticulture. Looking to the different types of allotments and present glasshouse horticulture in these areas one could concluded that small scale irregular allotment fits best to pot planting (and niche), rational strip allotment fits best to flowers and the large scale block allotment fits best to vegetables.

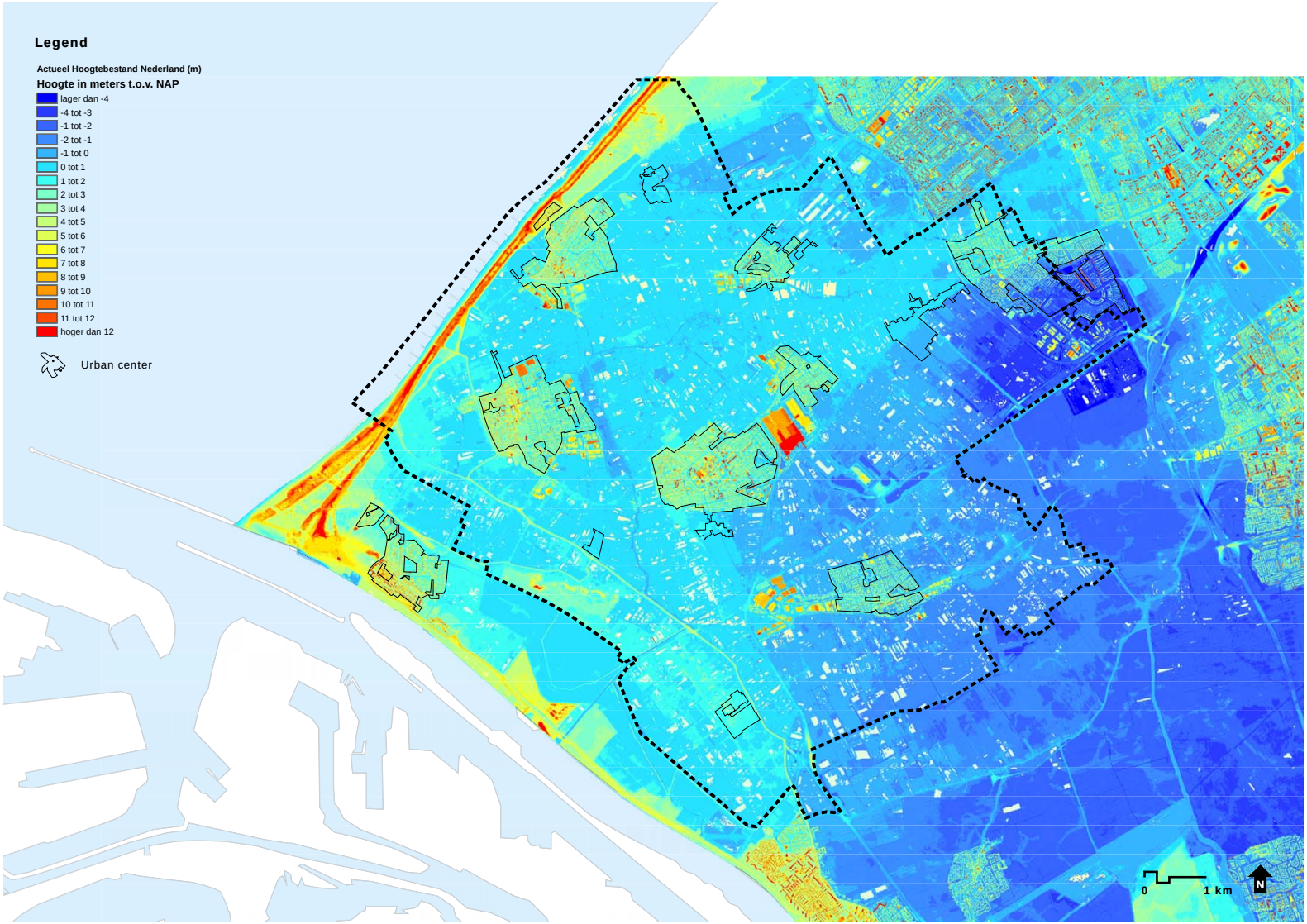


Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Present height ground level

With the exception of the coast line and the Maas zone, where young dunes determine the geological situation, there is little relief in the landscape.

The coastal zone encloses the highest grounds and the former and present peat landscape in the east encloses the lowest areas.



Source: Hoogheemraadschap van Delfland (2008). Hoogtekaart Westland en omgeving [map]

Make sure that the area and especially the lowest parts can adapt to present and future water problems.

Use lowest parts to create peak or calamity water storage.

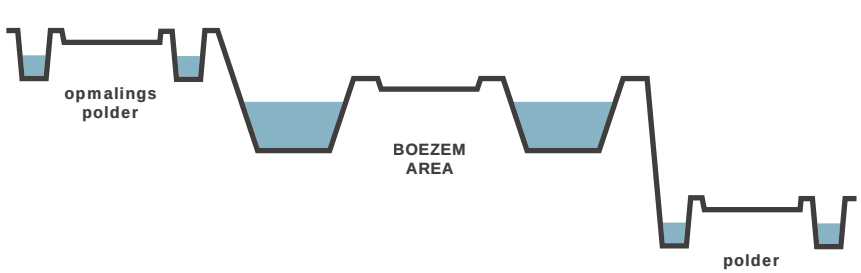
Water

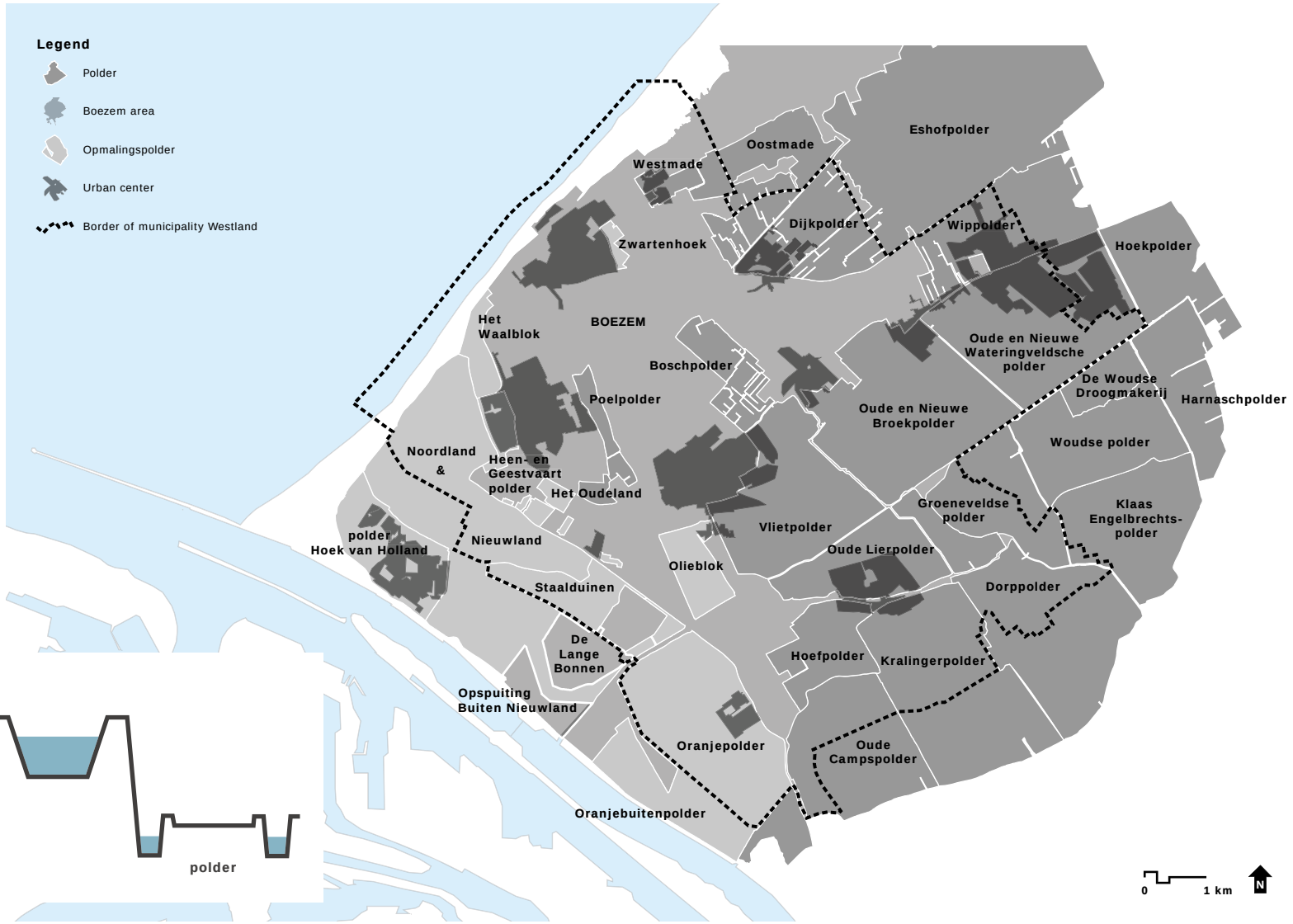
Boezem area & polders

23 polders of which 10 are partial situated within the Westland.

Polders
- Boschpolder
- Dijkpolder
- Dorppolder
- Groeneveldsepolder
- Hoefpolder
- Klaas Engelbrechtspolder
- Kralingerpolder
- Oude Campspolder
- Oude Lierpolder
- Oude & Nieuwe Broekpolder
- Oude & Nieuwe Wateringveldsche polder
- Poelpolder
- Vlietpolder
- Westmade
- Wippolder

Opmalingspolders
- Heen- en Geestvaartpolder
- Het Oudeland
- Het Waalblok
- Noordland & Nieuwland
- Olieblok
- Oranjepolder
- Staalduinen
- Zwartenhoek





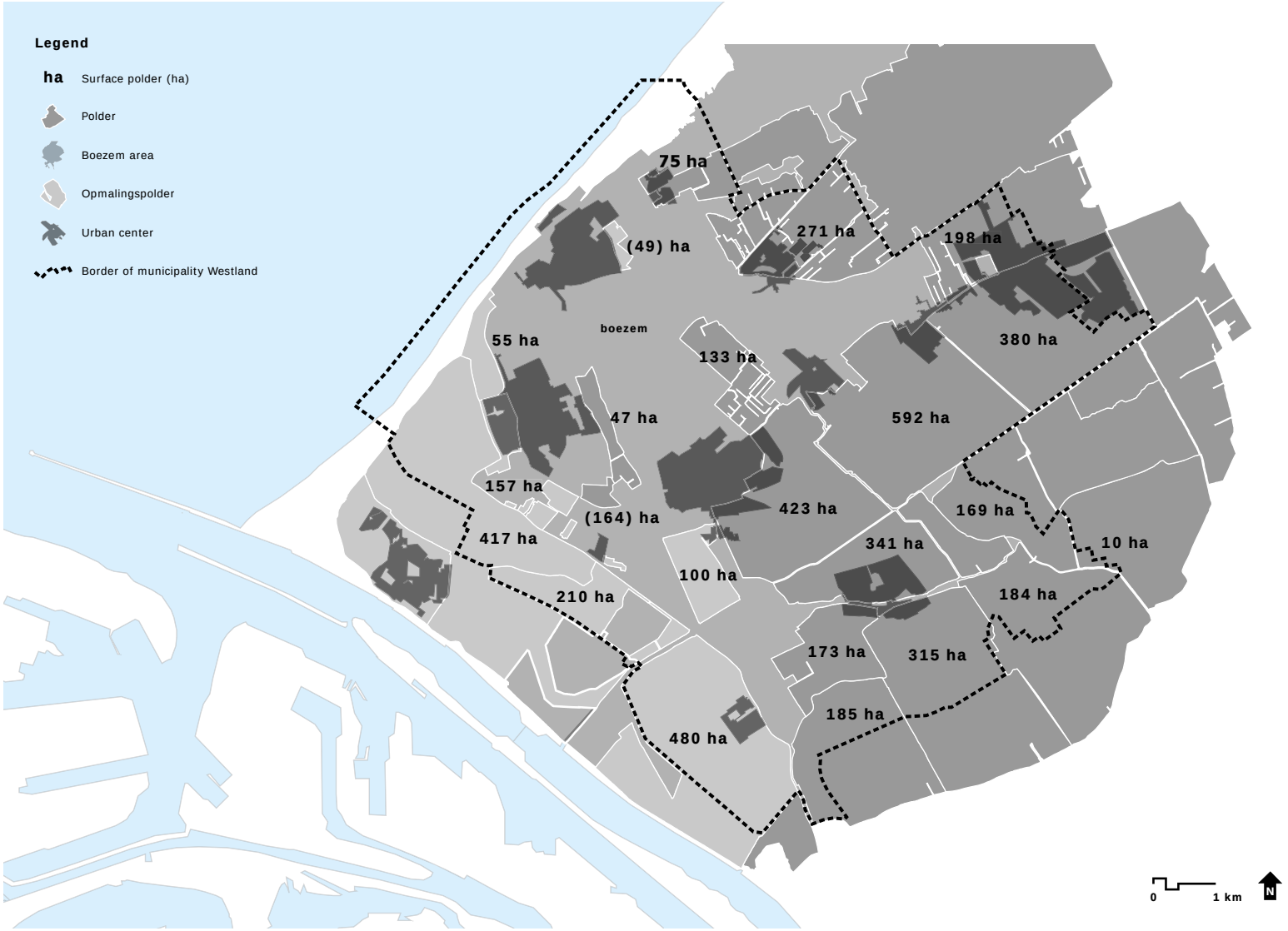
Source: Hoogheemraadschap van Delfland (2008). Watersysteem Westland en omgeving [map]

Surface polders

Within the drawing the surface of the polder (ha), that is situated within the borders of the Westland, is shown.

The surface of the polders varies from 47 ha (Poelpolder) up to 592 ha (Oude en Nieuwe Broekpolder).

The surfaces related to the polders Zwartenhoek (49 ha) en Het Oudeland (164 ha) are based on the original polder. However parts of these polders are added to the boezem area, whereby the total surface in practice will be less.



Source: Gemeente Westland & Hoogheemraadschap van Delfland (2008). Waterplan Westland - Waterstructuurvisie & Polderbeschrijvingen

Water levels

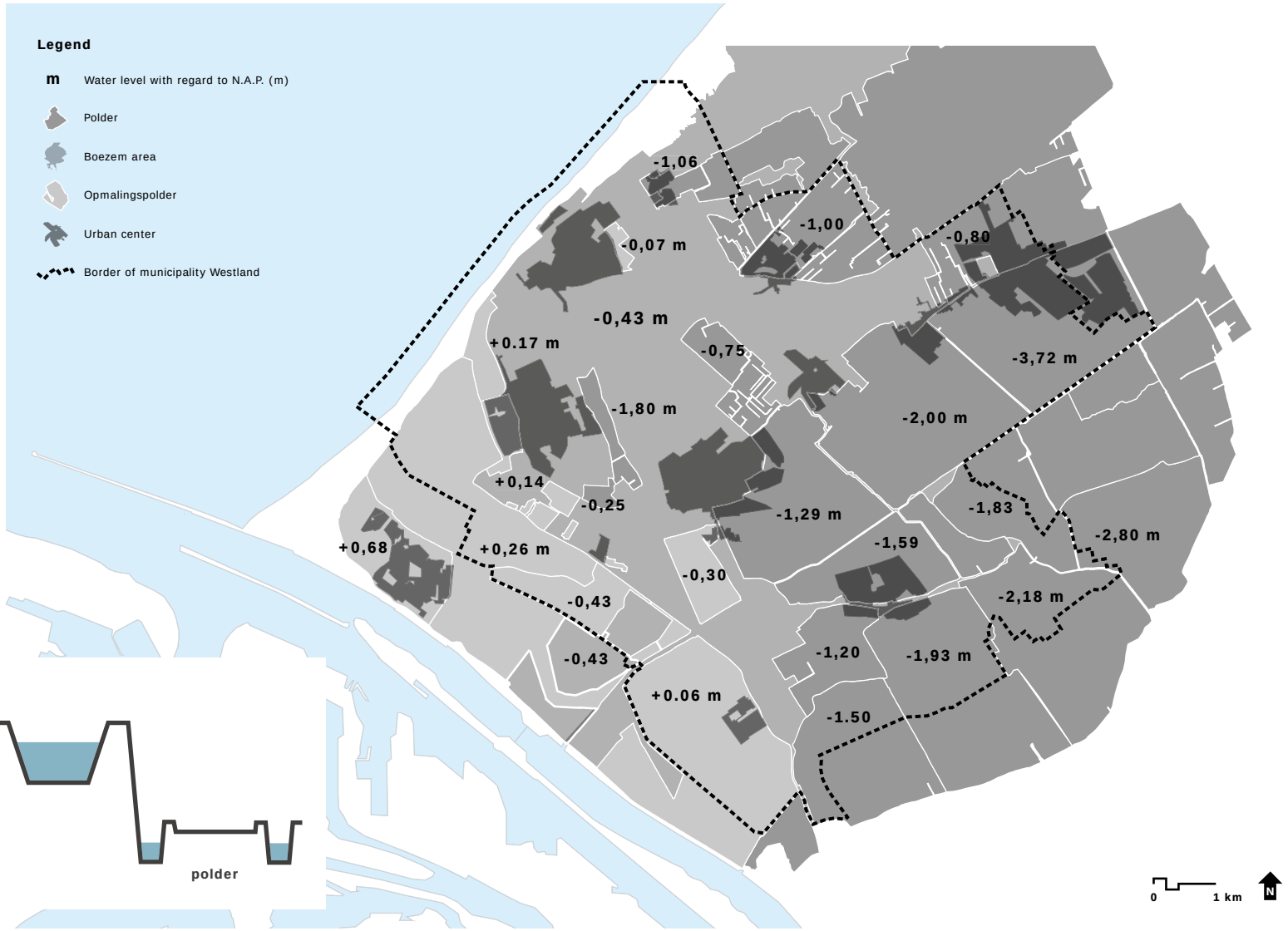
Within the drawing the water level with regard to N.A.P. is shown.

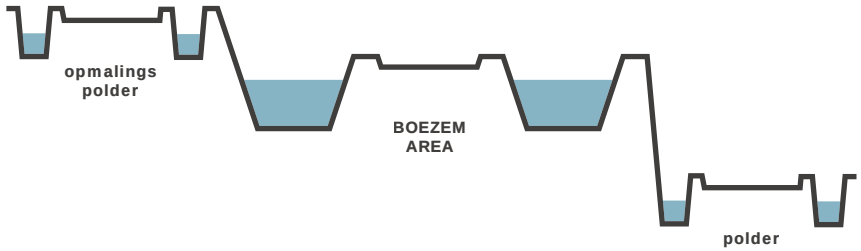
- The water level of the complete boezem is 0,43 m below N.A.P.

Because each polder encloses different water levels an average water level is shown.

- The average water level of the polders varies from 0,75 m to 3,72 m below N.A.P.

- The average water level of the opmalingspolders varies from 0,43 m below N.A.P. to 0,26 m above N.A.P.





Source: Gemeente Westland & Hoogheemraadschap van Delfland (2008). Waterplan Westland - Waterstructuurvisie & Polderbeschrijvingen

Water system

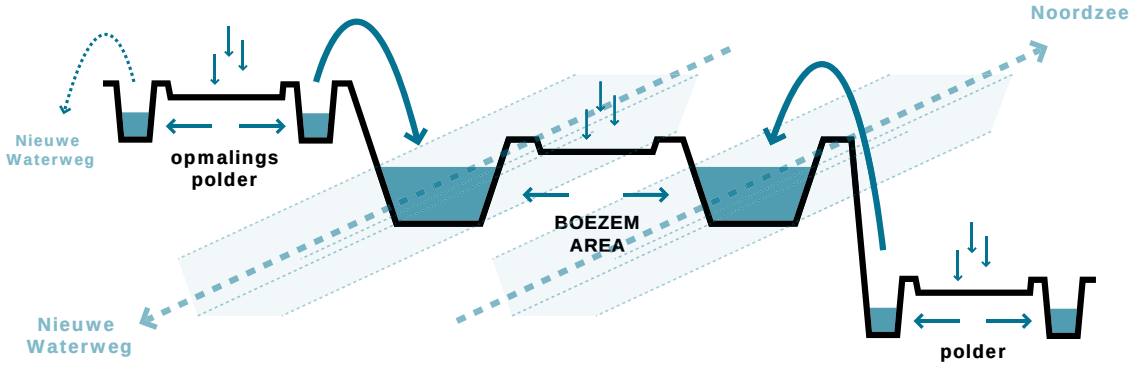
The water system, consisting out of a boezem system and polder system, is part of the area that is controlled by the Hoogheemraadschap van Delfland.

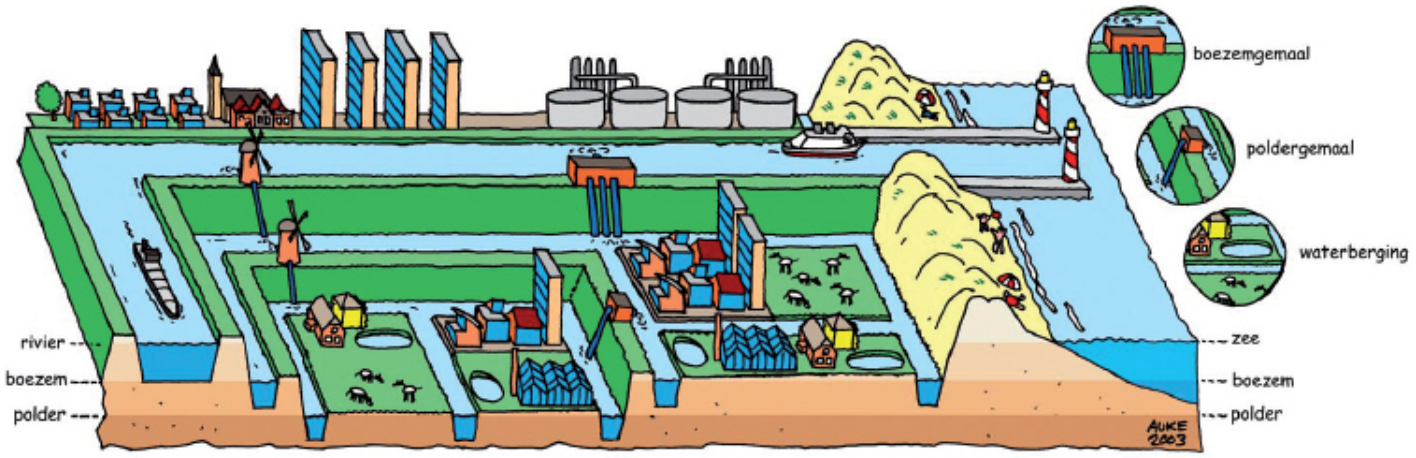
Out of the polders the surplus of water will be inflated, by polder pumping stations, into the boezem system consisting of canals and bigger water ways.
However the water level in the opmalingspolders is higher than the boezem system. Therefore these polders drain of in free fall by using weirs.

The boezem system drains off the water, by boezem pumping stations, to the Nieuwe Waterweg and the Noordzee.

The opmalingspolder Noordland & Nieuwland drains of the water directly to the Nieuwe Waterweg.

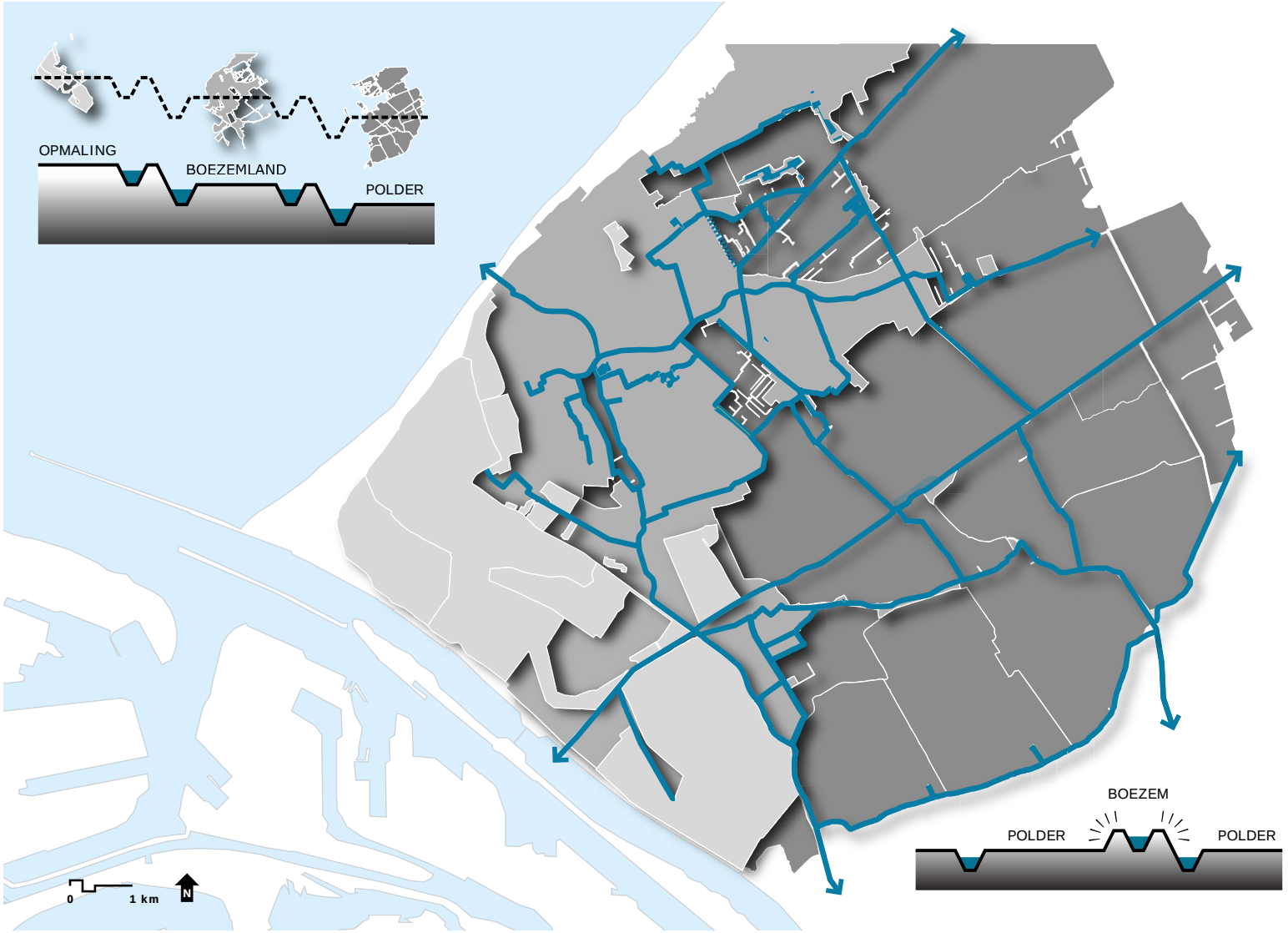
In dry periods water out of the boezem will be let in to the lower polder or inflated into the opmalingspolder.
In these periods the boezem system will be feed by water out of the Brielse Meer (Brielse Meerleiding). There are also possibilities to let in water out of the Vliet (Leidschendam), coming from the water system of Hoogheemraadschap van Rijnland. However the quality if this water is lower.



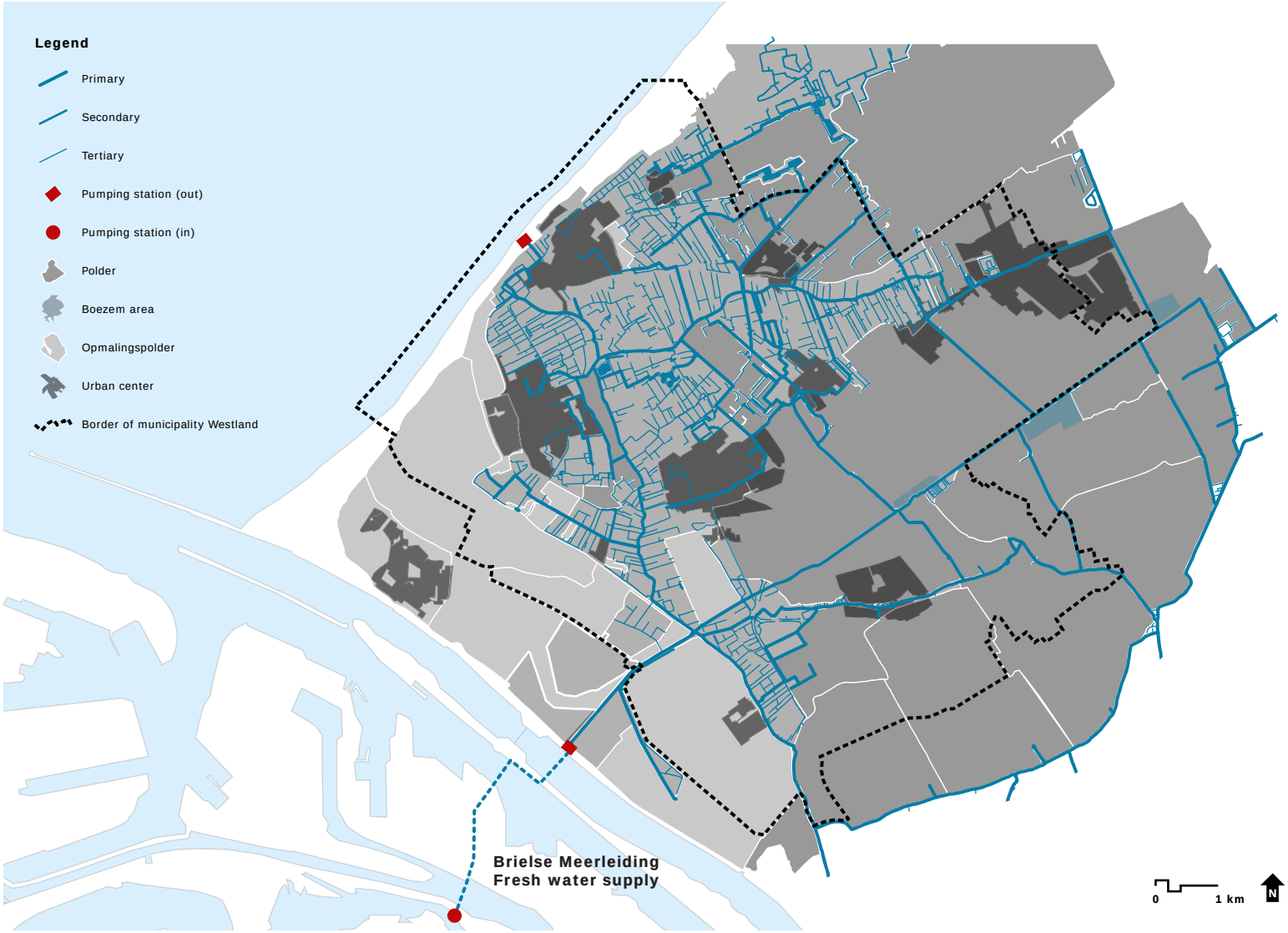


Source: Gemeente Westland & Hoogheemraadschap van Delfland (2008). Waterplan Westland [policy document]

Boezem & polder levels

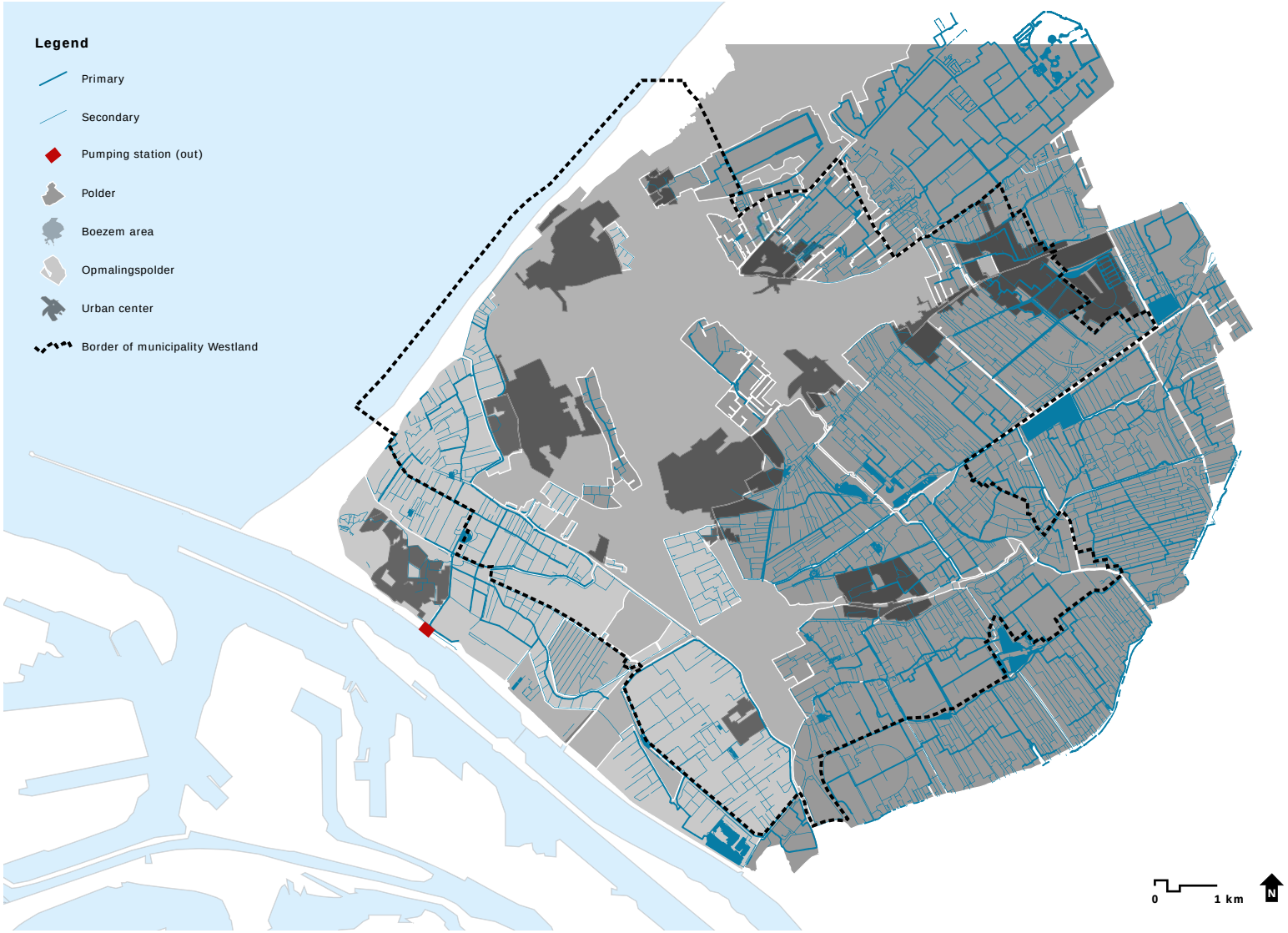


Boezem system



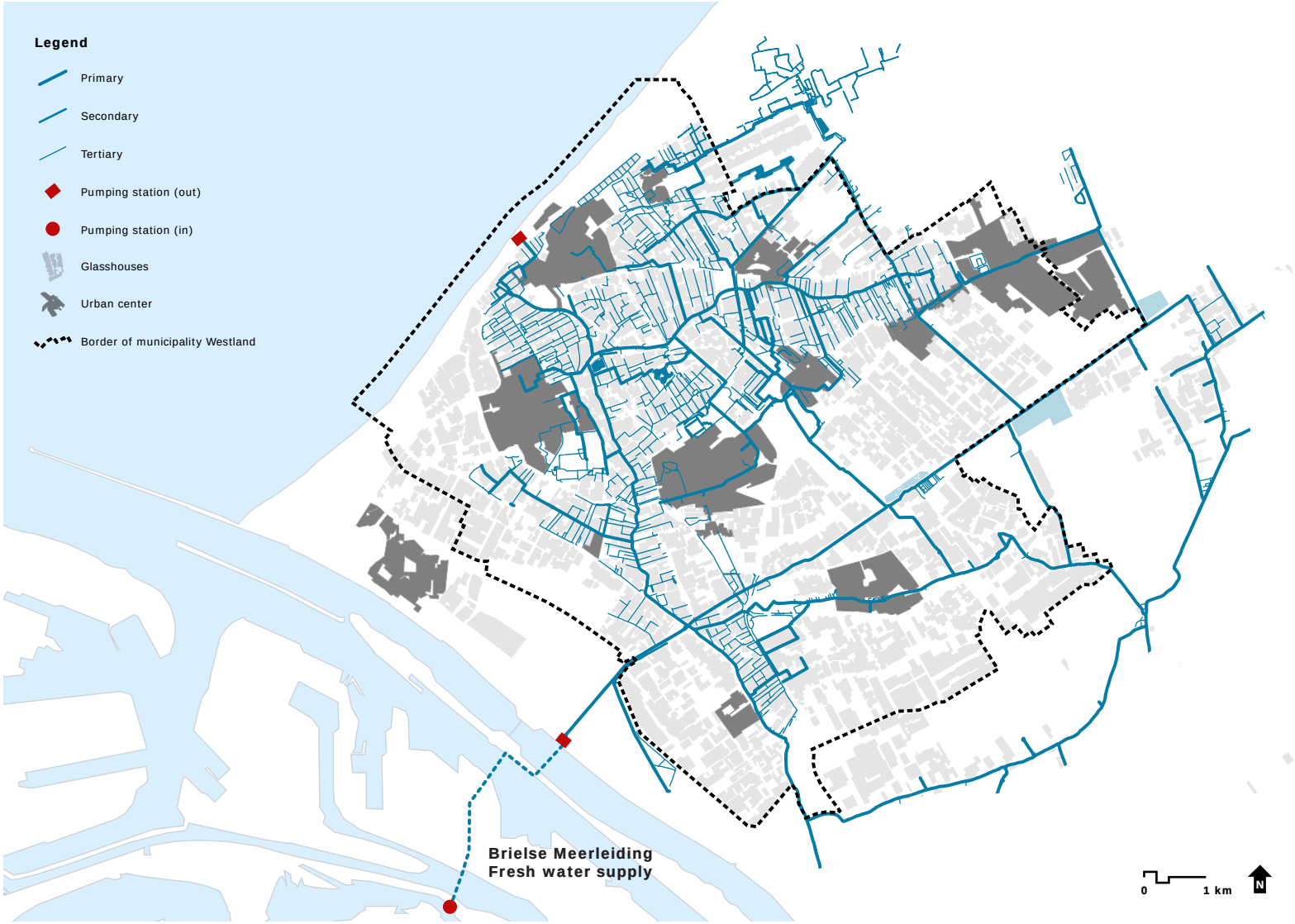
Source: Hoogheemraadschap van Delfland (2008). Watersysteem Westland en omgeving [map]

Polder system



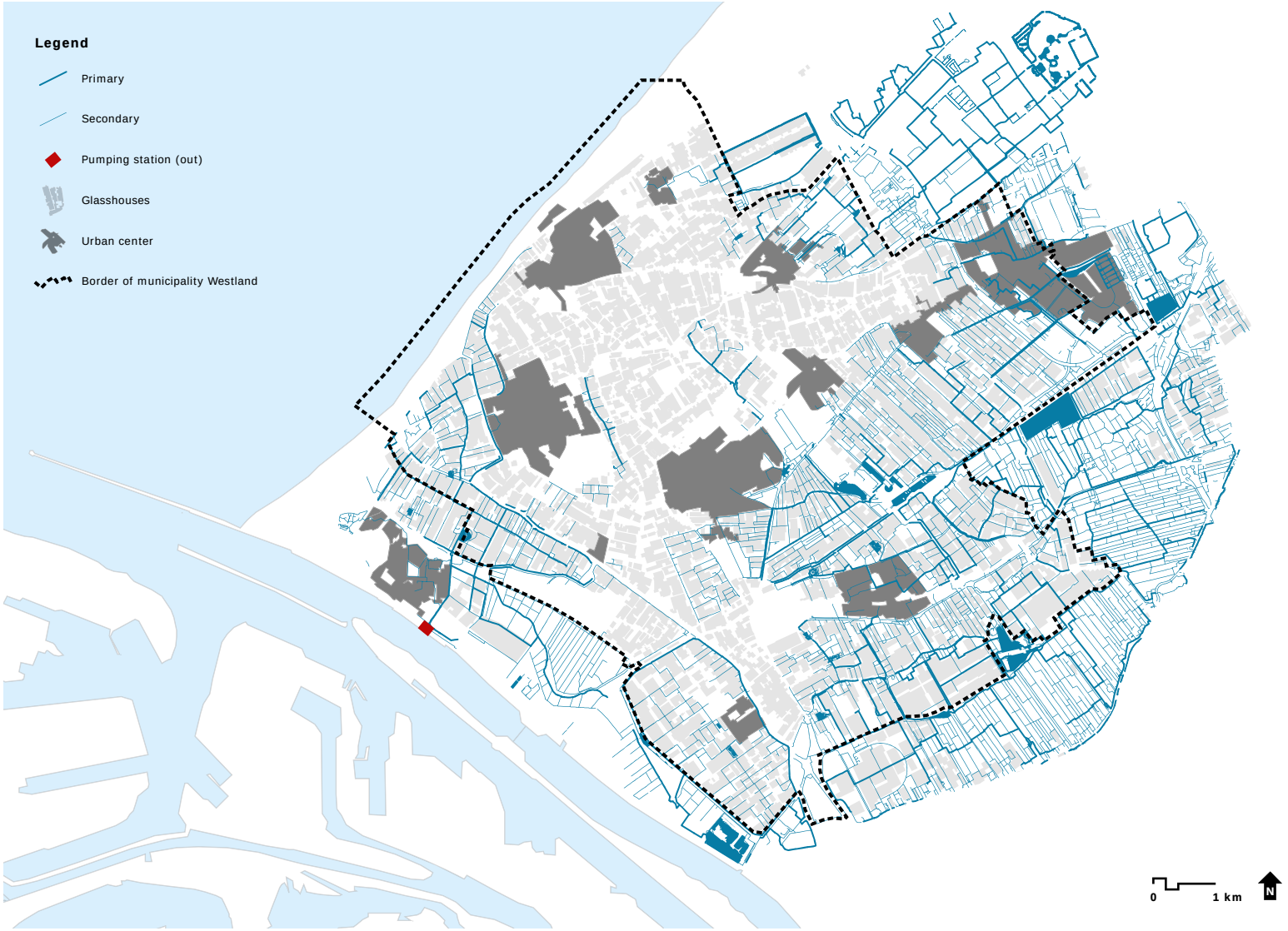
Source: Hoogheemraadschap van Delfland (2008). Map Watersysteem Westland en omgeving [map]

Boezem system



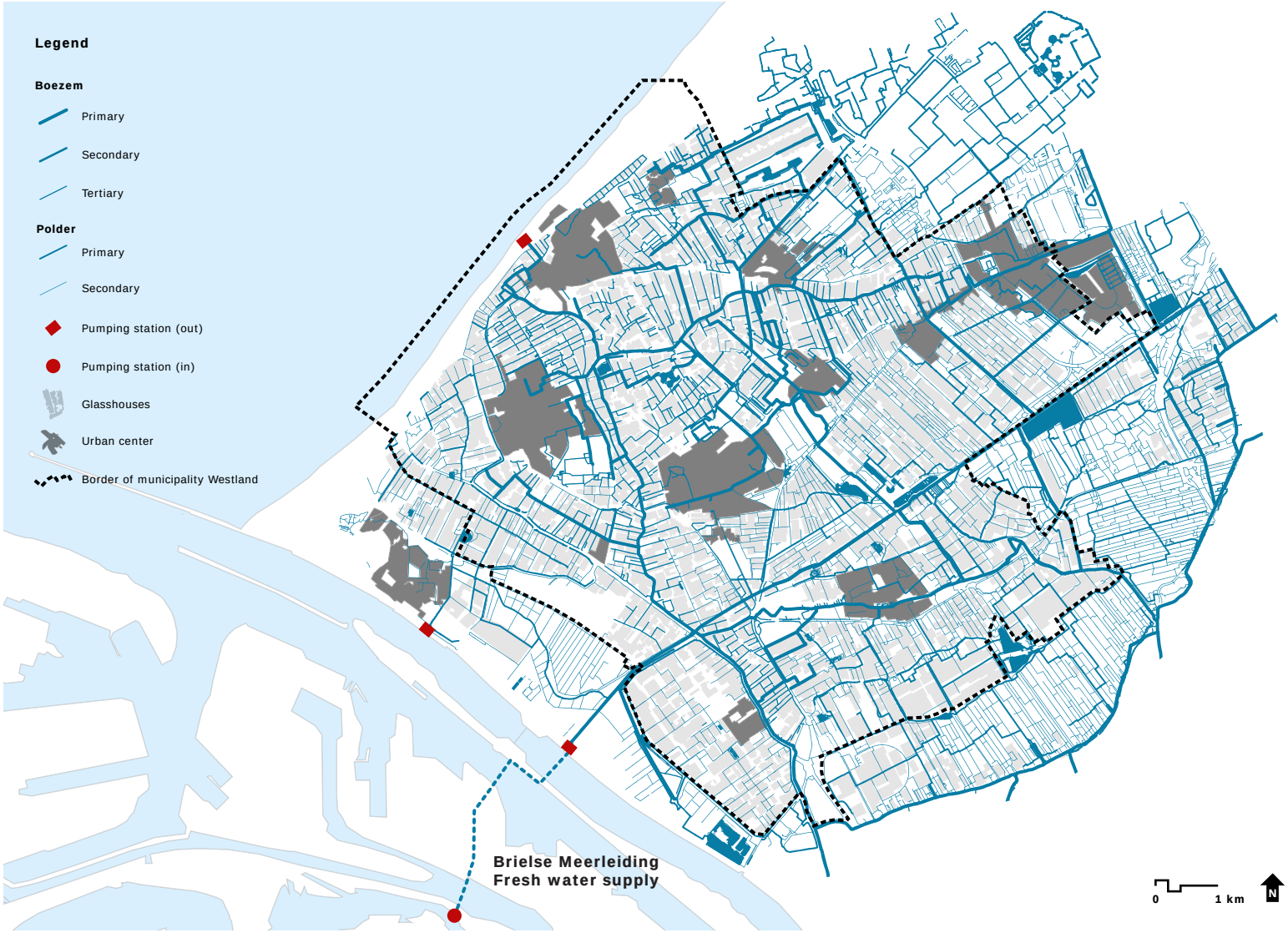
Source: Hoogheemraadschap van Delfland (2008). Watersysteem Westland en omgeving [map]

Polder system

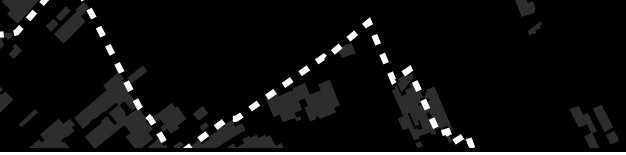


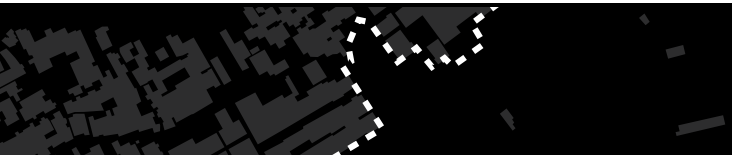
Source: Hoogheemraadschap van Delfland (2008). Watersysteem Westland en omgeving [map]

Complete water system



Source: Hoogheemraadschap van Delfland (2008). Watersysteem Westland en omgeving [map]

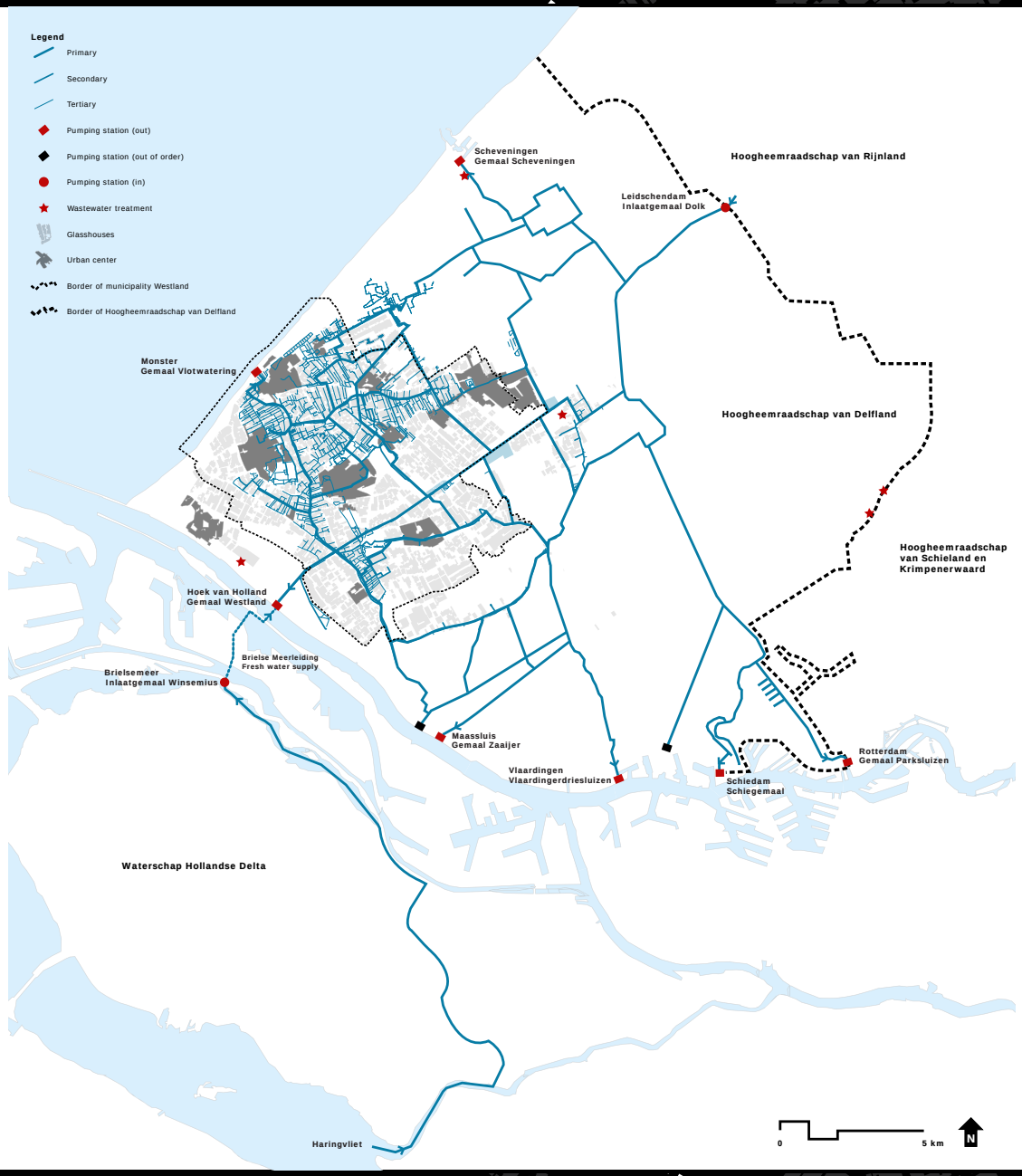




Boezem system linked on regional scale

(page 19)
In dry periods water out of the boezem will be let in to the lower polder or inflated into the opmalingspolder.
In these periods the boezem system will be feed by water out of the Brielse Meer (Brielse Meerleiding). There are also possibilities to let in water out of the Vliet (Leidschendam), coming from the water system of Hoogheemraadschap van Rijnland. However the quality if this water is lower.

There are plans to open the locks of the Haringvliet. Because the Brielse Meer is linked to the Haringvliet it is possible that the water of the Brielse Meer does salify. In this case the fresh water supply of the Westland becomes in danger.



Create a water system that is self sufficient and can adapt to climate change! Do not use water from outside the region in dry periods and make sure that there is enough water storage to cope with extreme rainfall and collect water that can be used in dry periods.

There are also plans to reuse water coming from the wastewater treatment installation in the Harnaschpolder, what in the present situation is discharched into the Noordzee.

Use nature development in Maaszone next to the Nieuwe Waterweg to create an green area that does filter the salified water coming from the Brielse Meer.

Lack of water storage

Mainly because of the accumulation of glasshouses and spatial pressure on the Westland it is hard to collect and store water in the area. Therefore the Westland deals among other things with a big lack of water storage, causing a lot of water problems and nuisance.

Because of the ABCDelfland program, started in 1998, the lack of water storage in the boezem area is nowadays almost solved.

However within the polders there still is a big request! In the beginning of 2008 the lack was around the 450.000 m3.

To solve the different water problems and lack of water storage, Westland and the Hoogheemraadschap van Delfland set up a water plan (see page 28). This plan does propose many interventions as well for the boezem as for the different polders.

In 9 polders the interventions, as proposed in the water plan, are not enough to solve the lack of water storage in the future!

Polder	Surface (m2)	Lack of storage according to ABC-Polderstudie (2001-2005) (m3)	Lack of storage according to Waterstructuurvisie (2008) (m3)	Spatial water surface according to Waterstructuurvisie (2008) (m2)	Expected lack of storage after completing Waterplan Westland
Boschpolder	1.330.000	9.500	9.500	22.857	Overschot
Dijkpolder	2.710.000	24.600	24.600	65.831	Overschot
Dorppolder	1.840.000	36.821	36.821	94.956	Ja
Groeneveldsepolder	1.690.000	19.000	19.000	75.450	Ja
Heen- en Geestvaartpolder	1.570.000	15.263	15.263	28.023	Nee
Het Oudeland	1.640.000	4.500	2.500	25.000	Ja
Hoefpolder	1.730.000	11.995	4.995	11.100	Overschot
Klaas Engelbrechtspolder	100.000	900	900	4.500	Nee
Kralingerpolder	3.150.000	53.000	53.000	175.738	Ja
Noordland en Nieuwland	4.170.000	37.923	3.723	7.160	Overschot
Olieblok	1.000.000	10.780	8.995	20.209	Ja
Oranjepolder	4.800.000	86.850	86.850	332.915	Ja
Oude Campspolder	1.850.000	26.726	12.476	39.479	Ja
Oude en Nieuwe Broekpolder	5.920.000	61.004	58.304	190.588	Ja
Oude en Nieuwe Wateringveldschepolder	3.800.000	35.350	31.950	83.386	Overschot
Oude Lierpolder	3.410.000	51.715	12.515	46.105	Overschot
Poelpolder	470.000	2.400	-	-	-
Staalduinen	2.100.000	9.600	7.800	11.401	Ja
Vlietpolder	4.230.000	49.662	41.892	88.714	Nee
Waalblok	550.000	11.250	11.250	46.150	Nee
Westmade	750.000	13.134	2.976	8.267	Nee
Wippolder	1.980.000	10.800	7.300	20.857	Ja
Zwartenhoek	490.000	1.550	1.550	4.760	Ja
Total	42.960.000	583.723	453.560	1.406.018	

Source: Gemeente Westland & Hoogheemraadschap van Delfland (2008). Waterplan Westland - Waterstructuurvisie & Polderbeschrijvingen

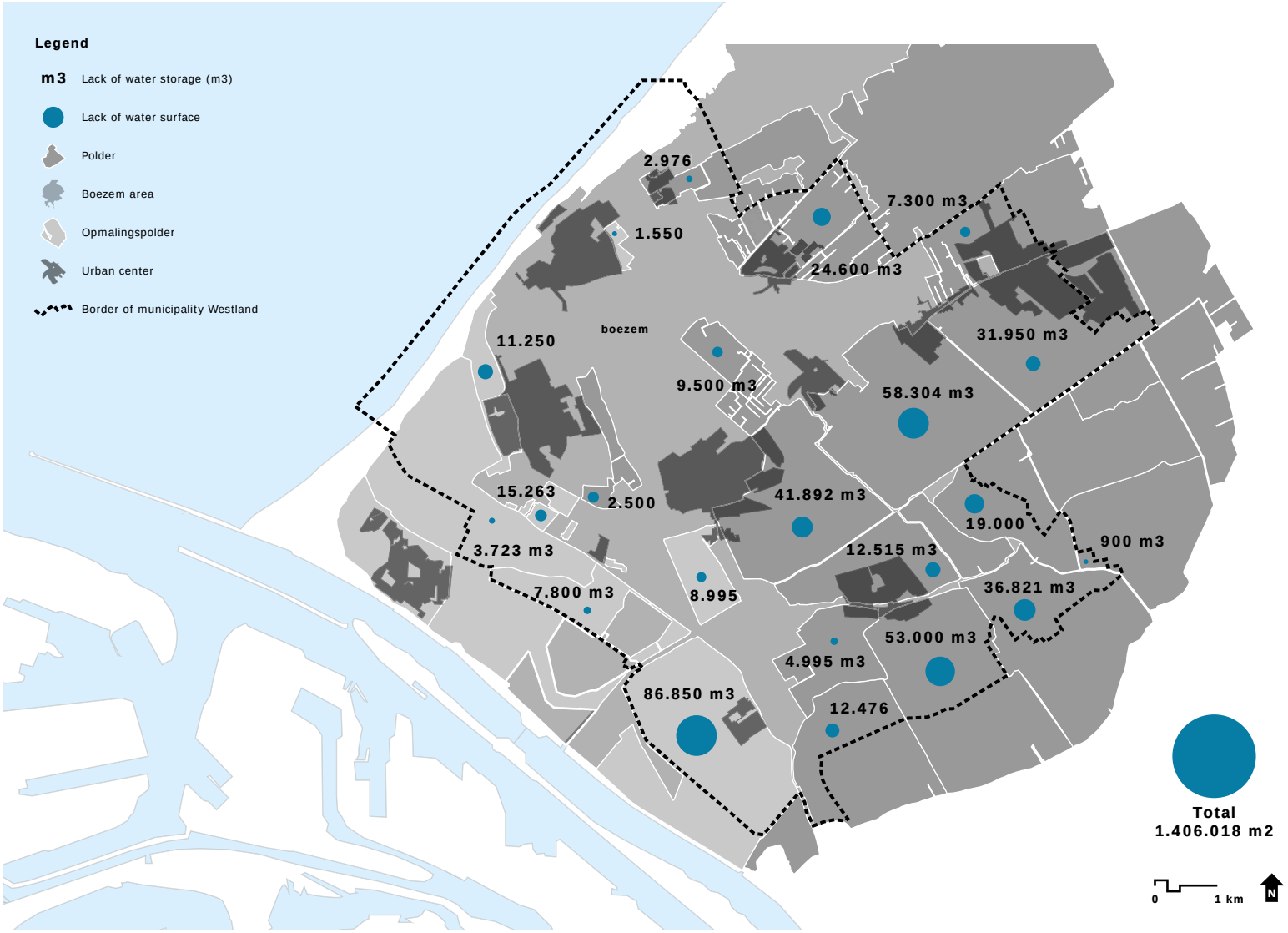
Lack of water storage

Future spatial plans in problematic areas must nowadays meet the requirements of the so called 'Watertoets':

325 m3 water storage for each ha.

Within the drawing for each polder the lack of water storage is shown. On the one hand it gives an overview of the request in m3, but on the other hand it shows at the same time the lack of water surface (blue dots) in m2. This surface is calculated at hand of the average maximum level rise of each polder.

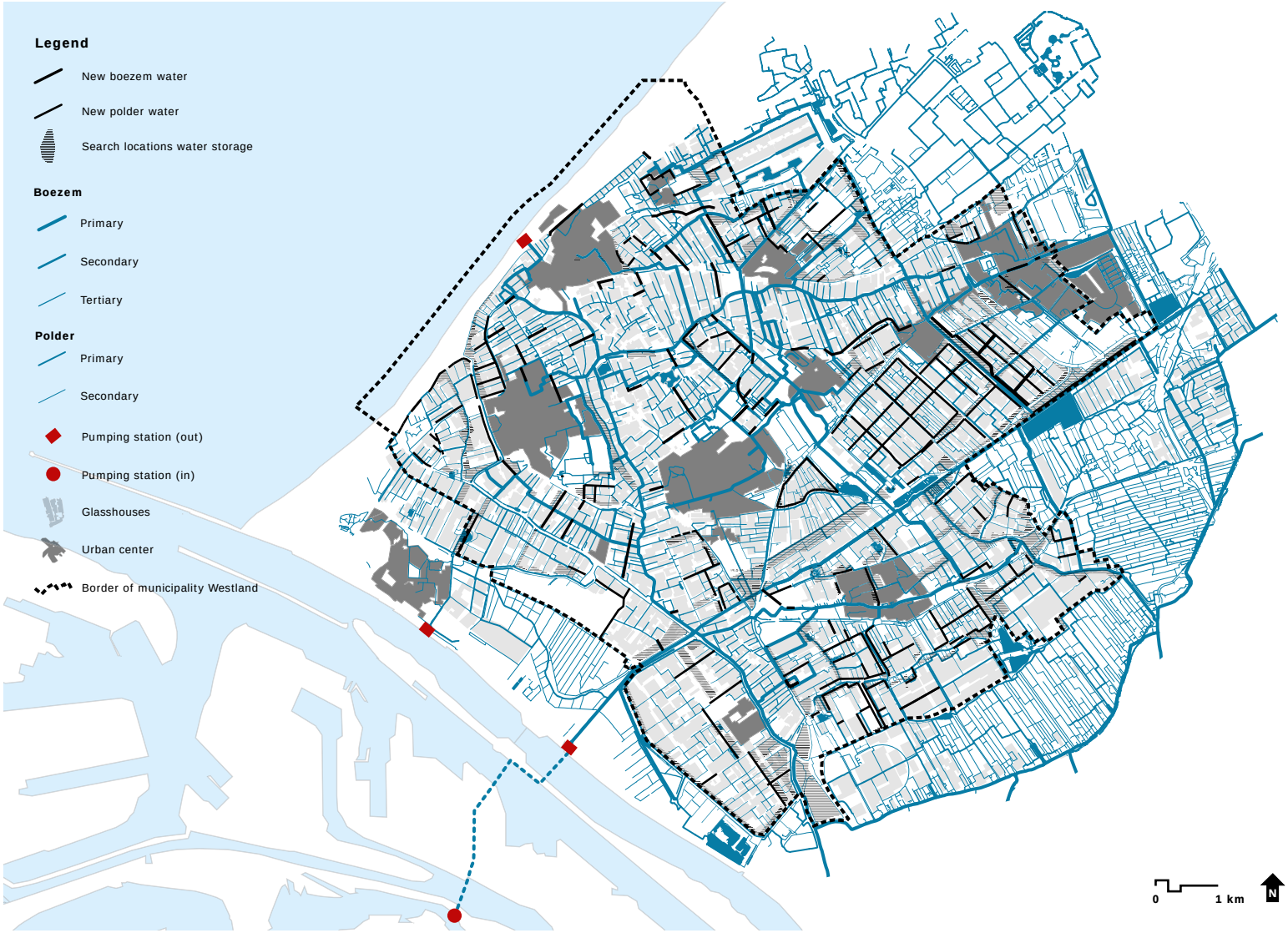
In this perspective one could see that there is for example a big lack and spatial assignment in the Oude en Nieuwe Broekpolder or the Oranjepolder.



Big lack and spatial assignment in the Oude en Nieuwe Broekpolder, Oranjepolder, Vlietpolder, Kralingerpolder, Dorppolder and Groeneveldsepolder!

Interventions Waterplan

Because the ABCDelfland program already deals with a lot of water problems in the boezem area, the most and biggest interventions of the water plan are planned in the polders.
This could be the enlargement of pumping stations or improving the drain capacity of present water ways, but also restructuring of old water structures and creating new water ways and extra water storage.
In the perspective of water management, the present water system and possible future spatial developments the drawing represent the preferable solutions of the Westland and the Hoogheemraadschap van Delfland. Based on the demands of water storage, flow direction and bottlenecks in the drainage, for each particular polder the interventions are determined.



Waterplan as main starting point for further development and reinforcement of the water system!

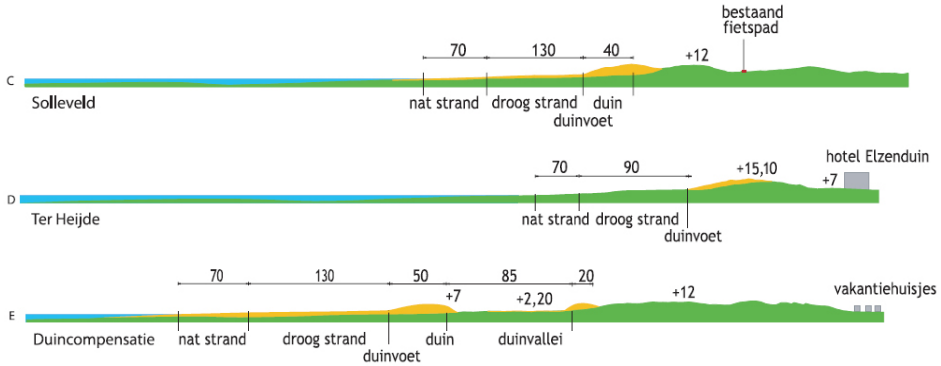
Max. 50% innovative water storage!

Source: Gemeente Westland & Hoogheemraadschap van Delfland (2008). Waterplan Westland - Waterstructuurvisie [maps]

Coastal defence, dikes & dykes

The coastal zone, consisting out of dunes and a dike can be seen as the most important primary defence against the Noordzee. This sea wall varies in height. The dunes in Hoek van Holland are relatively stable with a height around 10 m above N.A.P. while the height further more varies between the 10 and 20 m (Westduinpark) above N.A.P.

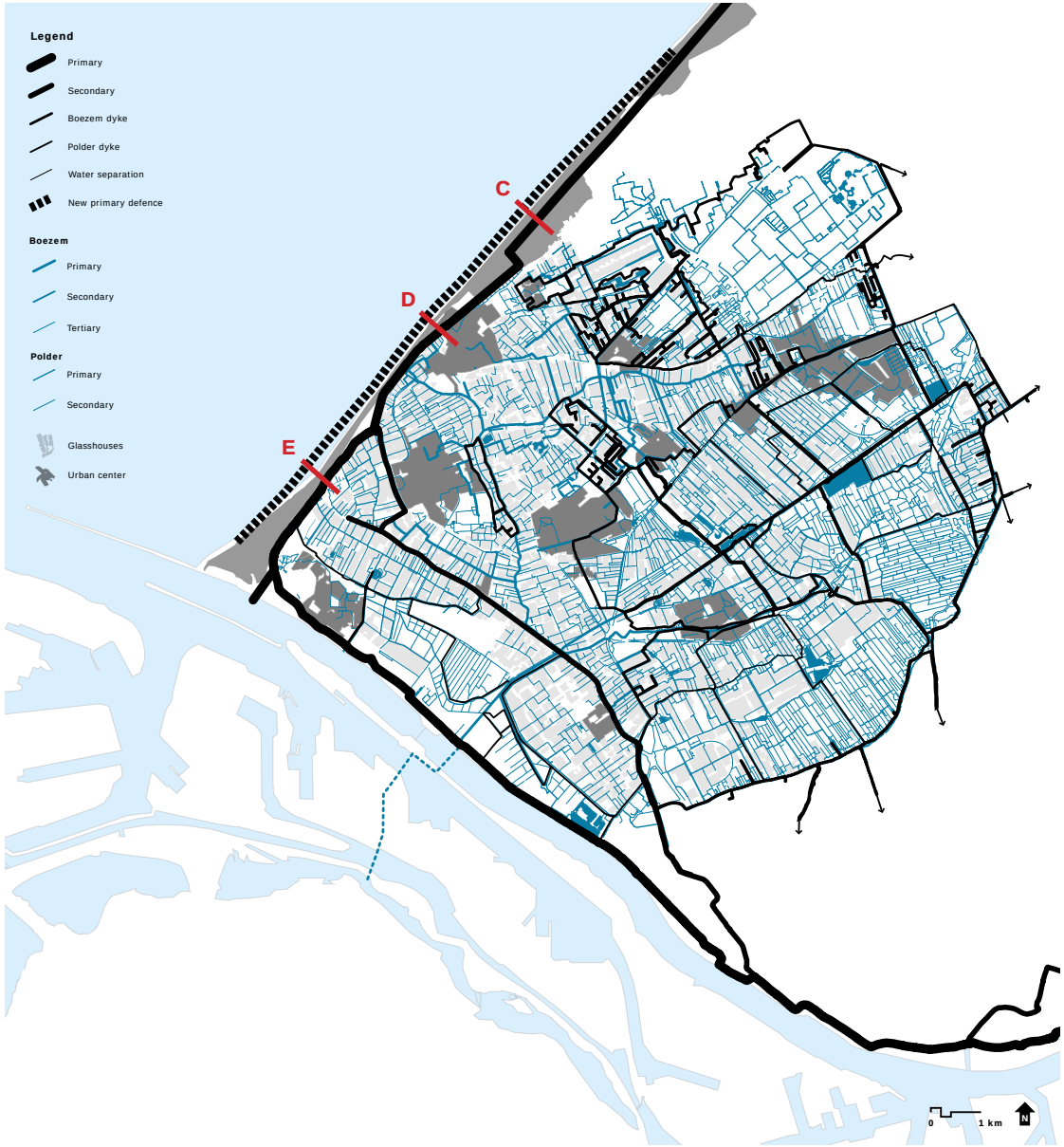
Because of the seaward broadening of the coastal defence there will be, besides a broadened beach, a new row of dunes that varies in height between the 7 m and 15,10 m above N.A.P.



Source: Hoogheemraadschap van Delfland, Projectteam Delflandse kust (2007). Kustvisie Zuid-Holland [report]

From origin the Maasdijk was a primary river defence against de water of the former Maas. Nowadays the Delflandsedijk next to the Nieuwe Waterweg functions a primary river defence while the Maasdijk is downgraded till a secondary defence wall, which is still important.
The Maasdijk has a height around the 4,5 m above N.A.P. and the height of the Delflandsedijk varies between the 7 and 8 m above N.A.P.

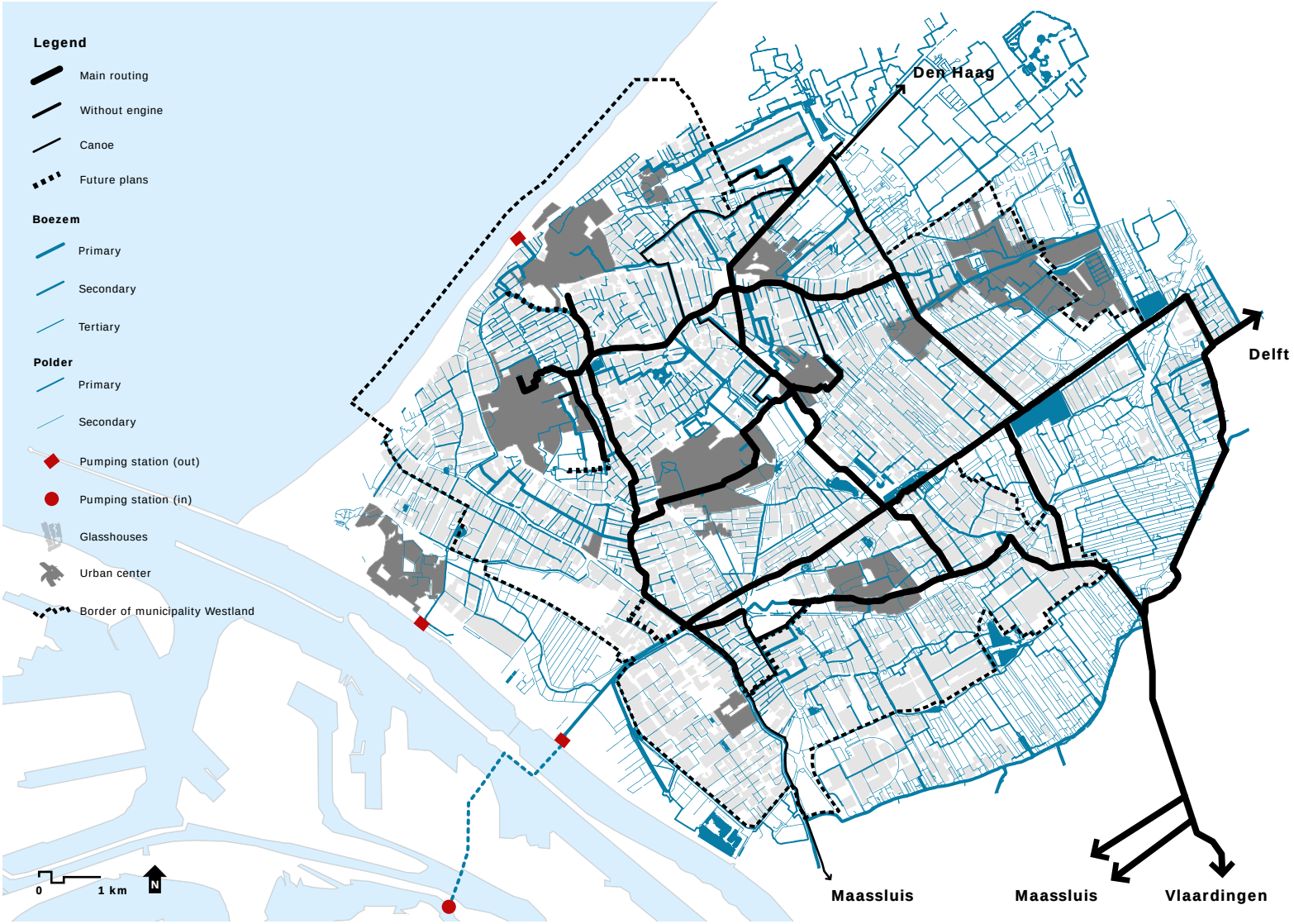
Furthermore there are a lot of boezem- and polder dykes in the Westland. As stated in the water plan it is necessary to broaden, reinforce and heighten a lot of these dykes as well. Most of the time this is generated by the change of function and program in the polder, but because of the lack of space, the intervention will not be easy!



Source: Hoogheemraadschap van Delfland (2008). Waterkeringen Delfland [map]

Accessibility by boat

The drawing represents the official water routes as determined by the Hoogheemraadschap van Delfland. Of course there are more waterways, bigger and smaller ones, accessible by boats or canoes. In practice the real water network that is accessible by boat will be more extensive than represented.



Source: Hoogheemraadschap van Delfland (2007). Vaarkaart [map]

Extend the accessibility of the public water network!

Create more recreational routes next to the main water routing.

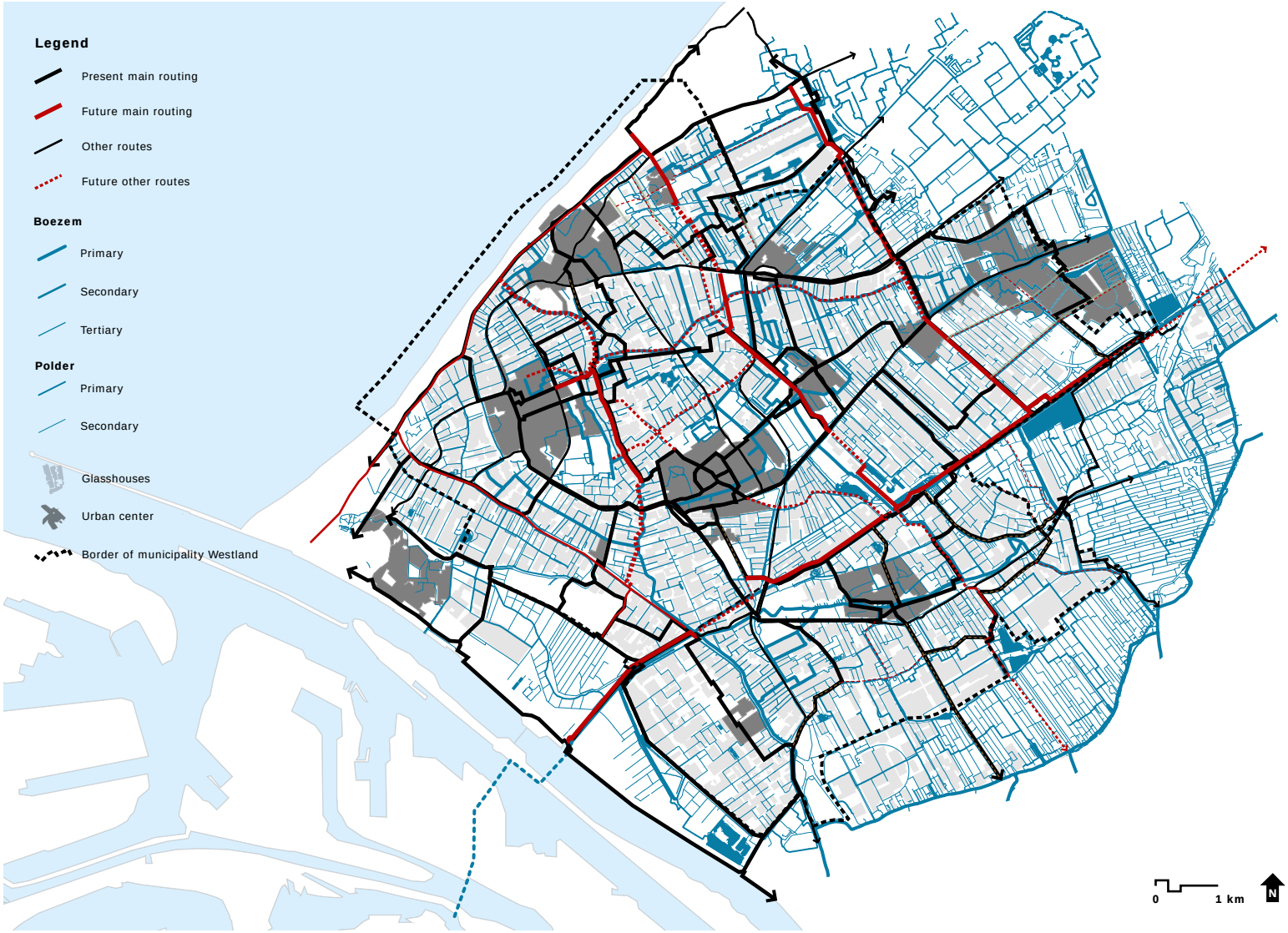
Create more public connections to Midden-Delfland!

Create a water route next to the Maasdijk.

Accessibility by bicycle

The present accessibility of the water by bicycle and the related visibility of the water is lacking.

As can be seen the proposed future bicycle network follows mainly the bigger and most important water ways and makes the water more accessible, visible and perceptible.



Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

Strengthen the accessibility and visibility of the Gantel!

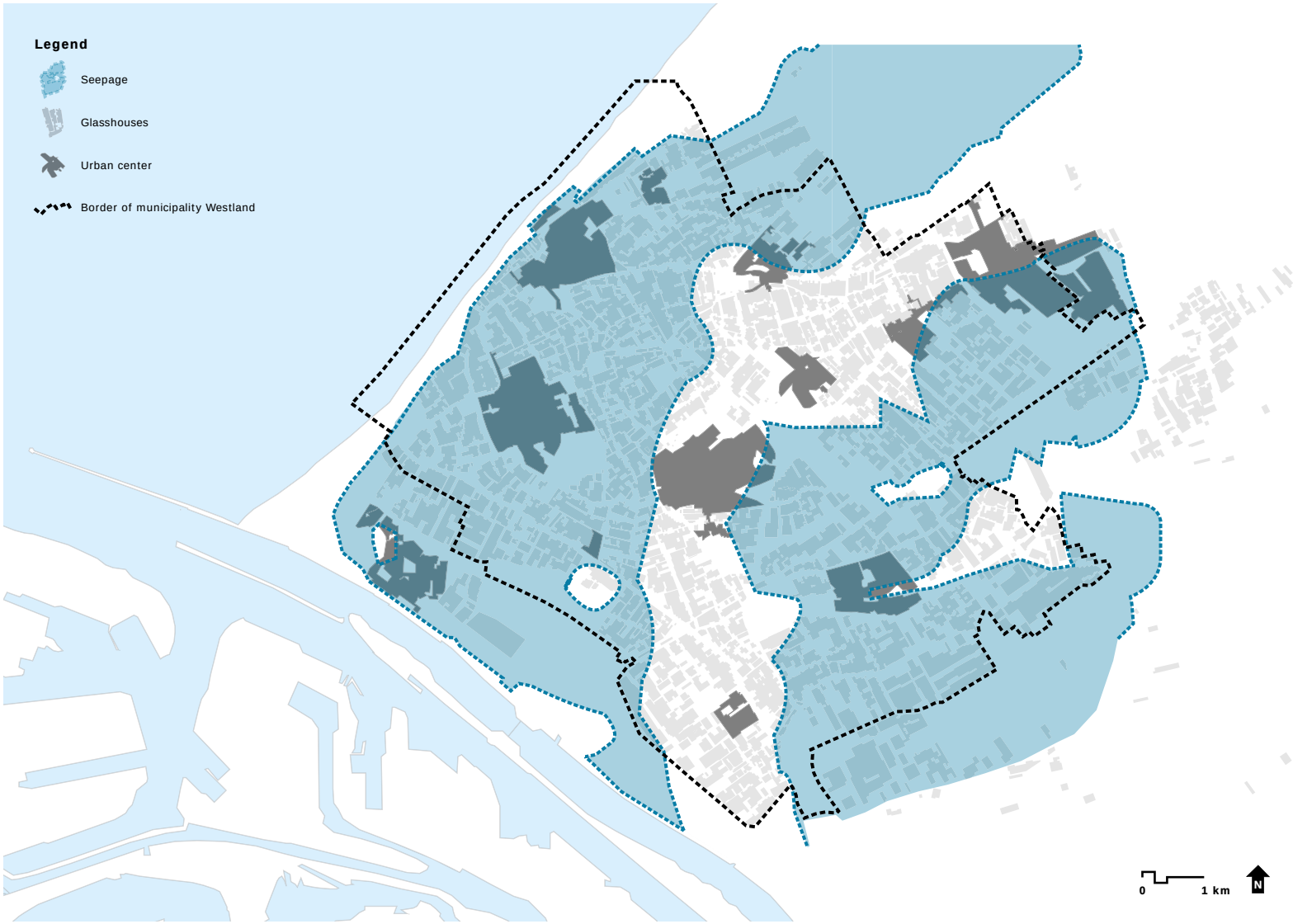
Combine the new and additional waterways with green spaces and the bicycle network!

Average seepage 1994-2004

Within the drawing the average seepage over the period 1994-2004 is shown. This map is based on the ground water model of Deltares which is integrated within a study related to the consequences if DSM (Delft) stops inflating ground water.
The factory is planning to do this and a rise of the ground water level could be the result if DSM realy stops inflating ground water. This could therefore lead to ground water problems, also in Westland although this is not directly in the nearby environment of the factory.

On the other hand other water problems related to seepage may occur in the future because of the predicted climate change.

The map shows that the lowest polders in the east and areas close to the Noordzee and Nieuwe Waterweg are most vulnerable for seepage.



Take seepage and the rise of the ground water level into account!

Source: Deltares (2007). 'Flux' of ground water (concept drawing) based on ground water model DSM-study [map]

Seepage around 2006

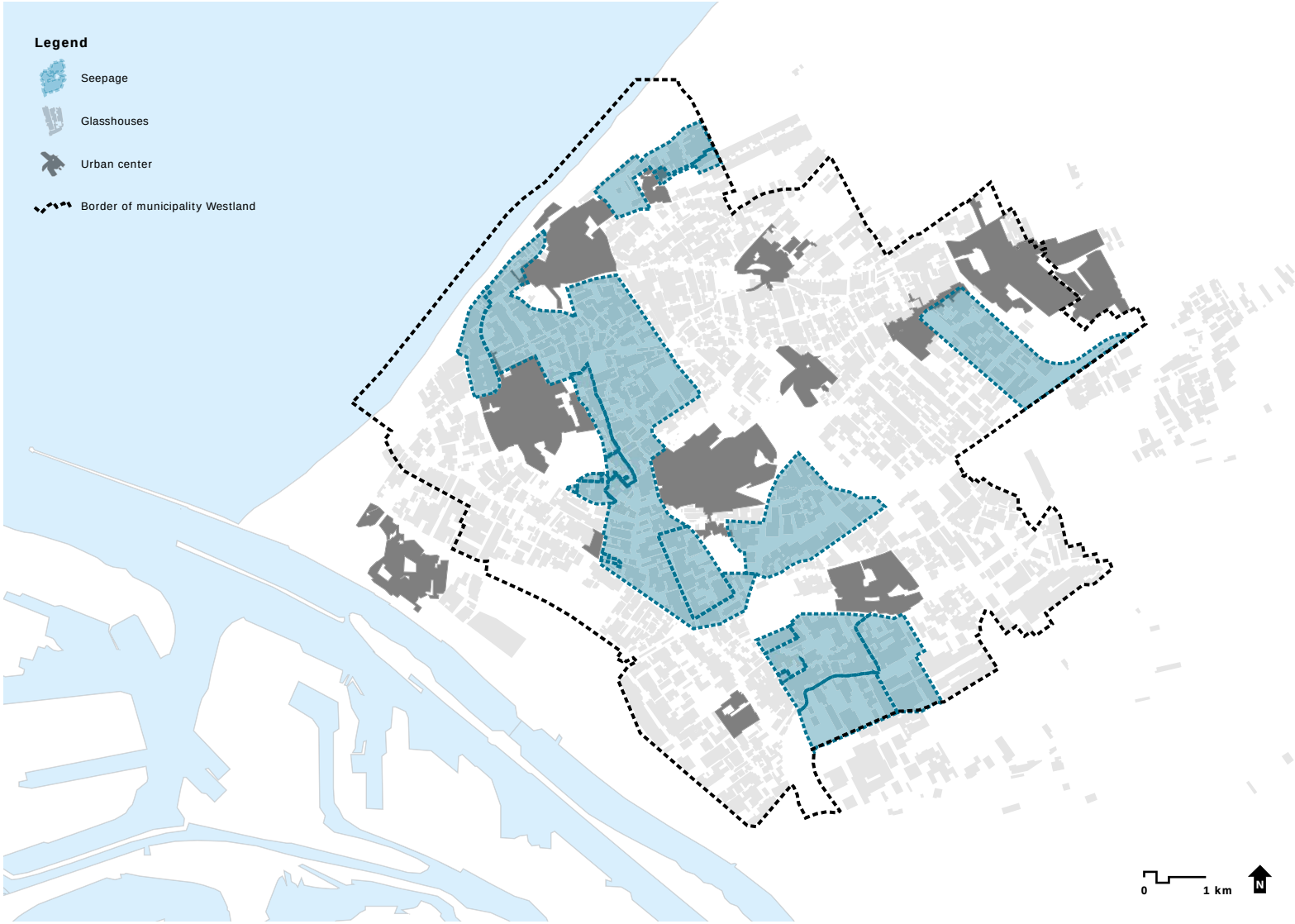
This drawing shows a more restricted view of areas where seepage could lead to ground water problems.

Again the polders and parts of the boezem area behind the dunes and next to the Noordzee and some of the lower polders in the east are in this perspective problematic.

Furthermore there is a relatively big part of the boezem area in the so called 'Poelzone' and the polder Olieblok problematic. These areas are situated at the former Maas route and linked to the present water ways of the Poelwatering, Monstersche Vaart and Vlotwatering.

Problematic polders:
-Het Waalblok
-Westmade
-Poelpolder
-Olieblok
-Vlietpolder
-Hoefpolder
-Oude Campspolder
-Kralingerpolder
-Oude & Nieuwe Wateringveldsche polder

Problematic boezem area:
-Poelzone



Source: Hoogheemraadschap van Delfland (2007). Waterplan Westland - Waterketenaspecten [map]

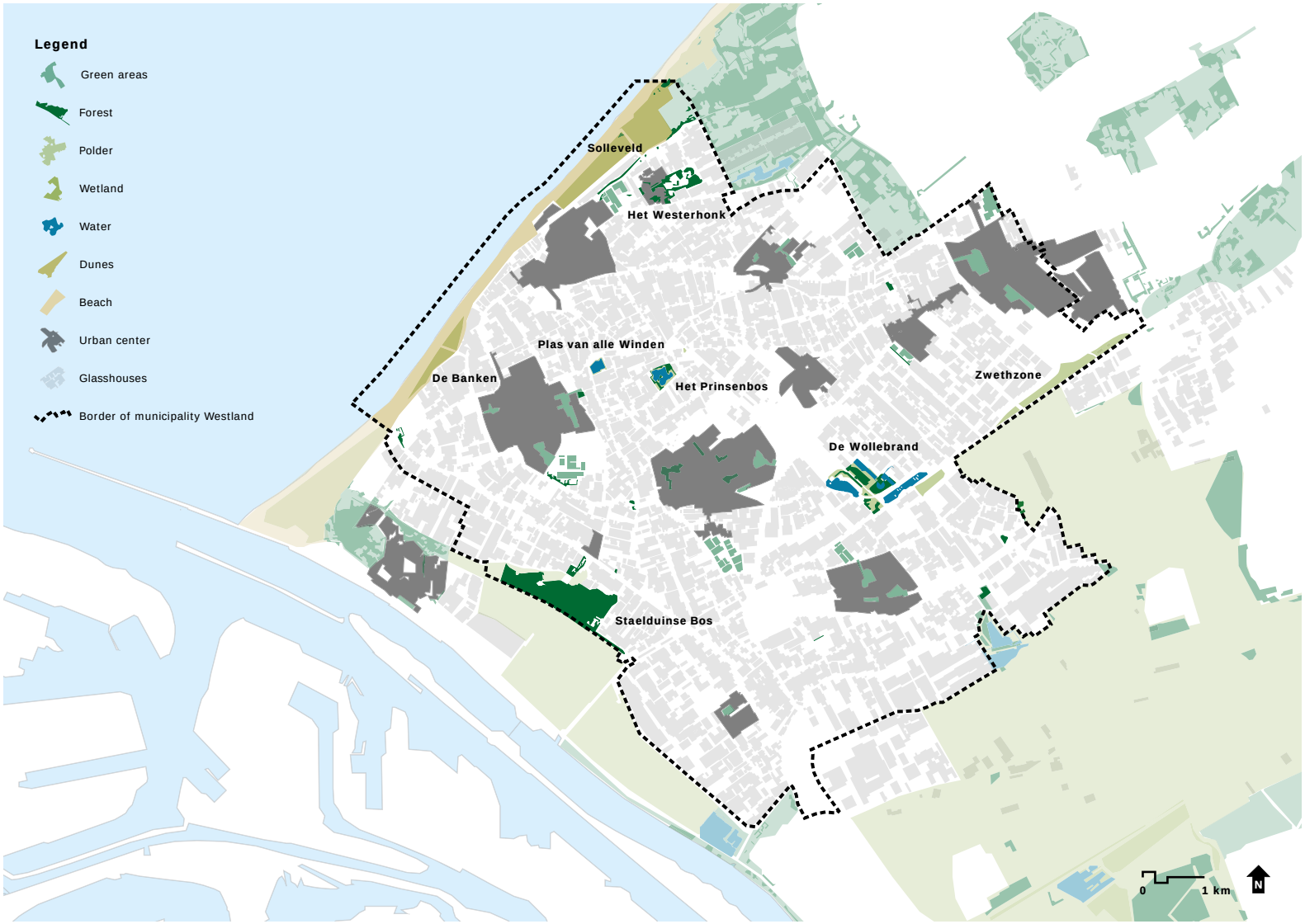
Green

Green areas Westland

The drawing shows clearly that there is a lack of green in Westland. According to the Visie Greenport Westland 2020 the surface green for each household is less than 20 m2 against 150 m2 as national average.

Furthermore the green areas are relatively small, dispersed and isolated.

The dune areas at the coast can be seen as the biggest green structure, but has a relatively low recreational value.



Link green areas to each other by using green connections next to the water system and recreational bicycle system!

Reinforcement of the green and recreative value of the coast zone.

Take non-use areas of former glasshouses into account!

Main green structure Westland

The drawing represents the desirable main green structure that must taken into account within future spatial planning of the Westland and is based on the proposals out of the Visie Greenport Westland 2020.
The most important issues are:

- Linking green areas by the main boezem water ways.

- Connecting Midden-Delfland and the green areas of the coast.

- Using the seaward broadening of the coast to reinforce the green and recreational value of the coast.

- Better transition and connection with Midden-Delfland (gateways).

- Green stepping stones next to water-, green- and recreational network.

- Create green and recreational routes towards the surrounding green zones

Green stepping stones could be linked to former courtyards, fruit gardens or orchards!

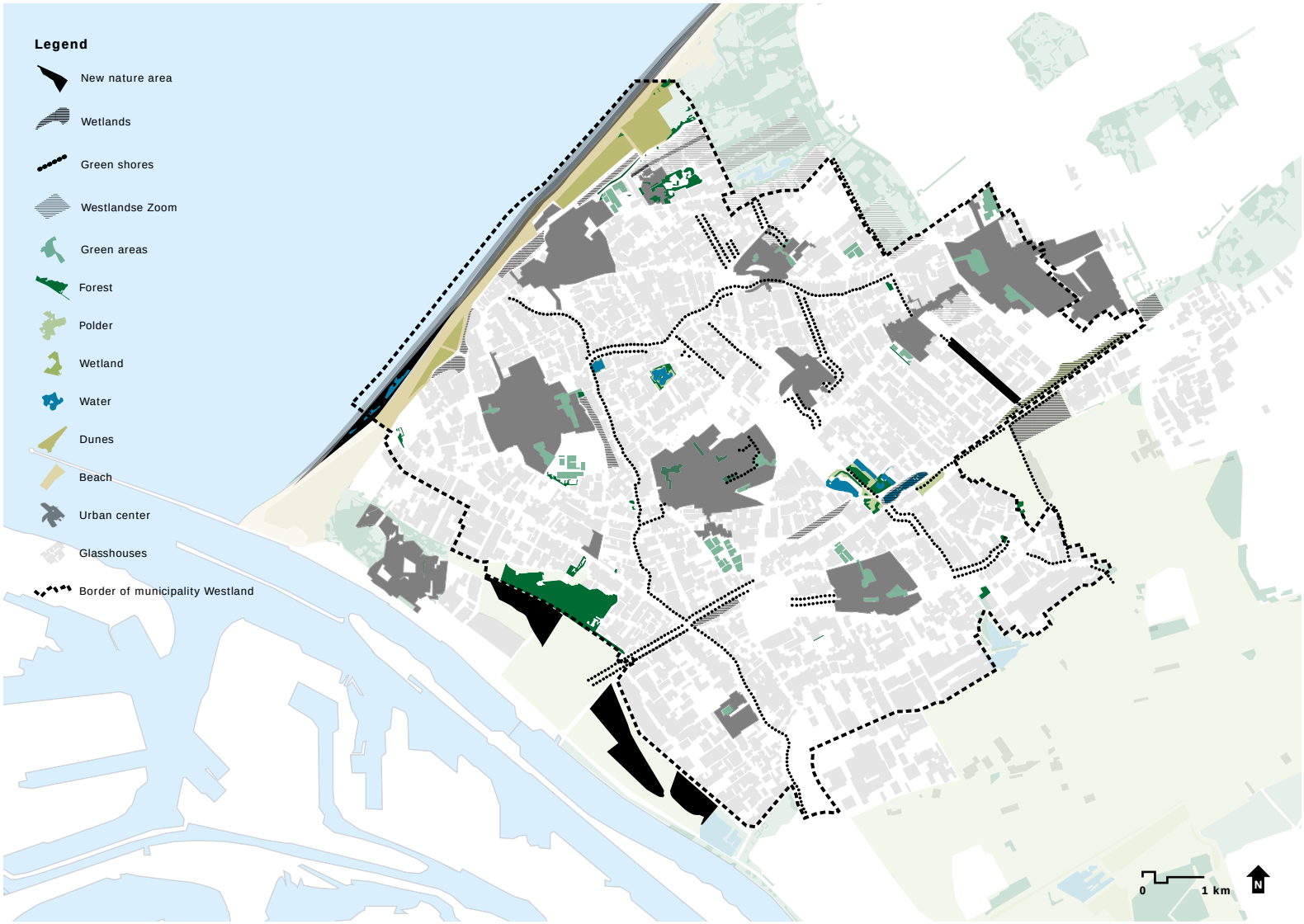
Source: Gemeente Westland (2005). Visie Greenport Westland 2020 [policy document]

Proposed interventions

As can be seen the are, besides the proposals for green areas in the Maas zone almost no concrete proposals for new green areas or stepping stones.

Besides the green shores of some of the boezem water ways, the green connections between existing green areas or the coast and Midden-Delfland are also lacking in this drawing.

Remarkable areas are the proposed wetlands, taken into account within the water plan, which should cope with increasing problems of seepage.

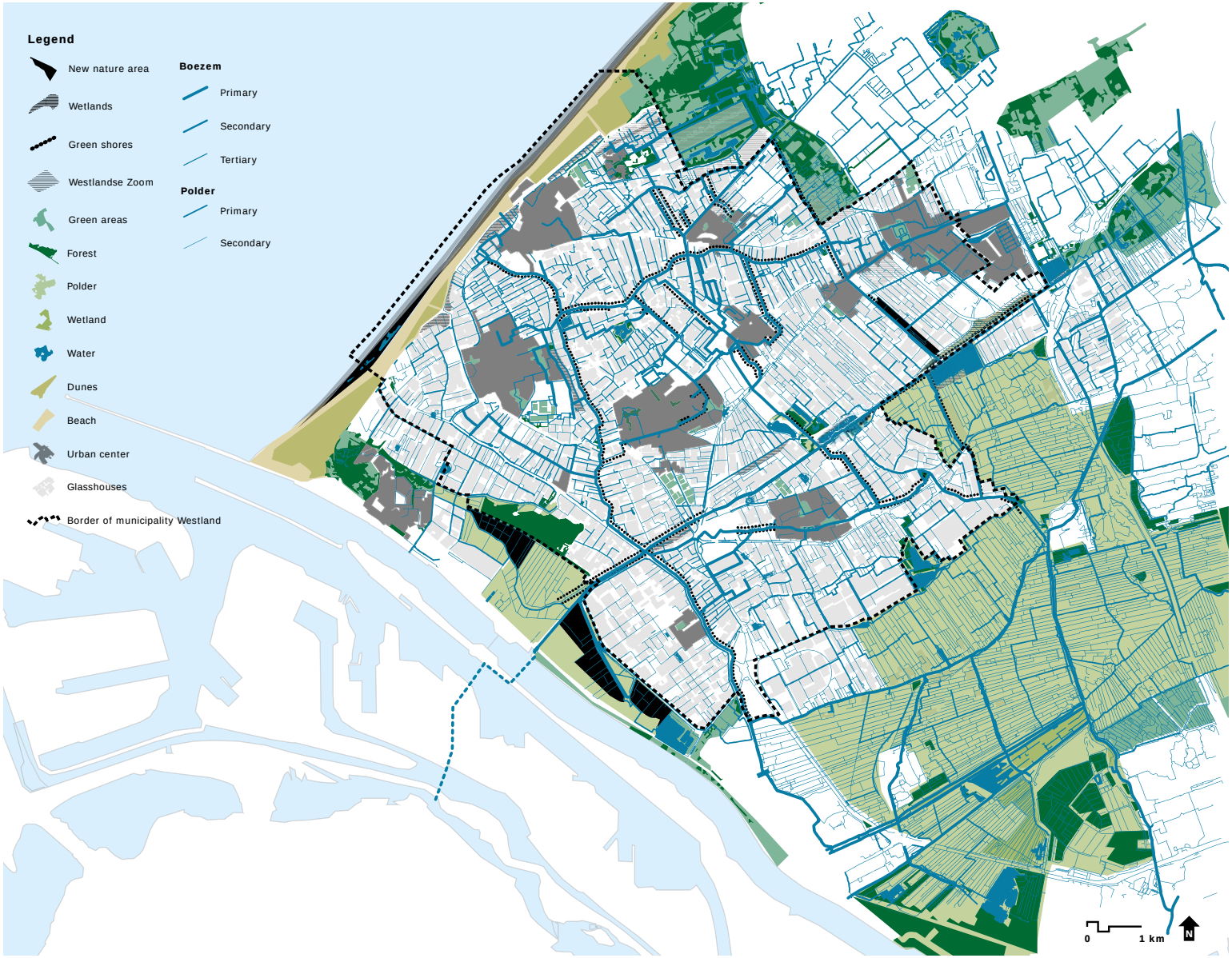


Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) + Gemeente Westland (2008). Waterplan Westland - Waterstructuurvisie

Green- & water structure

The extensive water system can be seen as the connecting element between the different green areas in and surrounding the Westland.
Because of the present accumulation of glasshouses, the lack of space and lack of accessibility these connections have a low green, ecological and recreational meaning.
According to the present policy these connections, most of the time related to the main boezem water ways, will be reinforced by creating green shores and green recreational paths next to it to generate a green blue network with a strong ecological and recreational meaning. Smaller and dispersed green areas, like parks and recreational lakes, water storages or wetlands must be linked to this network and will function as green stepping stones.

Link green and recreational areas to the water network!



Source: Hoogheemraadschap van Delfland (2008). Watersysteem Westland en omgeving [map]

Recreative routing (bicycle)

Within the 'Westlands Verkeer en Vervoersplan' an additional bicycle network is proposed that fills up important missing links, is connected with important green zones at the borders of the Westland and follows the main boezem water ways and main green structure instead of the crowded road network.

However the connections to Midden-Delfland and the areas next to the Nieuwe Waterweg are quite modest and could be improved and reinforced.

Improve and reinforce connections with Midden-Delfland and (future) green areas next to the Nieuwe Waterweg!

Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

Green context

The Westland is surrounded by big green zones.
In the north the country estate zone where the forest of Ockenburgh and the recreation areas of Madestein and De Uithof are the most important. To reinforce this zone within the area several locations, together called Westlandse Zoom, are pointed to realise green areas with luxury villas.

In the east the biggest green and recreational area, Midden-Delfland is situated.

In the south, next to the Nieuwe Waterweg, the green zone Maasmond is situated. There have been many plans to create new green recreational areas over here to intensify this green zone and give this part more meaning, but most initiatives are never realised.

In the west the coast zone is situated. Because of the seaward broadening of this zone there are opportunities to upgrade the green and recreational meaning.

Provincial main structure

As can be seen the main green structure of the Westland joins up to the provincial main structure.

It is as well in recreational as in ecological (biodiversity) view important to connect the regional with the provincial main structure.

Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Infra

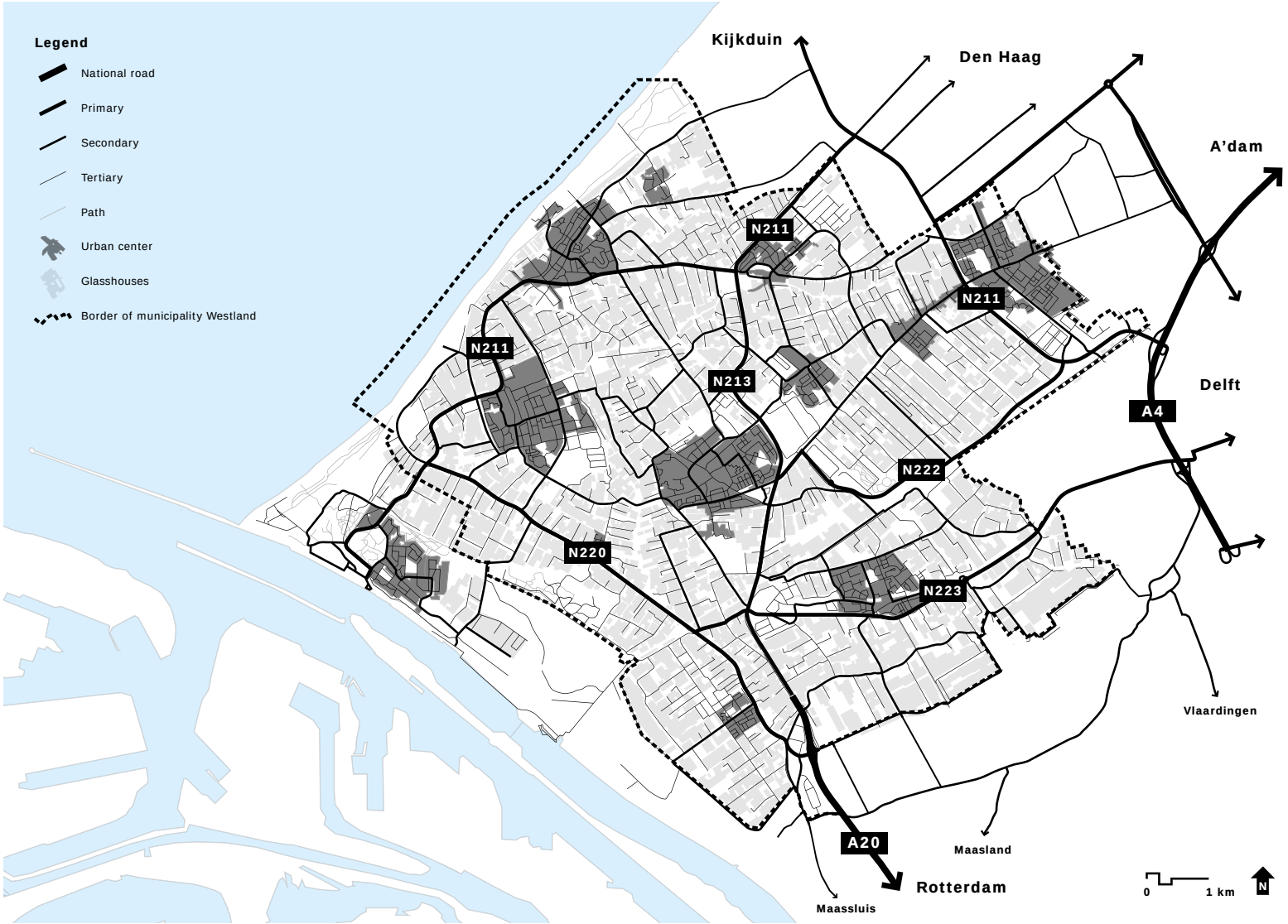
Road network Westland

The main roads are the N211, N213, N220, N222 and N223 and are connected with the national roads tha A20 and A4.

The line A20 - N213 - N211 is also called the 'economic axis' because the most important companies are situated next to this line (page 60).

The present road network is based on historic patterns. The main routing is based on historic lines, connected to almost every urban center and there is a lot of ribbon development next to these roads. This does result in an irregular road network that is on many places out dated and insufficient. Especially when looking to the growth and scale up of the glasshouse horticultural sector and increasing population.

Furthermore the network is characterised by many small and dead end horticultural paths which do not fulfil to the demands of present day cargo traffic.



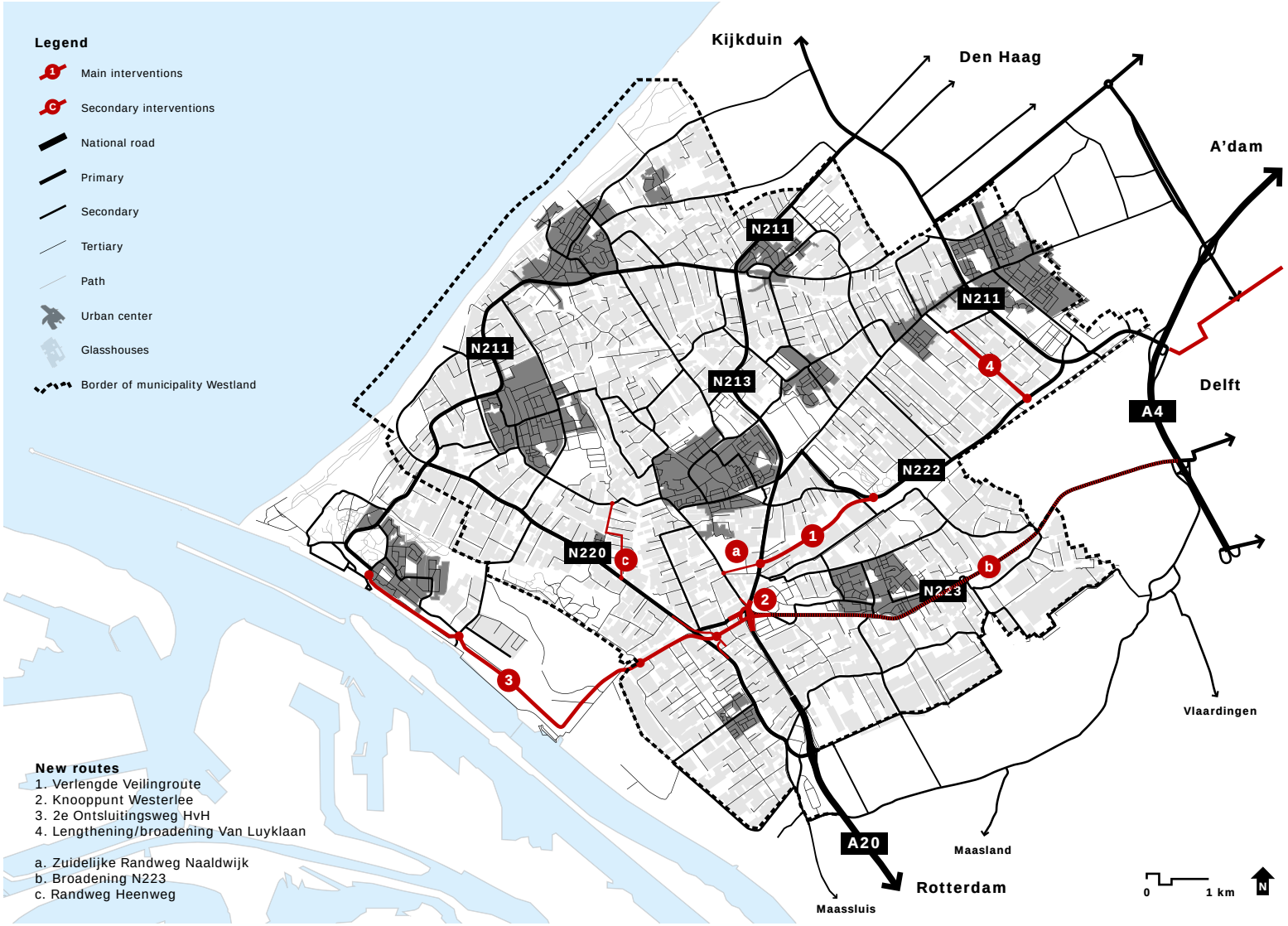
Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

Proposed interventions 2010

To improve the disclosure of the Westland and cope with the intensive use, by inhabitants and the horticultural sector, of the road network there are several plans to improve the network.

Within the drawing the planned interventions which should be finished in 2010 are shown.

Most important is the so called '3-in-1 project' which encloses the elongation of the N222 (1), the improvement of the problematic node Westerlee (2) and the disclosure of Hoek van Holland (3).



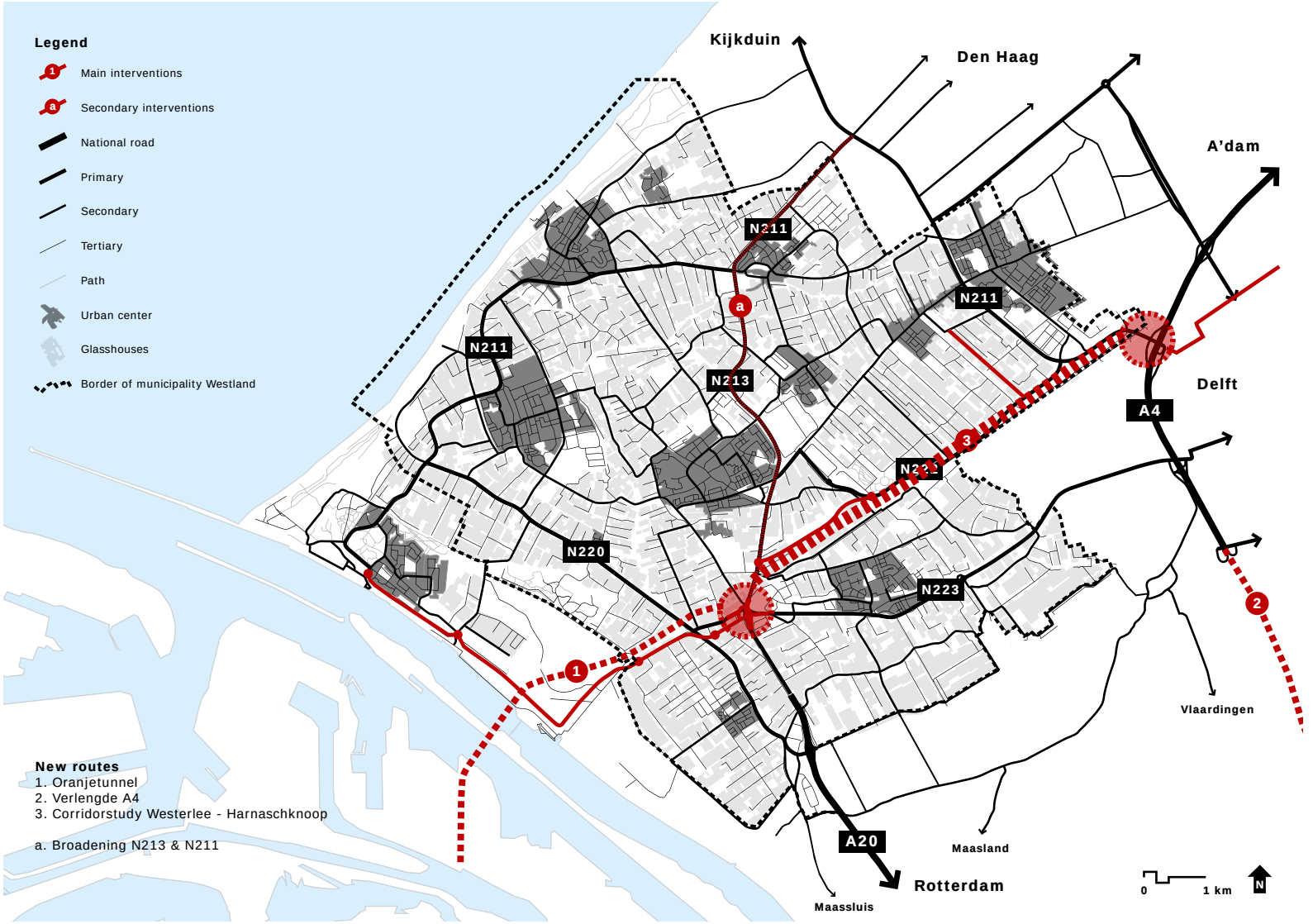
Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

Proposed interventions 2020

Within the drawing the planned interventions which should be finished in 2020 are shown.

In the interest of the Greenport function and future of the glasshouse horticulture it is necessary to construct the elongation of the A4 (2) and the 'Oranjetunnel' (1) to realise a better disclosure and strengthen the relation and connection with the Mainport of Rotterdam.

Because of the increase and intensification of traffic and cargo the main nodes of Westerlee and Harnaschpolder need to be upgraded.
Furthermore it could be necessary to upgrade the N222 (3) up to 2x2 lanes instead of the present 1x1.

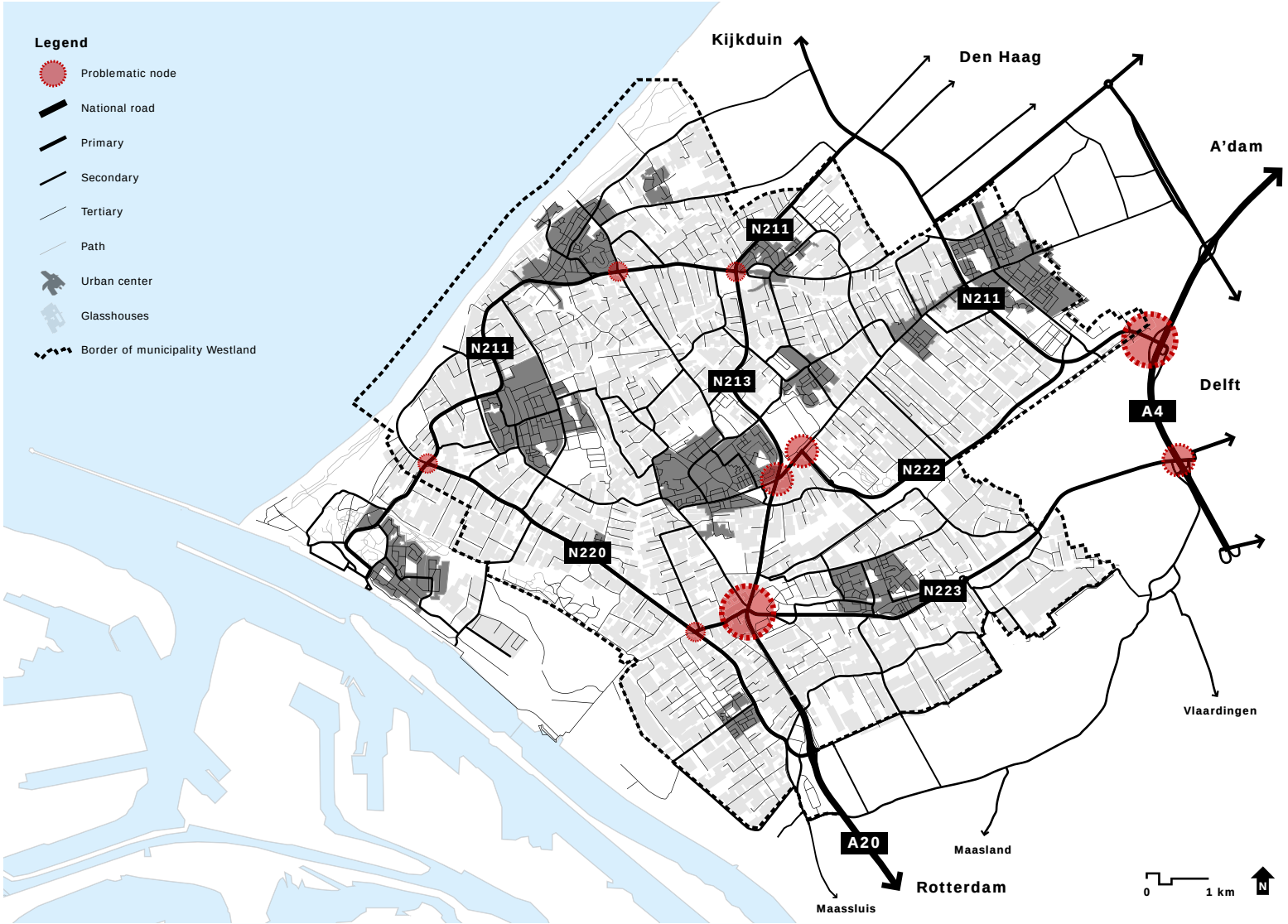


Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

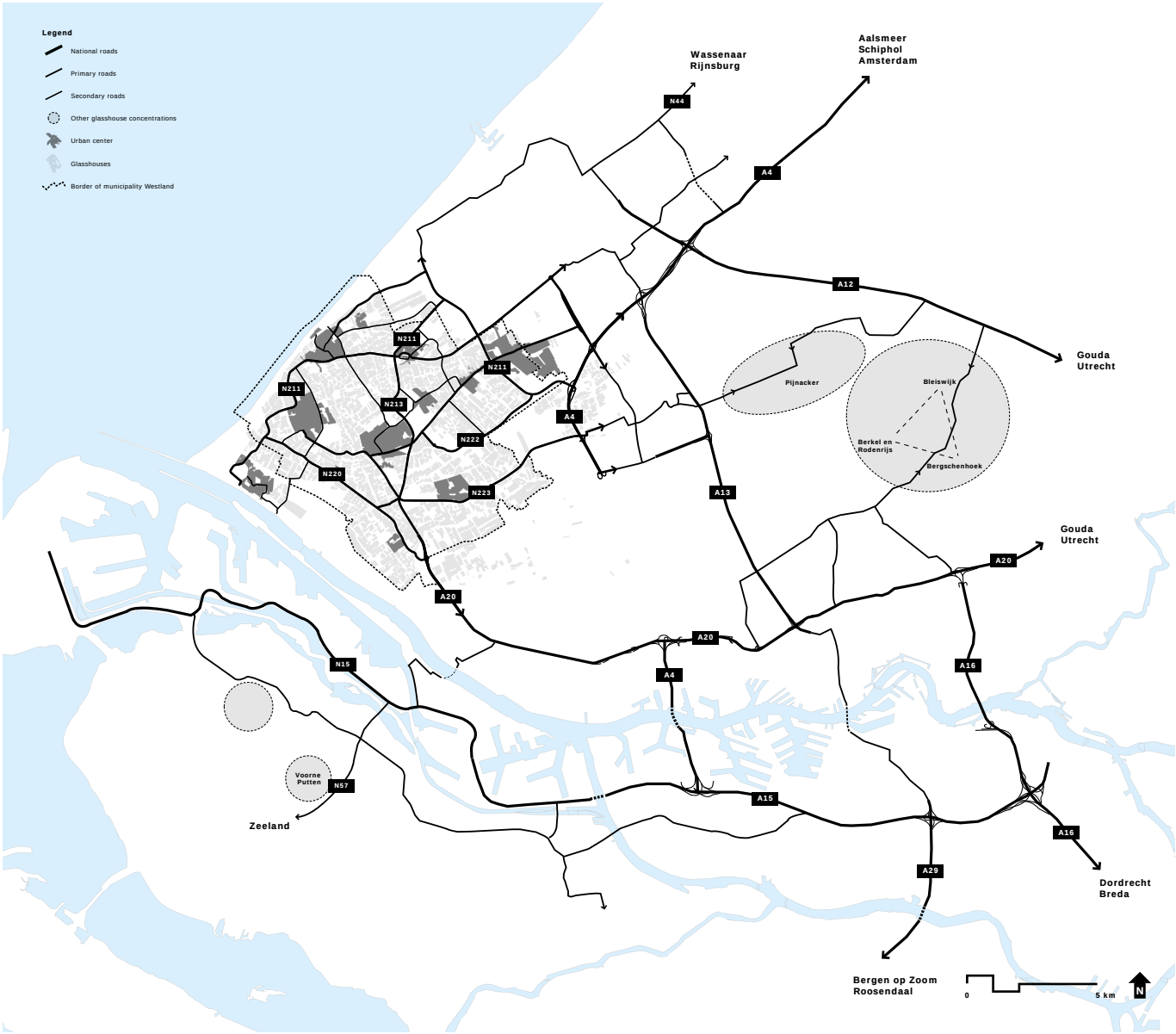
Problematic nodes

The nodes where traffic can enter the national network are the most problematic. Because of traffic lights and a relatively low capacity and dimensioning the traffic jams here many times.

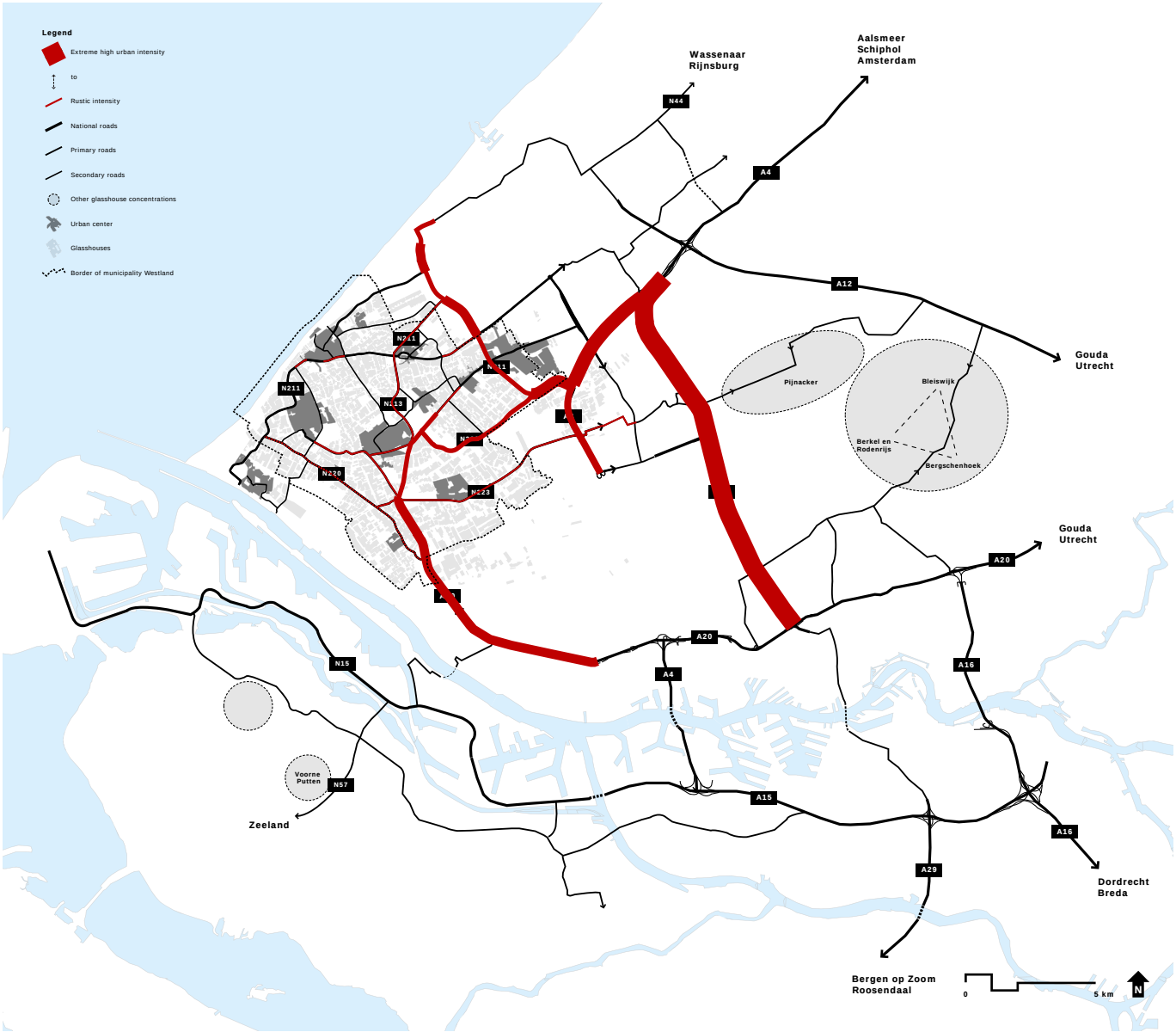
In rush hour other nodes become problematic as well, most of the time because of traffic lights.



Regional road network



Road intensity

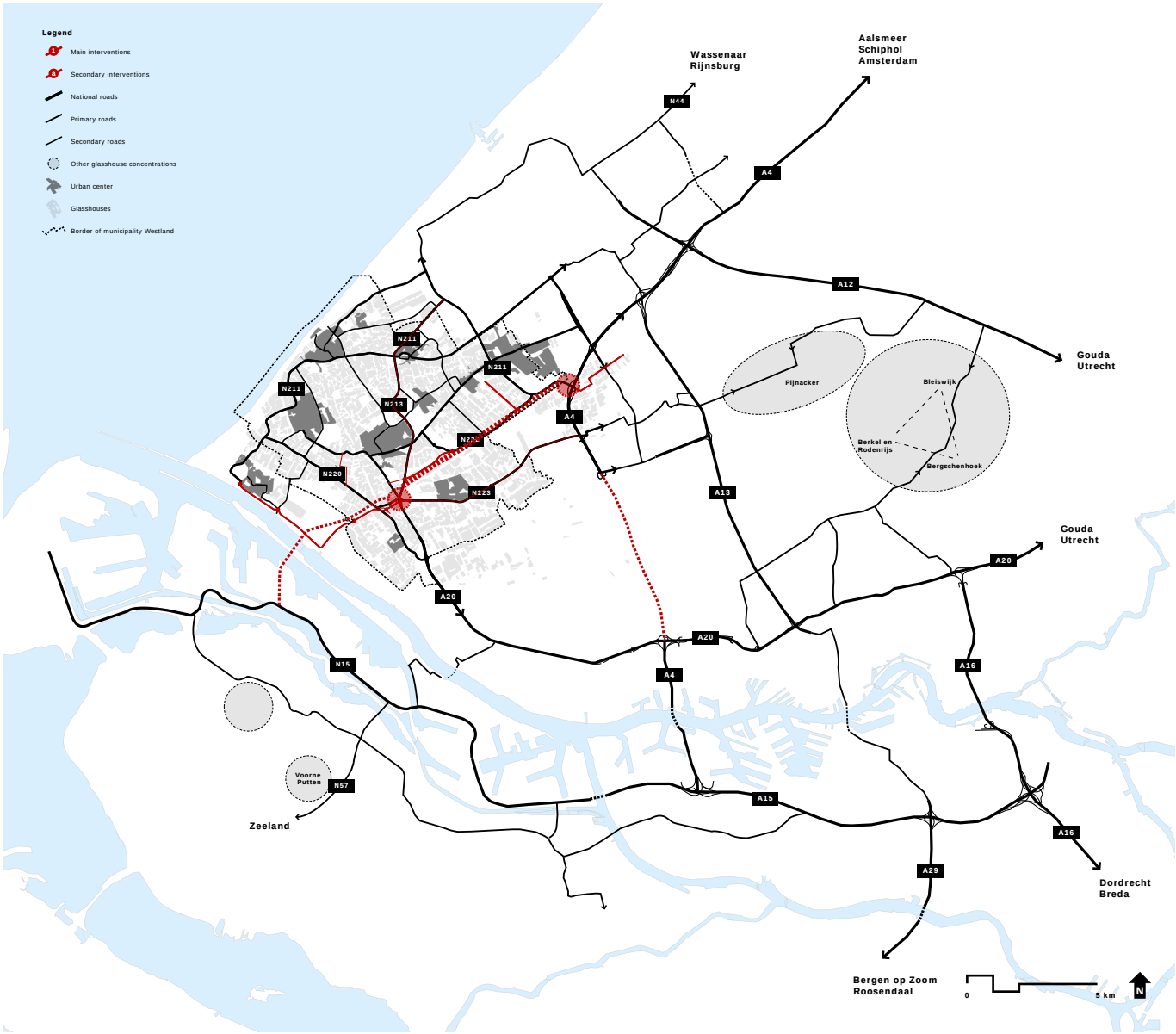


Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Interventions road network

As can be seen the traffic intensity on the A20 and especially the A13 is very high. The elongation of the A4 in the future could lead to a relief of the A13.

The elongation of the N222 up till the A15 (Oranjetunnel) could lead to a relief of the present A20 and helps on the first place to create a shorter connection between Greenport and Mainport which could improve the relation between them.



Bus network Westland

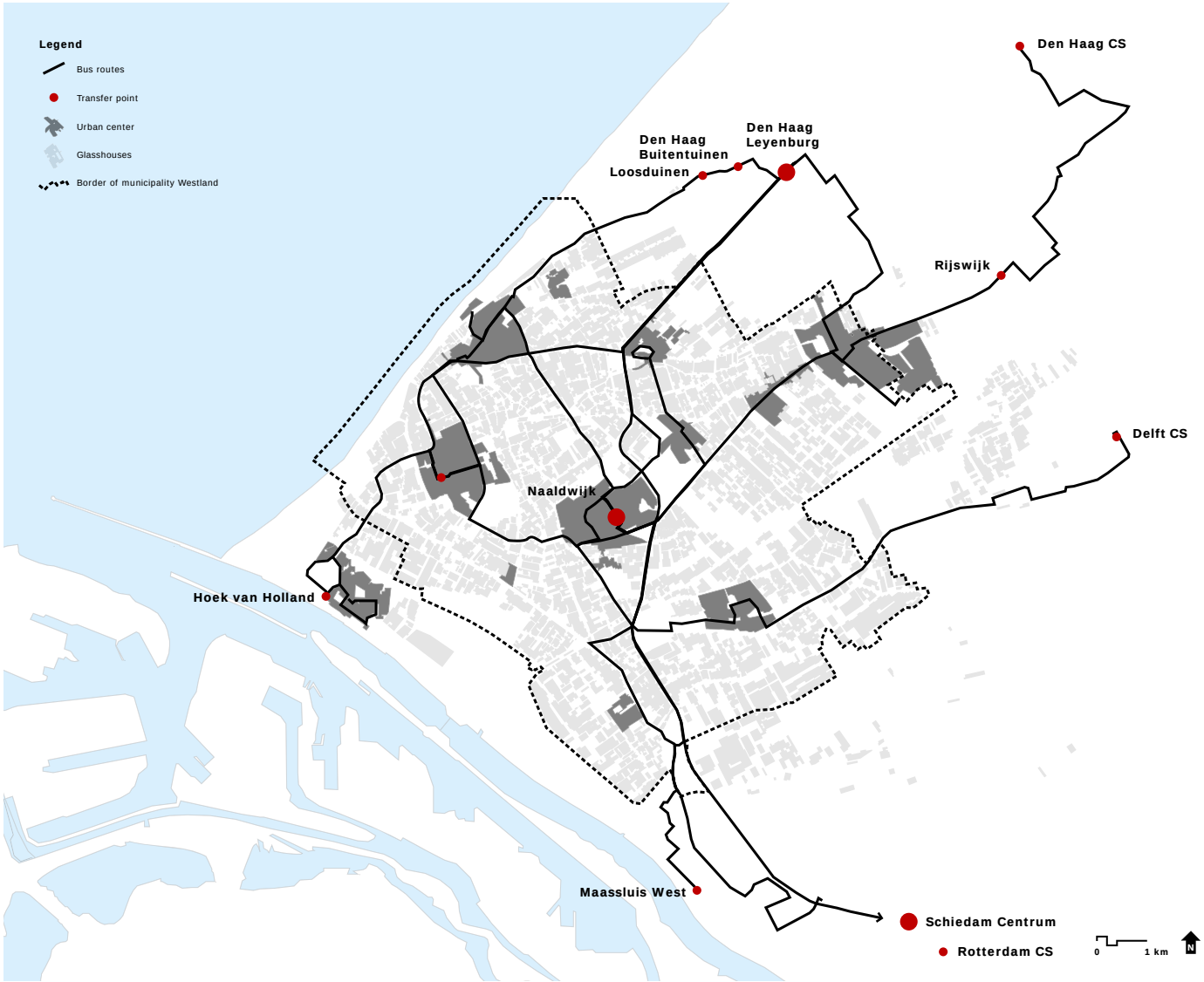
The Westland has an extensive bus network that is connected to almost every urban center and different transfer points outside Westland where one can change to the train, RandstadRail, tram or city bus.

However people need to change buses several times, buses are more and more jammed in the increasing traffic and the frequency and connection with other public transport networks, tuning of time and place, leaves much to be desired.

Create a better connection with the RandstadRail!

Create a (bus) system next to the regular roads.

Upgrade frequency buses and tune in connectivity to (time and place) other public transport!



Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

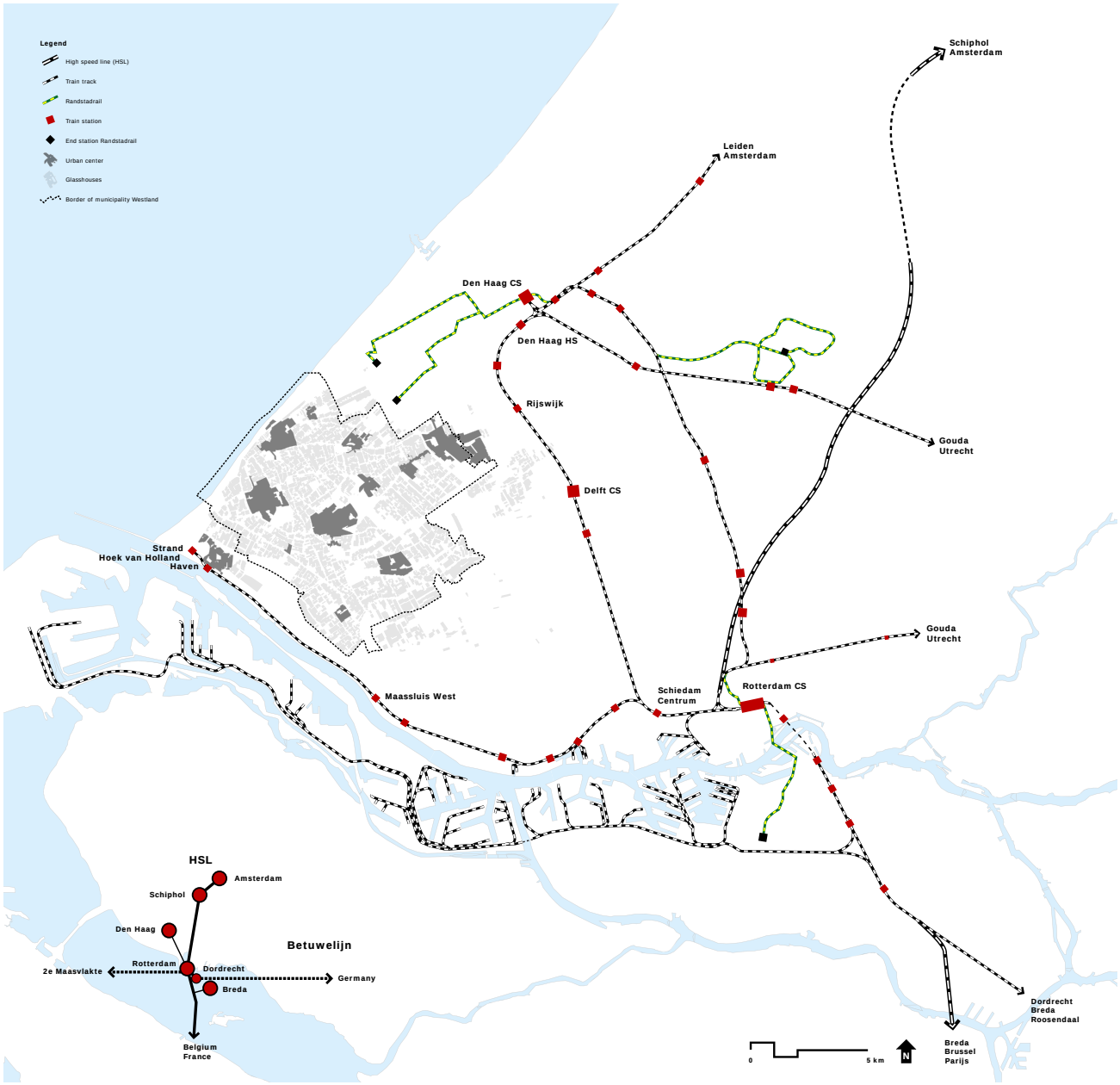
Regional rail network

With exception of the train track between Hoek van Holland and Rotterdam the regional train network does not enter the plan area. The Westland is therefore fully dependent of the bus network to reach the regional or national tracks.

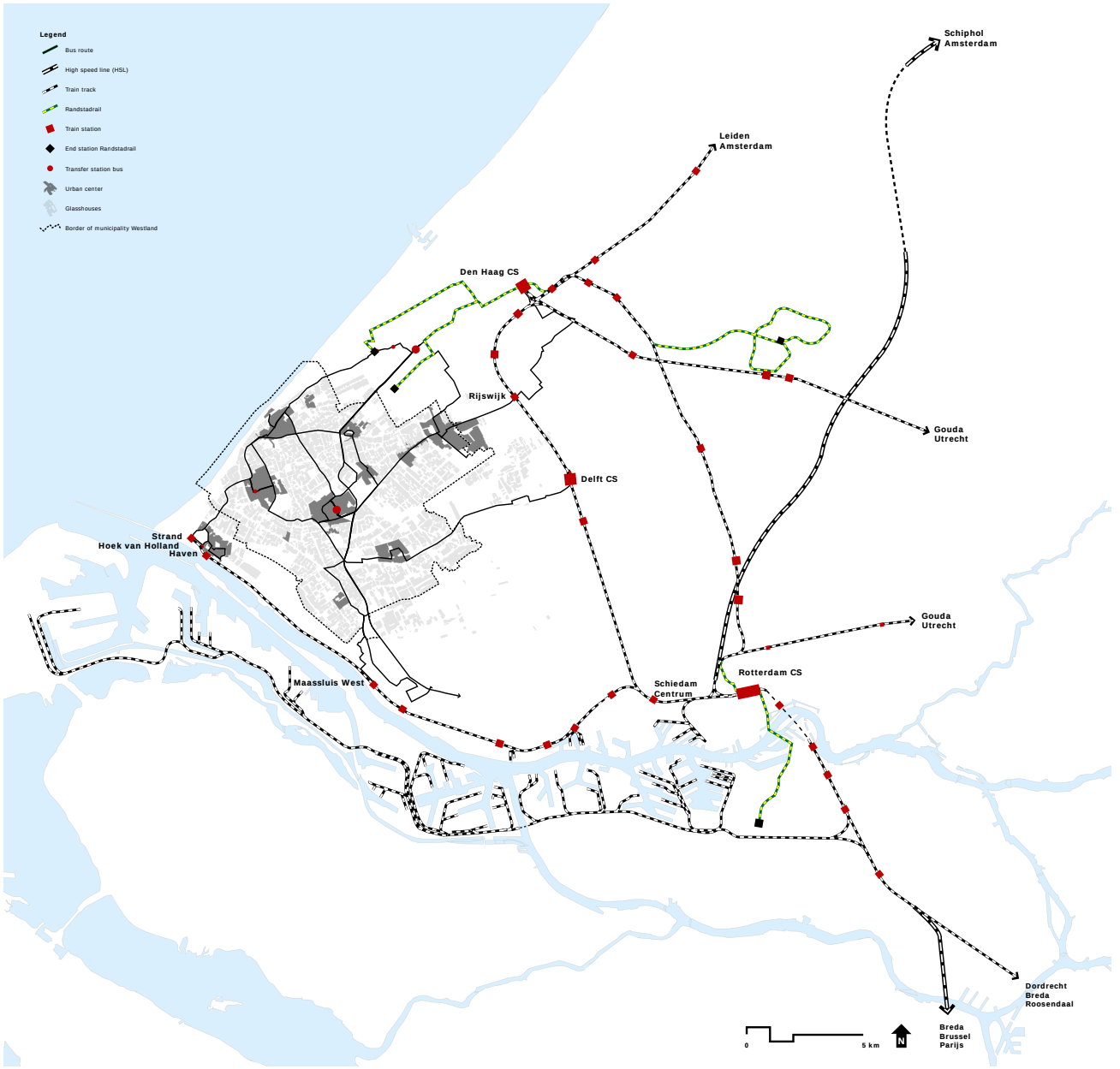
By creating a better connection (Oranjetunnel) between Greenport and Mainport there could be possibilities to use the cargo track of the Rotterdam harbour and in the future even the elongation of the 'Betuwelijn' which will run than to the 'Tweede Maasvlakte'.

Make use of the 'Betuwelijn' and high speed line to Schiphol to relief the road network.

Create a Greenport terminal in the Rotterdam harbour that is linked to the national train- and water network.



Bus & rail network



Create a better connection with the RandstadRail!

Create a (bus) system next to the regular roads.

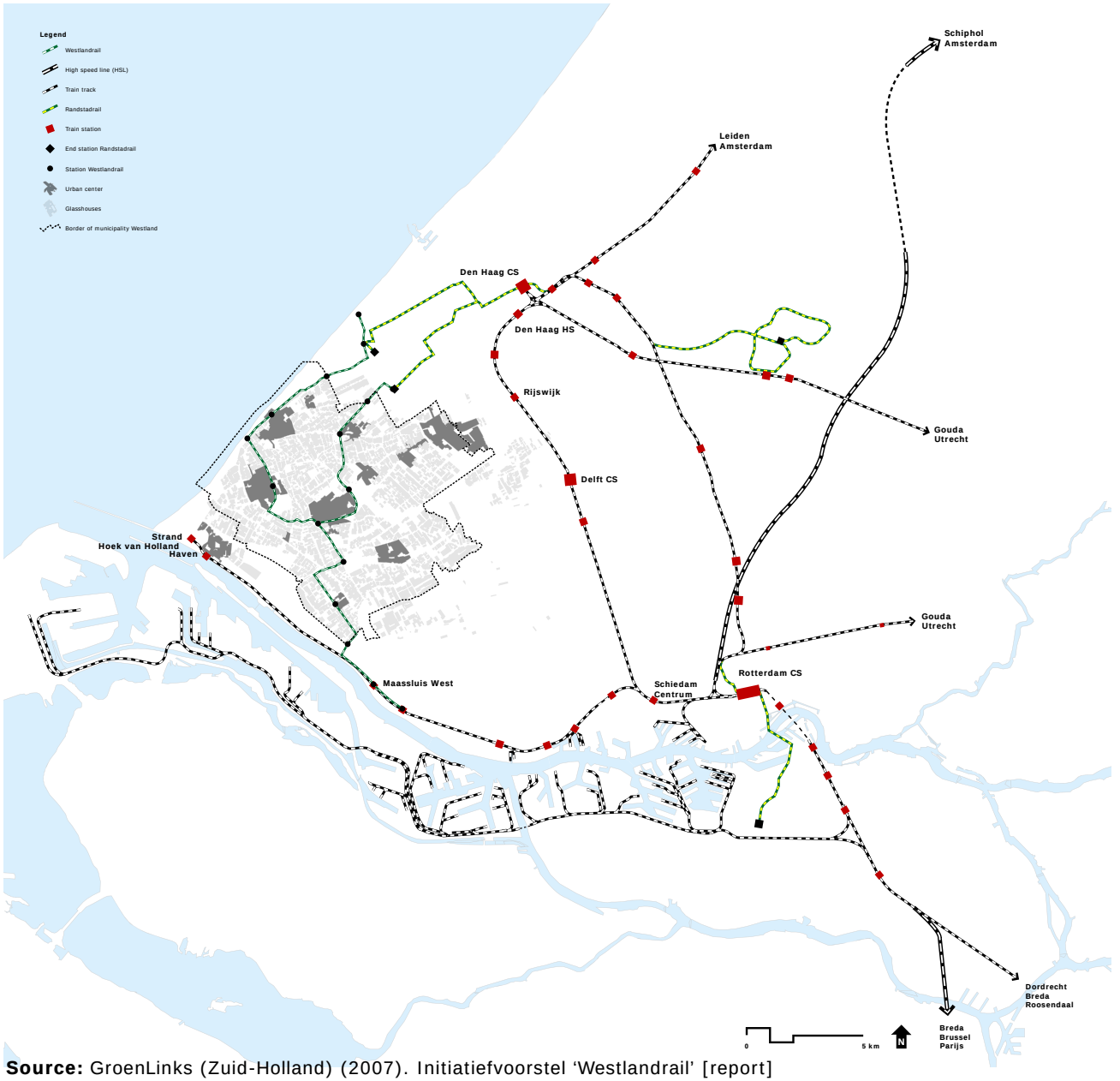
Upgrade frequency buses and tune in connectivity to (time and place) other public transport!

Proposal Westlandrail

In 2007 a political party (GroenLinks) of Zuid-Holland made a proposal for high quality public transport in Westland. Although the area can be seen as a rural and low densed area with a dispersal of urban centers, the opinion of this party is that also these kind of areas must be accessible with a high quality public transport system.

Within the report they propose different tracks for a concept that is similar to the RandstadRail and runs through or alongside different urban centers of Westland; the Westlandrail.

A feasibility study must proof if these kind of solutions are really feasible. However this proposal provides a new way of thinking about high quality public transport in Westland instead of looking to adjusting and improving the present bus system.
The urban density and the dispersal of urban centers combined with the demand for public transport, which is low at the moment, are important issues that should taken into account!



Source: GroenLinks (Zuid-Holland) (2007). Initiatiefvoorstel 'Westlandrail' [report]

Bicycle network

The present bicycle network does mainly follow the crowded main roads of Westland. These routes are most of the time not the shortest and one becomes constantly confronted with the intense car traffic.
Combined with the lack of green and space and the lack of connectivity with the green areas at the borders of the Westland, especially the coast, this is not attractive.

The recently opened ferry is a welcome addition to the recreational network and opens new possibilities to discover and use the other side of the Nieuwe Waterweg.

Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

Create routes which connect the coast and Midden-Delfland!

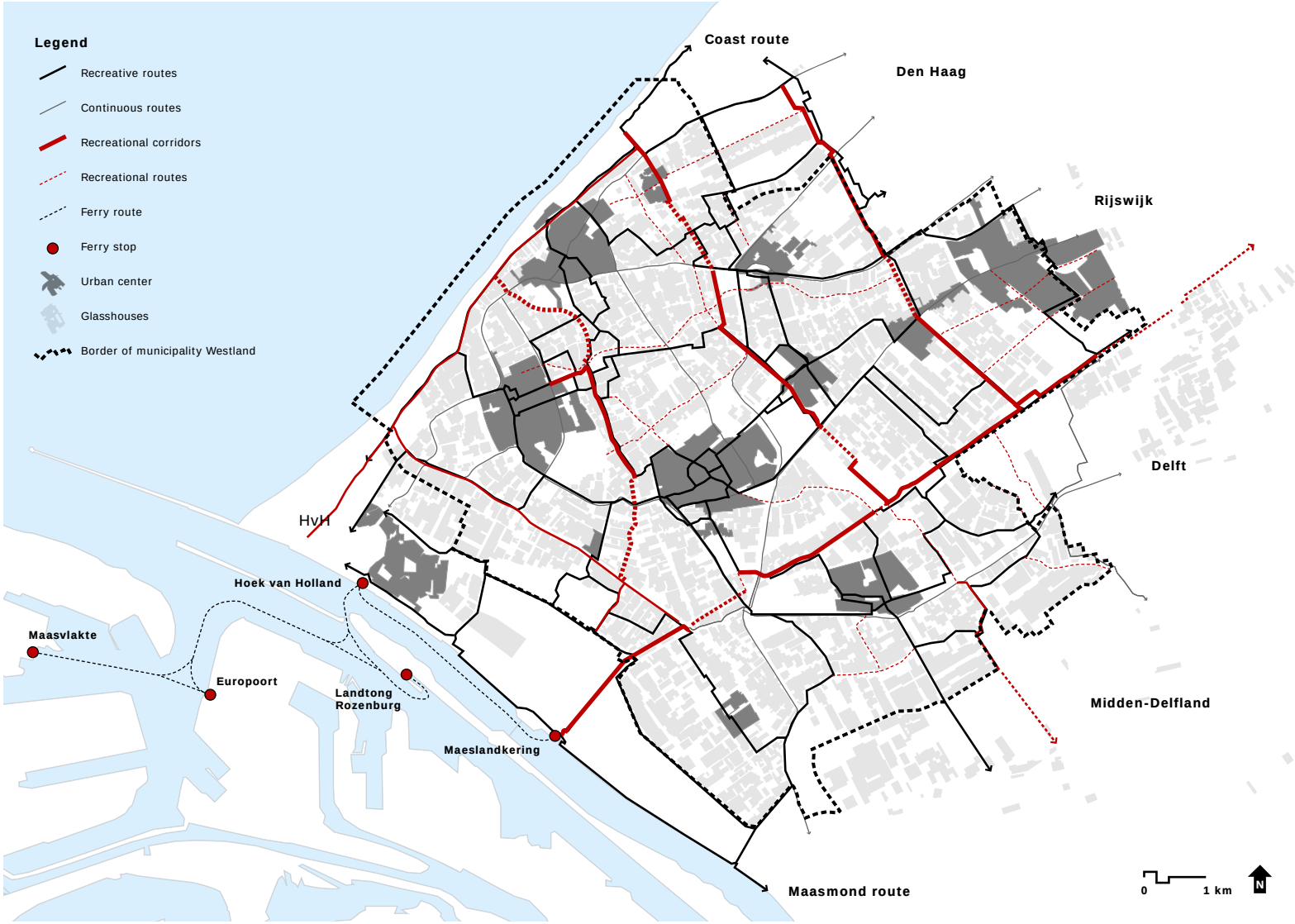
Create green and attractive routes towards surrounding green zones.

Create new ‘short cut’ routes and make use historic lines and interesting elements of the landscape.

Proposed interventions bicycle network

Within the 'Westlands Verkeer en Vervoersplan' an additional bicycle network is proposed that fills up important missing links, is connected with important green zones at the borders of the Westland and follows the main boezem water ways and main green structure instead of the crowded road network.

However the connections to Midden-Delfland and the areas next to the Nieuwe Waterweg are quite modest and could be improved and reinforced.



Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

Improve and reinforce connections with Midden-Delfland and (future) green areas next to the Nieuwe Waterweg!

Program

Glasshouse areas

The total glass surface of the Westland is around 2495,7 net ha. This is 27,5 percent of the total surface of the Westland. Almost 1/3 of the total surface is covered with glasshouses. However the total surface related to glasshouse horticulture, including water basins, tanks, installations, sheds and residual spaces, will be much more!

However in the last 10 years the surface of glasshouse horticulture in the Westland is decreasing. According to numbers of CBS there has been a decrease of 261,3 ha net glass surface in the last 10 years. The total net glass surface is decreased from 2757 ha in 1998 to around 2495,7 ha in 2007.

Because of the need to grow and scale up that takes place within the glasshouse horticultural sector, restructuring of old and outdated glasshouse areas is necessary.

Many horticultural related houses, which are situated within the glasshouse areas, are of hindrance for a prosperous and efficient process of restructuring.

Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

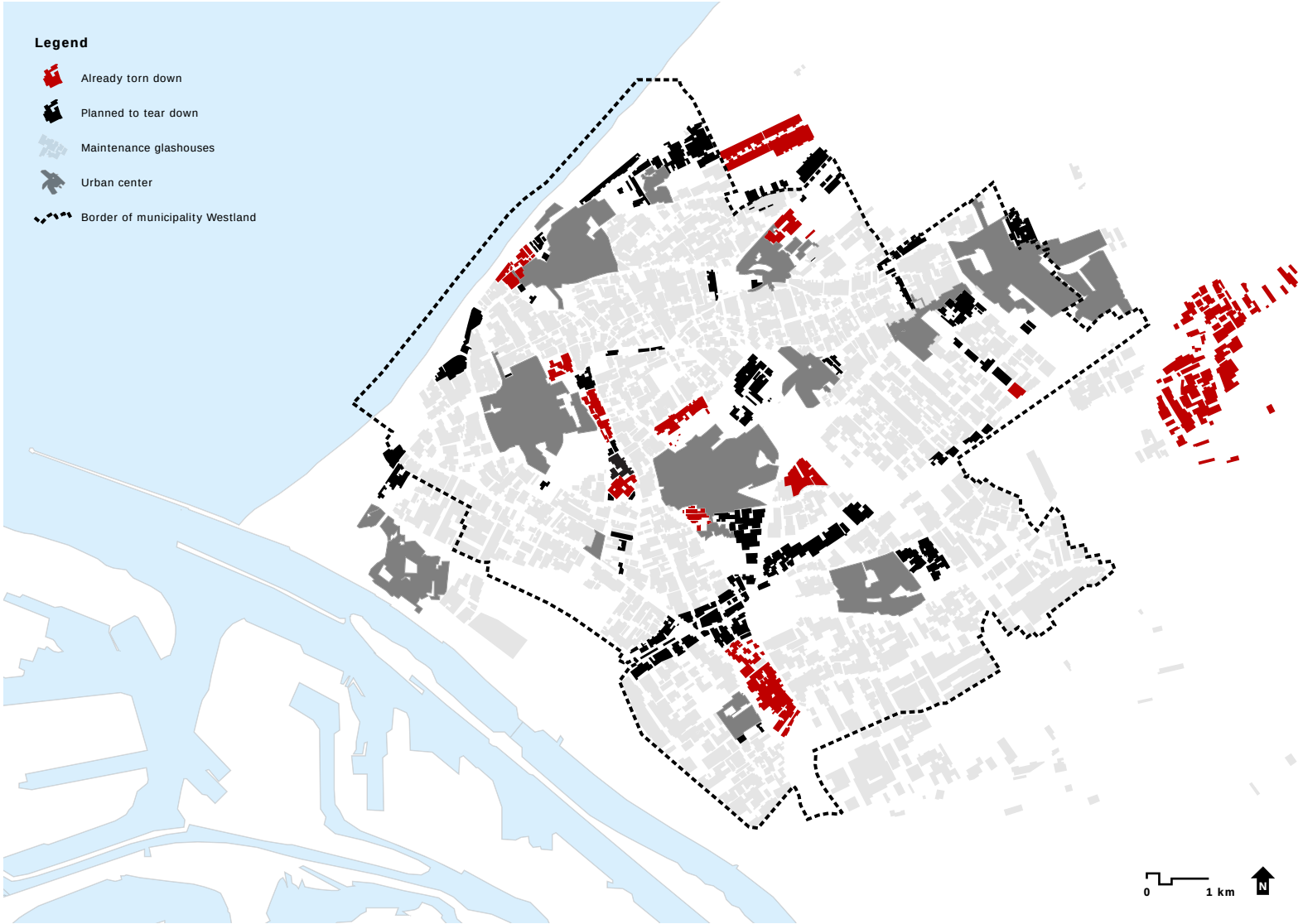
Decline of glasshouses

This drawing gives an overview of the decline of glasshouses in the last years and what must be torn down because of future plans coming forward out of the present policy of Westland.

The glasshouse structure of the year 2000 is used as starting point and is represented in light gray. These glasshouse will be maintained in the future or transformed into durable and flexible glasshouse areas.

The glasshouses that are coloured red do represent the areas where glasshouses are torn down already.

The glasshouses that are coloured black do represent the areas where glasshouse will be torn down if the present policy and related future plans will be accomplished.



Urban areas

Westland counts 11 urban centers of which ‘s-Gravenzande has the most inhabitants and Naaldwijk is the most important because of the central position and the highest provision and facility level.

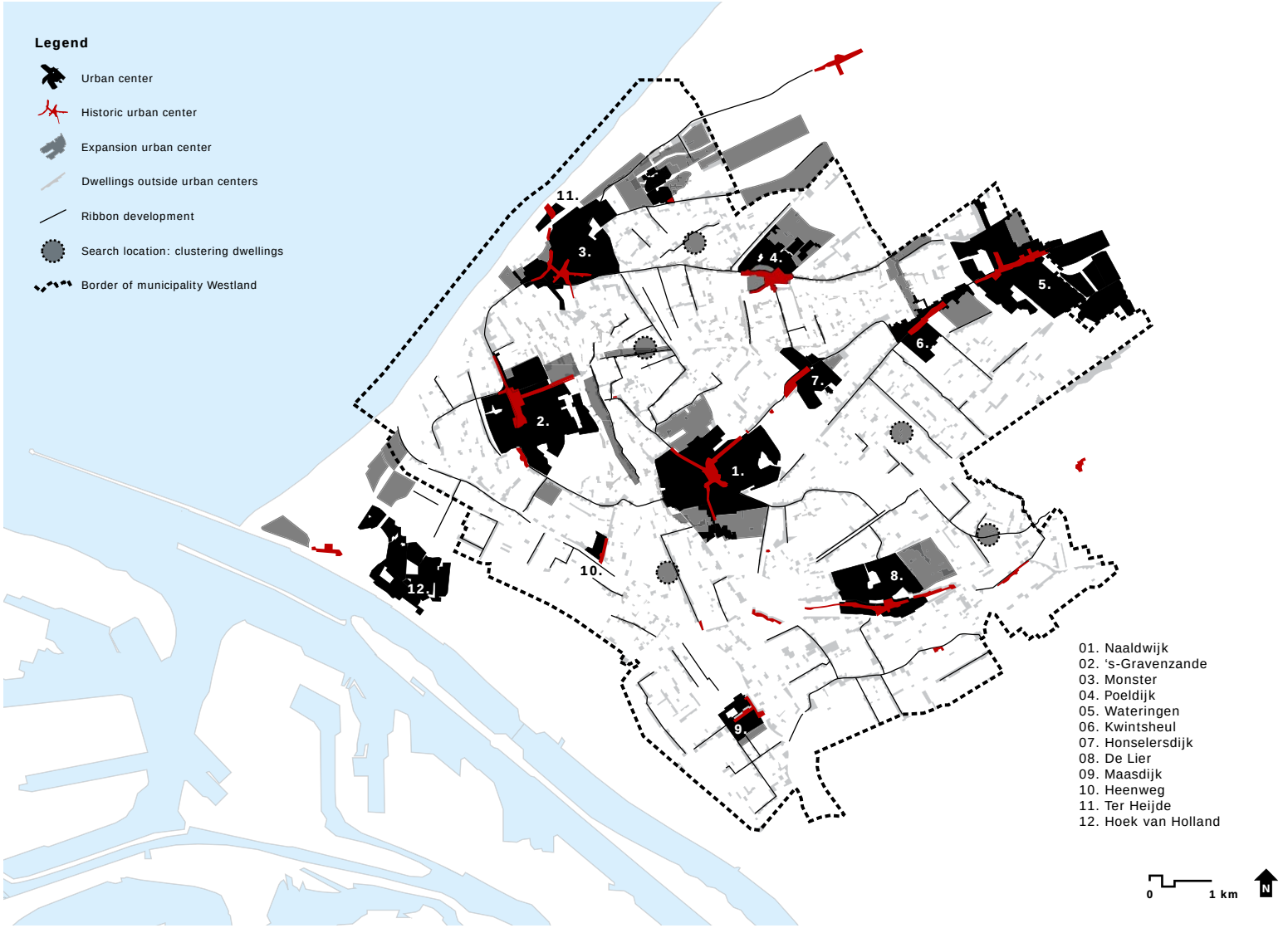
As can be seen there are many future development locations to expand the present urban centers (4.500 dwellings). Besides these expansions the Westland mainly put in on densification of the present urban centers (4.500 dwellings). Furthermore the development locations in the north, related to the ‘Westlandse Zoom’ (2.000 dwellings), and the ‘Poelzone’ (1.500 dwellings) will be part of the future urban structure.

Because of the restructuring of glasshouse areas Westland does also point out some search locations where horticultural housing could be clustered to be able to realise durable and flexible glasshouse areas.

Besides the urban centers the Westland is characterised by a lot of ribbon development.

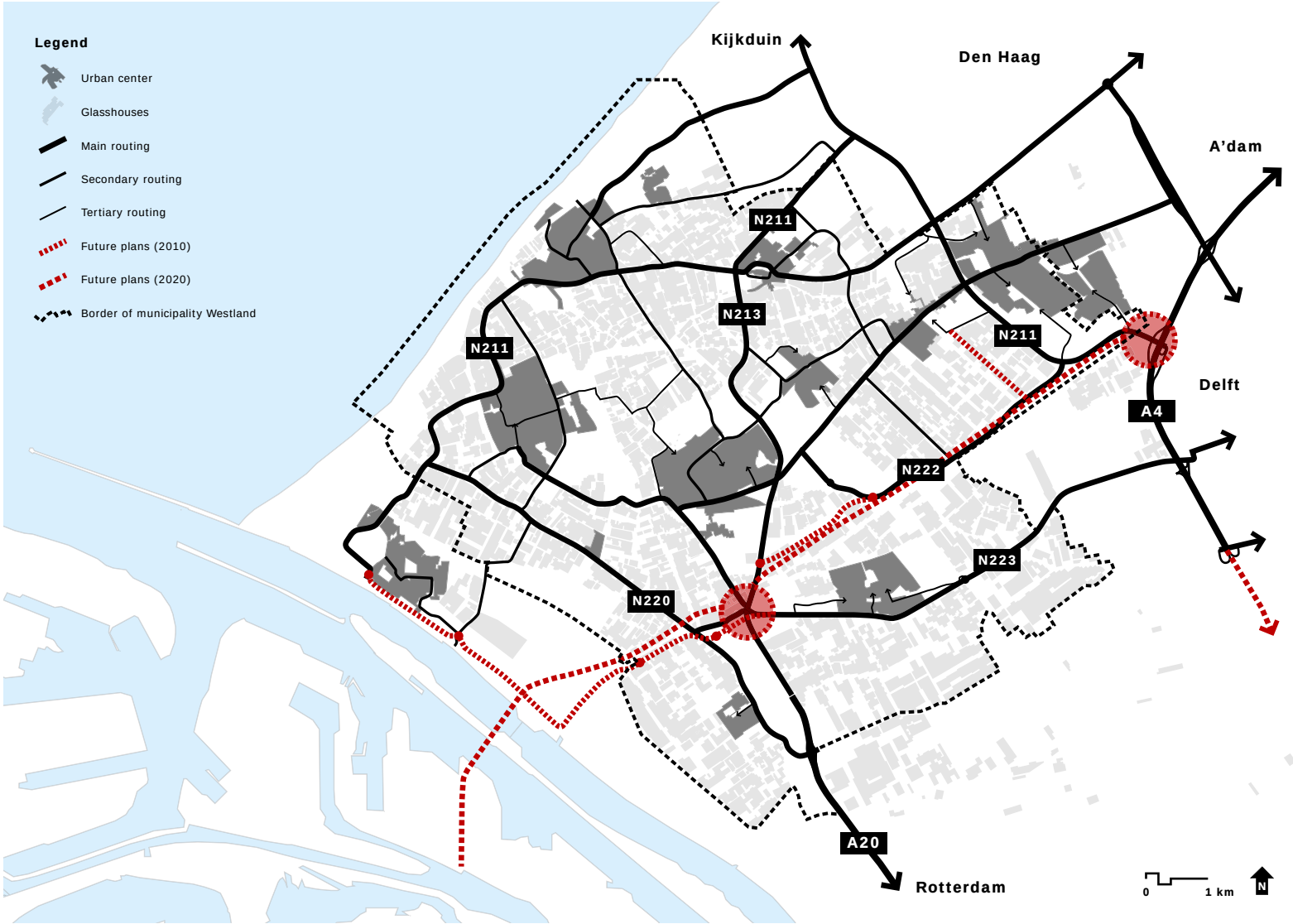
Densification of urban centers!

Clustering of dispersed horticultural housing!



Source: Gemeente Westland (2005). Visie Greenport Westland 2020 [policy document]

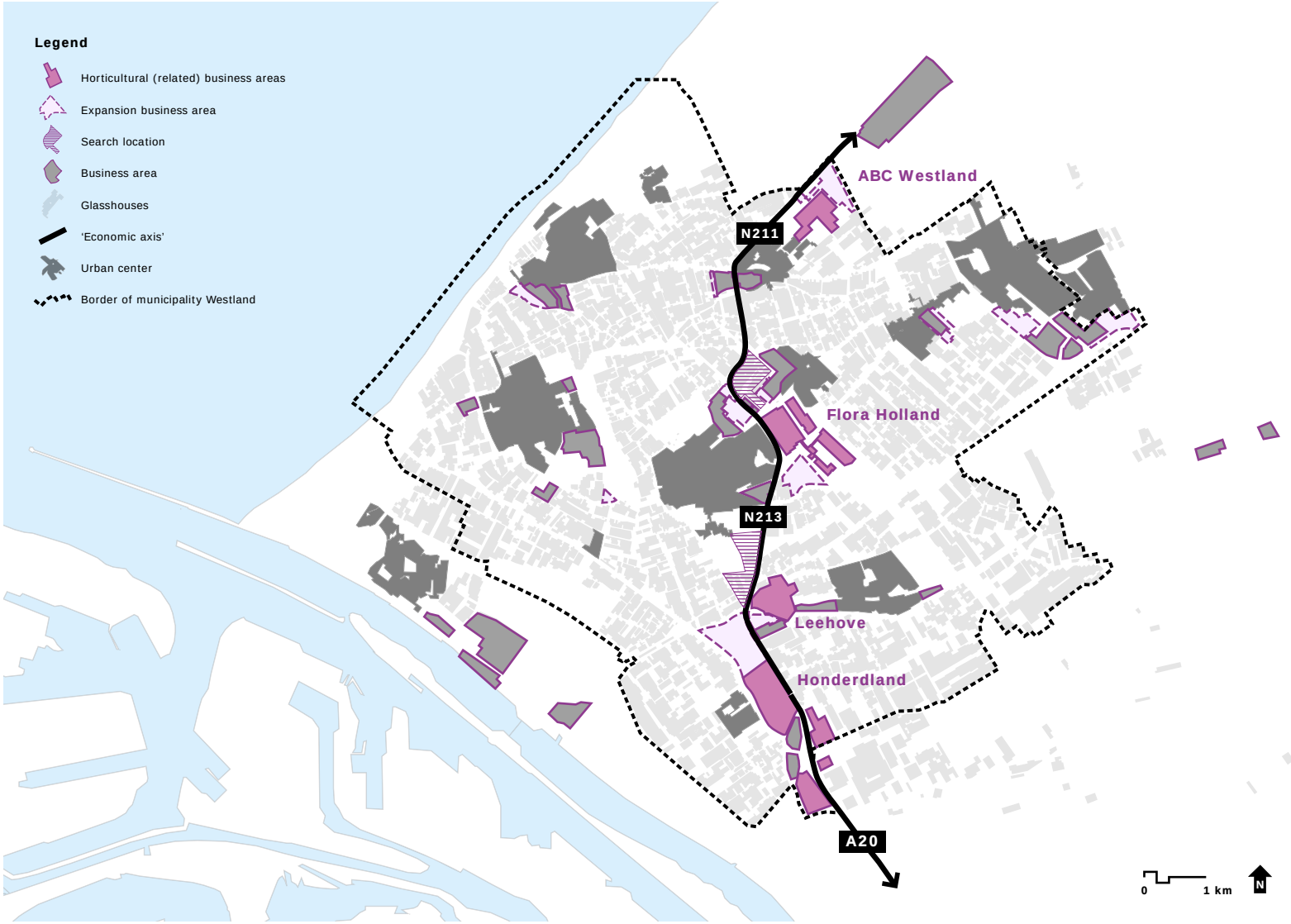
Accessibility urban centers (main roads)



Business areas

Within the Westland there are bigger and smaller business areas. The most important and related to the glasshouse horticulture are situated next to the line A20 - N213 - N211, also known as the 'economic axis'.

The local policy aims for development and reinforcement of this axis. Most of the planned expansions and new sites for business activities are therefore next to this axis.

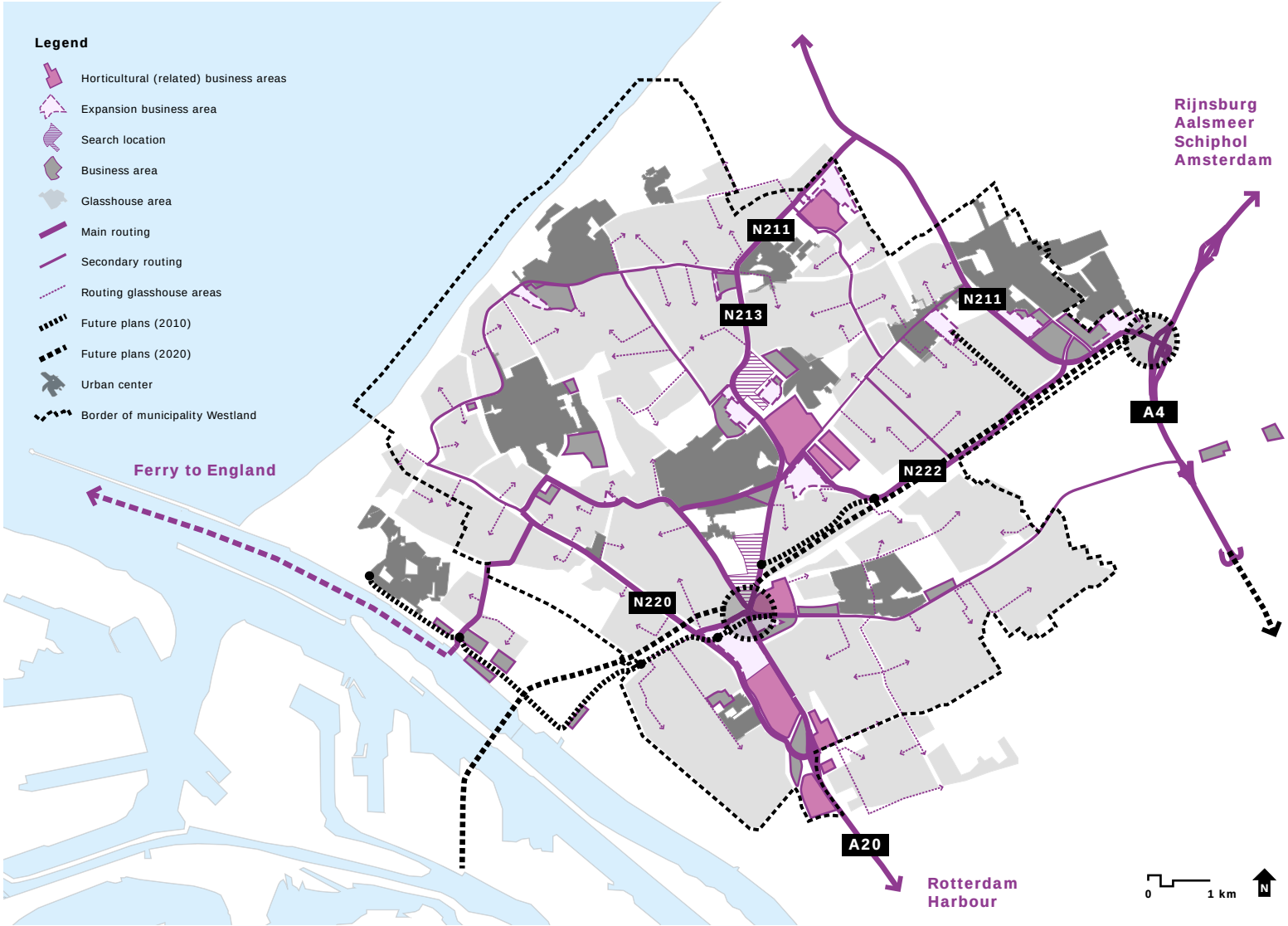


Source: Gemeente Westland (2005). Visie Greenport Westland 2020 [policy document]

Accessibility business areas & glasshouse areas (main roads)

The elongation of the N222 and the construction of a direct connection with the other side of the Nieuwe Waterweg could lead to new possibilities for business areas which are situated next to this future infrastructural line.

Areas in the Wateringveldsche-polder, Oude en Nieuwe Broek-polder, Vlietpolder, Olieblok or next to the Nieuw Waterweg could be interesting development locations.



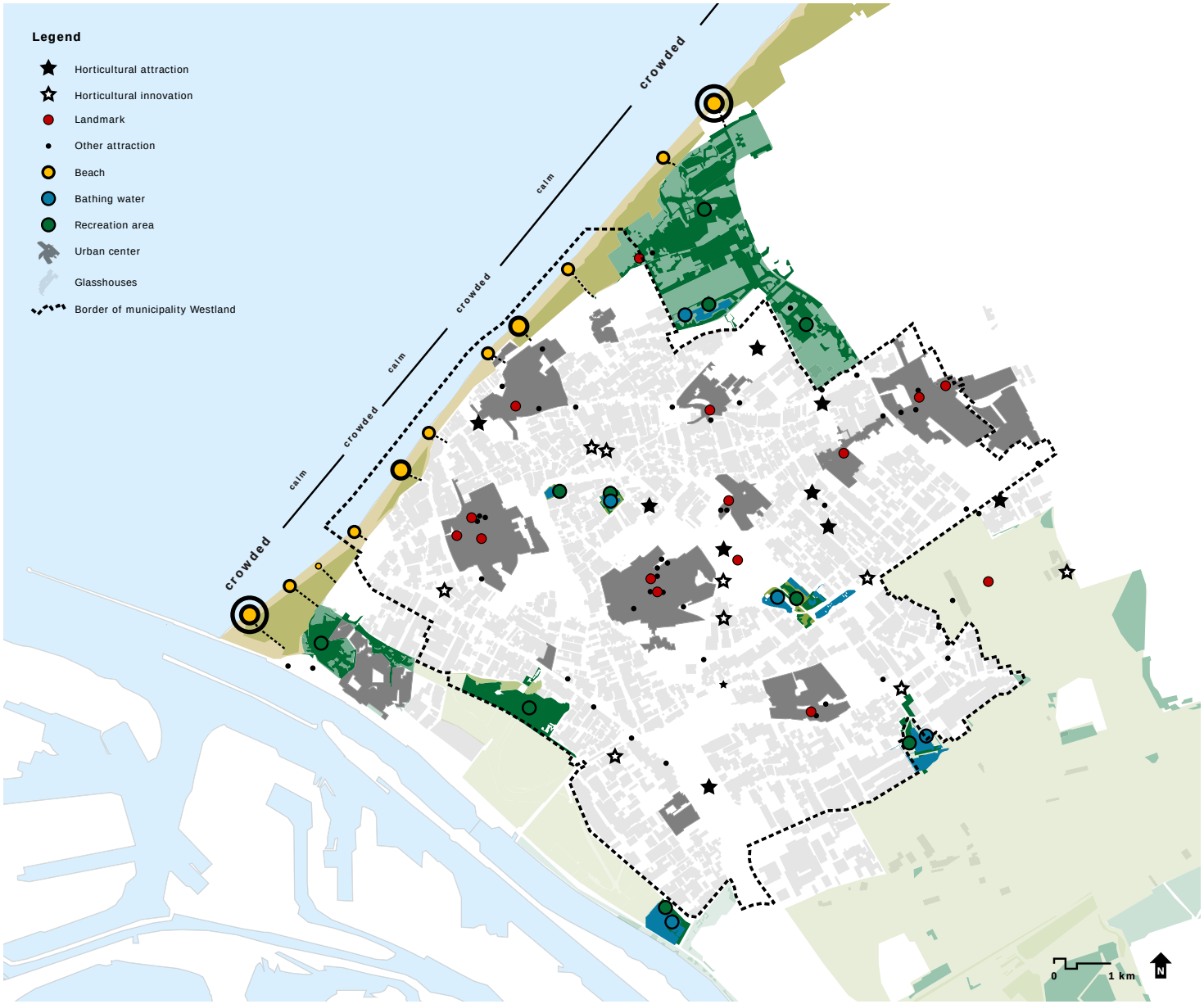
Possibilities to develop business areas next to future main infrastructural routes.

Recreation

The coast zone encloses crowded and calm parts, related to the intensity of the different beaches. According to the policy of Westland and the Hoogheemraadschap this must be maintained.
Although the broadening of the coast will lead to new possibilities for green and recreational areas large scale recreational or urban development will be declined.

The drawing shows that there are, dispersed of the area, many glasshouse horticultural attractions or places were horticultural innovations are realised.

With exception of the water tower in Solleveld and the auction building in Naaldwijk the present landmarks are mainly related to churches in the urban centers.



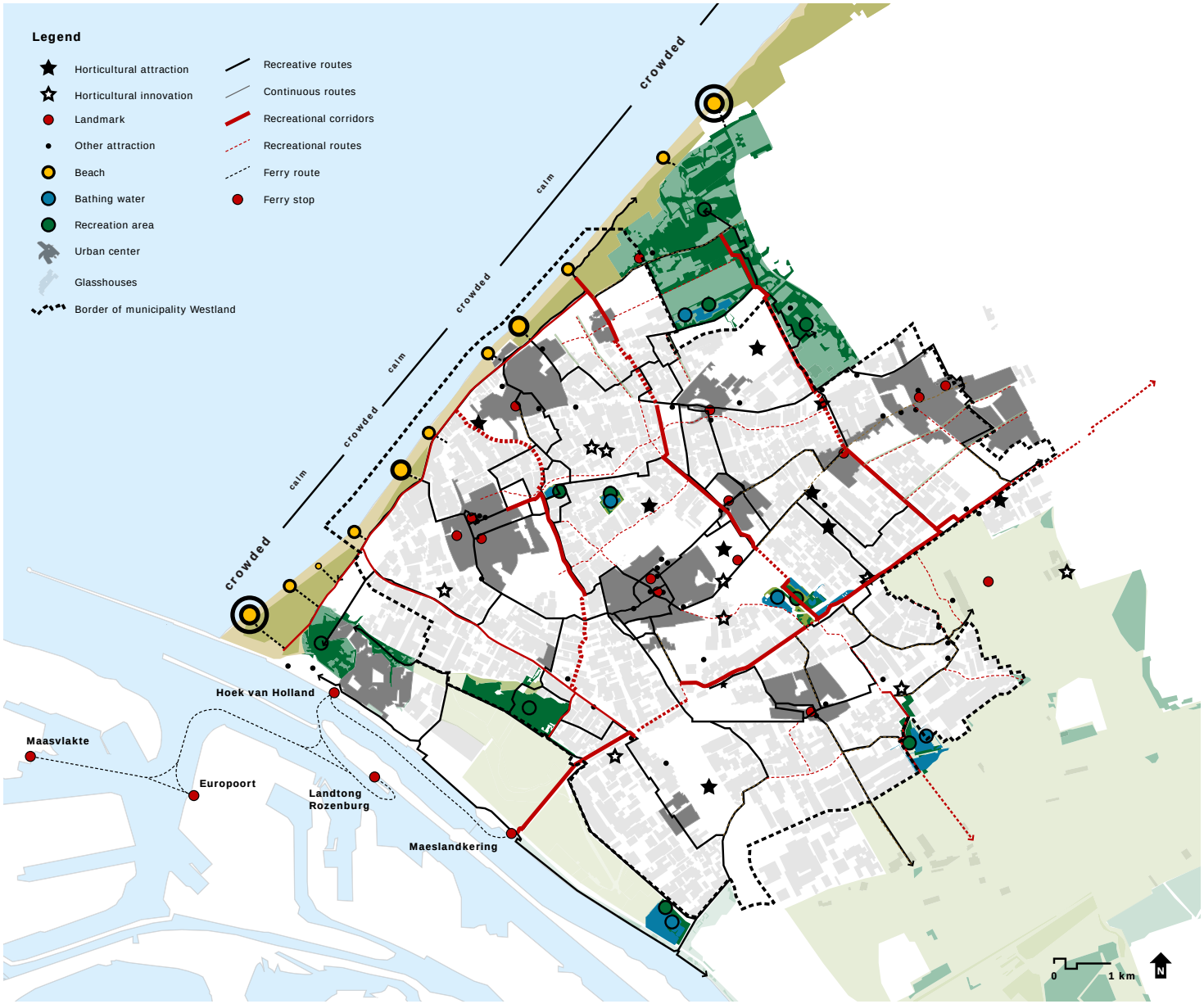
Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Recreative routing (bicycle)

The present and future bicycle network is mainly tuned in to the green recreational areas in the Westland.

A lot of horticultural attractions and innovations are not related to a recreational route, while glasshouse horticulture is one of the most important elments in this region.

Link horticultural attractions and innovations to the recreational network or create a special horticultural route that links these typical places.



Source: Gemeente Westland (2006). Westlands Verkeer en Vervoersplan [policy document]

Cultural History

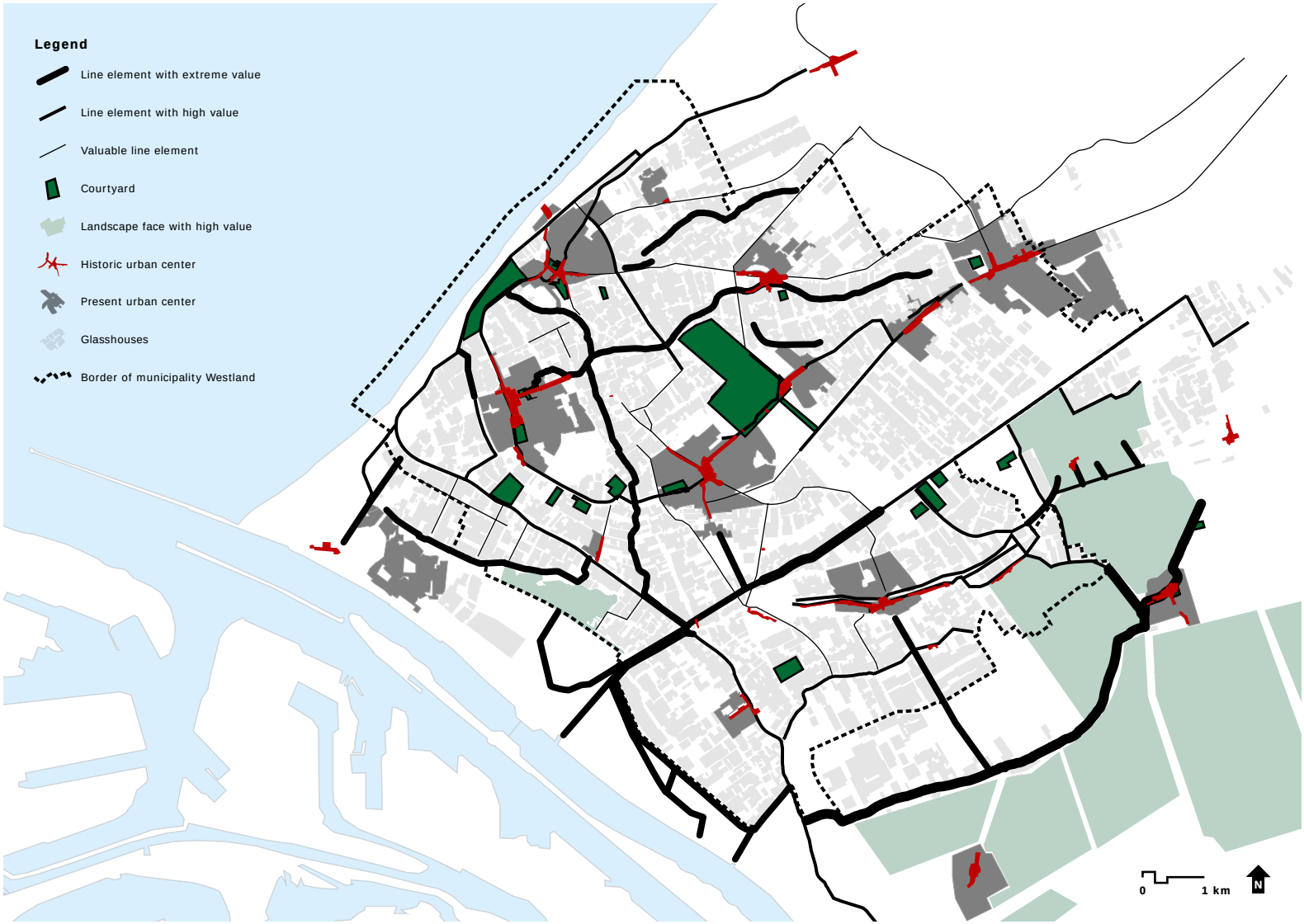
Cultural historic main structure

Based on the three main parts of cultural history, archaeology, historic urbanism and historic landscape, the province of Zuid-Holland composed a cultural historic main structure which provides an overview of the cultural historic characteristics and values of Zuid-Holland.

As can be seen there are many important line elements, mainly related to historic water ways, dikes and ribbon development.
Furthermore the historic courtyards do have a high cultural historic value and do refer to the roots of the glasshouse horticulture in this area.
The Staalduinse bos and big parts of Midden-Delfland can be considered as landscapes with a high cultural historic importance.

These cultural historic line elements and places do link the area to this particular place and give the region a certain identity. By restoring and reinforcing these elements the Westland can be linked to the legislative history, something that makes the area readable. At the same time it could generate a higher quality of the living environment.

Restoring and reinforcing cultural historic elements and places.



Source: Provincie Zuid-Holland (2008). Cultuurhistorische Hoofdstructuur (CHS) - Cultuurhistorische kaart [map]

Defence works (WWII)

To protect the hinterland against hostile attacks coming from the Noordzee the Germans built many blockhouses along the coast line.

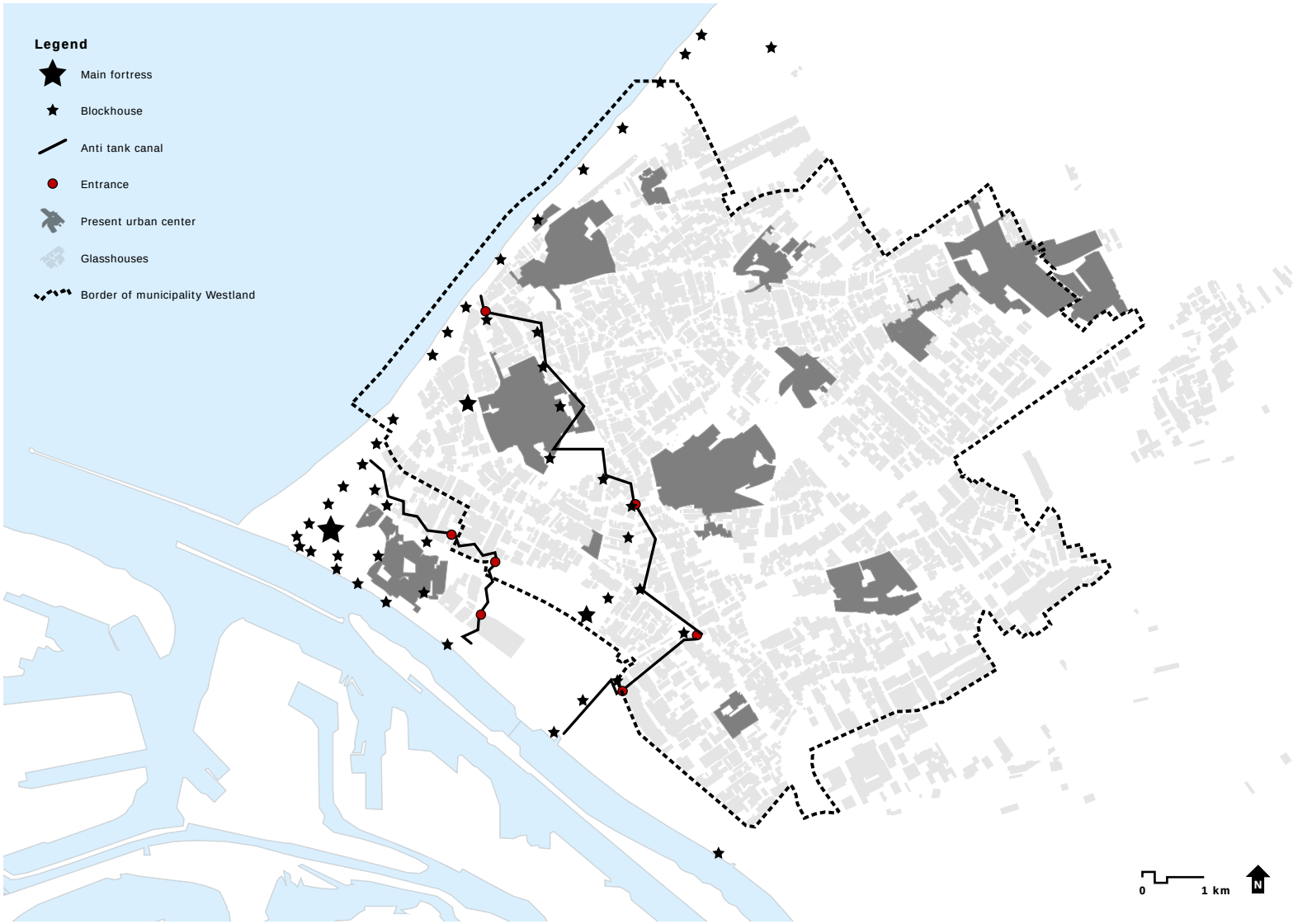
To defend the Nieuwe Waterweg, the Germans built a fortress in Hoek van Holland and several smaller blockhouses along the Nieuwe Waterweg.

To protect this fortress against attacks from land the Germans created two defence lines of which each line consist out of a anti tank canal with several blockhouses.

Together these defence works were called the 'Festung Hoek van Holland' and were part of the Atlantikwall defence running from Spain up to Norway.

Many blockhouses and several parts of the outer anti tank canal are still present (p. 76).

Restore the outer anti tank canal and combine this unique water element with green spaces. These green spaces could be linked to blockhouses that are still present or their former locations.



Source: Stellungsbaukarte der Festung Hoek v. Holland (1945) [map]

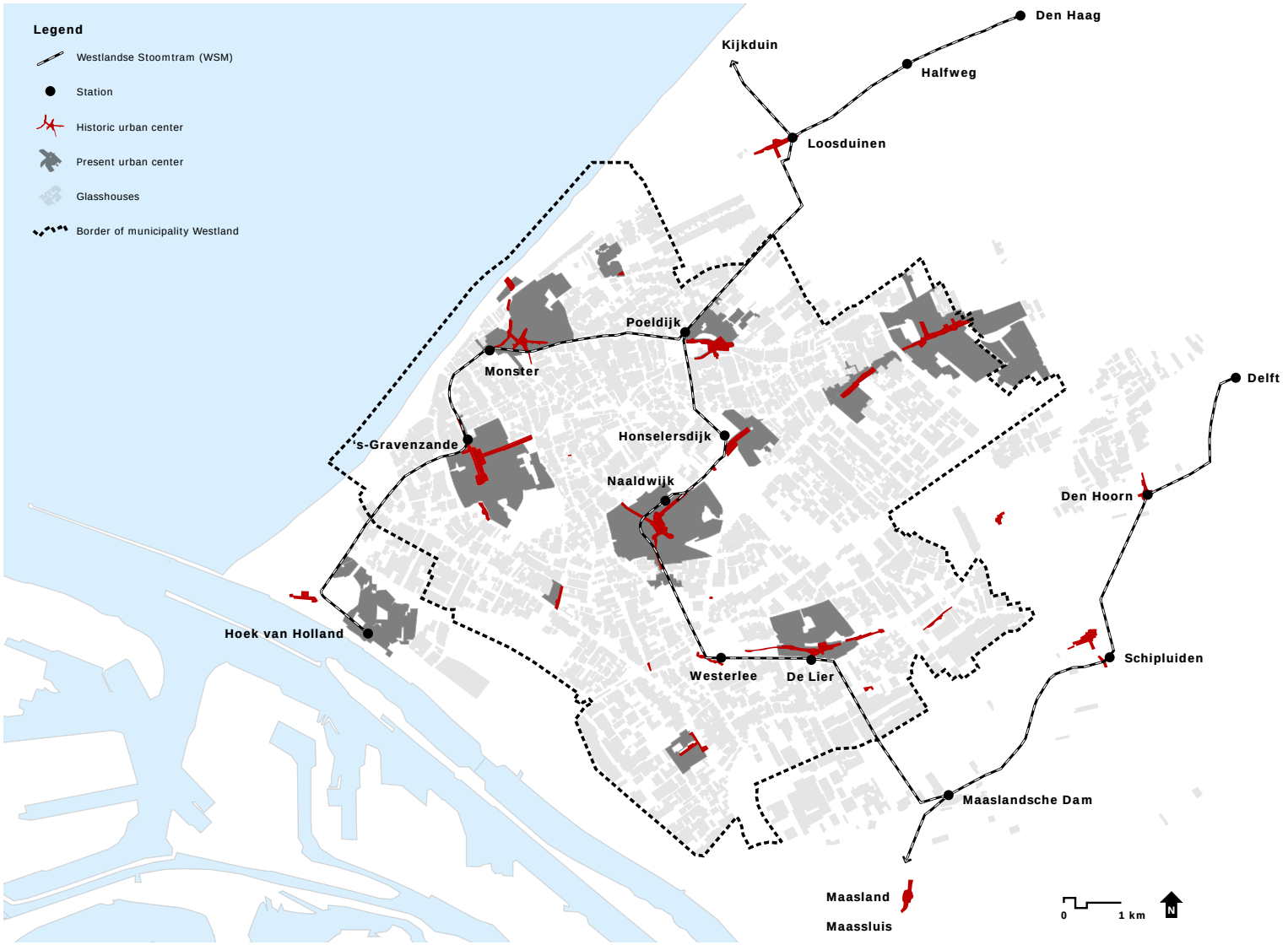
Tracks Westlandsche Stoomtram Maatschappij (WSM)

In the period between 1882 and 1970 several tracks of the 'Westlandse Stoomtram Maatschappij' were used to transport persons and cargo. Almost every urban center had a station that was most of the time linked to the local auction of horticultural products. This was the main reason that the tracks also were used for cargo and not only for persons.
Because of the rise of bus transport and the the upcoming cargo transport by truck the tram becomes redundant.

The former tracks followed the main ribbons of that time and most of them become nowadays important main roads.

If high quality public transport, like for example a light rail or RandstadRail becomes useful again and feasible, refer to historic system and look if it is possible to follow the historic track.

Maybe there are possibilities to combine the transport of persons with the transport of horticultural cargo on the future transport system.



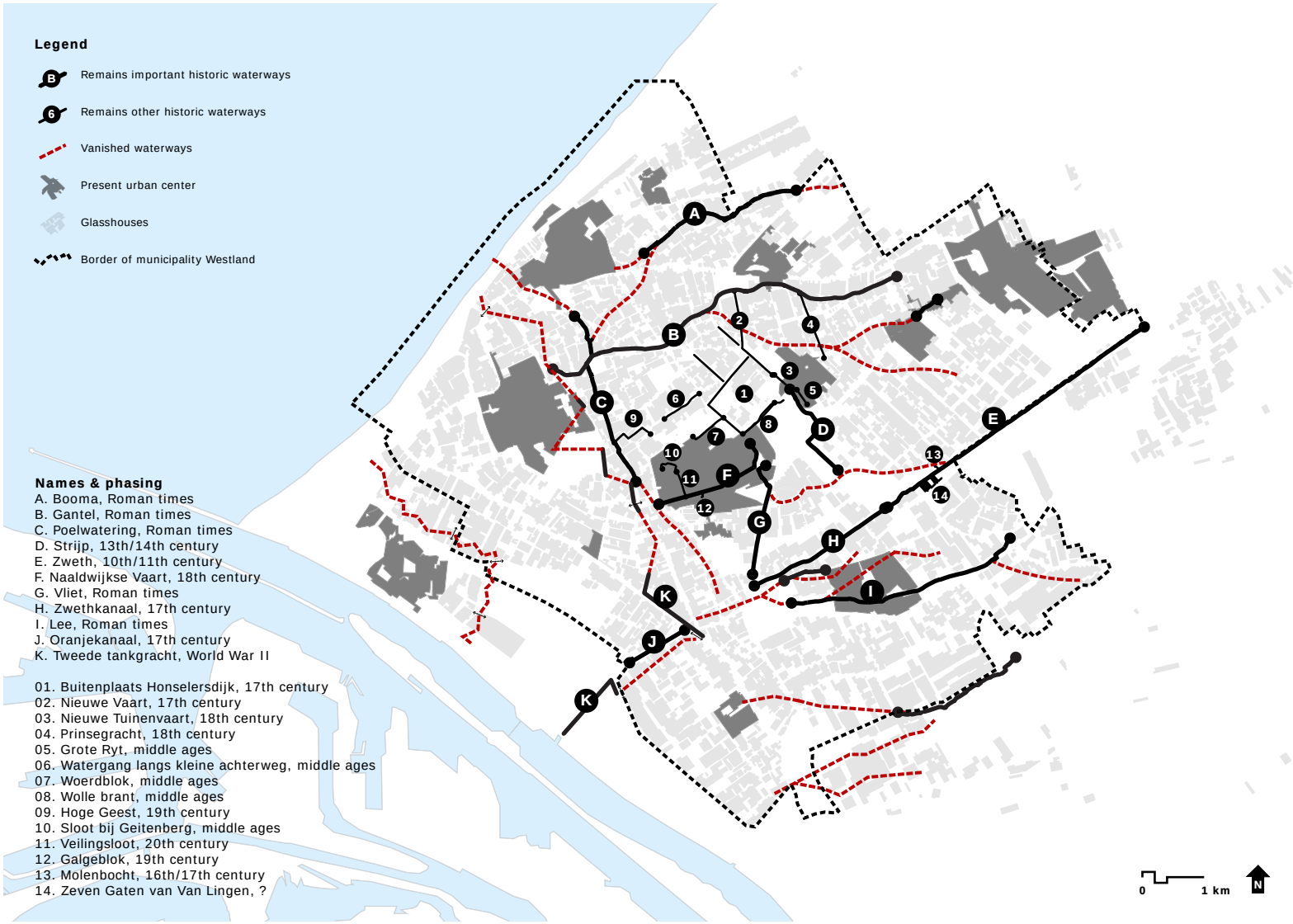
Source: Gemeente Westland & Gemeente Midden-Delfland (?). Stoomtram routekaart [map]

Remains historic waterways

This drawing gives an overview of the remaining parts of historic waterways and some important tidal creeks.

At the same time waterways, tidal creeks or parts of it that are disappeared because of the transformation of the area are shown.

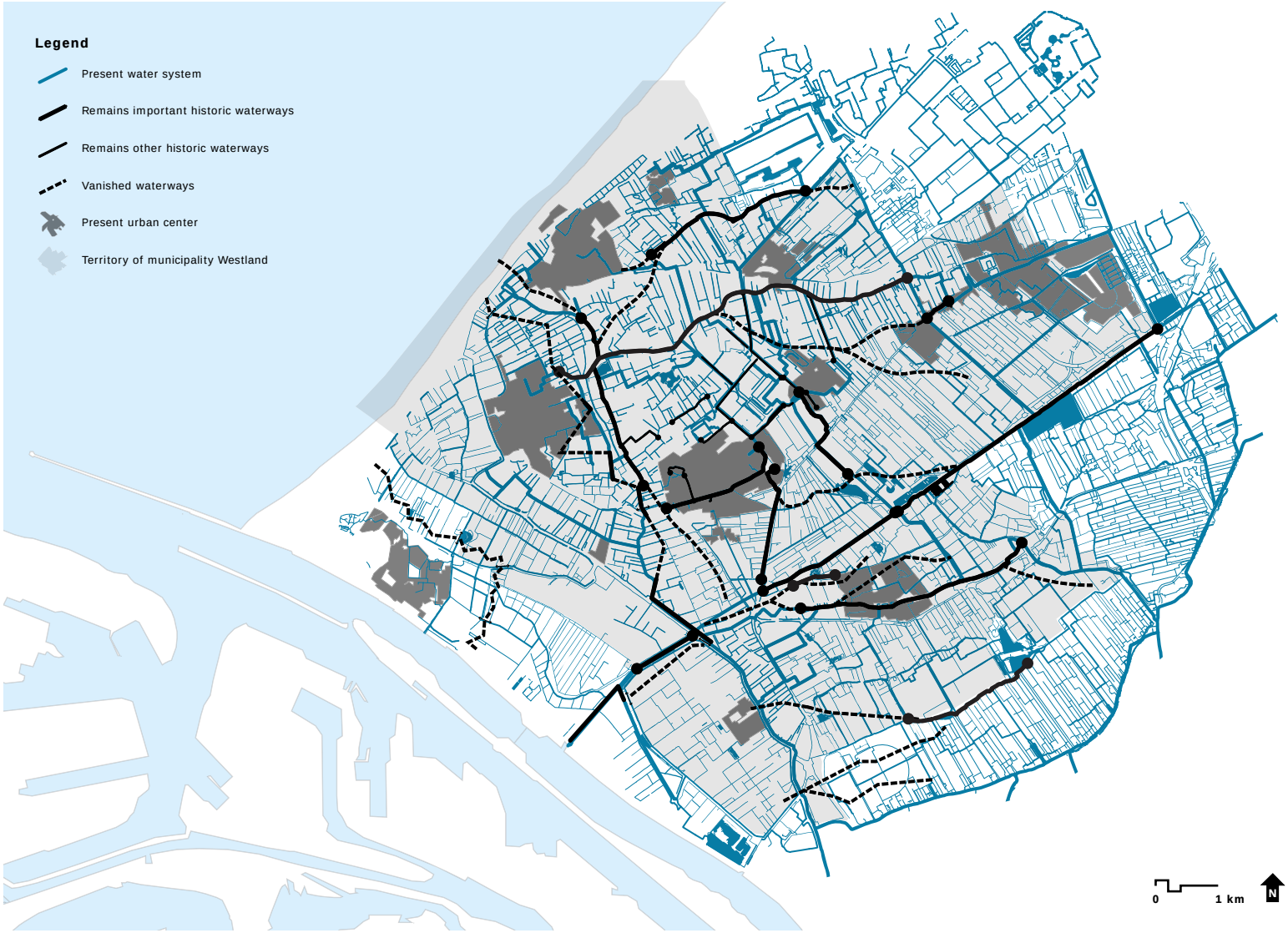
To generate a higher spatial quality it could be possible to restore and reinforce these waterways to bring back the readability and some of the identity of the Westland.



Restore and reinforce waterways and tidal creeeks with a cultural historic value.

Source: Gemeente Westland & Hoogheemraadschap van Delfland (2008). Waterplan Westland [policy document]

Remains historic waterways



Historic dikes

The many dikes that were and are situated in the area representing the fight against the water in this former delta area and the movement of the sea and former Maas mouth.

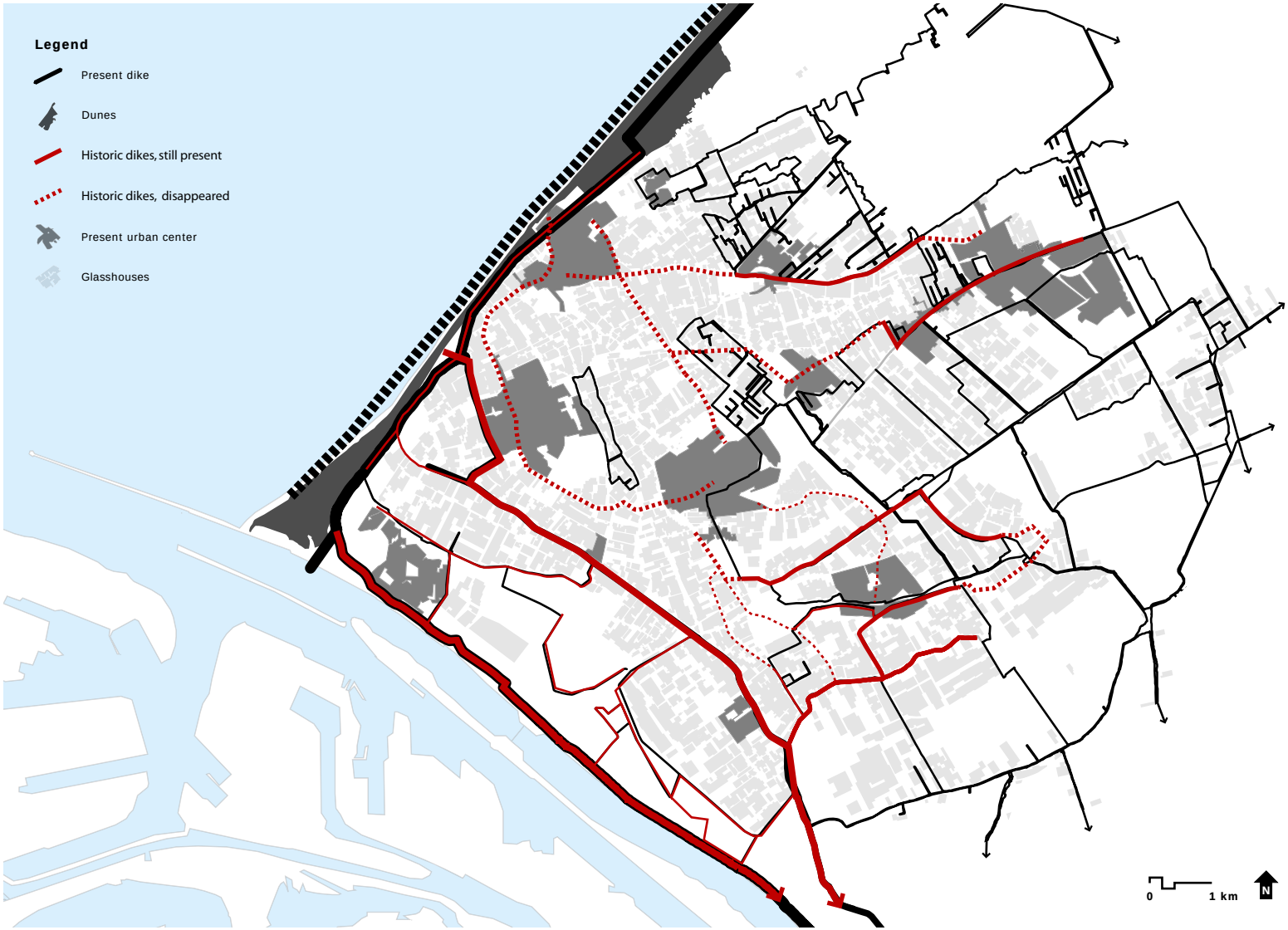
The first dikes were constructed to guide and confine the tidal creeks. Later on the most important issue was the protection against the Noordzee (coast line) and the water of the Maas mouth. Especially the fight against the water of the Maas mouth (later on the Nieuwe Waterweg) lead up to a sequence of interventions.

Nowadays most of these historic dikes become important main roads built-in by glasshouses or urban development although they can be considered as important line elements with a high cultural and historic value.

Restore and reinforce dikes with a cultural historic value!

Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept)

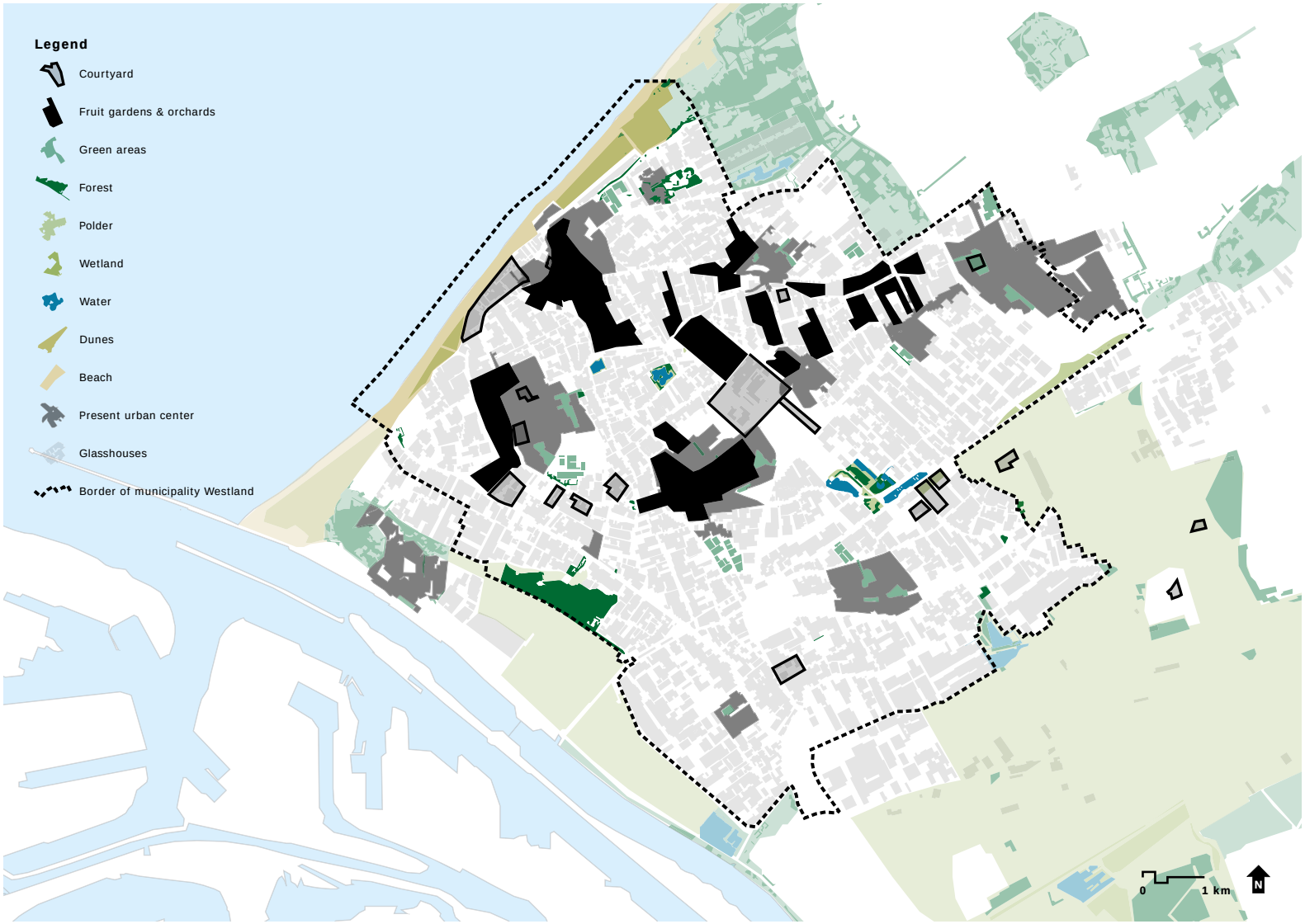
Remains historic dikes



Courtyards & first horticulture (1850)

This drawing gives an overview of the former courtyards and first horticulture in terms of fruit gardens and orchards, around the year 1850. As already described these fruit gardens and orchards were mainly situated next to the river Gantel.

Looking than to the lack of green in Westland, these historic places can be used to create new green spaces within the present green main structure of the Westland and could be seen as additional green stepping stones within the main network.



Bring back historic courtyards or create green open spaces in glasshouse areas where former fruit gardens or orchards were situated!

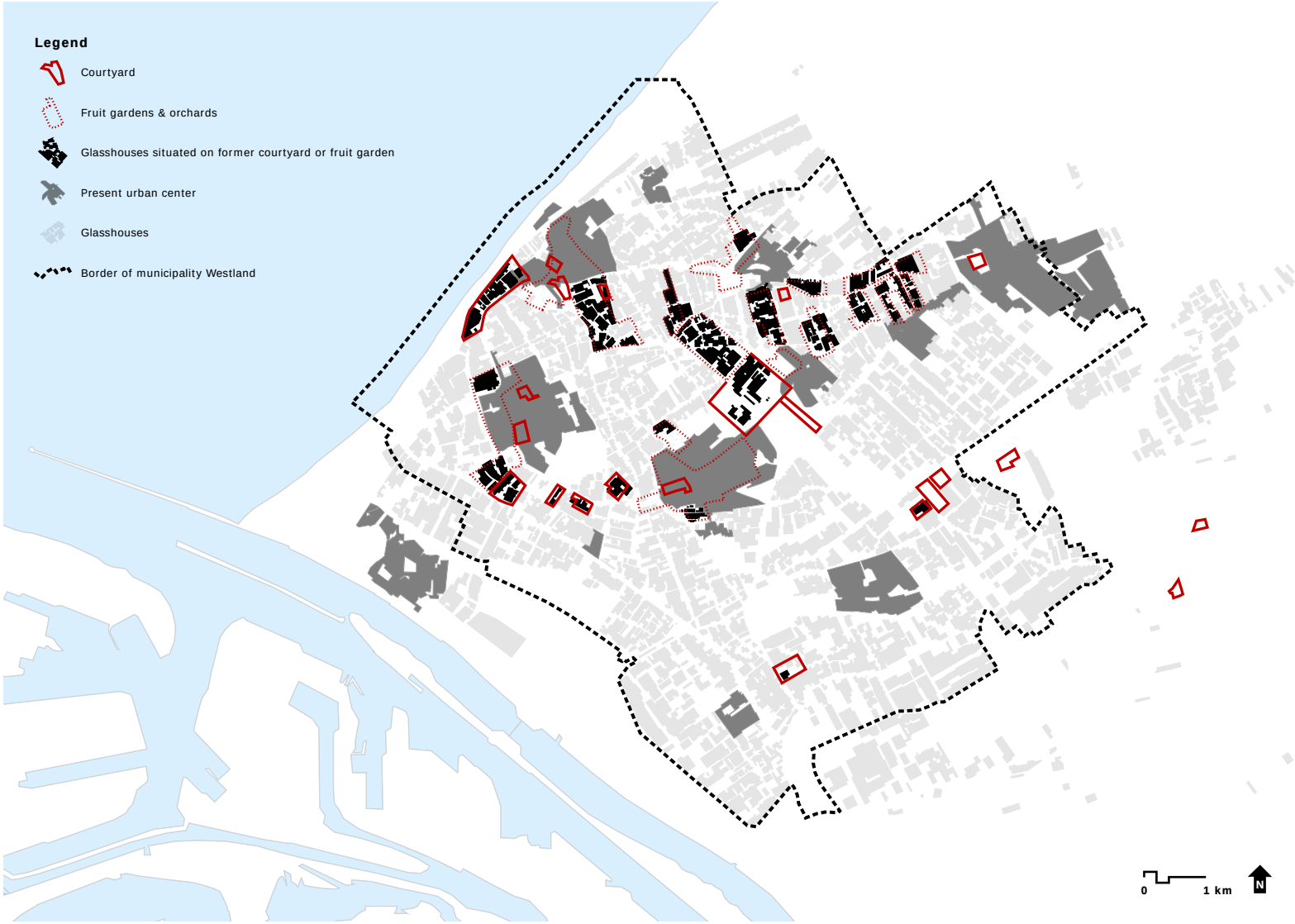
Create green spaces enclosed by glasshouses in order to refer to the historic courtyards.

Source: Gemeente Westland (2007). Kwaliteitsagenda Westland (Concept) [policy document]

Courtyards & first horticulture (1850)

Within this drawing the former courtyards, fruit gardens and orchards are combined with the present glasshouse structure.

The glasshouses that are coloured black are built on the location of a former courtyard, fruit garden or orchard.



Part C

From **Glass City** to **Hybrid Landscape**

The transformation of a historic grown glasshouse concentration in the Randstad

Msc4 Graduation Lab Urbanism

Product	**: Structural vision**
Status	**: Final**
Date	**: 03-07-2009**

Student	: Sander Krul
Student #	: 1297333
Main Mentor	: Ir. I. Bobbink
Second Mentor	: Ir. F.F. Colombo
Third Mentor	: Dr. T. Schuetze

Topografic map Westland

Content

1 STARTING POINTS

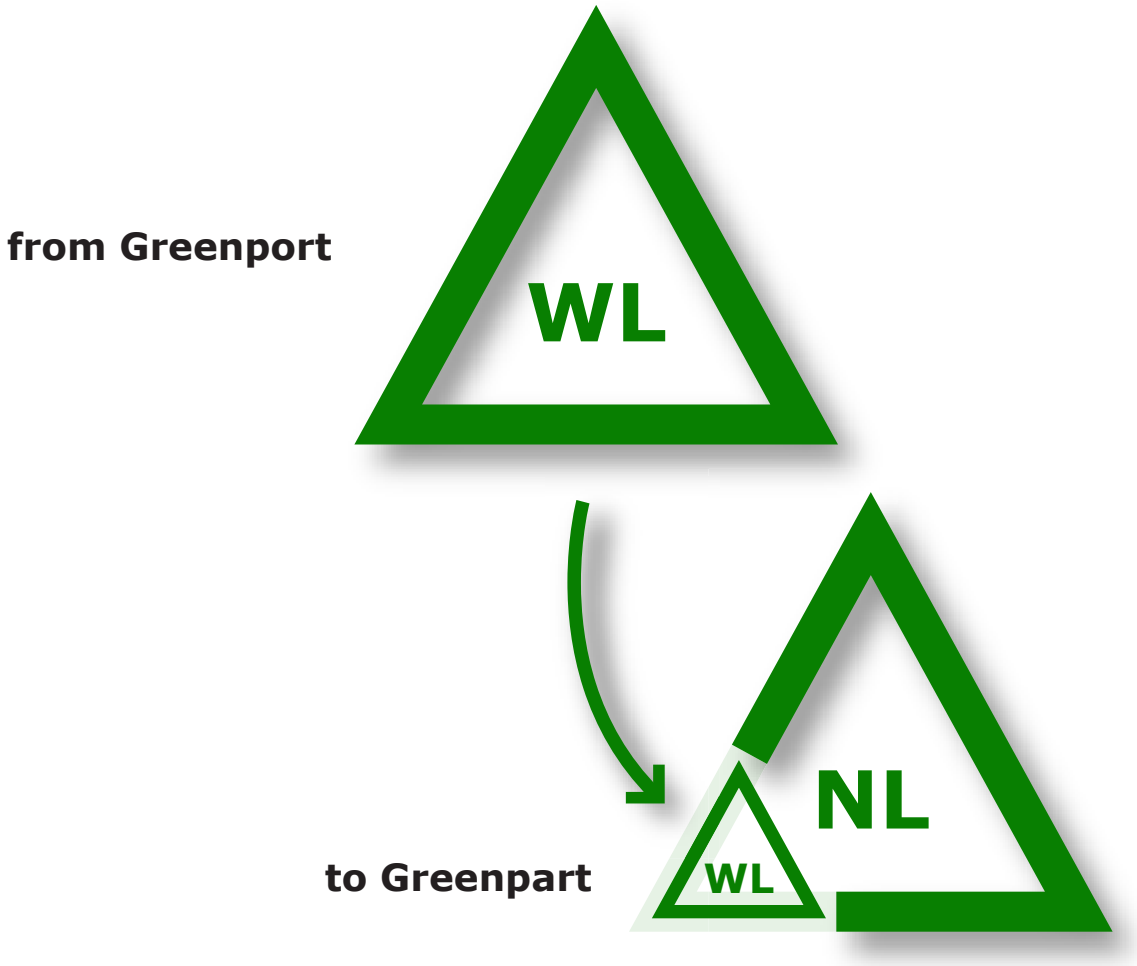
1.1 Introduction

In this chapter the most important results and starting points out of different other parts of the project will be summarized. These aspects will be of importance for the new sustainable spatial structure and could be used or applied to improve the spatial quality of the area.

First of all a fundamental vision related to the question how to deal with the decrease of glass surface can be formulated and is based on some important conclusions made in the theoretical research.

Then the main starting points coming from the analysis will be bundled and enumerated within the different used main groups.

At last the results of a study about glasshouse horticulture and spatial quality will be listed and ordered by utility-, amenity-, and future value.



1.2 Vision

As stated in the objectives of this thesis, a decrease of glass surface is necessary to come to a consistent and structural renewal of the area. On the one hand to concede to the spatial demands that are required in the Randstad but also to ensure the vitality and continued existence of the glasshouse horticulture in this area. Restrictive and historical thinking and the preservation of strict regional boundaries will finally lead to uprooting of the glasshouse horticulture. To reach a healthy development of the glasshouse horticulture it is essential that the horticultural activities spread over the Netherlands. This will occur a shift from separate regional glasshouse concentrations towards one 'Dutch glasshouse complex' that is not restrained to regional boundaries. In fact the central function will be on a higher geographic scale level.

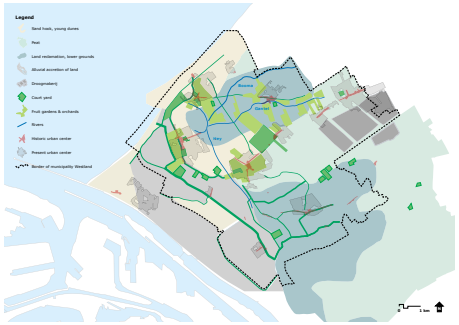
By considering the Westland as an integral part of Greenport Nederland the present glasshouse cluster can be developed to an area with a complete new meaning and appearance and can concede to the high quality requirements of the Randstad. There will be a movement of big production companies and the emphasis will be more on the increase of production and added value, high quality products, knowledge, innovation and niches. Of course the total glass surface within the concentration will decrease but according to the future prospects there still will be a relatively big part of the production areas left and a big part of the horticultural related companies including most of their head offices will be located in these areas.

1.3 Output analysis

By making an analysis it is possible to clarify and understand the spatial structures. At the same time it provides important starting points which can be used to set up the new sustainable spatial structure.

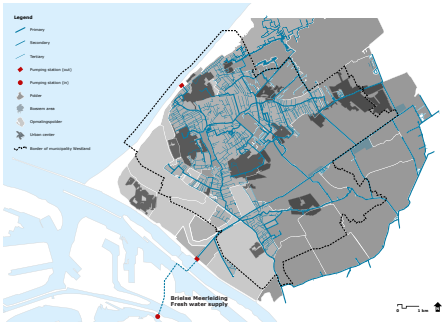
Complementary to the analysis of the present situation there has been a analysis of the geological transformation of the landscape and of important cultural historic elements. By doing this the new sustainable spatial structure could also be placed within a historic perspective.

Next to this the most important and relevant starting points related to the improvement of the spatial quality are arranged within the different main groups of the analysis.



Landscape

- Restore and reinforce historic creek rivers
- Restore historic fruit gardens and orchards
- Restore former courtyards
- Adapt to the differentiation of allotments
- Use lower parts to create seasonal, peak or calamity water storage
- Refer to tidal landscape with creeks, pools and wetlands
- Refer to historic sand hook; first settlements on higher grounds & low wet inner area

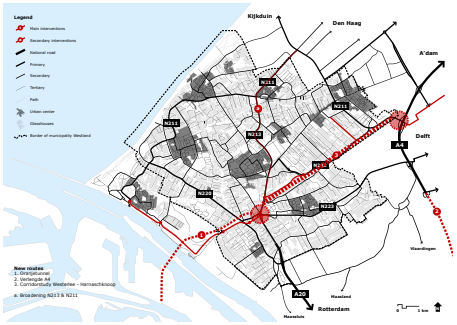


Water

- Create an independent and self sufficient water system
- Integrate water storage into the nature development of the Maas zone
- Use dune areas for water storage; continuation of dune water line
- Solve big lack of water storage, especially the lower polders
- Spatial orientation on water network
- Ensure accessibility and visibility water network
- Create recreational routing next to water network
- Link green and recreational spaces to water network
- Broadening of present water ways
- Create new waterways
- Reinforcement historic waterways

Green

- Link isolated green areas
- Reinforcement of green and recreational value coast zone and Midden-Delfland
- Take non-use areas and empty spaces of former glasshouses into account
- Take rest spaces at the edges of glasshouse areas into account
- Connecting the coast zone with Midden-Delfland
- Reinforce green & recreational routing towards isolated green areas and bigger green areas at the borders of municipality
- Create green ‘stepping stones’ within the glasshouses
- Create green and natural shores

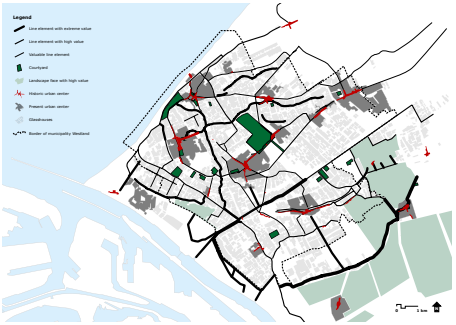


Infrastructure

- Upgrade insufficient and outdated road structure
- Improve disclosure of Westland
- Redesign problematic traffic nodes
- Combine road, rail and water transport on one place; ‘Greenport Terminal’
- Integrate high quality public transport
- Separate bicycle network from car and cargo network; create short cuts
- Extend bicycle network and recreational routing
- Separate recreational network from car and cargo network

Program

- Cluster dispersed horticultural housing; ribbon development or small groups
- Create business areas next to new infrastructural lines
- Concentrate business areas next to economic axis
- Combine economic axis with high quality public transport
- Link horticultural attractions and innovative companies to recreational routing



Cultural history

Restore and reinforce cultural historic elements and places:

- Waterways
- Dikes
- Ribbon development
- Courtyards
- Fruit gardens & orchards
- Creek rivers
- Defence works WOII; blockhouses & anti tank canal
- Tracks & stations of steam tram
- Staalduinse bos
- Midden-Delfland

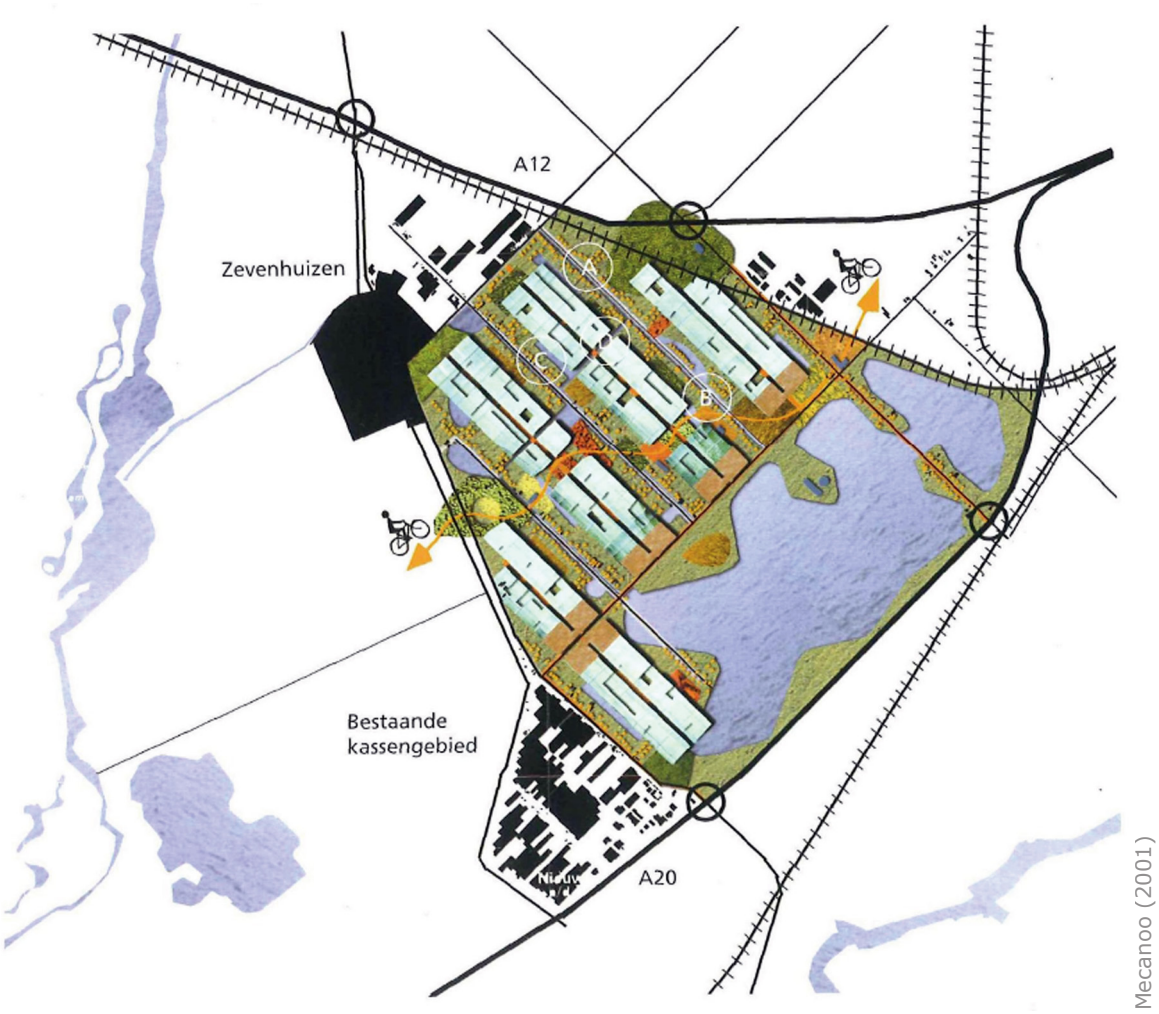
1.4 Output study

Within this study the emphasis was on the relation of spatial quality and glasshouse horticulture. By reviewing different studies and analysing plans for future glasshouse areas or transformations of present glasshouse areas it was possible to determine some general qualitative principles that could be used to set up a new sustainable spatial structure.

Most important were the studies and plans related to the Zuidplaspolder where glasshouse horticulture becomes an integral part of the spatial development.

To order and combine the qualitative principles out of different studies and plans, the principles were arranged by the three basic aspects of spatial quality, utility-, amenity-, and future value.

The most important and relevant principles, which also could be applied on the Westland, are listed in the overview next to this.



'Het glazen dorp' - Conceptual design of Mecanoo for the Zuidplaspolder

Utility value

- Optimal **(square) allotments**
- Diversity of allotments:
  big and rational but also small for niches/specialties
- Separate and **regroup** functions and activities:
  housing, green, water vs cargo, installations, sheds, loading docks, tanks, silo's
- **Clustering** of different business parts glasshouse horticulture
- Integrate water storage in spatial planning
- Stimulate **collective water storage** and other facilities
- Minimise transport distance
- Determine location glasshouse company with regard to business network and position in chain
- Adjust road network to scale up glasshouse horticulture
- Separate horticultural transport and local traffic
- **Intensive landuse**
- Combine different functions and activities
- Pile up different functions and activities
- Remove and **relocate** obstructing horticultural housing
- Combine glasshouse horticulture and housing

Future value

- Square and rational allotments
- Possibilities to **grow** and connect separate blocks to create bigger units
- Diversification: areas of for example 2, 4, 6 and 8 ha.
- Prevent obstructing functions, like dispersed horticultural housing
- Adapt to the **life cycle** of a glasshouse

Amenity value

- Restore historic **identity**
- Preservation of unique landscapes & structural elements of the landscape
- **Continuity and recognisability** cultural historic aspects & elements of the landscape
- Combine recreational routing with cultural historic aspects & elements of the landscape
- Continuity and recognisability water network
- Use collective water storage to strengthen the green blue network
- Combine collective water storage with recreational functions and activities
- Integrate water basins and collective water storage within green blue structures
- Integrate rest spaces and non-use areas into the green blue structure
- Link small scale, variation and high **diversity** to recreational and public routing
- Connect additional green blue network to surrounding green blue network and elements
- Adding recreational routes with green blue spaces
- **Separation and differentiation** between cargo, residential and recreational networks
- New and **experimental shapes** and architecture of glasshouses
- Separate entrance, business areas, cargo traffic from green, green blue and recreational network
- Link housing to central and collective water storage or green blue network
- Integration of **recreational functions** into glasshouse areas
- Link recreational routes to cultural history, innovations, workshops, fresh and high quality product sale
- Create small and recognizable housing clusters
- Pay attention to **transitions** between glasshouse areas and other areas

2 ORDERING PRINCIPLES

2.1 Introduction

Based on the differential output coming from the vision, analysis and complementary research, it is possible to set up some ordering principles in which the most important and structuring quality aspects are united. These principles can be considered as tools which could be used to improve the spatial quality of the present glasshouse cluster.

On the following pages the different principles will be clarified and arranged within the following main groups:

- Green blue structure
- Infrastructure
- Program

Together the ordering principles can be placed within a conceptual drawing that could be considered as ‘quality under layer’ and will guide the set up of a new sustainable spatial structure.

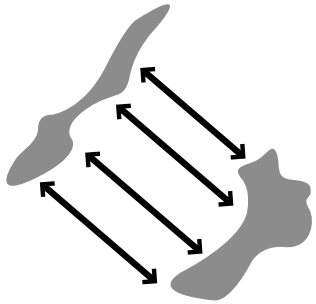
2.2 Green blue structure

Looking to the present accumulation and dominance of the glass housing in the area and the huge lack of water storage and green open spaces improving the green blue structure will be of great importance to come to a better spatial quality. Within this chapter the green blue structure will be separated into the green blue network and green blue places and the possible qualitative interventions will be clarified and divided over these two main parts.

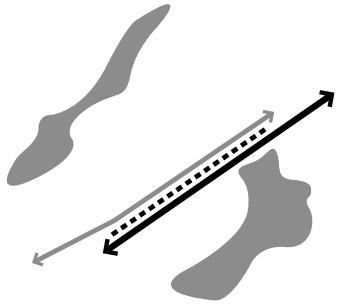
2.2.1 Green blue network

The qualitative improvements related to the green blue network putting an emphasis on the connectivity and accessibility of green, blue and recreational areas and recovery and reinforcement of cultural historic elements and characteristics. Besides that green blue and recreational shortcuts between urban centers should be taken into account.

Main structure

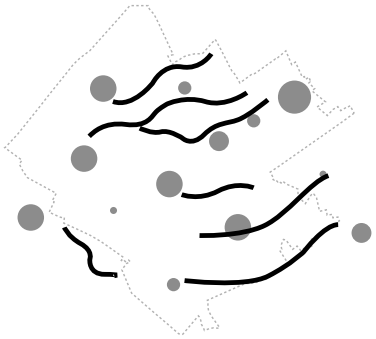


Coast - Midden Delfland
The coastal zone and the polder landscape of Midden-Delfland are two of the most important green and ecological source areas at the borders of the Westland. However the connectivity and accessibility of these areas is lacking. Connecting both source areas by **green blue corridors**, following present or additional main (boezem)water ways, will be the basis of a new solid and recognizable main structure that cuts through the uninterrupted glasshouse structure.
By linking green spaces and recreational routing within these corridors there will be a contribution to the connectivity and accessibility of green and recreational spaces. At the same time it restores the accessibility and visibility of important main waterways and lead up to coherence between isolated and free-standing green areas.

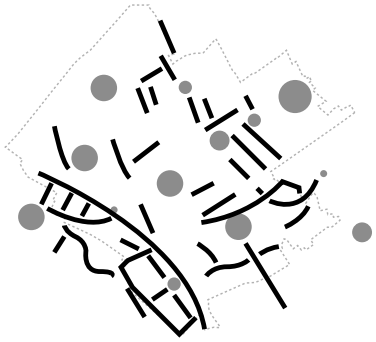


Zwethzone
The zone between the foreseen road corridor A4-A15 and the water line of the Zweth, can also be developed as green blue main corridor perpendicular on connections between the coast and Midden-Delfland. It connects these other green blue corridors with each other and could be an important continuous green and recreational zone that runs from the green areas next to the river Maas up to the Elsenburgerbos. During wet periods the Zweth functions as an important outlet channel within the water system. Therefore it could be useful to integrate temporary flood areas, like wetlands, within this green blue corridor.

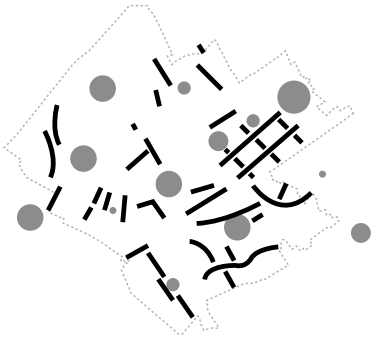
Secondary structure



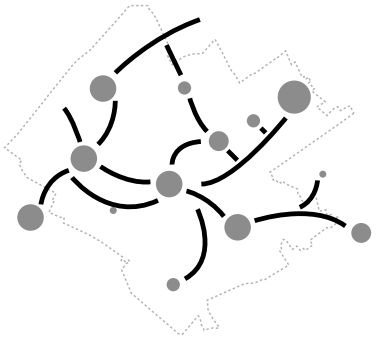
Creek rivers
By restoring and reinforcing former creek rivers it is possible to refer to the historic tidal landscape, something that contributes to the identity of this particular area. The former creek river structure could be the basis for new green, blue and recreational routing. On the one hand it connects the main green blue corridors which are running from the coast to Midden-Delfland. On the other hand the creek rivers could be used to connect different urban centers. By orientating the present urban centers towards the creek rivers and connect the internal green structure (tertiary structure) to the creek rivers there could be a continuous green blue network that runs from the urban centers up to the bigger green and ecological source areas situated at the borders of the Westland.



Cultural history
Because of the growth and scale up of the glasshouse horticulture important cultural historic lines and places become inferior to huge and high glasshouses or supporting installation. Characteristic ribbon development, historic waterways and dikes are disappeared or are enclosed and covered by large scale structures.
By linking the green, blue and recreational network to the cultural historic elements it is possible to restore en reinforce important lines and places. It provides 'air' and space within the profile and puts the emphasis on the small scale. At the same time it makes the area readable and it brings back some of the covered characteristics.



Waterplan Westland
The interventions and search locations as proposed in the most recent Waterplan can be used as guideline for new and additional waterways and space for water storage.
The locations are based on actual spatial opportunities and technical possibilities related to the present water system. The Waterplan provides therefore important information that can be used by developing a new or additional water network. By adding at the same time green or recreational spaces to these places the green blue network can therefore also be improved on the basis of the Waterplan.



Shortcuts
Because of the accumulation of glasshouse areas green and recreational connections between the urban centers are lacking. Therefore the present bicycle network is on many places directly linked to the road network. Out of necessity people need to follow unattractive and busy roads and become constantly confronted with intensive car traffic and cargo transport. Separation of the bicycle and road network by creating green, blue and recreational shortcuts through the glasshouse areas contributes enormously to the qualitative experience of as well inhabitants as recreational people. At the same time people can use shorter connections to come from one urban center to one other.

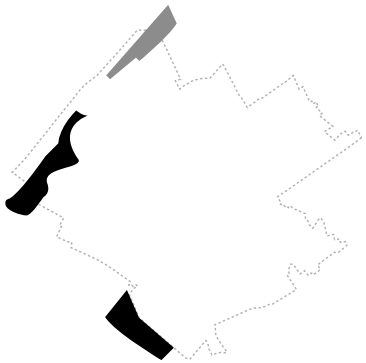
2.2.2 Green blue places

Besides to the green blue network there are some important places which possibly could be used to improve or reinforce the green blue structure. There will be a differentiation in main elements, which could mainly be related to the possibilities to combine (seasonal) water storage with nature development and secondary elements which mainly coming forward out of an historic perspective and could be developed as green blue stepping stones with a unique character within the green blue network.

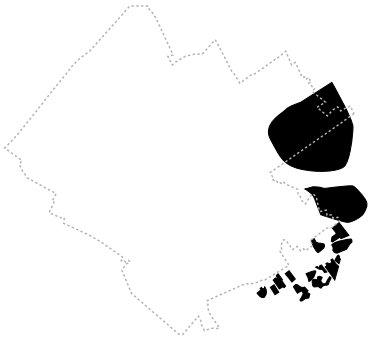
Together the proposed interventions related the green blue network and green blue places could lead to a fundamental improvement of the spatial quality and contributes mainly to the amenity value of the area.

Main elements

Dune area
To upgrade and reinforce the recreational and ecological meaning of the coastal zone there could be an inland broadening of the dune area up to the N211 between Hoek van Holland and Monster. By combining the nature development with dune water areas, which can be used as seasonal water storage, the dune water line can be continued. At the same time this is of importance to realise a self-sufficient and independent water system in the Westland.
The present rational glasshouse areas will be replaced for small scale experimental glass housing just like for example the Eden Project. Together these interventions will give this part a complete new appearance which fit better to the present dune areas and restores the historic dune landscape.

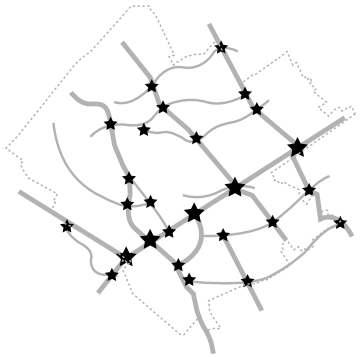


Oranjebuitenpolder
To upgrade and reinforce the recreational and ecological meaning of the green areas next to the Maas nature development is planned in the Oranjebuitenpolder. In the perspective of a self-sufficient and independent water system this area offers excellent opportunities to integrate space for water and could easily be linked to the main boezem system or internal water system of the Oranjepolder which deals with a big lack of water storage.



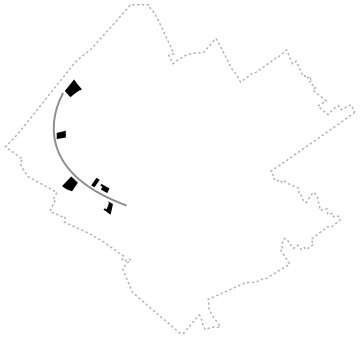
Lowest parts
The lowest parts of the Westland could also be used to create a self-sufficient and independent water system. They could function as seasonal water storages. Combined with nature development the flood areas in Midden-Delfland could transform into wetlands with a high ecological and recreational value. In a way that area reflects than the historic tidal landscape that once was so characterizing for this part of the plan area. The lower areas in the North could be used to develop floating glasshouses.

Secondary elements



Nodal points
The intersection between the green blue main structure and substructure provides opportunities to develop special green blue areas with an extra quality and special program. Because of the accessibility, connectivity and position within the green blue network these nodal points become attractive to realise recreational functions and activities, but could also be interesting for public and cultural functions and activities. Combined with nature development and space for water (storage), it offers also an unique environment for small scale housing clusters. However the emphasis will be on the development of green blue crossing points within the green blue main network.

Fruit gardens & orchards
The places where former fruit gardens & orchards were situated could be used to open the uninterrupted glasshouse structure by creating here green blue spaces. These spaces will function like green stepping stones linked to the reinforced creek rivers. The spaces could be developed within a historic perspective like open fruit gardens and orchards, but it is also possible to create green spaces with an ecological or recreational purpose. It is also possible to create here collective water facilities or peak water storage.



Courtyards
On the higher grounds of the historic sand hook important courtyards, with extensive gardens and green spaces were built in favour of rich and upper class people who want to get away from the crowded city. Looking to the lack of green within the present uninterrupted glasshouse structure these locations nowadays could be used to create green open spaces for people who want to get away from the 'glass city'. Looking to the country estates that belong to this courtyards these places could also be developed as small scale housing clusters within a spacious and green environment. The separate spaces could be linked by creating a green or recreational route next to the boezem water and Zanddijk or adding a new additional waterline.

Defence works WOII
It is possible to transform the locations of the blockhouses into green, blue and recreational areas, with a special attention to remaining parts. At the same time missing parts of the outer anti tank canal could be restored to bring back the coherence of the separate locations. The inner anti tank canal can be restored to reinforce the green blue corridor that connects the green areas next to the Maas. However it is not the meaning to create a military defence wall like it used to be. The different elements need to be transformed in a way that they can be integrated within present spatial structure, become part of the green, blue and recreational network and reinforce the qualitative experience.

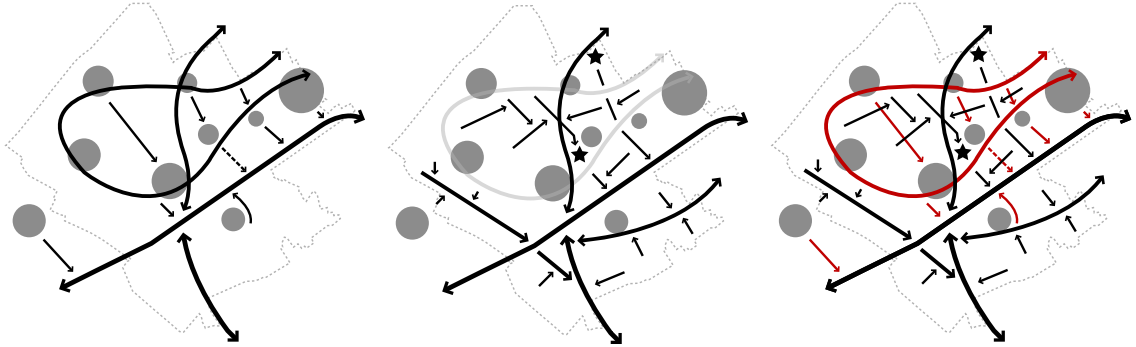
2.3 Infrastructure

As can be concluded out of the analysis the present infrastructural network can be improved on many aspects. However these infrastructural ordering principles will put an emphasis on the main road structure, including disclosure of the area, and the possibilities to improve the problematic public transport system.

Coming foreword out of the research about glasshouse horticulture and spatial quality separation and differentiation of cargo and residential traffic is of great importance for the spatial quality, as well for the utility- as the amenity value, of the area. Therefore this will be the main issue to take into account with the development of the main road network.

Looking than to the public transport system the connections to the bigger cities like Den Haag and Rotterdam and the national train network will be most important. Reordering of the bus system and the integration of a high quality public transport system will be the main issues to take into account with the development of the public transport system.

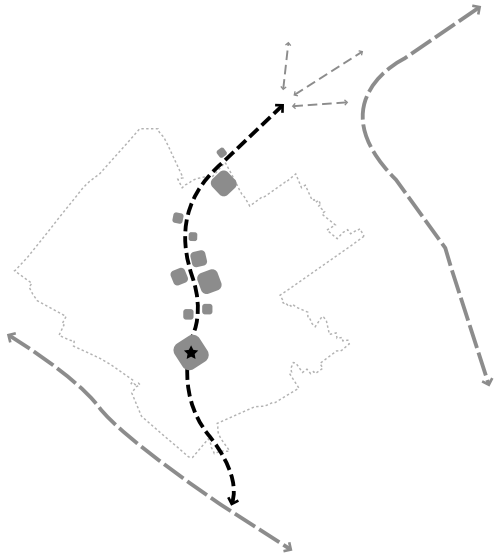
Roads



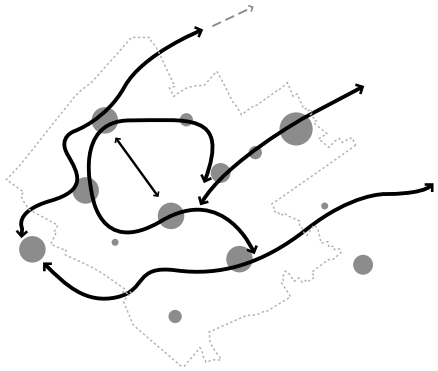
Urban centers
Most of the urban centers come into being along a historical main road that was mainly focused on the connection with the city Den Haag and used to come from center to center. Nowadays the connectivity with the national road network becomes more important. However the present disclosure to this network is lacking.
The foreseen A4-A15 corridor could be the most important intervention to link the Westland directly to the national road network. By creating then new and additional connections between the urban 'ring road' and this main corridor the disclosure of the urban field can be improved. At the same time connections between free-standing urban centers, like Hoek van Holland and De Lier, and this corridor could be realized.

Glasshouse horticulture
The cargo traffic of the glasshouse horticulture must be separated as much as possible from the residential network. By connecting the free-standing centers to the foreseen A4-A15 corridor the present disclosure routes can be developed as glass axes which can be linked to the bigger glasshouse areas in the south.
The cargo traffic of the glasshouse areas in the middle of the urban field must be separated from the historic urban 'ring road'. By adding a new road structure that is tuned in to the different auctions and creating two direct and continuous main routes from these auctions the cargo traffic could be guided to the new A4-A15 corridor without using the historic urban 'ring road'.

Public transport



High quality public transport
Looking to the planned upgrades and reinforcements of the economic axis this line could be a prefect track for high quality public transport. Different commuter streams can be bundled along a central axis that is easy to reach for most urban centers. By connecting it to the RandstadRail in Den Haag and train track that runs to Rotterdam the connection to the bigger cities and national public transport network could be improved. Commuters could travel quicker and on a more comfortable way from and to the Westland.



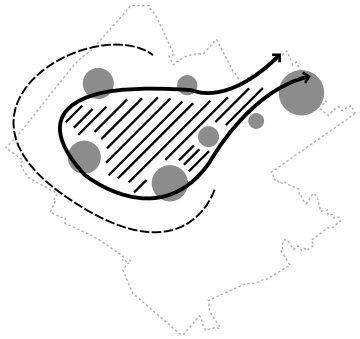
Bus network
By separate different bus lines and link them to clear zones, like for example the coast, the urban centers of the Westland, the urban line from Naaldwijk to Rijswijk or Delfland, the present bus system could be ordered and better tuned in to each other and other public transport systems. However upgrading of the frequency of some lines and fine tuning related to the transfer points is most important if public transport wants to compete with the car.

Collaboration
The integration of a high quality public transport system could be the necessary addition that, together with an upgraded bus system, could contribute to decrease of the intensive car traffic and decongestion of overpressure road network. However without collaboration and fine tuning the car will unabated be the most dominant conveyance.

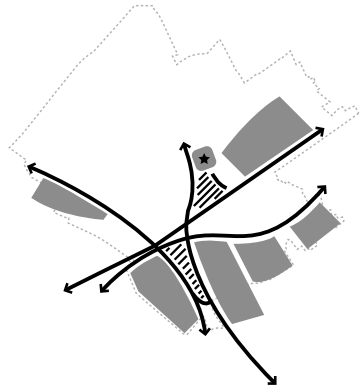
2.4 Program

Based on geological under layer and historical patterns of the landscape it is possible to make a programmatic main arrangement that should be the basis of the future spatial development. The situation and well functioning of the glasshouse horticulture is in this case leading because it is the most dominant and extensive program.
However the development and situation of new (horticultural) business areas become more and more important. Additional infrastructural lines or reinforcement of present lines generating new possibilities and opportunities to link or cluster business and horticultural related functions and activities.

Glasshouse horticulture

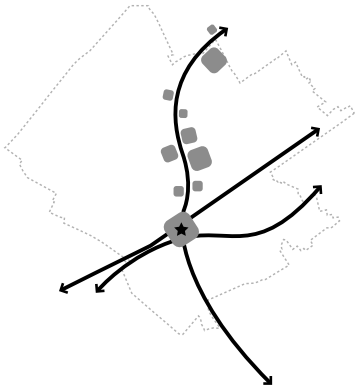


Small scale
Looking to the historical development of the landscape the urban centers started to grow on the higher grounds of a former sand hook that encloses a low and wet inner area that was characterized by creek rivers and pools. By restoring important characteristic elements of this former landscape and combining it with small scale glasshouse horticulture in a more spacious and green environment this inner area could have a complete new appearance that fits better to the qualitative demands of the surrounding urban centers. At the same time a lot of the original and characteristic small scale and irregular allotments could be preserved. Glasshouse horticulture, housing, recreation, green and water should be intertwined within a dynamic environment that refers at the same time to the historic landscape.

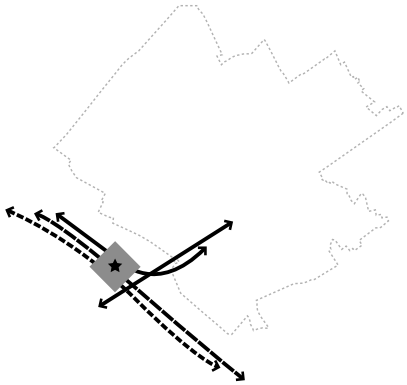


Large scale
Bigger and large scale glasshouse horticulture could be developed at the borders of the Westland. These areas are linked to important main disclosure roads or even directly to the national road network and well connected to important horticultural related business areas and functions. Besides that most of these areas already have a rational block allotment what fits best to the present day and future glasshouse companies. Accessibility, connectivity rationality and the well functioning of the glasshouse horticulture itself becomes in these areas more important. However cultural historic aspects or valuable elements in the landscape should be preserved and reinforced as much as possible.

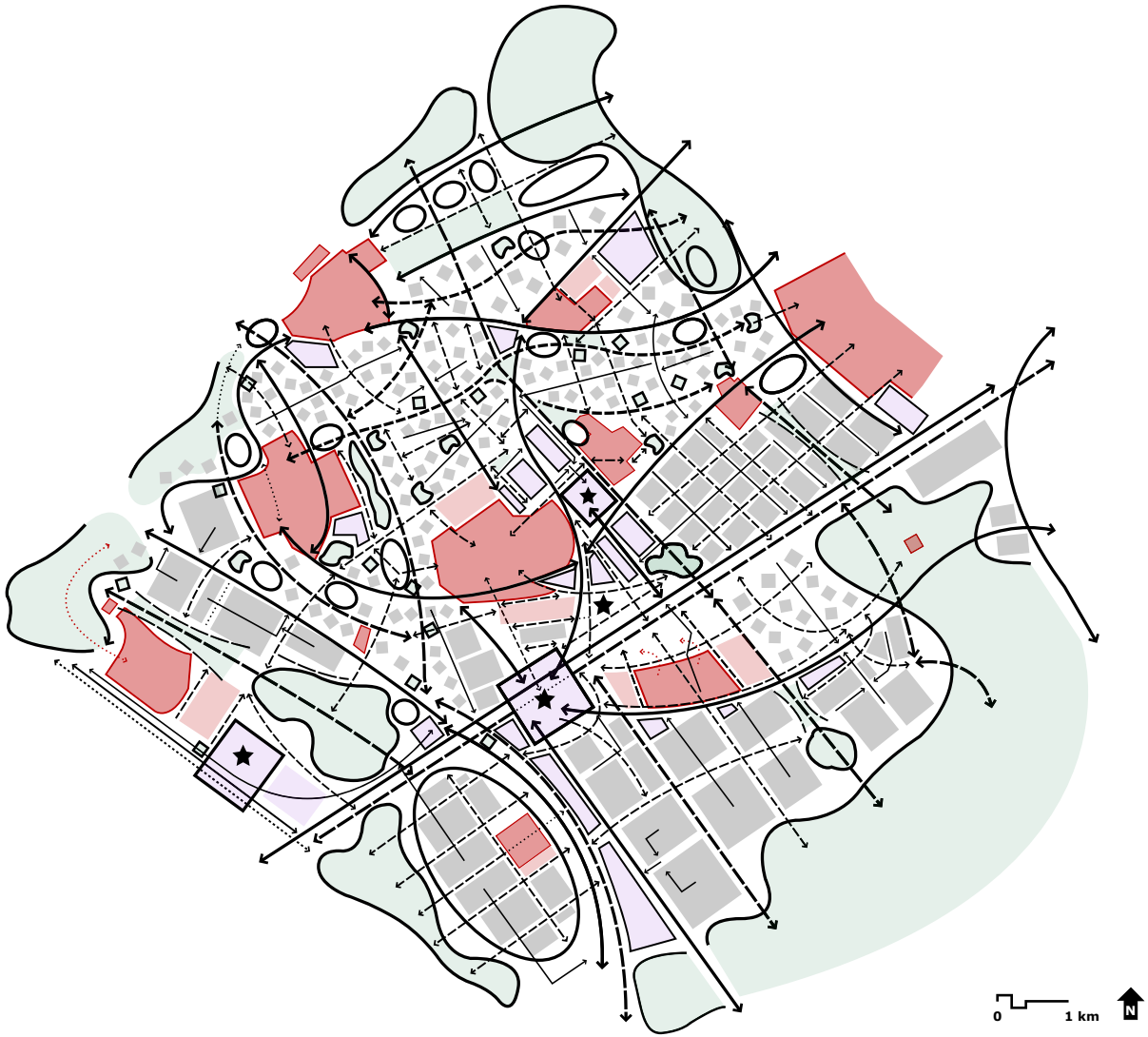
Business areas



Economic axis
New business areas and horticultural related functions should be clustered and linked to the so called economic axis. This prevents a dispersal of business activities over the Westland and concentrate them along a central line that is well accessible. It generates possibilities to bundle different traffic and transport streams and offers opportunities to integrate high quality public transport. At the same time it could be possible to improve the image quality along this line and realise a recognisable and continuous business line.
The intersection with the foreseen A4-A15 corridor could be developed as main business area where glasshouse horticulture and related business comes together.



Greenport terminal
The present business areas next to the river Maas could be transformed into a business cluster that makes use of different transport modalities.
By creating a terminal that combines transport by boat, train and truck the glasshouse cluster could be linked to the national water, train and road network at one place. It offers new opportunities for transport and could generate new business. At the same time it could contribute to the decrease of cargo traffic.



Conceptual drawing based on ordering principles

2.5 Concept

Together the ordering principles can be combined and placed within a conceptual drawing. The drawing creates coherence between the different ordering principles and provides a clear overview on the scale of the Westland.
During the development of the new sustainable spatial structure the drawing can be used as basic under layer.

3 FLORIADE

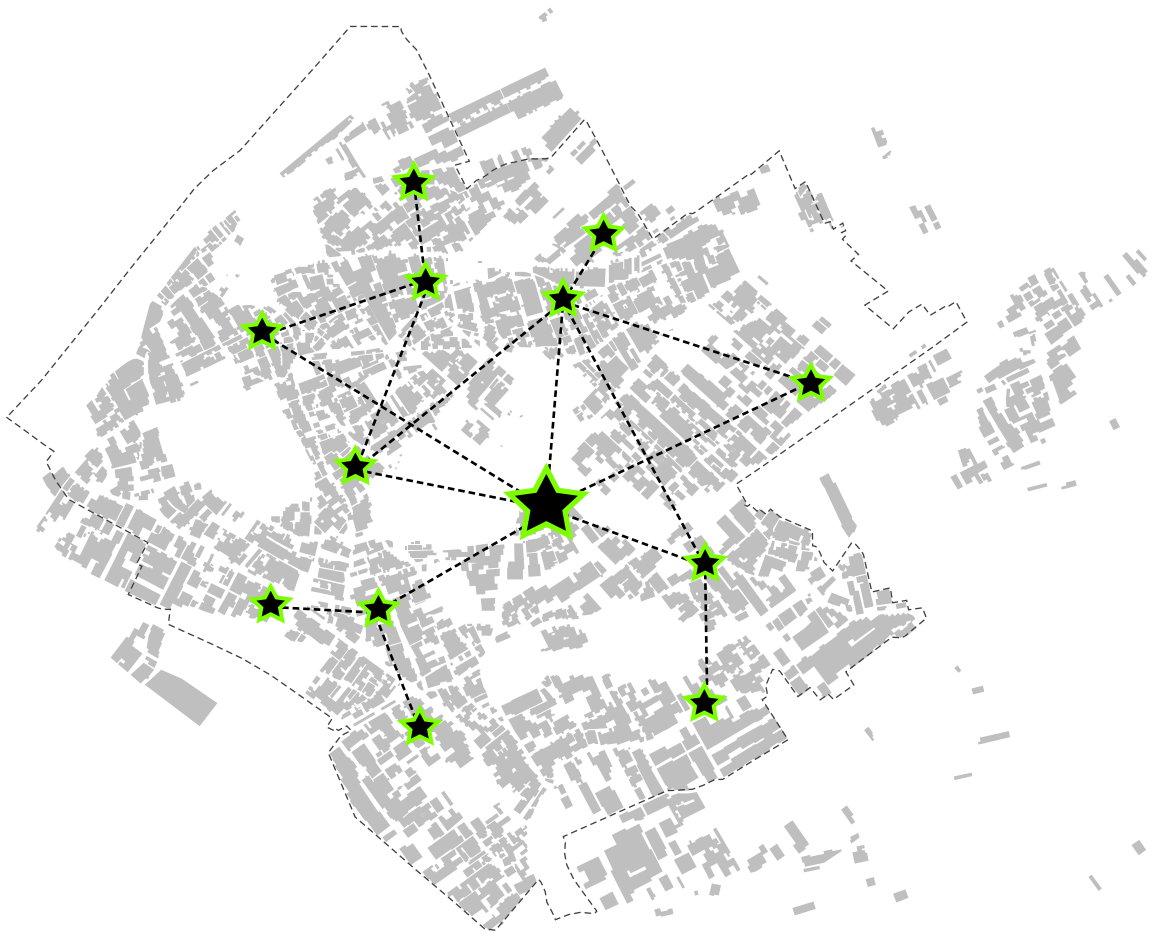
3.1 Introduction

Because of restrictive and short term thinking of glasshouse companies and intensive lobby of horticultural organizations it is hard to come to fundamental and qualitative spatial changes.
Complementary to the ordening principles it is therefore necessary to think about a tool that could stimulate these spatial changes and triggers future spatial development.

Using an event like the Floriade could be such a tool and could lead to a break through related to the thinking in terms of keeping as much glass as possible.
At the same time it is in the interest of as well horticultural actors as non-horticultural actors and concede to economic and spatial demands.

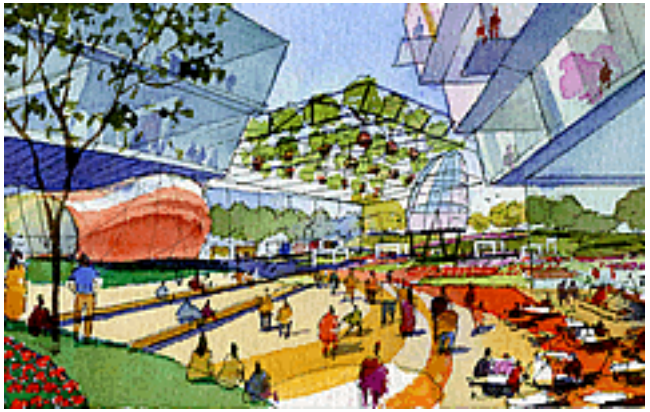
3.2 Concept

By using a concept that links the Floriade to the glasshouse cluster as a whole, the event could stimulate spatial changes through the complete area. In addition to one central main area, therefore some smaller extensions will be realised spread over the glasshouse cluster. This could be divers green & open spaces, which could vary in size, with pavilions, flowers or horticultural art & expo but could also be related to for example innovative or experimental glasshouses. By creating these places within accumulated glasshouse areas and connecting them to the green, blue and recreational network the extensions could trigger spatial development within the surrounding areas and could lead to the improvement of the qualitative experience of the glasshouse cluster a whole.



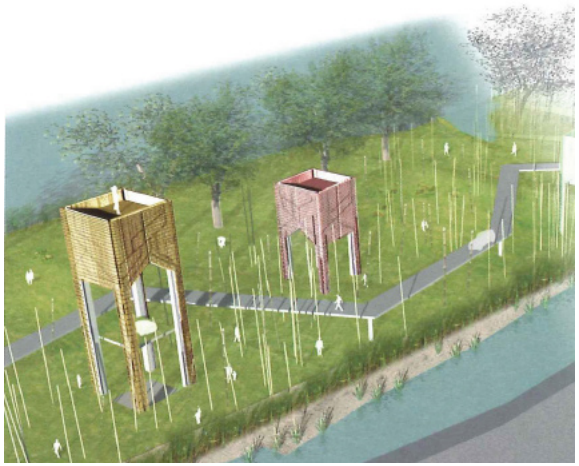
Floriade: main area & extensions

Main area

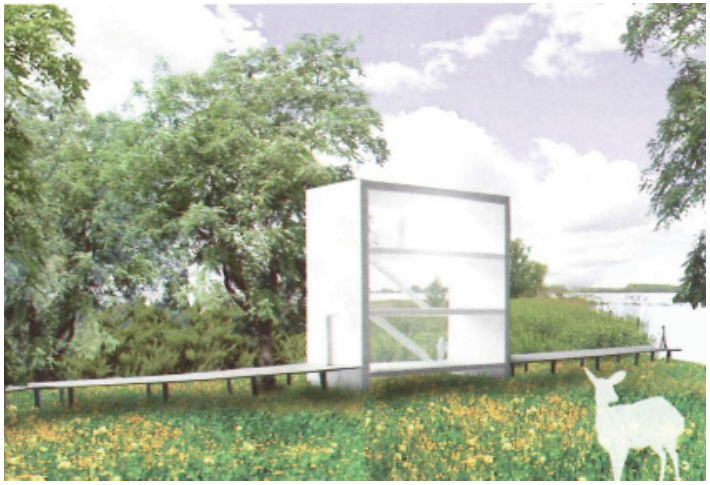


The Jerde Partnership, Bloomin'Holland (2008)

Extensions



Casa Nova (2007)



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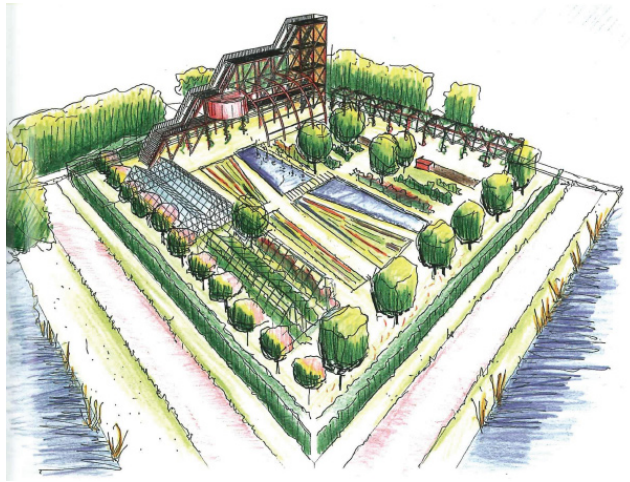


Huisman (2002)

3.3 Main area

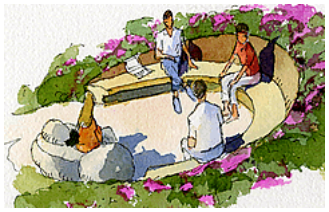
The position, accessibility, connectivity to the green, blue and recreational network and the possibilities to improve the spatial structure of an area are important aspects to determine the location of the new main area for the Floriade. On the next page these aspects will be related to the area next to the present flower auction which could be enclose the perfect location for the future main area.

After the Floriade the main area still could be an area of great importance. By combining for example innovation, knowledge, business, recreation, education and other public and cultural functions and activities within a dynamic and green environment the area could be a central meeting point for horticultural and non-horticultural people.


WORKSHOPS

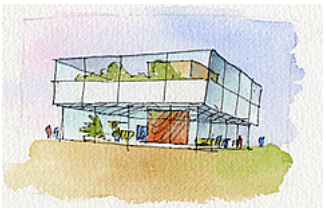

RECREATION


EDUCATION

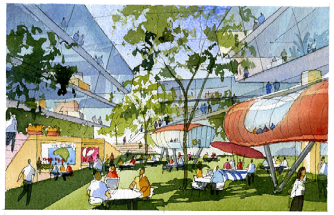

RELAX


THEATER


FRESH PRODUCTS


INNOVATION

SHOW

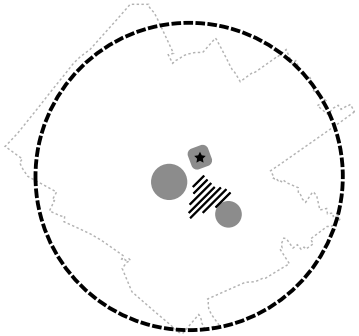

BUSINESS CENTRE


MEETING PLACE

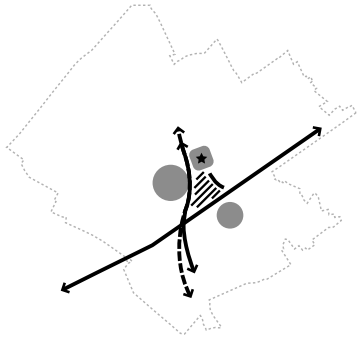

GREEN SPACE


FAIR

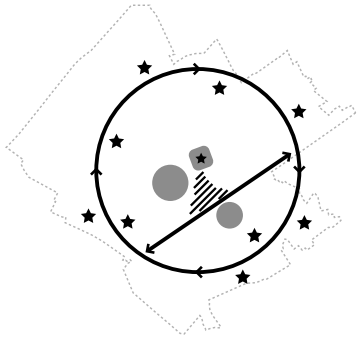
The Jerde Partnership, Bloomin'Holland (2008)



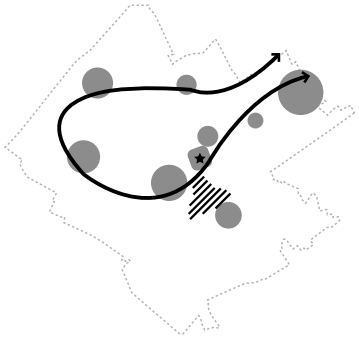
Central position
Looking to the location for the main area of the Floriade in relation to the position within Westland shows that it is in the center of the glasshouse cluster. In combination with the present flower auction this could be a perfect location to situate the main area of the Floriade from where the rest of the Westland could be discovered. It could be the 'green hart' of the Westland.
Afterwards it must also be an area where glasshouse horticulture, business, recreation, social and cultural functions and activities will be combined within a green and dynamic space. Because of the central position it is easy to reach and well accessible.



Accessibility
Because of the presence of the present flower auction the area is enclosed by important main roads which are connected to the national road network. However reinforcement of the present road network is necessary. The Floriade offers the opportunity to change the present infrastructural layout, come to necessary improvements and share expensive infrastructural investments.
The foreseen A4-A15 corridor could be one of these necessary improvements which connects the area directly to the national road network. This is of importance for the present flower auction but improves also the accessibility of the Floriade.
With the integration of a high quality public transport system, next to the road of the economic axis, the area will be linked to the national train network or RandstadRail and could therefore also be well accessible by public transport.



Green blue network
Because the main area is situated next to the water of the Zweth, it can be connected with the wide spread boezem water network and makes the area accessible by boat. During the Floriade it generates possibilities to park at the borders of the Westland or create an transfer point at the crossing of the train track Hoek van Holland-Rotterdam and the end of the Zweth and come by boat to the main area. By linking the extensions of the Floriade also to this main boezem water network people could discover and explore the Westland by boat.
However most important is that the Floriade becomes part of the green, blue and recreational network and on this way the event could stimulate the qualitative experience of the Westland.
Afterwards the main area will transform into a green and public area that is easy to reach and becomes the most important place within the green, blue and recreational network.



Connector
The urban center of De Lier is surrounded by important glasshouse areas and situated between the large scale glasshouse areas at the south and the 'small scale' glasshouse areas in the middle of the main urban network. Restructuring of the area between Naaldwijk and De Lier opens the 'glass circle' and generates possibilities to link, orientate and integrate De Lier on a better way to this urban network. At the same time De Lier could therefore also be linked and orientated to the Zwethzone which is part of the main green, blue and recreational network.

3.4 Context

Looking closer to the area between the urban centers Naaldwijk and De Lier, and especially to the scale, shows that it covers an enourmous surface: ca. 300 ha. This is about three times the surface of the historic inner city of Delft!

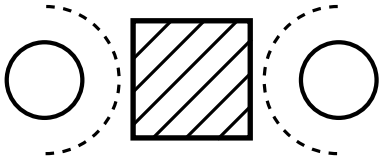
The average surface for a main area of the Floriade is about 70 ha. The main area for the future Floriade covers therefore only a part of the total plot and must be tuned in to surrounding areas.

The scale and distance between the two urban centers influences also the way the area will be approached and what it could mean for the two urban centers next to it.
Because of the huge scale and relatively big distance between the two urban centers the area could be approached as an independant plot that can be developed with its own program and functions. The two centers can grow to each other but do not become one urban center. When the scale of the area was much smaller the plot could be integrated within the development whereby the two urban centers become one urban concentration and the area will be the new center of this concentration.

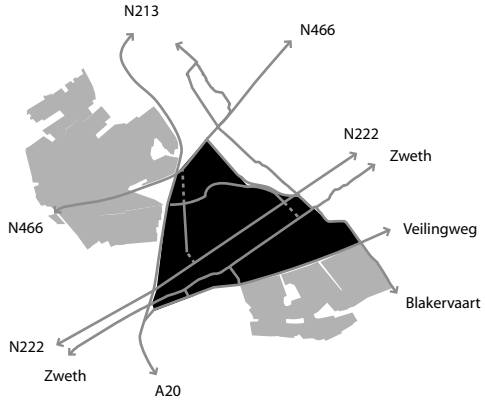
Nevertheless the development of this area generates possibilities to realise new connections, infrastructural and recreational, what could improve the relation between both urban centers.

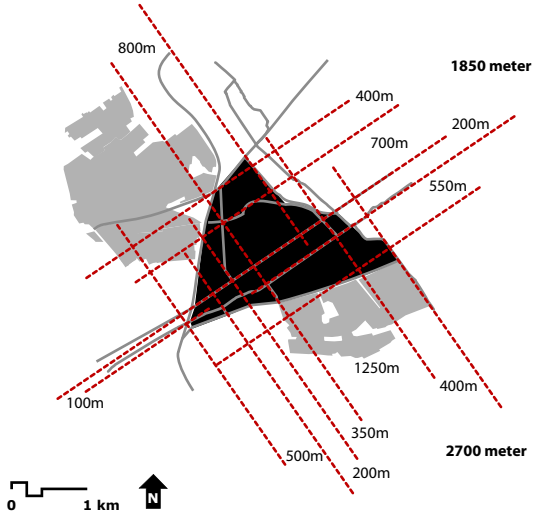
Different scale, different approach

One urban concentration

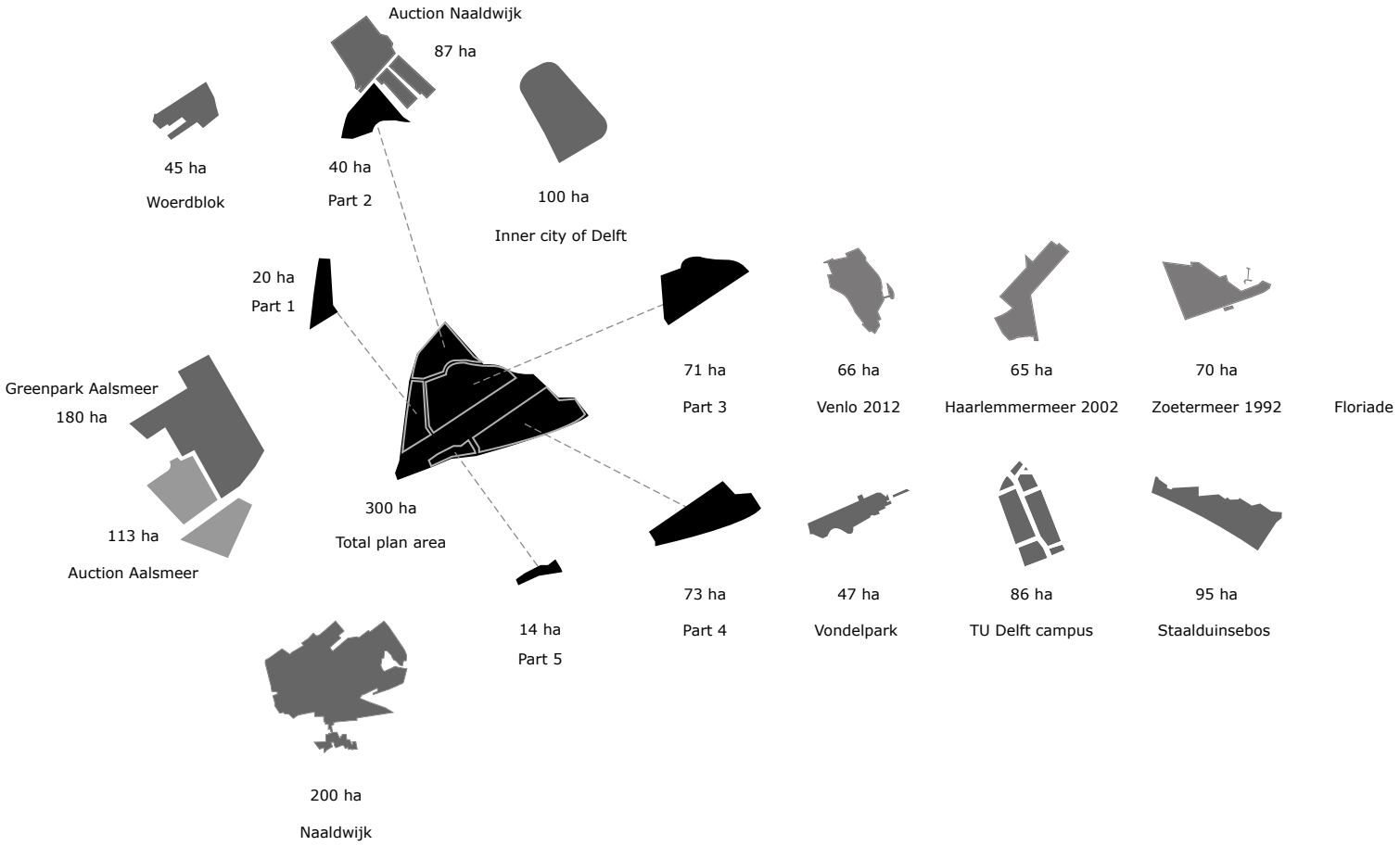


Independant plot





Situation & measurements



Scale study; different components

0 1 km N

4 ELABORATION

4.1 Introduction

Based on the conceptual under layer and different qualitative guidelines it is possible to set up a new sustainable spatial structure that adapt to the improvement of spatial quality.
On the following pages this structure will be elaborated and clarified at hand of the following aspects:

- Water
- Green
- Housing
- Infrastructure
- Business
- Glasshouse horticulture

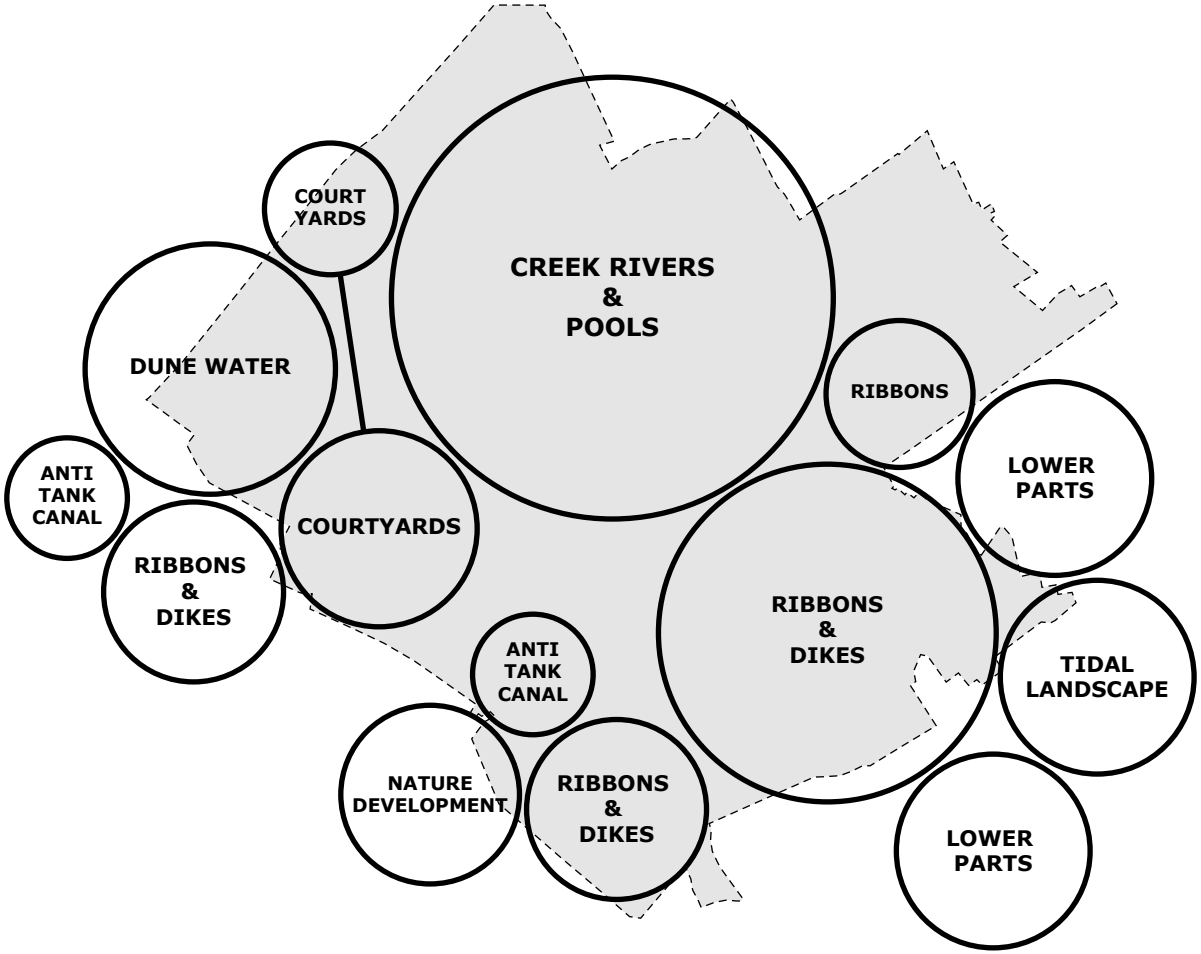
By restructuring the water network and linking green and recreational spaces or small scale housing projects to this network interventions related to the first three aspects can be seen as the most leading to improve the amenity value of the area whereby the new water network will be the most structuring element.
The infrastructural network will be the most ordering aspect in relation to the situation and well functioning of business areas and glasshouse horticulture. By restructuring this network and linking additional or reordered and restructured business- and glasshouse horticulture areas the interventions related to the second three aspects can be seen as the most leading to improve the utility value of the area but could contribute at the same time to the amenity value of the area.
However both groups will affect elements of utility-, amenity- and future value and together the proposed improvements could lead to a better spatial quality of the Westland.

4.2 Water

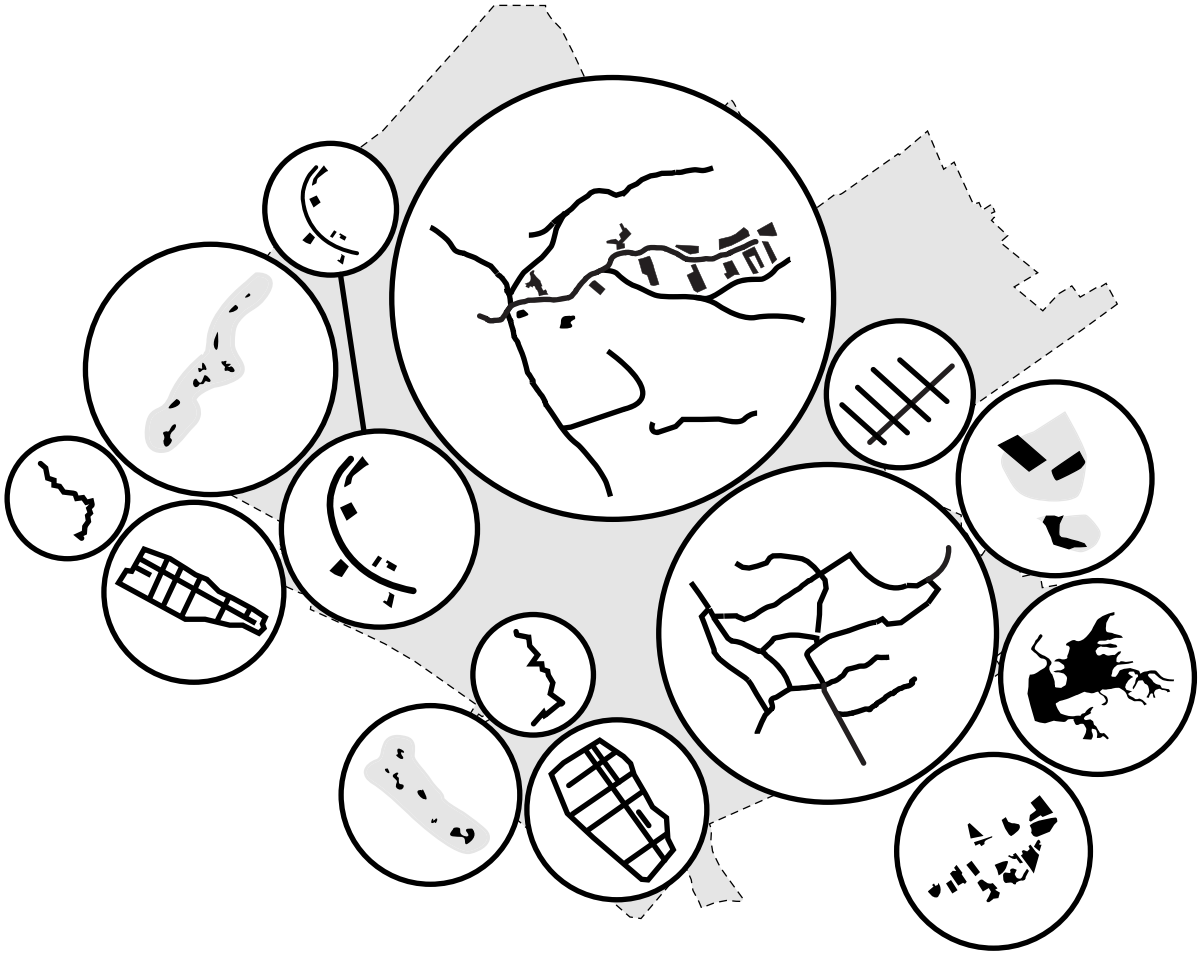
4.2.1 Starting points

Restructuring the water network will be the most important part by creating a new sustainable spatial structure.
As stated in the project objectives water can be seen as carrier of spatial quality. With this it is mainly about the amenity value. Making the water visible and accessible again, linking green or recreational spaces to the water network, restoring historic waterways or reinforcing other cultural historic and characteristic elements could be of great importance for the amenity value of the area and could lead to a fundamental improvement of the qualitative experience.

However there is also a necessity to adjust the present water system. There is a big lack of water storage and the fresh water supply of the area is threatened because of changing conditions. To create a sustainable glasshouse cluster that can adapt at the same time to future climate change there should be enough space for water whereby a self-sufficient and independent watersystem will be the main target. Because of the connectivity of the boezem system to the complete Delfland region, the emphasis of the new water structure will be on complementary water systems which should be separated from the boezem system.



Starting points different sub areas



By putting the emphasis on recovery and reinforcement of the characteristics of different sub areas and adapt to their identity the water system could be adjusted and integrated on a sustainable way. The drawings next to this reflect these characteristics and provide a certain main arrangement.
Together with the other starting points, the ordering principles and qualitative guidelines this will be the basis for the new water network.

4.2.2 Interventions

The integration of complementary water systems separated from the boezem will be the most important. These systems contribute to the self-sufficiency of the area and will be linked to the seasonal storages at the borders of the area or (collective) water storages which are linked to the glasshouse horticulture.
However there will also be some interventions related to the boezem system itself. These interventions mainly coming foreword out of the improvement of the connectivity and accessibility (by boat) of green and recreational areas (2 & 3) or the reinforcement of a main green blue corridor (1 & 4).

Boezem system

1. This intervention reinforces the green blue corridor to the dune areas of the coast and one of the entries to the beach. It could also be linked to future housing developments of the Westlandse Zoom.
2. By this intervention the urban center of Hoek van Holland can linked to the boezem system, and therefore to the main recreational (boat) network. Besides that the boezem system can be linked to the green and recreational development of the green areas next to the Staalduinse Bos.
3. By lengthening the boezem system over here the green and recreational area 't Kraaienest becomes accessible by boat.
4. By creating an extra green blue connection from the Zwethzone the connectivity and accessibility with Midden-Delfland can be improved. Because of the boezem water level there will be new a dike in the landscape. By following the borders of the concerning polders these borders become visible again. At the same time it could cover partially the large scale glasshouse horticulture.

Wet

Water system in wet conditions

Dry

Water system in dry conditions

Complementary water systems

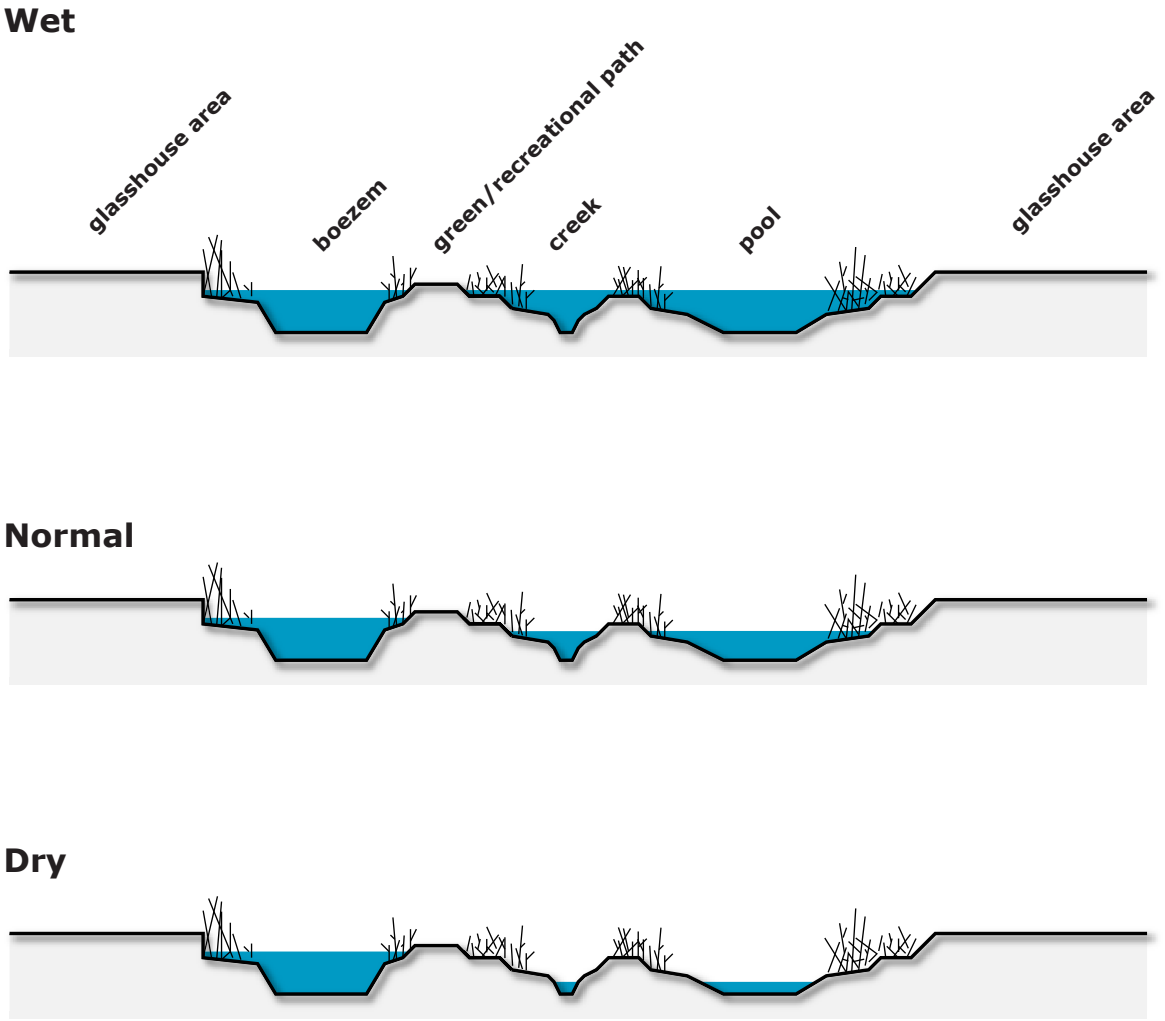
A. The historic creek structure will be restored or reinforced by integrating small waterways, sometimes next to former creeks (see section next page) which are nowadays become part of the main boezem system, with a big fluctuation of the water level that adapts to wet and dry times. In dry times the creeks could fall almost dry and in wet times the water level could rise, something that refers to the original dynamic character of the former landscape. By linking small pools and bigger collective water storages, which are connected to the glasshouse horticulture, to the creeks this character could be reinforced. These places could function at the same time as important green and recreational spaces within the glasshouse landscape. The surplus of water could be pumped into the dune area or drained to the lower areas in Midden-Delfland. The water out of these seasonal storages could be used as additional water supply in dry periods.

B. In early days this area was a huge flood area that was part of a tidal landscape. Using this as a metaphor and combining it with the lowest parts of the landscape could lead up to unique wetlands at the border of the Westland and Midden-Delfland which could be used as seasonal storage.
Later on this area was characterized by dikes which were important to control former tidal landscape. The complementary water system of this area will therefore be related to this former dike structure and could, in combination with the situation of glasshouse water storages, at the same time be used to reinforce the present day ribbon development that is developed along these former dike structures. By using a water level between the boezem and the polder there will be a new dike structure that refers to the old one. The water system is connects the water storages of the glasshouse horticulture with the lower wetlands. In wet periods the system drains the surplus to the lower areas and vice versa.

C. This water system will be linked to the characteristic ribbon development of this particular area. Water storages will be oriented and situated next to the ribbons and connected to this additional water network. Combined with green spaces and recreational routing these ribbons will get a complete new appearance within a historic perspective. Furthermore the lowest part of the area will be flooded and filled with floating glasshouses. By linking the water network to this flooded area it could be used as seasonal water storage.

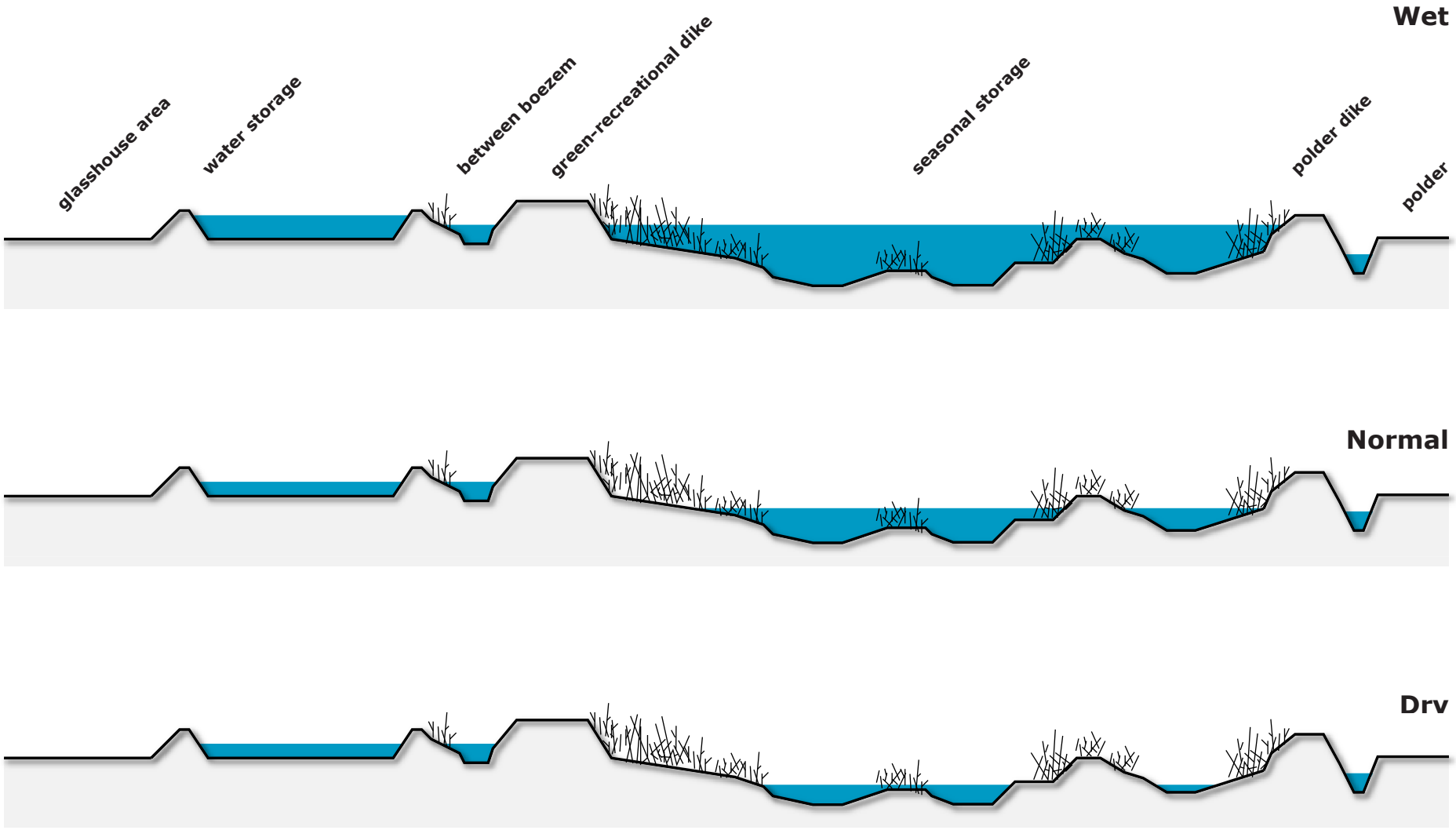
D. From the glasshouse areas the water will be drained to collective water storages at the border of the area. Most of the waterways that drain the water to the collective water storages will be combined with green and recreational routing and is linked to historic ribbon development. On this way it is possible to create connections to the green areas next to the Maas or shortcuts between the urban centers of Hoek van Holland and 's-Gravenzande. From the collective water storages the water can be pumped into the surrounding main polder system. The former anti tank canal will be integrated into this system and next to the Maasdijk this system will be part of a zone with characteristic ribbon development and generates it space between this historical dike and the large scale glasshouse horticulture. In wet periods the water can be pumped into the dune water areas which could function as seasonal storage. In extreme wet situations the water can be drained into the Nieuwe Waterweg by the main drainage canal, what is already there. By combining the collective water storages with nature development the green blue corridor could be reinforced.

E. In this system the water from the glasshouse areas will be drained to the collective water storages. These drainage waterways will be linked to characteristic ribbon development and following the historical patterns of this polder. On the hand these collective water storages will be situated at the border of the area, where it creates space between the characteristic and surrounding dike structure and the large scale glasshouse horticulture. On the other hand it will be combined within a green blue zone in the middle of the polder where these water storages will be combined with existing ribbon development, additional housing and green and recreational spaces. In wet periods the collective water storages drain the water towards a peak water storage that will be created between the former anti tank canal and the surrounding dike structure. From here the water can be pumped into the seasonal storages which should be integrated within the nature development of the Oranjebuitenpolder. The future glasshouse areas next to the Maasdijk will be developed with water cellars.



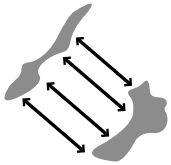
Basic section creek & pool

Fluctuation water level; creek system and seasonal storage Midden-Delfland



Basic section wetland Midden-Delfland

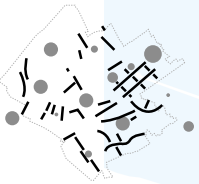
Green blue network
Main structure



Coast - Midden-Delfland

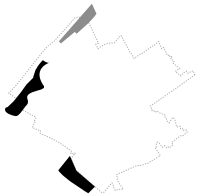
Green blue network
Secondary structure

Creek rivers

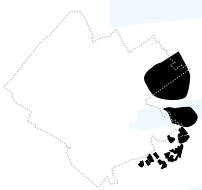


Cultural history

Green blue places
Main elements



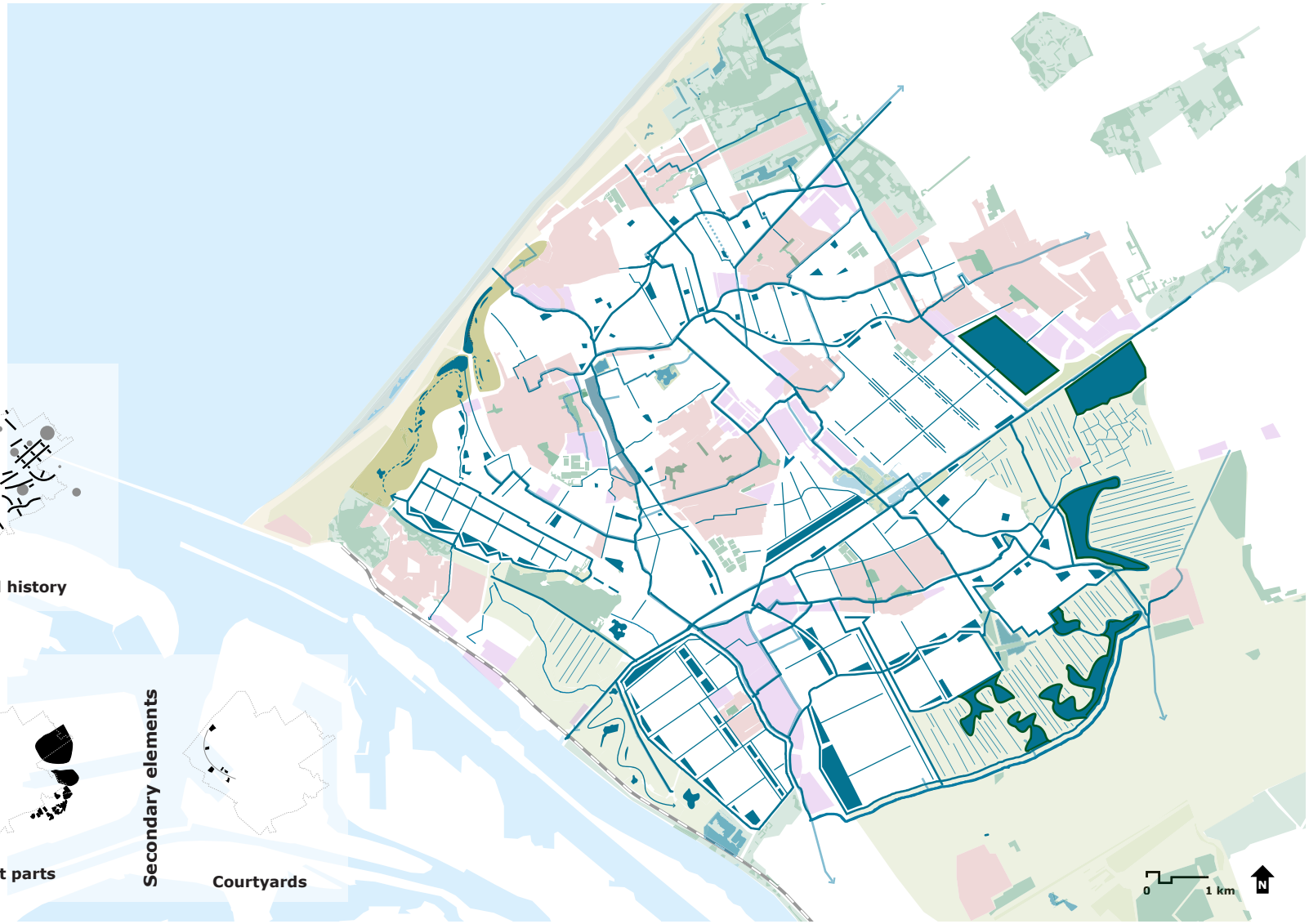
Dune area & Oranjebuitenpolder



Lowest parts

Secondary elements

Courtyards



Dune water

Mecanoo (2002)

Collective water storage & recreation

Mecanoo (2002)

Widening of profile related to water

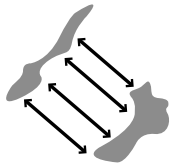
Wetland Midden-Delfland

4.2.3 Context

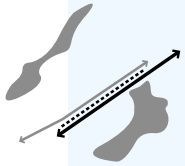
The new water structure becomes more clear when it is placed within its context. In the drawing next to this the water system can be related to different aspects of the present situation like for example the present urban centers or green main and sub areas.
At the same time the most important ordering principles which are integrated within the new water structure and some reference images are represented.

On the following pages the other aspects will be elaborated and represented within their context. Furthermore the main starting points that are of importance will be briefly clarified.

Green blue network
Main structure

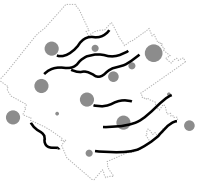


Coast - Midden-Delfland



Zwethzone

Green blue network
Secondary structure



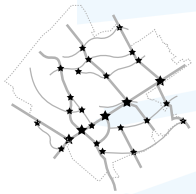
Creek rivers

Cultural history

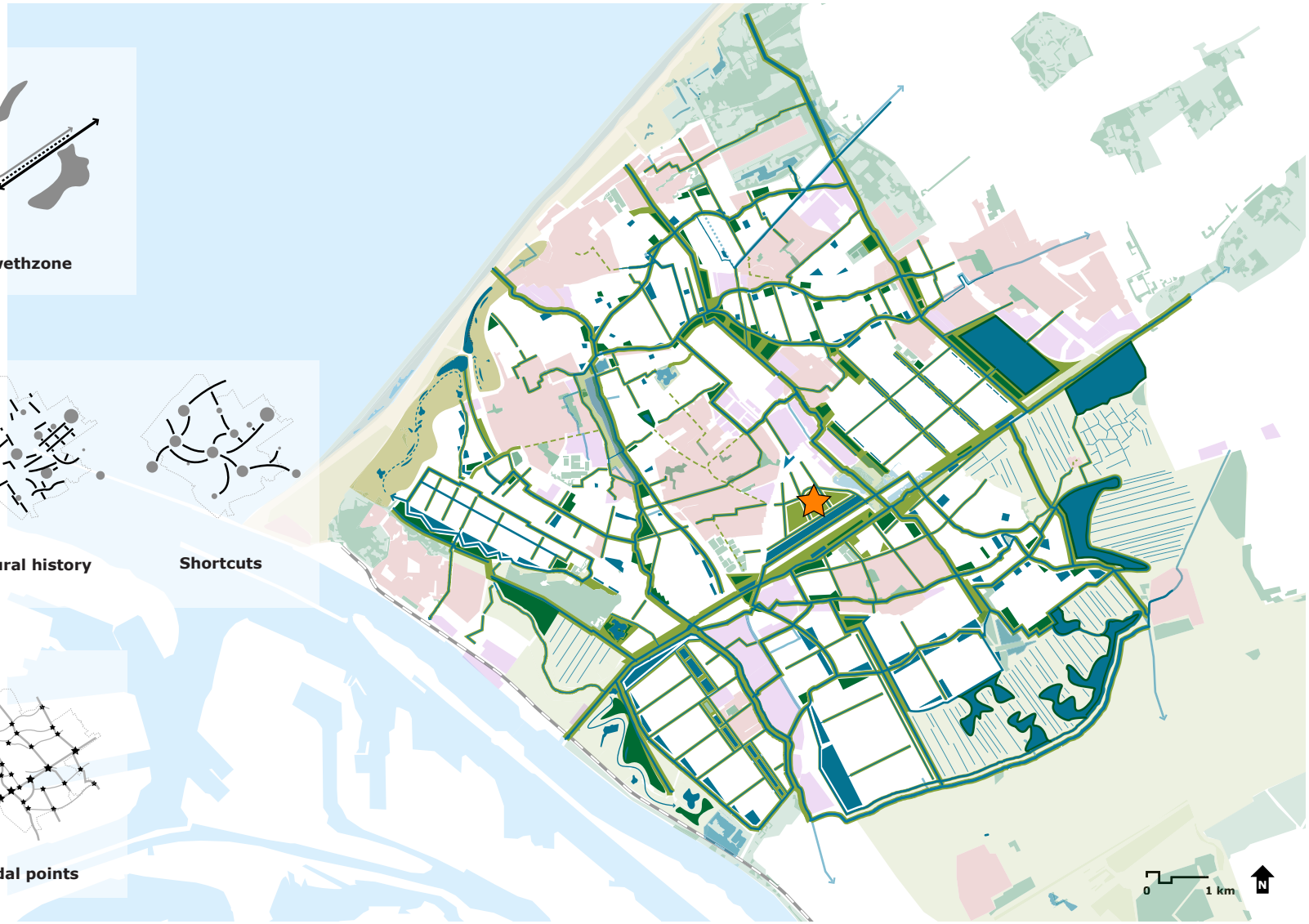
Shortcuts

Green blue places
Secondary elements

Fruitgardens & orchards



Nodal points



Creek

Croonen & van Soest (2007)

Green ribbon

Main green blue corridor

Mecanoo (2002)

Recreational route

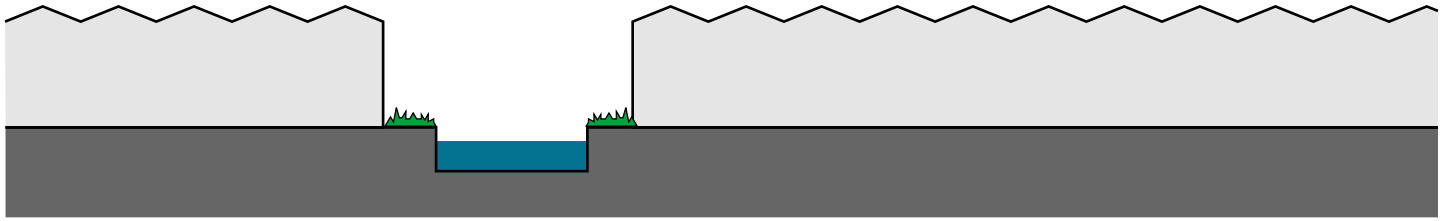
4.3 Green

By linking green and recreational spaces to the adjusted water network on the one hand the ecological and recreational main and sub structure could be improved what will contribute to the connectivity and accessibility of the green and recreational spaces and visibility water network.
On the other hand, and maybe even more important, the cultural historic lines and places or characteristic elements of the landscape and area itself could be restored and reinforced. By putting the emphasis on the smaller scale again and creating more space and 'air' within the enclosed and narrow profiles they become visible again what contributes to the readability of the area and reinforces the identity of the Westland.

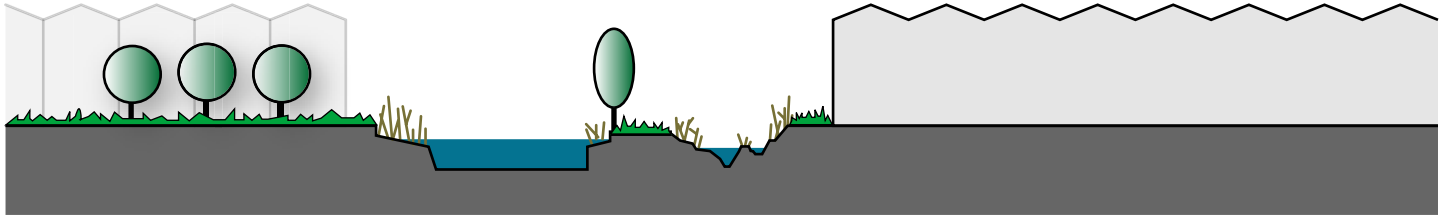
Furthermore it is of importance to attach this new green blue structure to the internal green structure of the urban centers to complete a green network from a residential area to one of the bigger source areas at the borders of the Westland routing to the surrounding.

Basic sections

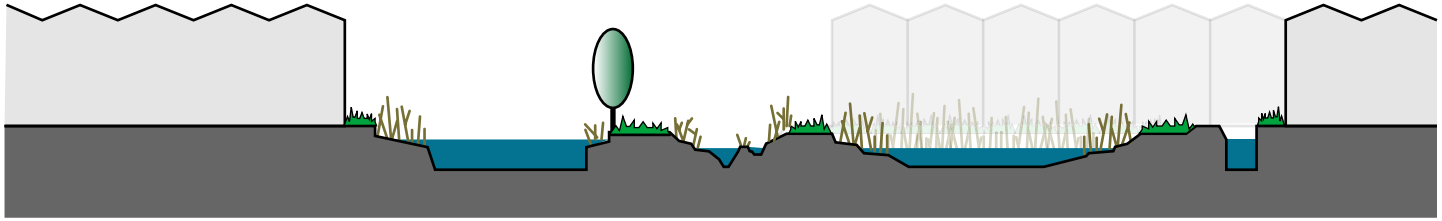
Present situation



Creek & fruit garden



Creek & pool



Widening of the profile; orientation on the water and space for green, recreation and water storage

Intervention

Green natural shores and recreational routing between boezem system and creek system

Present situation

MUST Urbanism & Feddes Olthof landschapsarchitecten (2009)

Bare profile and lack of space next to the water

Intervention

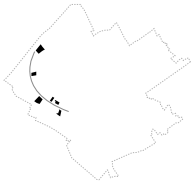
MUST Urbanism & Feddes Olthof landschapsarchitecten (2009)

Green recreational routing and natural shores

Green blue network
Secondary structure

Creek rivers

Green blue places
Secondary elements



Courtyards

Floriade

Connector

Synthesis housing and glasshousing

ONW (2008)

Small housing cluster

Courtyards

Urban cluster related to green blue main corridor

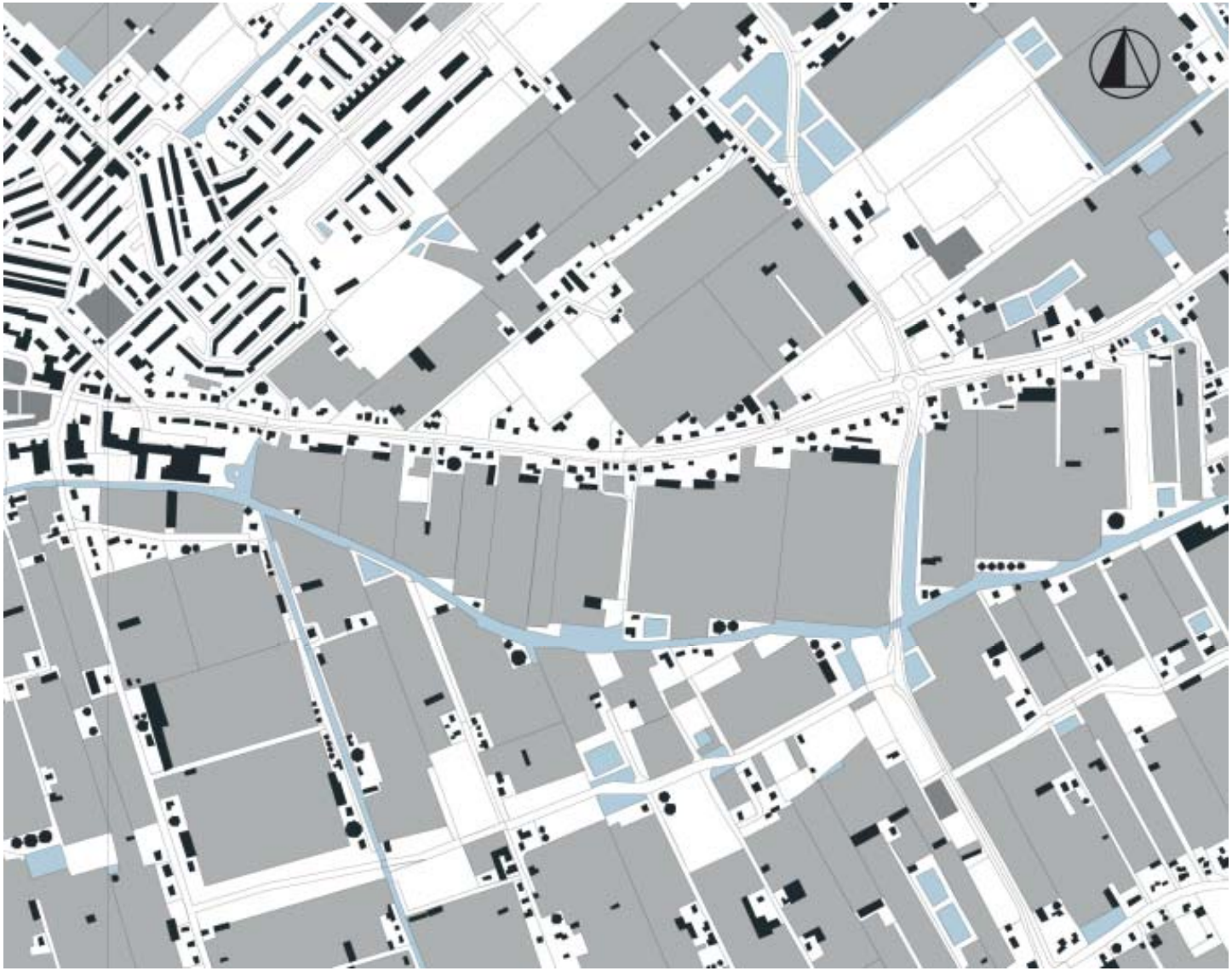
4.4 Residential areas

New residential areas, like expansions of present urban centers or smaller housing clusters and ribbons will be orientated and linked to the green blue structure. At the same time the dispersed housing within the present glasshouse horticultural areas must be clustered and integrated into the green blue structure. A spacious layout and green environment will be the main starting point of these new residential areas or clusters.
By developing urban expansions between the water of the Zweth and the urban center of De Lier this center can be orientated and linked to the green blue main corridor of the Zwethzone.

From origin most of the first settlements started to grow next to the former creek rivers. By expanding and reorienting present urban centers and linking new housing clusters to this creek structure the residential interventions can be placed within a historic perspective.
Looking to this perspective the area was also characterized by courtyards. The locations of the former courtyards will also be used to develop small scale housing clusters with characteristic green areas.

Furthermore the emphasis must be on (experimental) combinations of glasshouse horticulture and housing, mainly within the areas with 'small scale' horticulture.

Present situation



MUST Urbanism & Feddes Olthof landschapsarchitecten (2009)

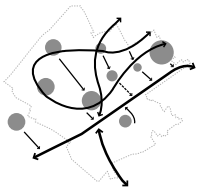
Accumulation of glasshouses, enclosed waterway

Intervention

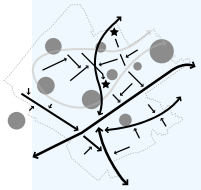
MUST Urbanism & Feddes Olthof landschapsarchitecten (2009)

Small housing cluster and green recreational routing linked to waterway

Infrastructure
Roads

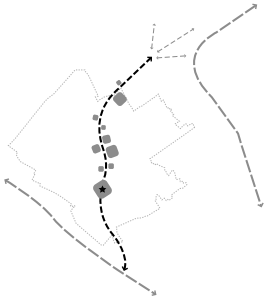


Urban centers

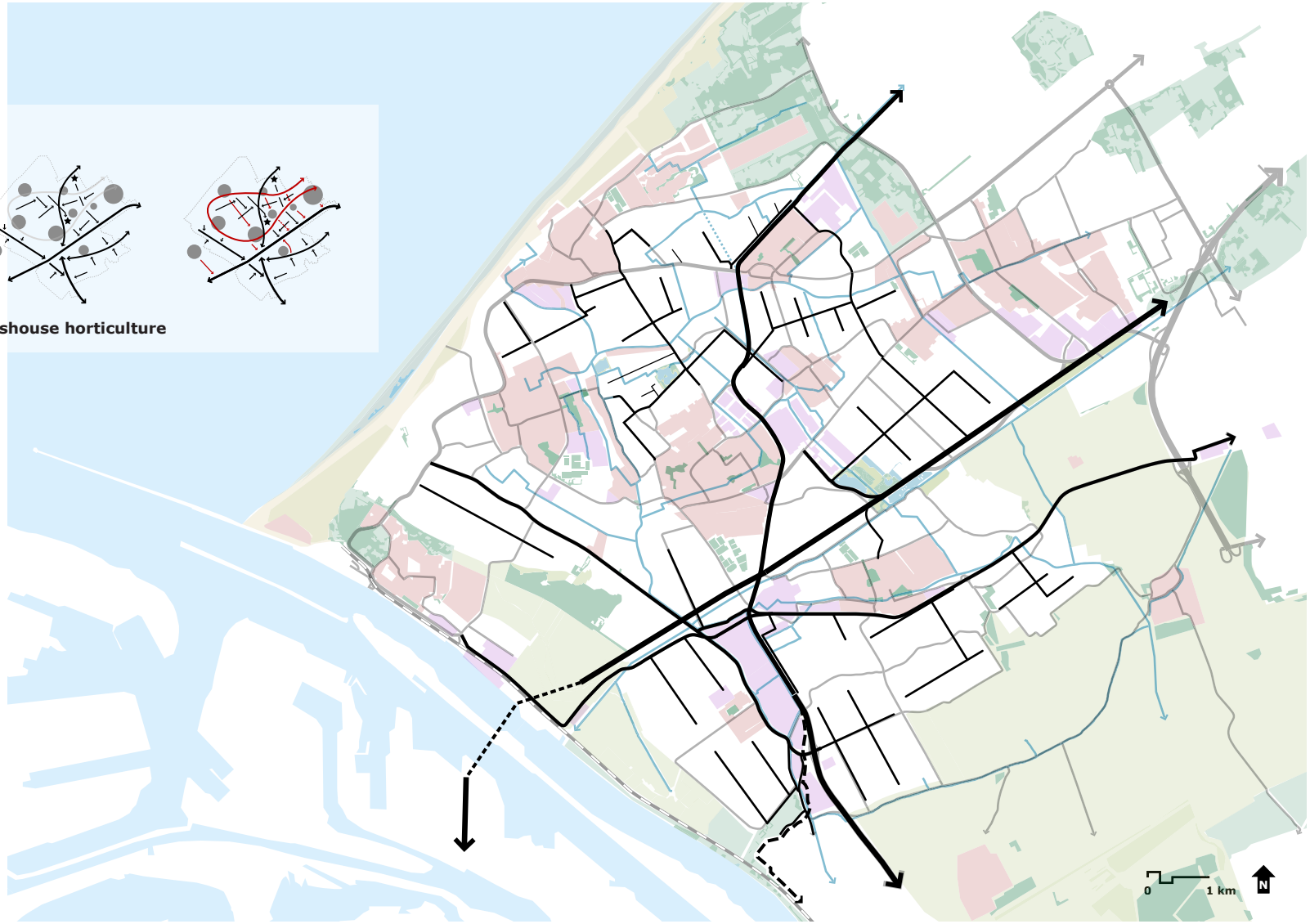


Glasshouse horticulture

Infrastructure
Public transport



High quality public transport



EZS / H+N+S (2007)

Secondary road

Light rail

EZS / H+N+S (2007)

A4-A15 corridor

Mecanoo (2005)

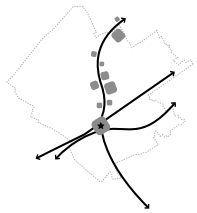
Economic axis

4.5 Infrastructure

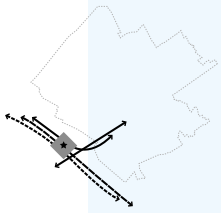
The emphasis of the new infrastructural network will be on the separation of the residential and glasshouse horticultural networks with a special attention to the disclosure to the national road network. The proposed A4-A15 corridor will be one of the main structuring elements of the new infrastructural network and is of importance for both groups. Most of the other interventions will only be related to the improvement of the disclosure of glasshouse horticultural areas and the separation of this network from the main urban 'ring road'.

The integration of a high quality public transport system will be an other important issue. Because of the proposed reinforcement of the economic axis and the possibilities to combine and bundle different commuter and traffic streams, a high quality public transport system, like for example a light rail, will be integrated within this axis.

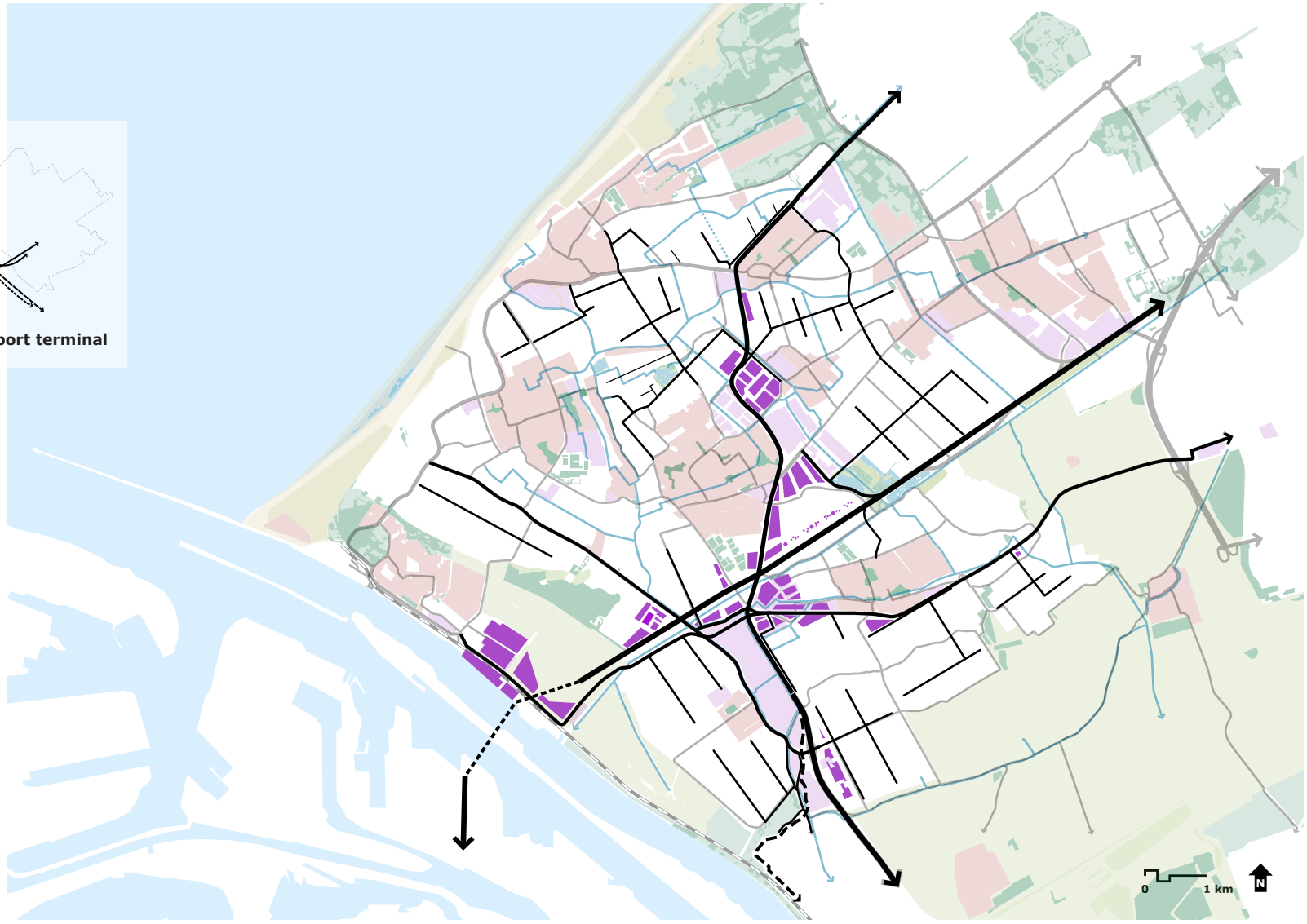
Program
Business areas



Economic axis



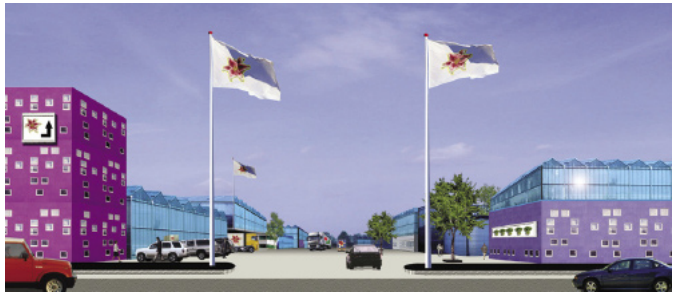
Greenport terminal



Kristinsson (2008)

Synthesis business & glasshousing

Floating pavilions Floriade



Mecanoo (2005)

MVRDV (2004)

Greenport terminal

Qualitative representation

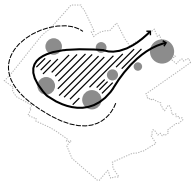
4.6 Business areas

The reinforcement of the economic axis will be the most important aspect. Along this axis glasshouse horticulture and (horticultural related) business come together and becomes in a way the lifeline of the future glasshouse cluster. This line ends at the intersection with the proposed A4-A15 corridor what will be developed as main business node and is reserved for the main offices and establishments of important (horticultural related) companies.

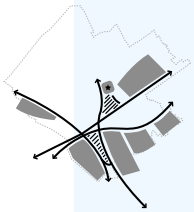
The expansion of the flower auction will be combined with new business areas, green spaces an public functions that will be attached to the main area of the Floriade. Next to the proposed A4-A15 corridor there will be during the Floriade bigger and smaller (floating) pavilions that after the Floriade will be used by small scale and experimental horticultural related functions and activities and becomes more or less the show case of a dynamic glasshouse cluster.

At the border of the Maas there will be a 'Greenport terminal' that adapts to the possibilities of multimodal transport and combines the road-, train- and water network on one place.

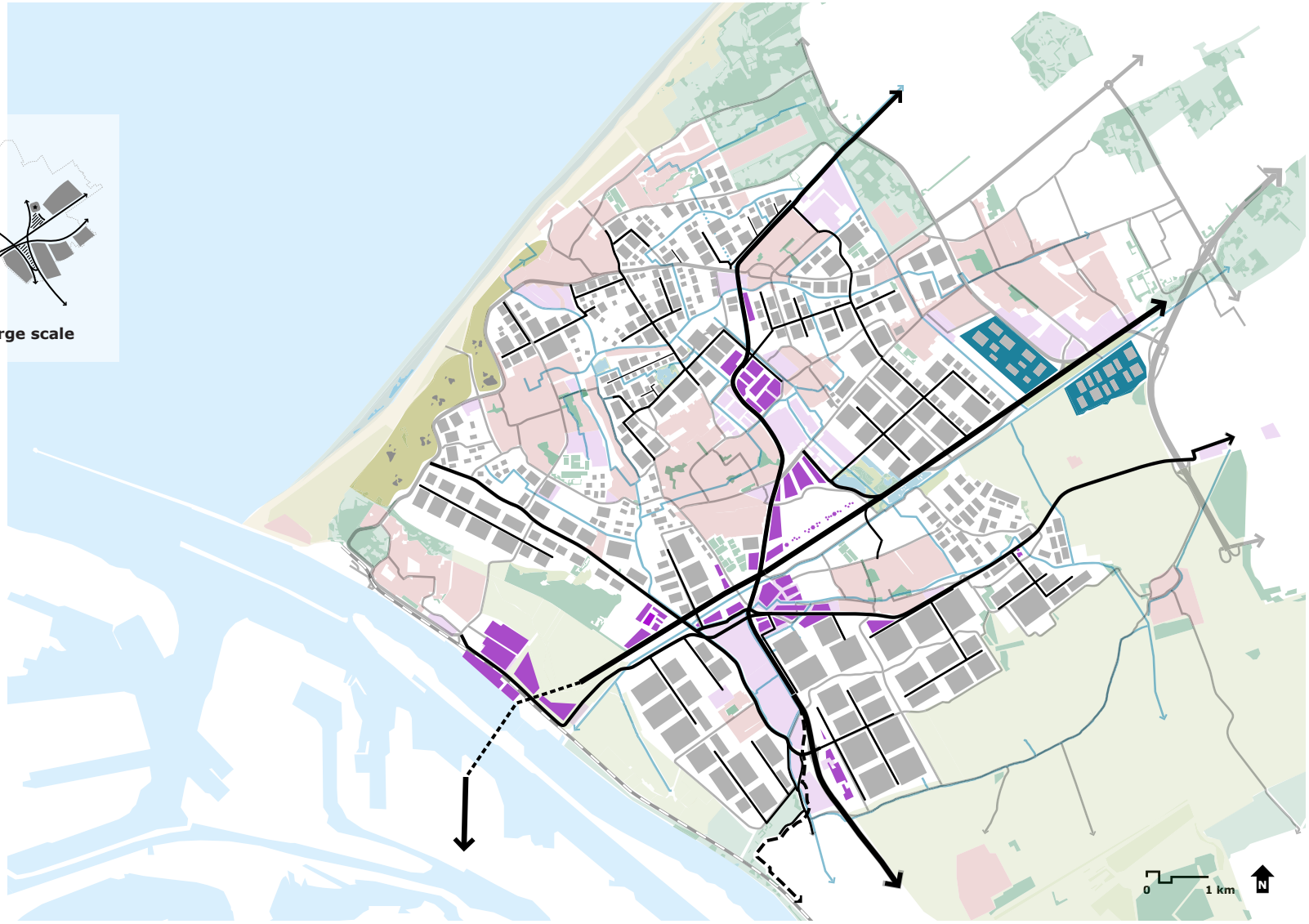
Program
Business areas

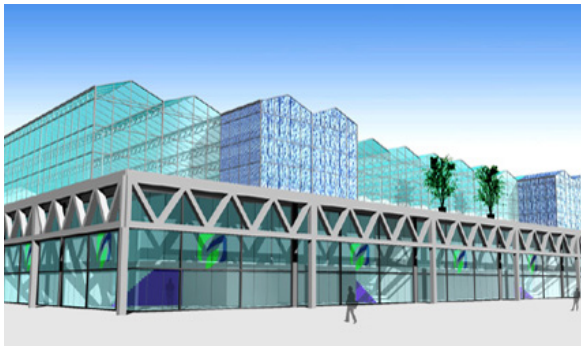


Small scale



Large scale

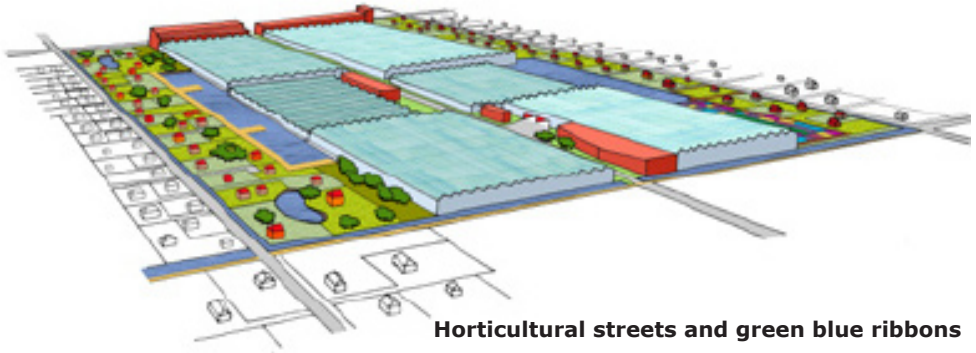




Architektenburo Bogaerds (2008)

Intensive use of space

Experimental shapes



Mecanoo (2005)

Horticultural streets and green blue ribbons

Casa Nova (2007)

Small scale glasshouse horticulture

Floating glasshouses

4.7 Glass housing

Rational and large scale glasshouse areas, focused on intensive use of space, will be situated at the borders of the glasshouse cluster and linked to the most important disclosure roads. These roads become in a way glass axes which are directly related to the national road network and important glasshouse horticulture related business areas and auctions. The emphasis of the area in the middle of the urban 'ring road' will be on 'small scale' glasshouse horticulture that adapts to the irregular allotments and the former creek landscape. Within this dynamic landscape there will be a mixture of green, recreation, water, housing and glasshouse horticulture within a high qualitative environment whereby some of the glasshouses will be intertwined with other programs than horticultural ones, like for example education, health care, cultural activities or of course housing. However when possible 'large scale' glasshouse horticulture can be integrated as well.

Because of the transformation of the coast zone a relatively big surface of glass housing will disappear. Within the area there only will be some natural shaped glasshouses, like the Eden Project, which fit better to the proposed dune water area. These glasshouses can be used for small scale horticultural activities or public and recreational functions and activities.

The lowest parts next to the proposed A4-A15 corridor which will be flooded will be filled with floating glasshouses.

Present situation

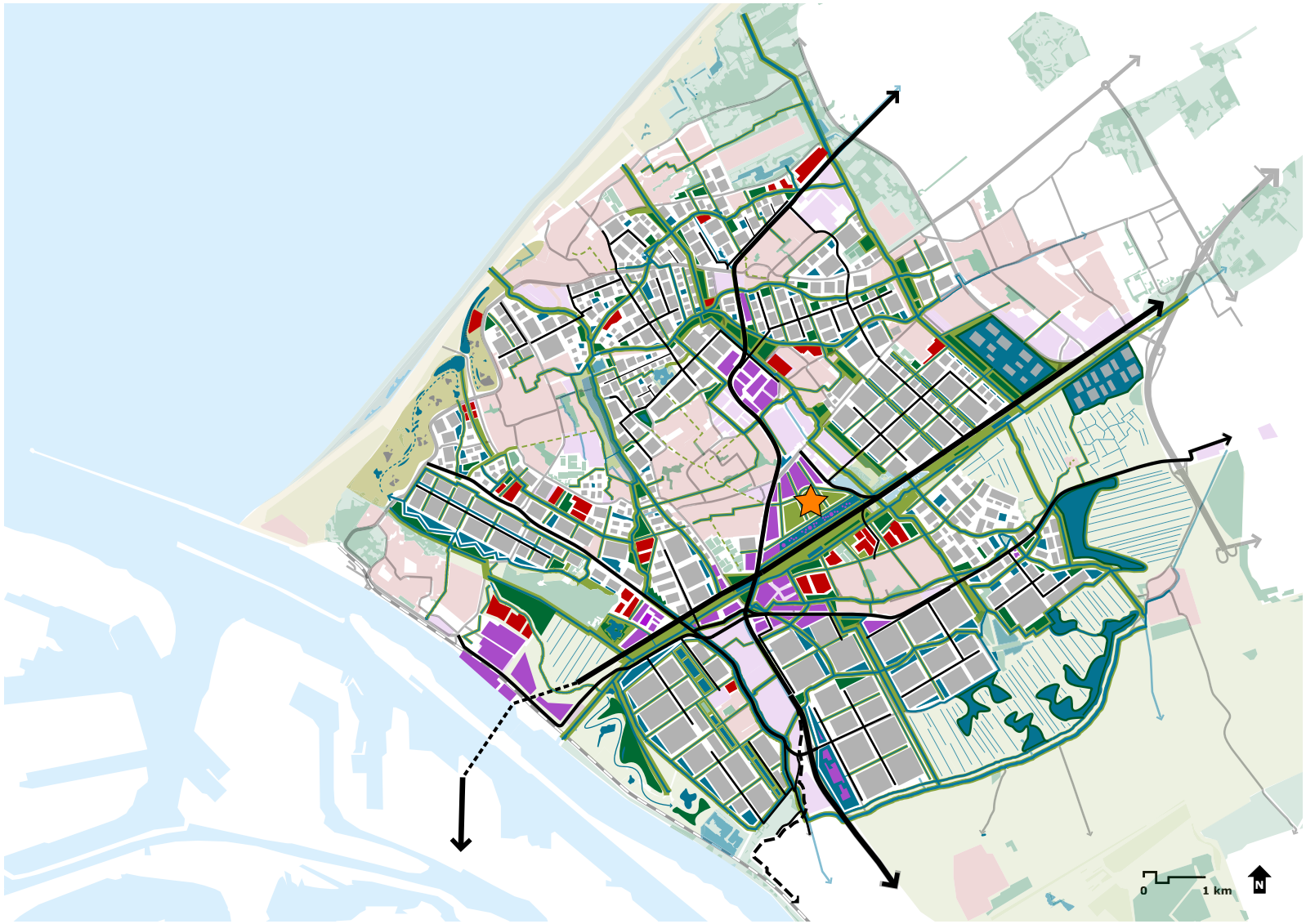
Standard dune area

Intervention

Stichting Nieuw Holland, SMO & KOW (2007)

Integration of dune water and experimental glasshousing

4.8 Synthesis



5 COMPLETION

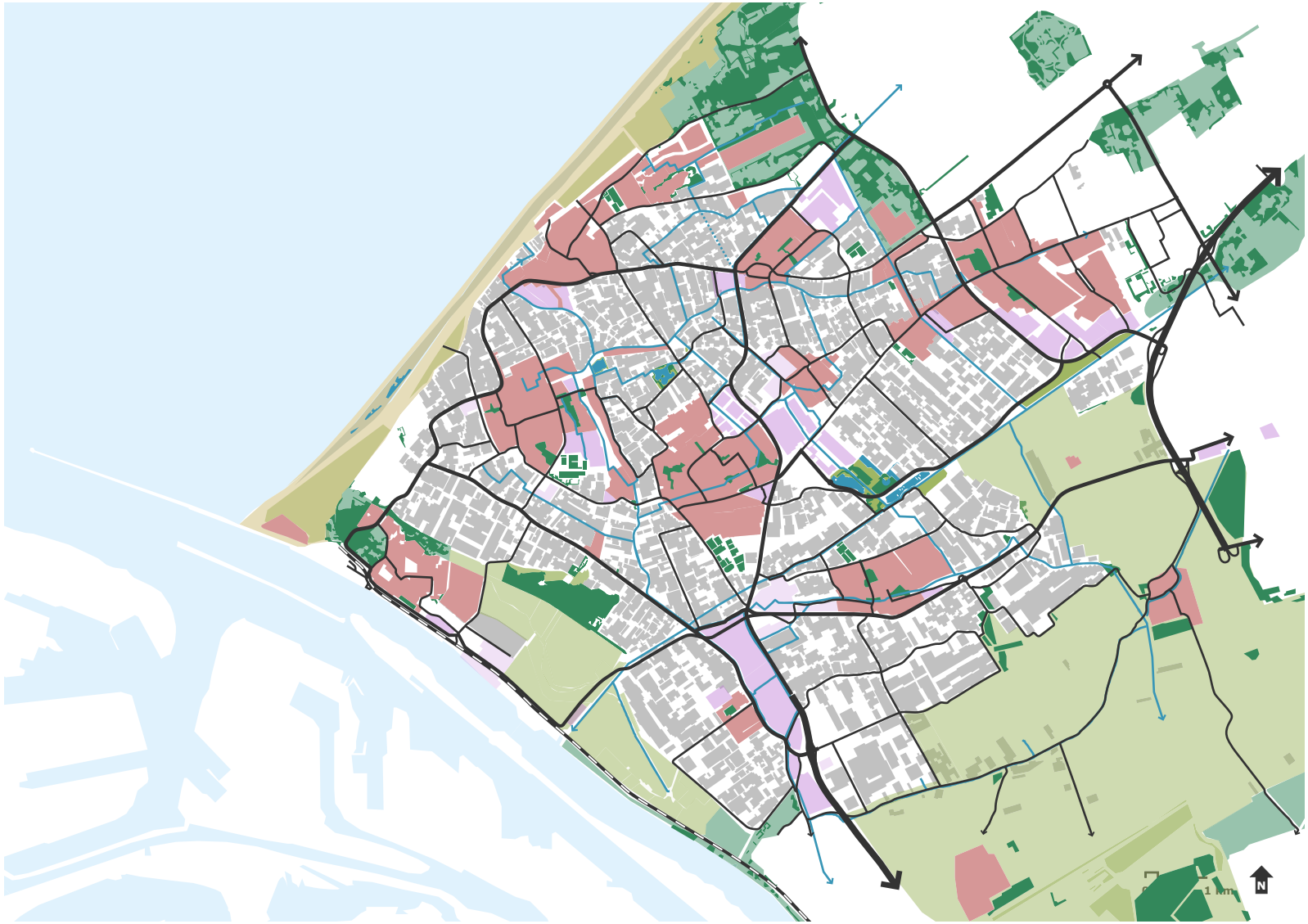
5.1 Introduction

To complete the thesis the present situation will be related to the proposed interventions. A rough calculation will reflect the total decrease of glass surface that can be expected if all proposed interventions will be realised.

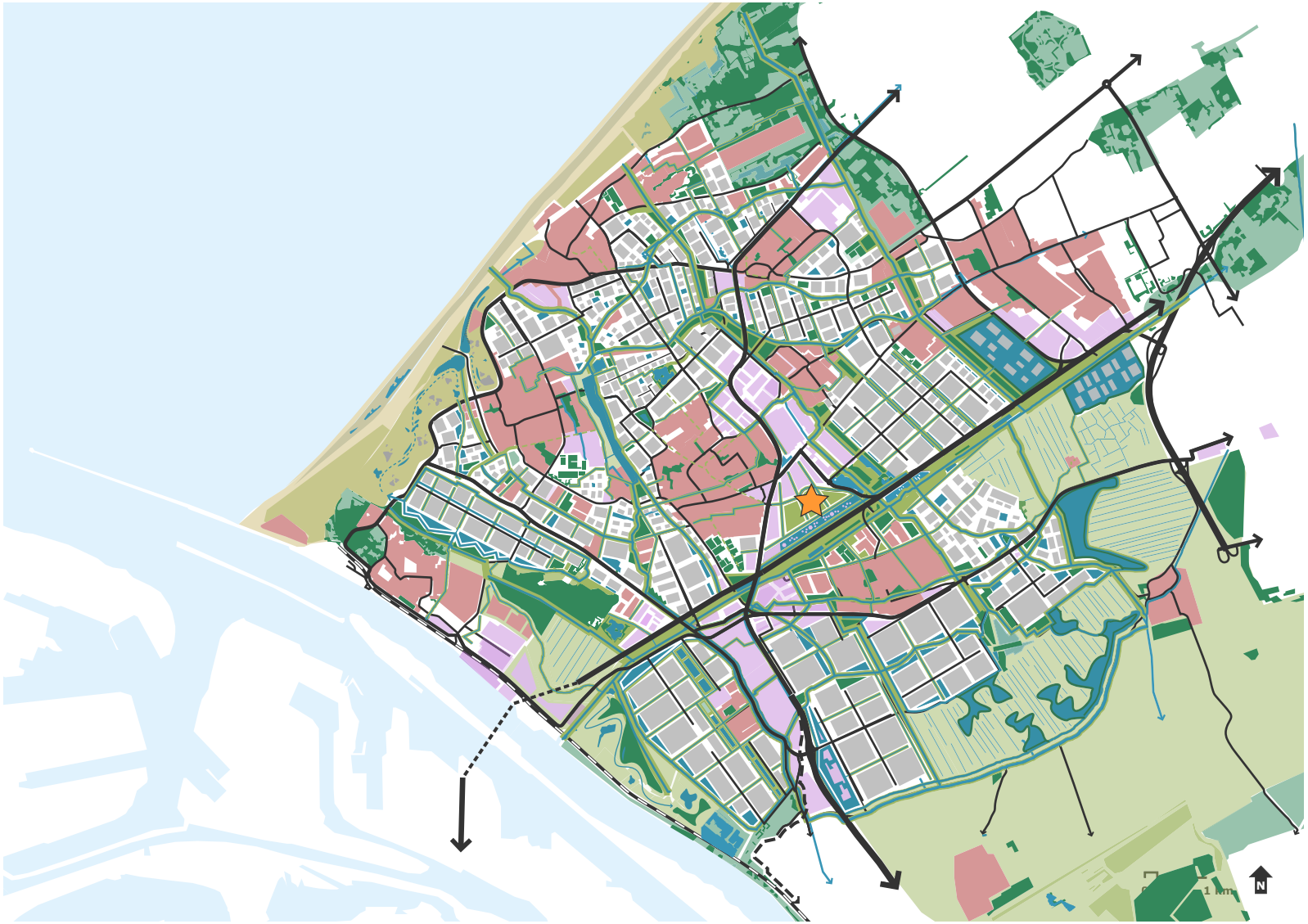
Furthermore there will be a brief clarification about the phasing and approach to develop the total area.

At last there will be an overview of the main conclusions and recommendations of this thesis. To fall back on the three main aspects of spatial quality these recommendations will be arranged by amenity value, utility value and future value.

Present situation



Possible future



5.2 Decrease of glass surface

A rough calculation shows that when all proposed interventions will be realised, this will be at cost of 1058 ha net glass surface of which 716 net ha are situated within the borders of the Westland. In comparison with the total glass surface in the year 2008 this is about 30%.
This percentage can be seen as most extreme scenario that includes all proposed interventions to come to the improvement of spatial quality. By realizing only the most substantial and effective interventions and put the focus mainly on the aspects which are related to the amenity value, the spatial quality can be improved as well. In that case the percentage will be much lower.

Within the calculation there will be an overview of the decrease of glass surface related to the bigger and most important interventions, ordered by main category, and the average decrease within different sub areas, which is calculated by using a fix percentage of the surface of the total area. This percentage is a rough estimation and must be determined for each sub area separately. After all there will be a differentiation of areas where 'small scale' glass housing will be integrated within a more spacious and green environment up to large scale glasshouse areas in a more densed lay out.

Decrease glass surface by main interventions (net ha)

Main green blue structure	190
Dune area	108
Housing	216
Business	118
Floriade (main area)	40
Glasshousing Hoek van Holland	45
Green areas Maasdijk	15
Sub total	**730 ha***

*Exclusive dispersed glass surface of Midden-Delfland

Decrease glass surface by main area (net ha)

Boezem area (creeks) (20%)	168
Olieblok (20%)	25
Oranjepolder (15%)	42
Heen- & Geestvaart (court yards) (10%)	18
Nieuw- & Noordland (10%)	15
Broekpolder (10%)	30
Polders Midden-Delfland (5%)	30
Sub total	**328 ha***

*Inclusive corrections because of overlap with main interventions

Total decrease glass surface all interventions (net ha)

730 ha + 328 ha **= 1058 ha**

Glass surface outside borders Westland (net ha)

Midden-Delfland	195 ha
Hoek van Holland	147 ha
Total	**342 ha**

Total decrease glass surface Westland (net ha)

1058 ha - 342 ha **= 716 ha**

Total glass surface Westland (2008)(net ha)

= 2500 ha

Total decrease glass surface Westland (percentage)

716 ha : 2500 ha x 100 **= 29 %**

Gemeente Westland (2008)

Prioritisation based on spatial developments and water assignment

5.3 Phasing

It is not possible to transform the complete area at once. Therefore a phased approach and a differentiation in sub areas is necessary. By using the polder borders or for example prominent infrastructural lines clear and coherent restructuring areas could be determined. As represented within the drawing out of the Waterplan Westland, it is then possible to give each sub area a certain priority, which reflects in a way the phasing in time. However it is not a static and fixed known fact. Continuously must be adapted to new insights, spatial developments or changing conditions.
The priority could be determined at hand of different aspects like for example the urgent need to solve problematic water issues or other spatial problems, the possibilities to combine different upcoming spatial developments or the need to renew outdated and insufficient glasshouse areas.

Because green blue structures or infrastructural lines will run through different restructuring areas it is necessary to set up a future spatial structure, on the scale of the Westland and some times even bigger, which includes these continuous structures. During the restructuring of a local glasshouse area the continuity, fittableness and recognisability of for example a green blue corridor could then be secured.

Adapting to the life cycle of individual glasshouse companies could provide furthermore possibilities to create unique temporary green, blue or recreational areas within accumulated glasshouse areas.

5.4 Conclusions

- The emphasis of the spatial development of the Westland is mainly on the well functioning of the glasshouse horticulture and the preservation of as much glass as possible
- Therefore the present spatial lay out does not concede to the actual spatial demands that are required in the high densed areas of the Randstad; this reflects a lack of spatial quality.
- A balance between utility-, amenity- and future value is necessary
- To ensure the vitality and continued existence this balance is also in the interest of the glasshouse cluster
- The spatial quality can only be improved if the amenity value will be raised with regard to the utility value
- The water network must be used as carrier of the improvement of the amenity value
- The infrastructural network must be used as carrier of the utility value
- The sustainability of the glasshouse cluster must be ensured by paying attention to the future value
- Because of the present accumulation of glasshouses improvements related to the amenity value are always at cost of glass surface
- The Westland must therefore be considered as integral part of Greenport Nederland
- The need to preserve as much glass as possible and an intensive lobby make it hard to come to fundamental changes
- The Floriade must be used as tool to stimulate spatial transformations and to trigger the future spatial development

5.5 Recommendations

Amenity value

- Adapt to geological situation and underlying landscape
  Restore and reinforce cultural historic characteristics and elements
- Adapt to the identity of different sub areas, diversity
- Put an emphasis on 'small scale' glasshouse horticulture to the area in the middle of the urban centers
- Create a solid and well accessible green blue and recreational network that is connected to the urban centers and bigger green and ecological source areas at the borders
- Orientate spatial development on water network
- Separate and differentiate traffic and transport streams
- Integrate experimental shapes of glasshouses and unusual lay outs
- Integrate green and recreational spaces and functions within a glasshouse area

Utility value

- Aiming for rational allotments
- Regroup and relocate business and horticultural functions and activities
- Aiming for intensive land use
- Aiming for collective facilities
- Separate and differentiate traffic and transport streams
- Improve the disclosure to national networks, auctions and other important (horticultural related) business areas

Future value

- Increase the production- and added value
- Independent and self-sufficient water system
- Create sufficient space for water storage
- Connect isolated green areas and spaces
- Improve the disclosure to national networks, auctions and other important (horticultural related) business areas
- Integrate 'large scale' and 'small scale' glasshouse horticulture within the area
- Differentiate and relocate glasshouse horticulture
- Create possibilities to cluster different horticultural allotments
- Cluster and connect business and glasshouse horticulture to main disclosure roads
- Cluster and connect business to economic axis
- Cluster dispersed and single horticultural housing in ribbons or small housing clusters, preferably situated at the borders of an glasshouse area
- Adapt to the life cycle of a glasshouse

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