

Life beyond the Dike

From Delta scale to Waterdriehoek scale

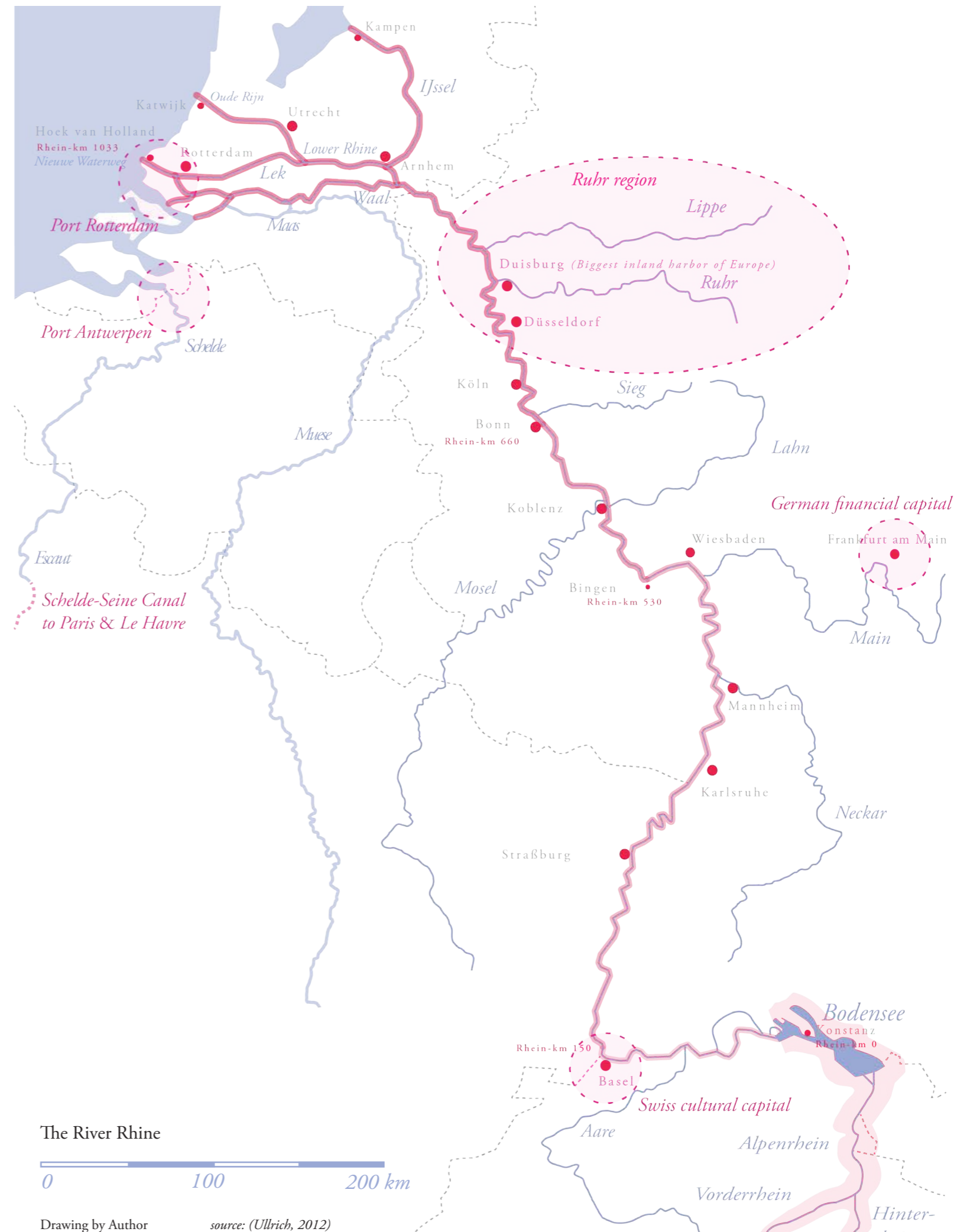
A serie of maps

Rhine-Meuse-Scheldt Delta

The Dutch delta consists of the combined delta of three rivers. All three are important corridors for industrial transport. Therefore it is important to keep them navigable. Planning decisions transcend country borders. Staying connected to the sea is important for trade and maritime activities. Decisions made upstream have an accumulative impact on water management downstream. Thus, a shared responsibility in Western Europe emerges to keep the biggest Delta in Europe both safe and navigable.

The Rhine has the highest discharge rate, meaning that it contributes to most of the water in the Delta. Melt water from the Alps combined with water from branch rivers. In spring when snow is melting it causes the river to be high. The Meuse has 1/10 of the discharge rate of the Rhine. The river is classified as a rain river, causing the river to highly fluctuate between different seasons. In winter the river is high, while in summer it can be almost dry. Whilst the Scheldt is part of the Dutch delta, it does not contribute to the discharge of the main rivers. The river is also a rain river changing from high to low between different seasons.

The Delta is a tidal delta, this means that high tide formed a serious risk because strong tidal currents could reach far inland. Before the construction of the Delta Works, the tide influenced the delta up to Nijmegen. Today the tide is better controlled but still very present for example in the river Noord.



Water in The Netherlands

The Waal accounts for 71,3% of the total discharge of the Delta. In the Waterdriehoek it splits into the Beneden Merwede (27,4%) and into Nieuwe Merwede (43,8%). Part of the Nieuwe Merwede is the Noordwaard polder, which was as part of the 'Room for the River' plan reintroduced as a floodplain area in 2015, the floodplain improves water safety and takes pressure of the dikes. The new floodplain also adds ecological and recreational value to the region.

The Beneden Merwede splits into the Noord (20%) and the Oude Maas (7%). The Noord is a tidal river, causing the flow direction to switch with the tide. Together with the Lek (11,3%) it forms the Nieuwe Maas that flows through Rotterdam into the Nieuwe Waterweg.

The Waterdriehoek area has been an important node in the Dutch Delta. Both as a busy shipping route and as a region tightly connected to water management. The Rivers come together, causing the discharge to be high. Industrial areas with harbors, extensive dike rings and floodplains form an interesting landscape of waterfronts where maritime and water identities mix together. For continued water safety and maritime activity it remains important to balance out these areas with opposing interactions with water.



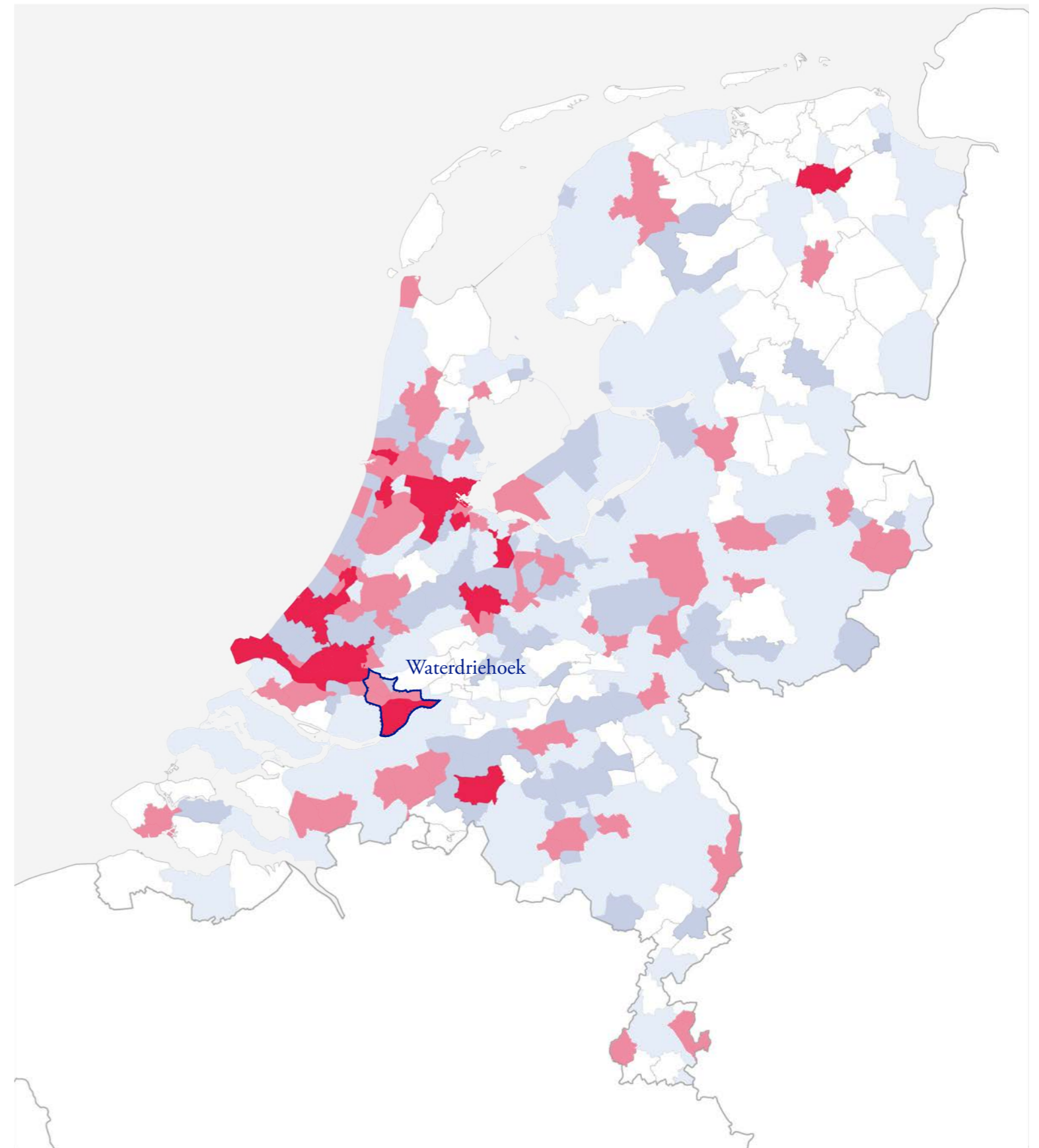
The Netherlands, a Land of Water

Degree of Urbanization

The Waterdriehoek is a relatively urbanised area in the Netherlands. Historic riverside settlements have expanded throughout the centuries and fused together. Therefore the capacity to further expand is limited.

The classification of surrounding address density based on five categories:

- extremely urbanised: 2,500 addresses or more per square kilometre
- strongly urbanised: 1,500 to 2,000 addresses per square kilometre
- moderately urbanised: 1,000 to 1,500 addresses per square kilometre
- hardly urbanised: 500 to 1,000 addresses per square kilometre
- not urbanised: fewer than 500 addresses per square kilometre



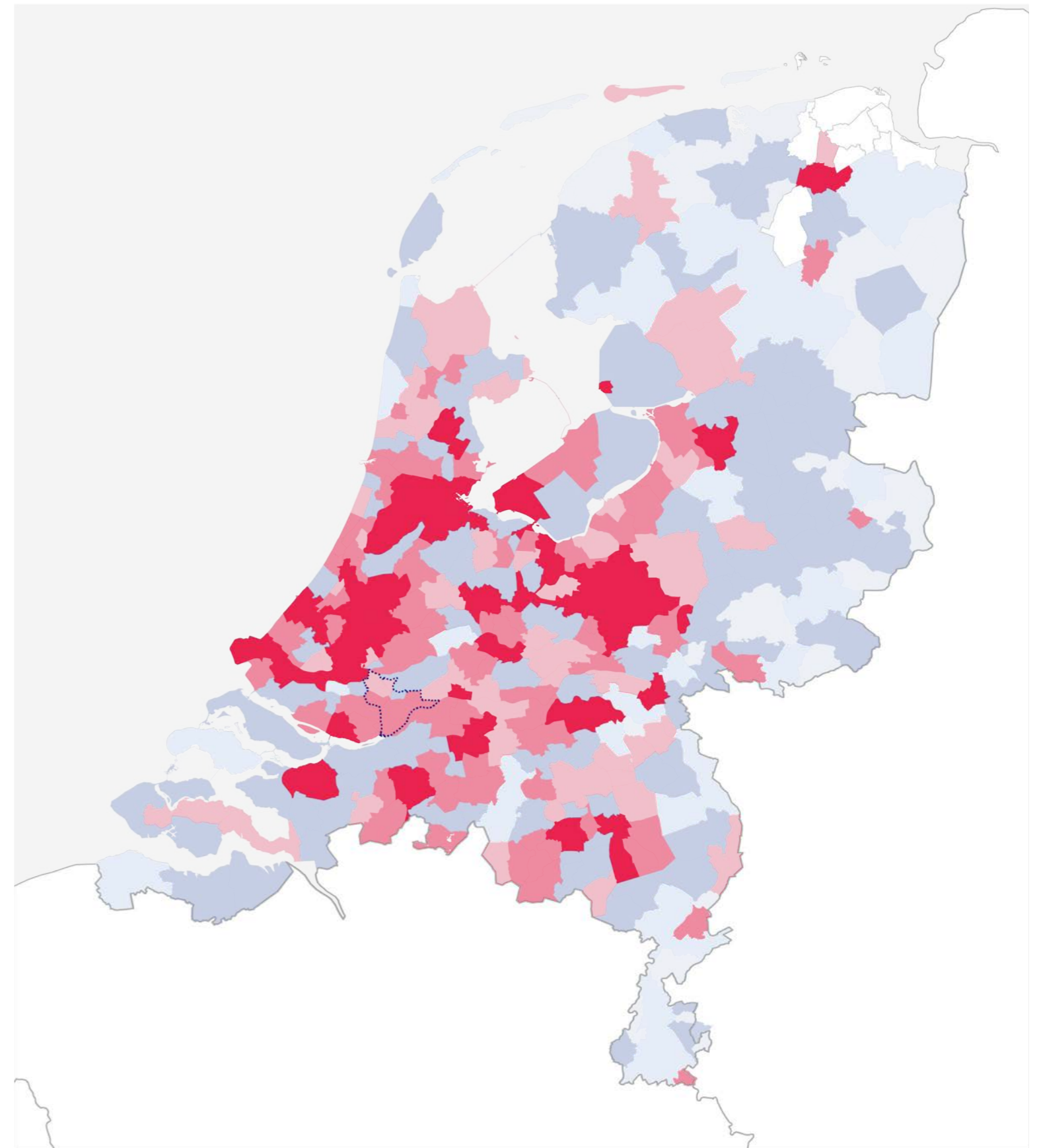
Degree of Urbanization (% of National Population)

■ Extremely urbanized (22%)	■ Moderately urbanized (17%)	■ Not urbanized (9%)
■ Strongly urbanized (31%)	■ Hardly urbanized (21%)	

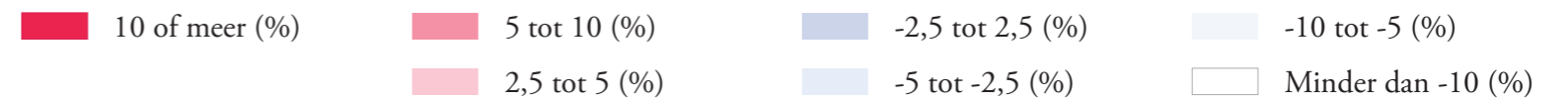
Drawing by Author source: CBS (2016)

Population Growth

The already densely populated area is also subject to population growth. Accommodating the expected growth asks for development strategies that are integrated with water management practices. The inflow of new residents also raises the questions about the identity and heritage of the region.



Population Growth between 2018 en 2023 (prognosis)

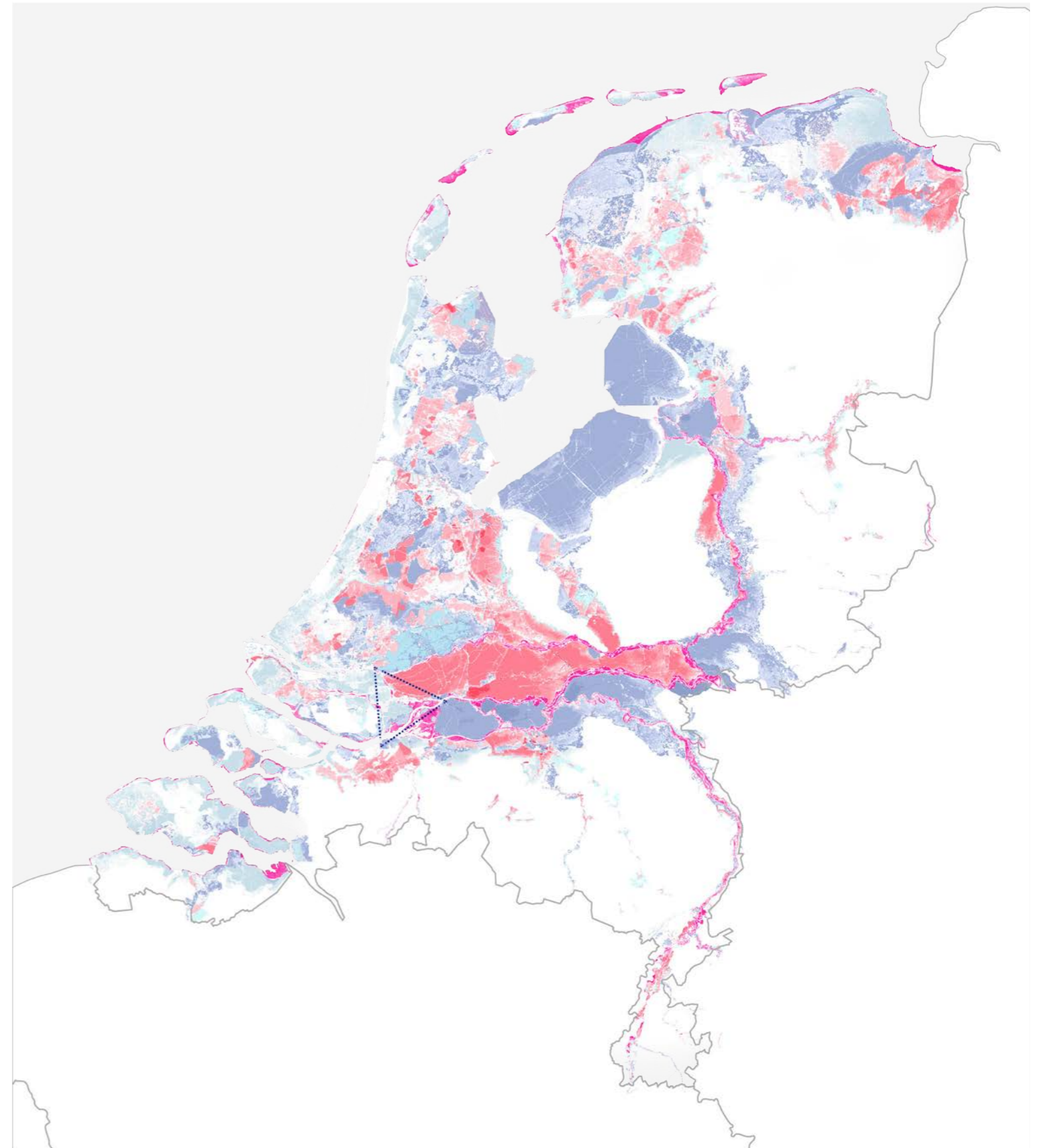
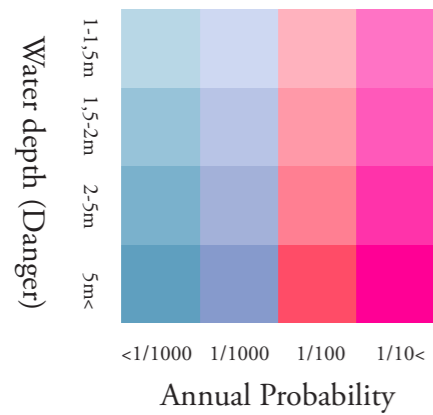


Drawing by Author

source: CBS (2016)

Floodrisk

The probability of flooding combined with the potential damage is expressed as the floodrisk. The probability is influenced by the discharge of the river and water management efforts. The water authorities are continuously assessing the water defenses and developing water management strategies. The potential damage is measured as water depth when areas flood. As seen in the map, the areas around the rivers have the highest floodrisk, especially the Alblasserwaard where the project areas are located.



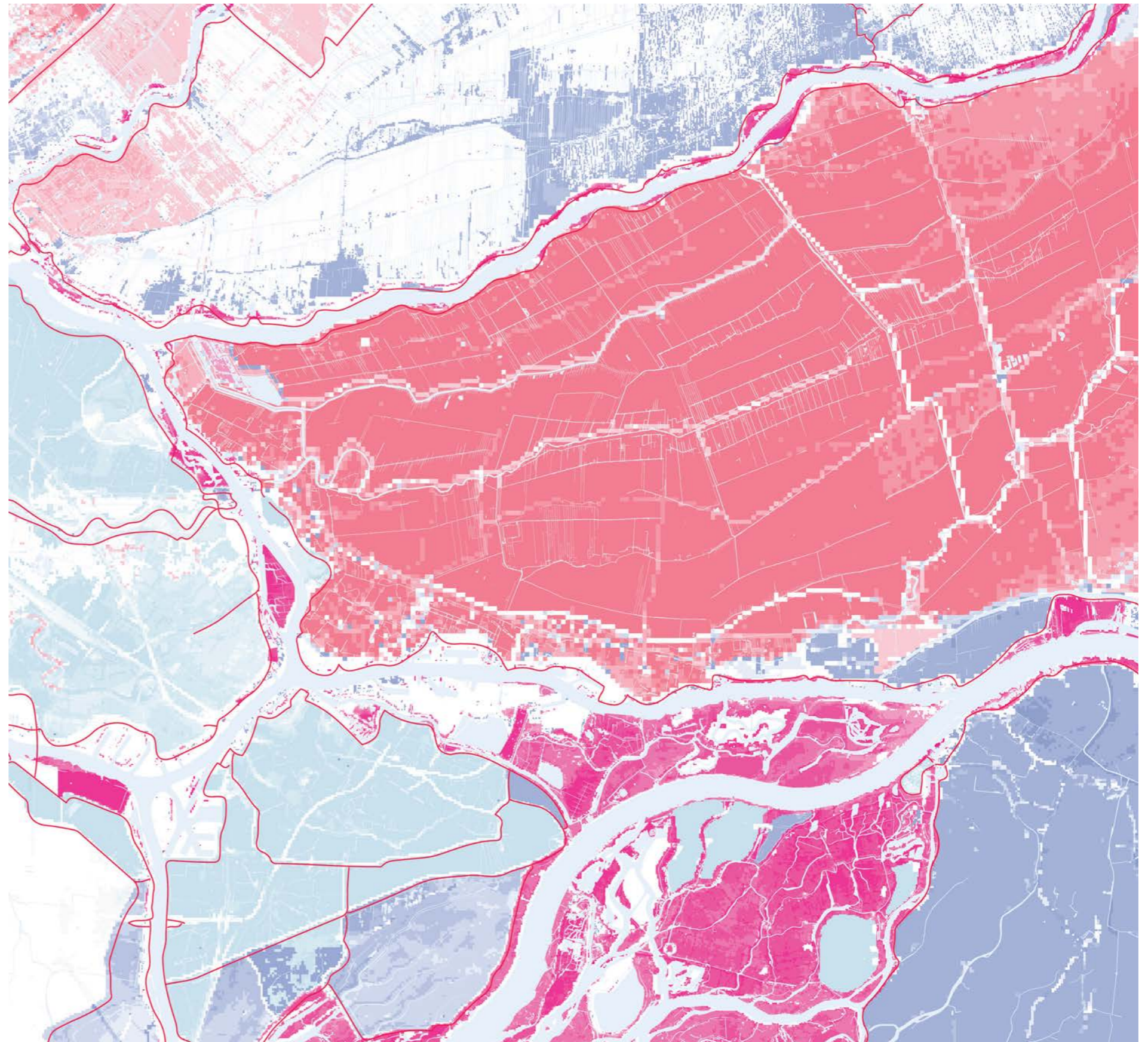
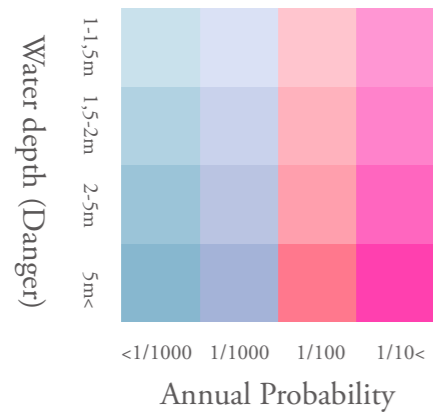
Floodrisk in The Netherlands

Drawing by Author

source: *Klimaat-effectatlas (2023)*

Floodrisk and the dikes

The outerdike areas have a high chance of flooding. The Alblasserwaard has a 1/100 chance of flooding, which is higher than the surrounding polders. In areas that remain white, often situated outerdike it is unclear what the floodrisk is.



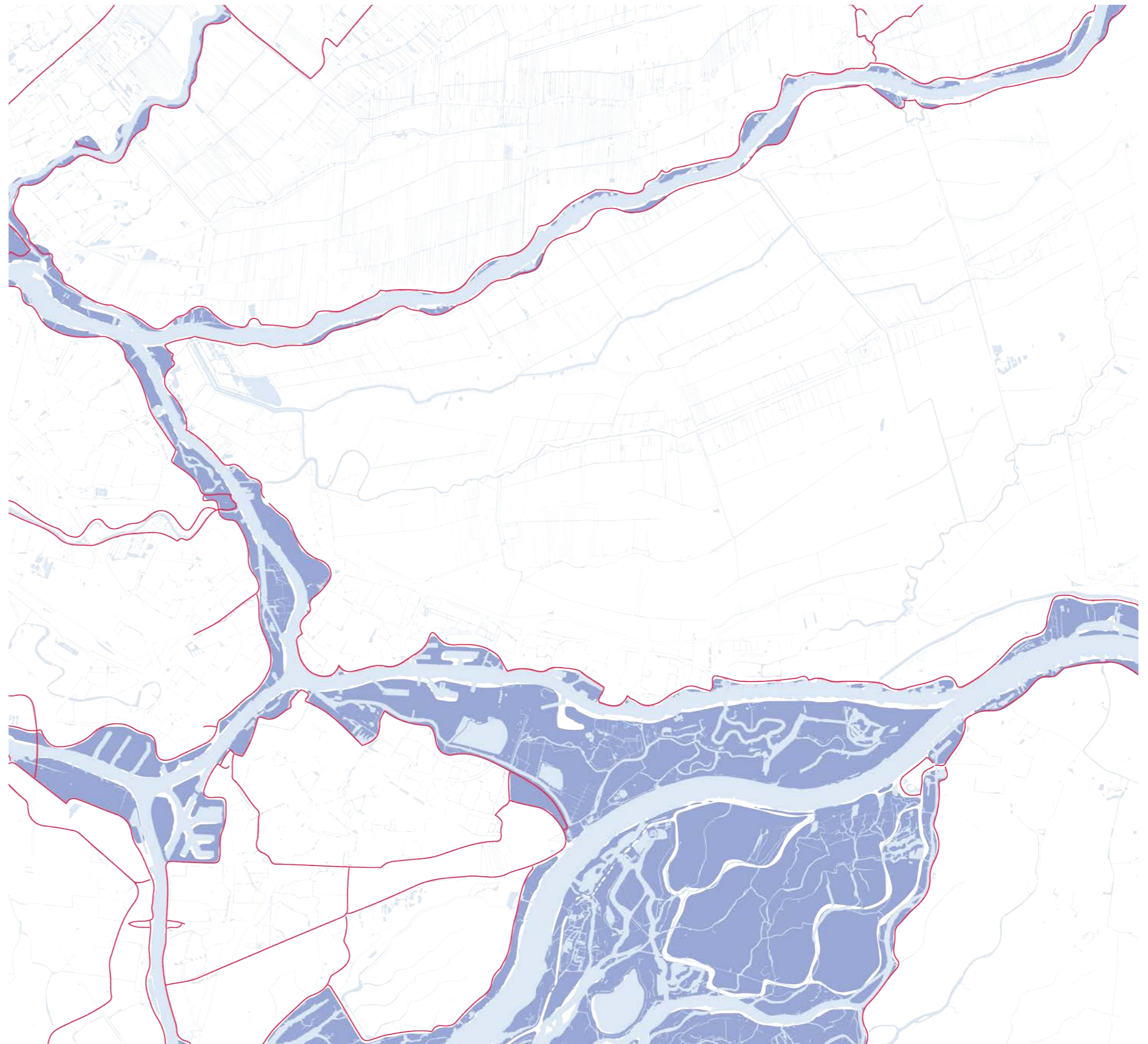
Floodrisk in The Waterdriehoek

Drawing by Author

source: Klimaateffectatlas (2023)

Dikes and Uiterwaarden

The Uiterwaarden are areas outside of the dike. This territory is bound to the river and subject to the changing conditions of the river. In urbanized areas the quays have been heightend. This narrows down the river and causes higher discharge rates, putting more stress on the dikes. This also works the other way around. More room for the rivers reduces the stress on the dikes. These floodplain areas can still be used for a variety of functions when the rivertide is lower.



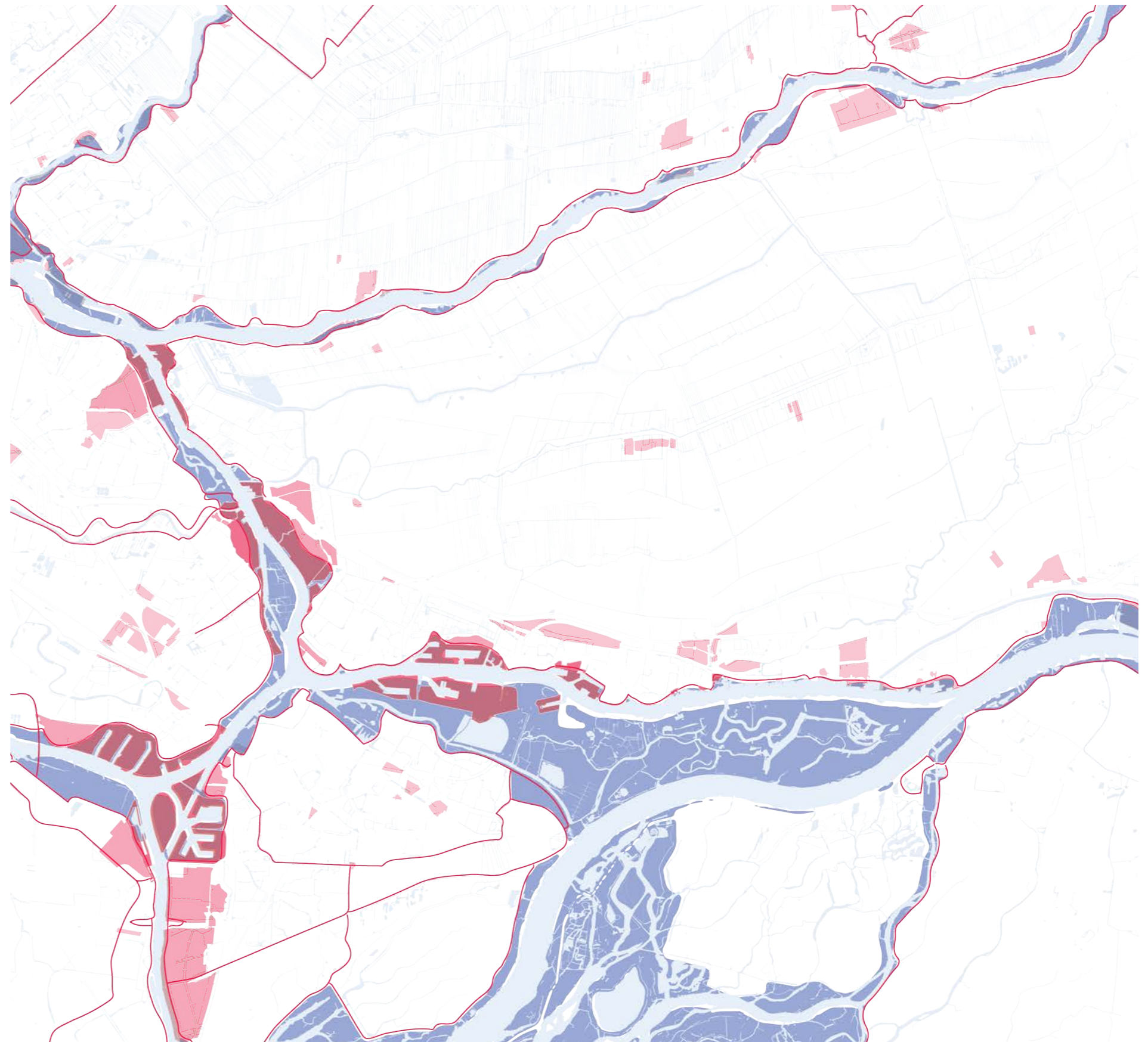
The Uiterwaarden in the Waterdriehoek

Drawing by Author

source: PDOK (2018)

Uiterwaarden and Industrial sites

The industrial sites are mostly connected to the river. These areas have been the economic motor of the region throughout history and contain many historical shipyards and factories. However, many of those maritime heritage sites are losing their maritime connection, becoming vacant.



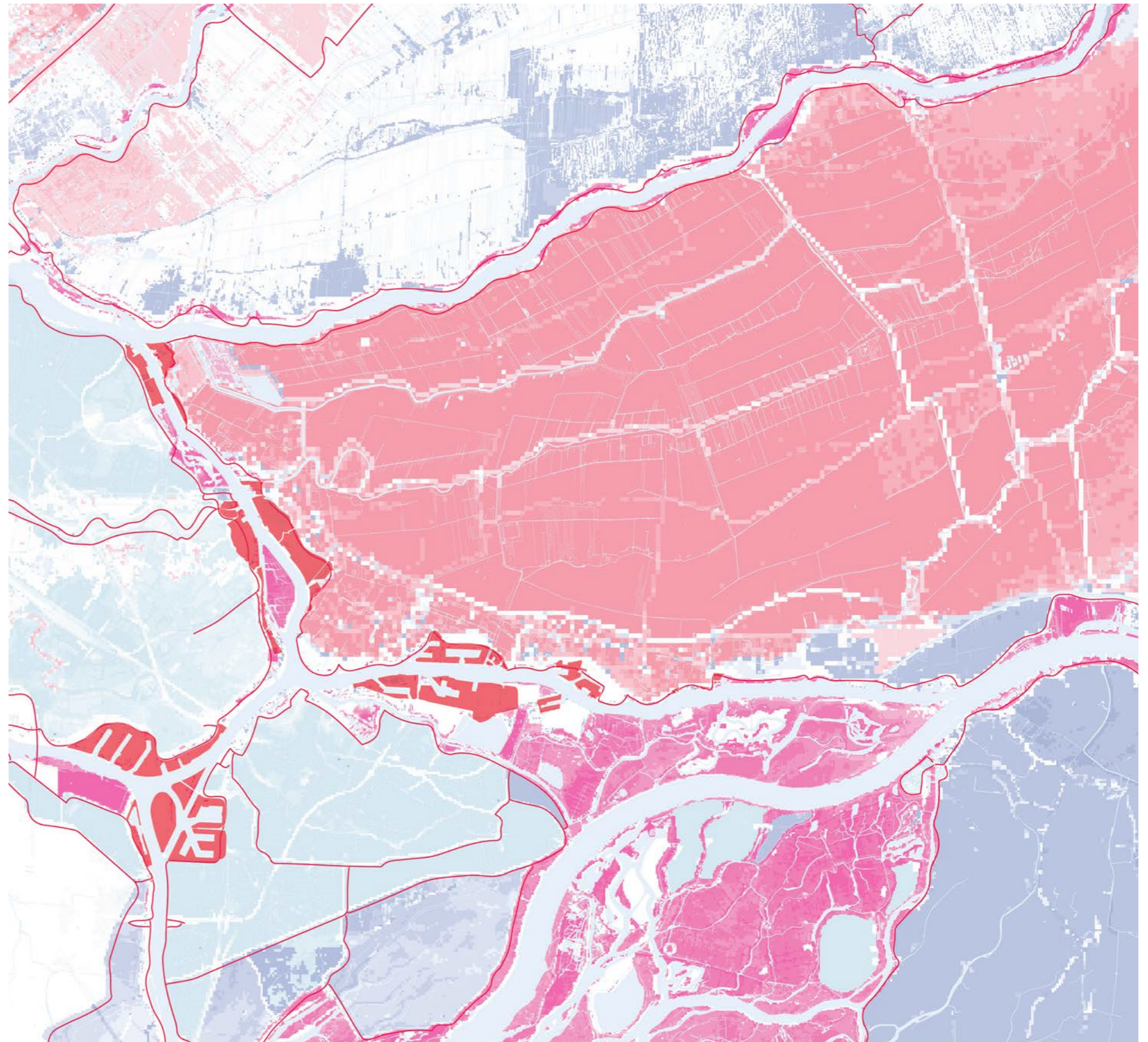
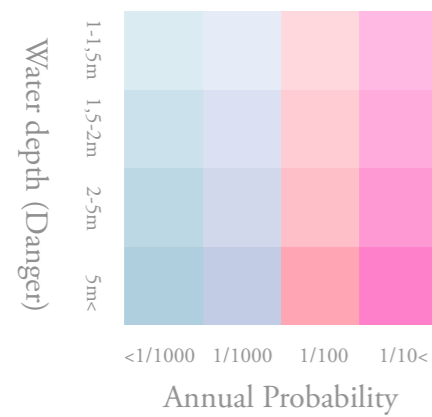
Floodrisk in The Netherlands

Drawing by Author

source: PDOK (2018) & (2023)

Floodrisk and the dikes

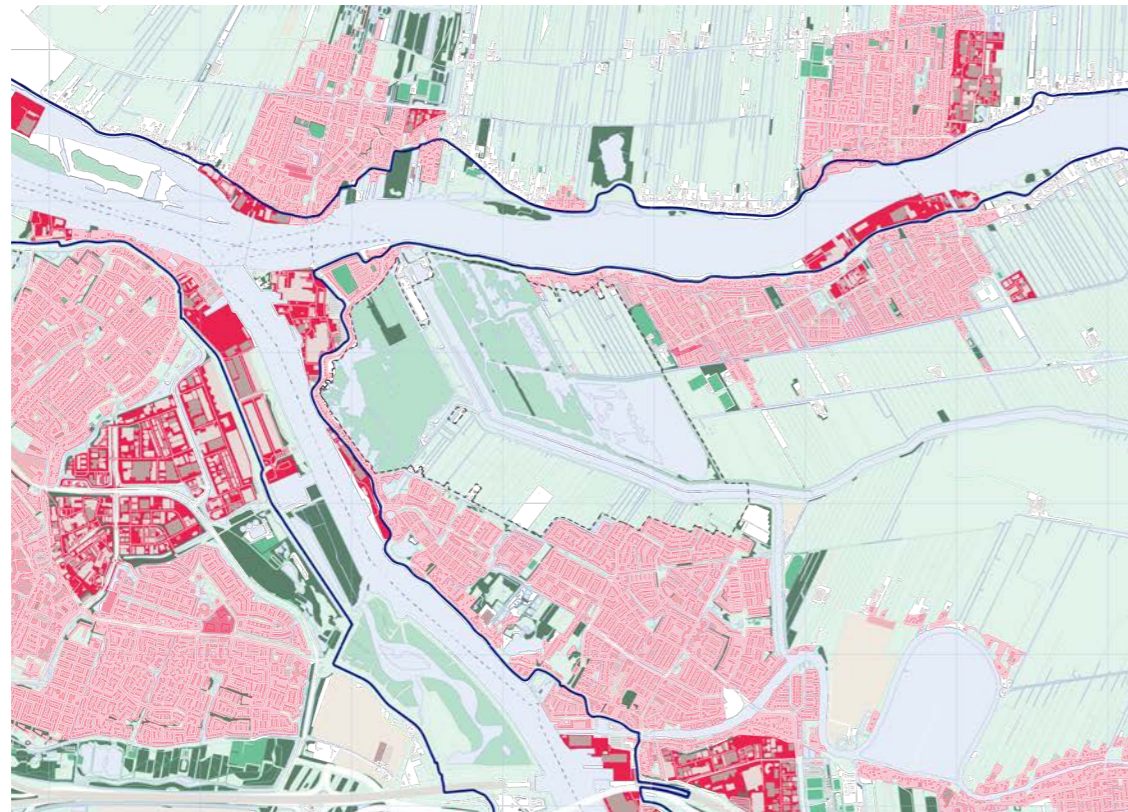
When overlapping the industrial sites along the riverfront with the floodrisk map, it becomes clear that most areas in white are artificially heightend quays. While they protect the industrial areas from the water, they also narrow the river, causing high discharge rates and putting pressure on dikes in the area, this could be one of the reasons why the floodrisk is relatively high in the Alblasserwaard. Softening the waterfronts and reintroducing floodplains to increase environmental adaptability in the region is worth exploring.



Floodrisk in The Netherlands

Drawing by Author

source: *Klimaateffectatlas (2023)*

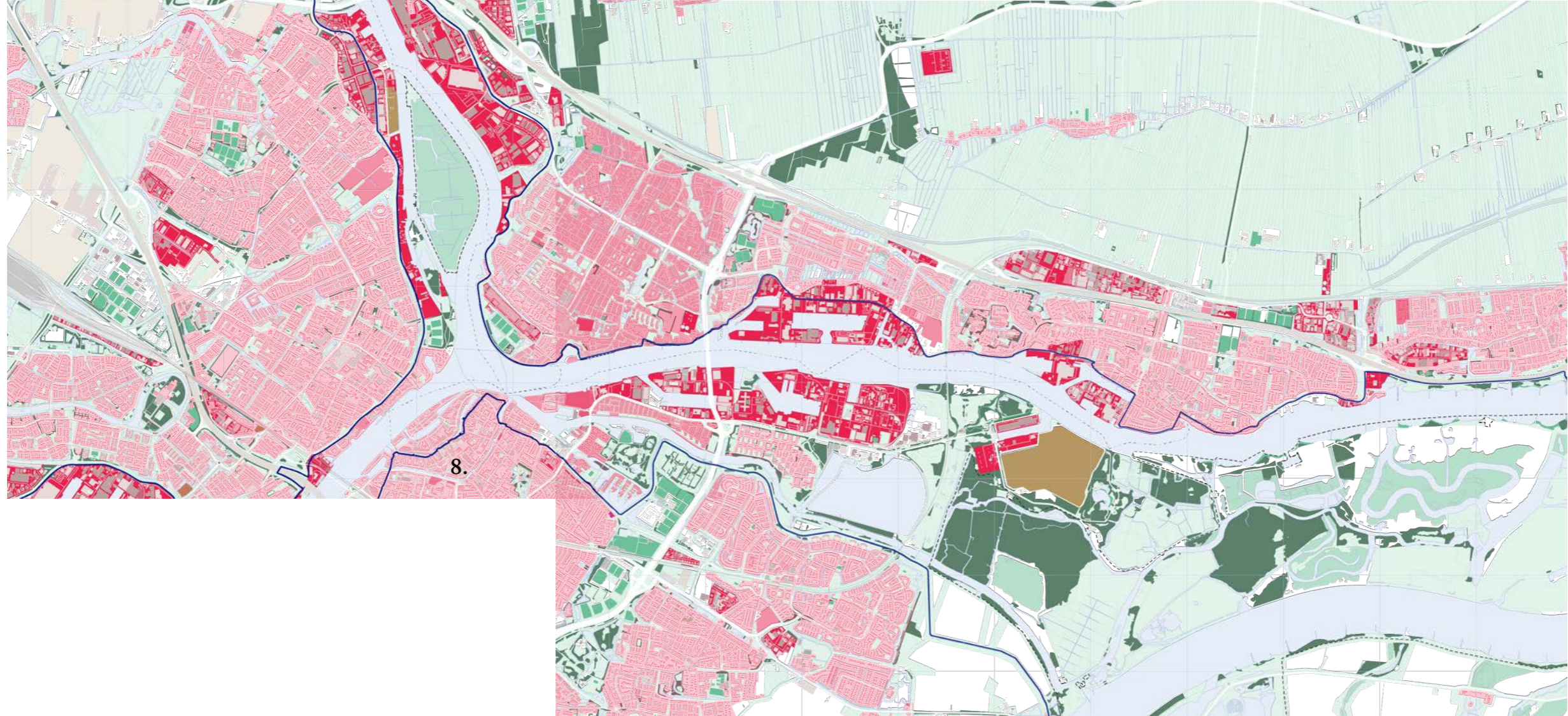


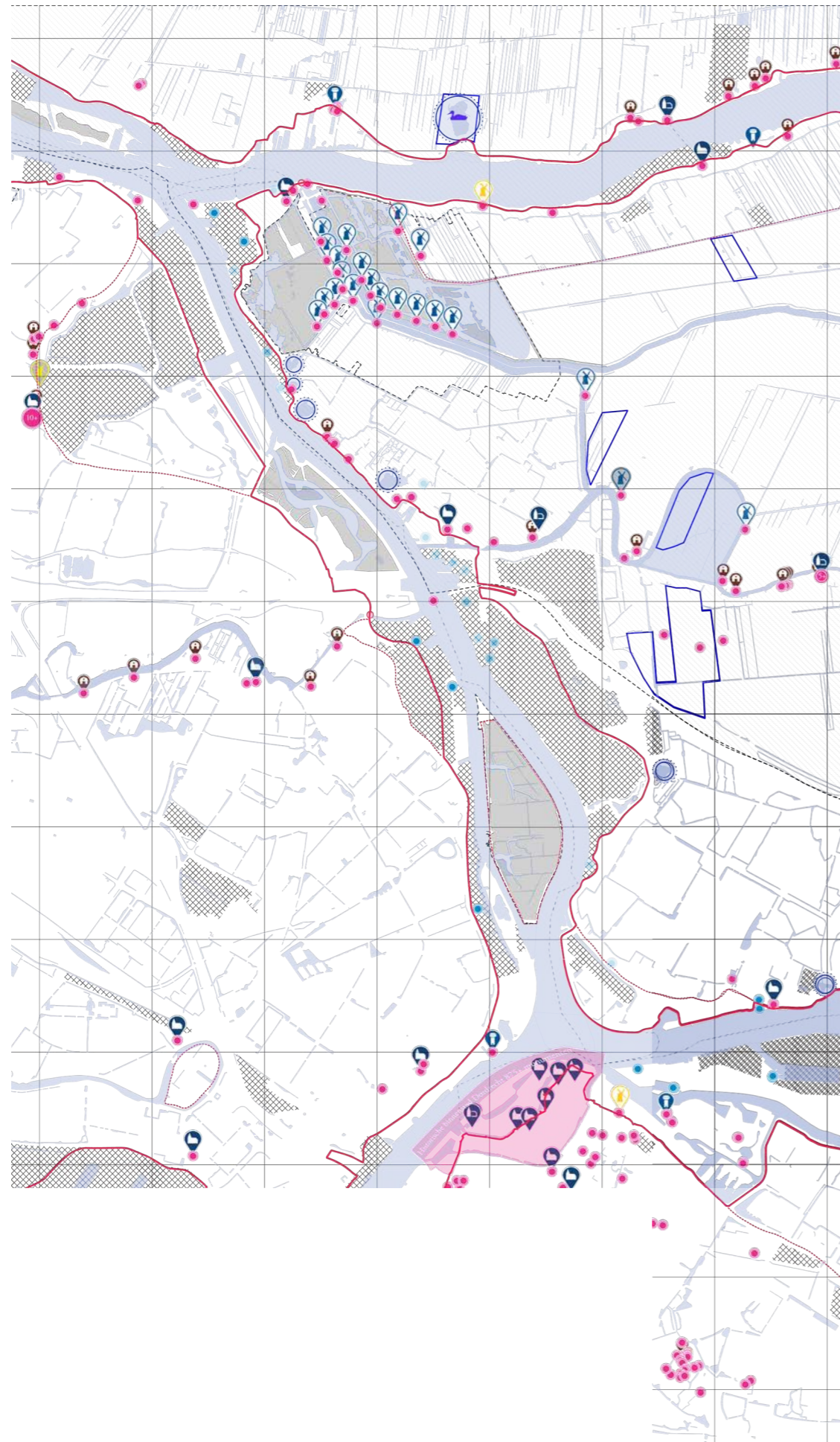
Legend

- | | | |
|---------------------|----------------------|-----------------------|
| Farmland | Water | Residential zones |
| Grass & meadow | Primary dike | Residential buildings |
| Wetlands | Industrial zones | Parking |
| Forest | Industrial buildings | Railway |
| Sports & recreation | Commercial buildings | Highway |
| | Landfill | Ferry |

Drawing by Author

Openstreetmap (2023)





Legend

Water

Industrial zones

Wetlands

Historic 'boskern'

Historic 'boskern'
(potentially)

Primary dike (current)

Historic dike

'Wiel'

Rijksmonument

Maritime Heritage

(Partially) Demolished

Watertower

Mill

Church/chapel

Historic farm

Drawing by Author

Rijksdienst voor Cultureel Erfgoed (2023)

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