

Using the subsoil in the urban design process

Looking up from underneath in the urban design process to come to new spatial solutions for the transformation assignment of Scheveningen Harbour.

Colofon

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1 INTRODUCTION

Onder De Straat

Wat ligt er eigenlijk allemaal onder de straat? Op deze tekening (gemaakt door de heer J. den Adel van Gemeentewerken) is het te zien:

- 1) Telefoonkabels
- 2) Waterleidingen
- 3) Gasbuizen
- 4) Electriciteitskabels
- 5) Hoogspanningskabel

- 6) Huisaansluiting riool
- 7) Hoofdriool
- 8) Transport gasleiding
- 9) Trottoirkolk
- 10) Straatkolk

1.1 Problem definition

The Dutch have a particular relationship with their subsoil. Through the centuries long struggle to protect the low-lying land against flooding and the draining of lakes and stretches of sea, a landscape is created that is largely handmade. This artificial landscape has laid the basis for the spatial structure of urbanization in the Netherlands Nederland (Palmboom, Thomaes, Stoekart, Kieboom, & Van Puffelen, 2010, p. 36). Especially in our country, where there are few examples of nature that is not cultivated, the debate about the relationship between city and landscape can be seen everywhere around us.

The development of city and landscape is inextricably linked. So initiated the urbanization during the golden age the transformation of our landscape. In the seventeenth century a large number of refugees from the southern provinces and the economic boom resulted in a huge growth in Dutch cities (Wagenaar, 2011, p. 40). Technical advances in water management ensured that our feet could kept dry in these city expansions. In order to provide the ovens, stoves and breweries of fuel, turf was used, which was created by the drying of peat. The mining of peat left behind peat lakes, which were afterwards drained and transformed into rational parcelled farmland. Transforming our landscape runs in our blood.

But the relationship between city and landscape has changed the past years. The Dutch tradition of mastering the landscape and our technical knowledge of transforming the land to answer to the wishes of the urban designer, led to the ignoring of the natural systems (Hooimeijer & Maring, 2013). But now with the changing climate testing our cities in resiliency for extreme weather conditions, the rising sea level and the financial crisis asking for cheaper and smarter

solutions, the need has risen up to come to a more sustainable approach in which subsoil conditions are integrated in the design of urban plans.

Frits Palmboom shows the shifting role of the designer towards the side in dealing with developments and its underground:

“Landscape architecture has increasingly become oriented to the landscape as an all-encompassing geographic fact. It treats the landscape as an entity in which biotic and abiotic processes are expressed, and in which processes of occupation, cultivation and urbanisation take place. The landscape architect influences and guides these processes, and gives shape to them. Both practical demands and aesthetic desires come into play here.” (Palmboom, et al., 2010, p. 33)

This vertical orientation can lead to possible benefits. By understanding the geographic facts and the natural systems of a certain location, we can use the characteristics to create urban quality on the surface level (Hooimeijer & Maring, 2013). For instance, natural drainage of rainwater via constructed wetlands comes with vegetated public space. Storing heat and cold in the subsoil will contribute to the reduction of energy use of the built environment.

Besides, when the subsoil conditions of a new site are taken into account, worse and better locations can be pointed out and used in the planning process. Different types of development within a neighbourhood (residential quarters, business quarters, infrastructure and recreational areas) have different sensitivities to poor ground conditions. When an area with good ground conditions is allocated to a very sensitive development, construction and maintenance costs can be minimised (Hounjet & Ngan-Tillard, 2009).

Moreover, the increased use of the subsoil requires some regulation to promote sustainable use of the subsoil and prevent a ‘wild west’ situation (Bonte et al., 2010). Below the surface of streets there are many cables and pipelines, which in some cases form an obstruction for trees to root or cause that tunnels are dug deeper.

Thus to ensure the proper use of the subsoil and avoid conflicts between different developments, it is necessary to look into a new way of dealing with the subsoil (Ministerie van VROM, 2006). Here, urban designers can play a key role as they are to balance the different interests from different stakeholders into one design. But while subsoil experts and engineers show initiative in participating in project developments, it still lacks the interest of urban designers, planners and project developers to include subsoil condition in a project (Groenenboom, 2011). Besides, developments in the subsoil are often low dynamic and rather invisible. The effects are noticeable in the long term and therefore the commitment of government and politicians is lacking (Vreugdenhil, 2012).

Although the benefits of taking into account subsoil conditions of a site are clear, it is not a familiar task for urban designers to look under the surface. Therefore, in this thesis I will research how subsoil conditions can be included in the process of urban designing.

1.2 Aim and focus

This project is part of the inter-disciplinary graduation studio 'Delta interventions'. Due to the changing climate and new visions on the sustainable relation between cities and water-landscapes, new interventions are needed to create a new urban delta-landscape. But between the disciplines there is still a distance. An example is the relation in building site preparation between urban designers and civil engineers. Instead of making urban design plans to which the subsoil infrastructure has to be changed and connected, information from the subsoil can be used in the beginning of the process of designing and therefore come to a more sustainable building process and end result. Integrating technical information from the subsoil in the design process to come to new spatial solutions, will be the main aim of graduation project.

The location of my project is a deserted harbour area, with its own specific conditions. These conditions contribute to a particular approach and process of redevelopment to come to a sustainable urban renewal plan. Therefore the focus is on creating a sustainable urban renewal plan through the redevelopment of contaminated land and brownfields and integrate it in the surrounding spatial context.

Being an outerdike harbour area, the project location is prone to floods. One of the problems to tackle on my location is to keep up with the safety standards it has to meet in being a barrier for the seawater to the hinterland. Therefore the focus is also on creating a sustainable urban design for Scheveningen Harbour which has a time horizon of 2100 on the subject of flood defense.

1.3 Research Questions

From the problem definition and my objectives I come to my following main research question:

What is the spatial potential of subsoil conditions in the urban redesign assignment?

This main research question can be divided in the following subquestions:

- When and how can the subsoil layer be integrated in the process of urban design?

To come to an answer to this question, I will first explain the process of design in general and the current situation of when the subsoil is integrated in this process. Then I will research a more desirable moment and method of integrating subsoil information in the design.

- What spatial potential do the subsoil aspects of brownfields in harbour areas have on surface level?

I will investigate the possible influence of subsoil aspects on the spatial interventions on surface level. The test location for doing this is Scheveningen harbour. Which aspects form stronger conditions compared to others for redesigning my location and have to be focused on?

1.4 Relevance

In this section I will explain the societal and scientific relevance of my graduation project.

Societal relevance

Taking in account the subsoil in the urban design process gives the potential to create urban quality on the surface level. By understanding the geographic facts and the natural systems of a certain location, they can be used in the urban climate challenge. Besides that, the subsoil can contribute in reducing our energy consumption.

Moreover, using the subsoil can have economic benefits. Maintenance costs can be minimized, by allocating sensitive developments to good ground conditions.

The fragmented increased use of the subsoil has also led to a chaotic inefficient situation, in which subsoil activities may affect each other negatively. Directing the use of the subsoil leads to less problems, costs and nuisance.

Scientific relevance

This graduation project will explore the expansion of skills and knowledge of the discipline of urbanism in taking in account subsoil conditions in the design process. The need for this is shown in 1.1 problem statement.

Besides that, this project will contribute to the generic knowledge of how to deal with the subsoil conditions as an urban designer, specifically in contaminated areas and brownfields. This knowledge will be applicable on other future cases.

1.5 Methodology

To achieve the aim of my graduation project, a methodology is used to come to the desired end product. My research question is divided in the investigations of how to integrate the subsoil in the design and in what the spatial potential of integrating the subsoil is on surface level. In this section I will explain the methods I will use in answering the different research questions.

Method of integrating subsoil [process]

This research focuses on how to implement subsoil conditions into the process of designing in the field of urban design.

Theoretical research

By studying literature on this subject I want to get an understanding of the current knowledge, position myself in the different views and use it to create my own theoretical framework.

Workshops

I have attended different workshops in which the subsoil conditions had to be used in urban design, working together with civil engineer students to get familiar with subsoil themes, create discussion and understand each other's field of work.

Interviewing experts

In my graduation internship at the municipality of The Hague I will meet different experts on this topic, since using the subsoil in the design is one of their aims from economic necessity.

Spatial potential of the subsoil [design]

This research will look into the design part of using subsoil conditions and makes clear what the different conditions can mean for the spatial implementation on the surface.

Workshops

The different workshops I attended in which the subsoil conditions had to be used in urban design, gave a first taste in what the spatial potential could be on surface level.

GIS data analysis

The municipality of The Hague has made an inventory on subsoil conditions of Scheveningen Harbour and created a GIS database. I have access to this database and will use it for analyzing my site.

Theoretical research

Studying literature about the different subsoil conditions will lead to a better understanding on how to deal with the conditions and what the possibilities are for me as an urban designer.

Research by design

By designing with the subsoil conditions, I explore new possibilities for urban designers and add my findings to the knowledge base of designing with the subsoil.

Location analysis

Analyzing the location is important for understanding the urban fabric of a location and will give directions in how to implement the new design in the urban context.

Mapping the current situation

To understand the urban context of my project location, I will map the main urban structure of the location and its surroundings.

Research by design

By designing a new urban plan for the harbour of Scheveningen and taking in account the flood risk, I extend to the knowledge base of flood proof harbour redevelopments.

Reference study

I will compare how other harbour locations cope with similar transformation assignments.

Research by design

By designing a new urban plan for the harbour of Scheveningen and taking in account the flood risk, I extend to the knowledge base of flood proof harbour redevelopments.



2 THEORETICAL FRAMEWORK

2.1 Process of designing

I will now setup a framework for the design process in which subsoil conditions are taken into account. First I will unravel the process of designing by using the article Making explicit in design education: generic elements in the design process (Van Dooren, Boshuizen, Van Merriënboer, Asselbergs, & Van Dorst, 2013), in which the process of architectural designing is made explicit and explained in five generic elements. Then I will link this framework to urban design by using the article Concepts of sustainable development (Van Dorst & Duijvestein, 2004) and place the subsoil conditions in it.

In Making explicit in design education: generic elements in the design process, Elise van Dooren, Els Boshuizen, Jeroen van Merriënboer, Thijs Asselbergs en Machiel van Dorst formulate designing as follows:

“In general designing is conceived as a complex, personal, creative and open-ended skill. Dreyfus and Dreyfus label the design process as ‘unstructured’. Lawson sees it as a ‘prescriptive job’, creating (some features of) the future. Schön (interviewed by) Goldhoorn points out that designing is complex: it is about different kinds of knowledge, about developing a personal system of preferences, and about using a specific language of sketching and modelling. For experienced designers the process is not split up in separate steps and actions but the process is an undivided whole with automatic, unconscious steps, actions based on common practice or routine, and moments of reflection and exploration.” (2013)

Even though the process of designing is ambiguous, personal and somewhat intangible, Van Dooren, Boshuizen, Van Merriënboer, Asselbergs and Van Dorst unravel it into a framework (2013). This framework is not a step by step guide for a successful design process, but an overview of five generic elements involved in

designing, making the design process explicit in a more clear and structured way.

1. Experimenting

Designing is first and foremost a process of exploring and deciding, of diverging and converging, of experimenting. Starting with ideas and sketches, with proposed solutions, the designer explores the problem and possible solutions with an open mind. The experiments or moves are evaluated and further experiments are done. Making moves means creating new problems to be described and solved.

2. Guiding theme or qualities

In the process of experimenting, one has to come up with an inspiring direction: a guiding theme or qualities as something to hold on to during the design process and to help create a coherent and consistent result.

3. A frame of reference or library

The design process is inseparably embedded in a broader context: a frame of reference or library. All knowledge is stored in the environment, in books and, often implicitly, in the designer’s mind. The references provide patterns, diagrams, rules of thumb and solutions to be used in the experiments.

4. Sketching/modelling

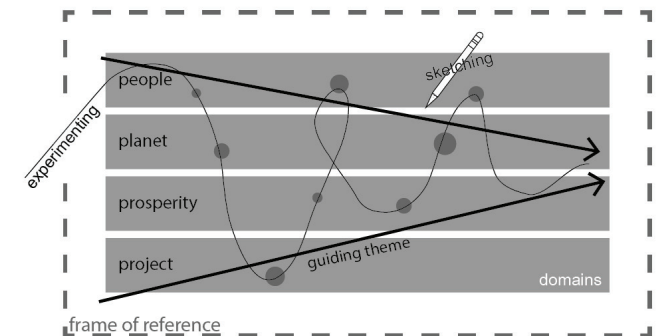
The design process has its own laboratory. For architectural design the laboratory consists of a visual language of sketching and modelling. The physical counterpart of the mental process is an external, extended memory and tool for reflection.

5. Domains

Since Making explicit in design education: generic elements in the design process is focused on Architectural design, the domains have to be translated to urban design. I will therefore use domains from In concepts of Sustainable Development in which the different aspects

of sustainable development in the built environment are made explicit (Van Dorst & Duijvestein, 2004):

- People: prosperity, health, freedom (of choice), social cohesion, participation, safety
- Planet: world, flows, energy, water, material, mobility, purity
- Prosperity: profit, affordability, fairness
- Project: spatial quality, relations across the scales, (bio)diversity, robustness, aesthetics



2.2 Intertwining subsoil conditions

Just like the urban fabric and social and economical characteristics, the subsoil form the context in which the designer makes his intervention. But subsoil conditions are rather hidden and unfamiliar for urban designer. So how and when do urban designers have to deal with all the subsoil aspects?

2.2.1 Approaching subsoil aspects in the domains

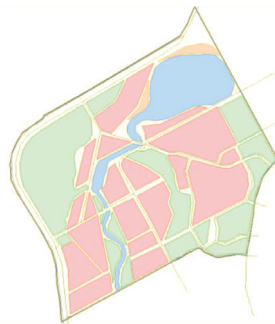
In developing a location we can approach subsoil conditions in different ways. First we can look at the subsoil from above. The desired urban developments are matched with the best possible location, considering the characteristics of the subsoil. Another possibility is to look up from underneath by analysing the subsoil and understand its potentials, which guide to the final development on the surface.

An example of a top/down approach is Almere Pampus, a new neighbourhood of 800 hectares planned by the municipality of Almere. Already three urban designs

were made for this area, when the municipality asked for an investigation in the subsoil conditions and their suitability for the to be developed infrastructure and buildings.



The different development types were set out on their construction methods, which were examined on their sensitivity to the geological, geotechnical and hydrological aspects of the location. Infrastructure is more sensitive to worse soil conditions than buildings on piles and their placement have a big influence on maintenance costs. From the data, maps were made showing the desirable locations for particular development types. Finally, with these results the design was adjusted.



In the process of developing Almere Pampus, the subsoil conditions were investigated rather late. The type of development was decided before investigating the subsoil. Per type of infrastructure and building typology, a match was made for the most suitable location. But in the long run this can still have a bad influence on the particular characteristics and own dynamics of the subsoil (Ministerie van VROM, 2006). So to take advantage of the potential qualities of the subsoil, the

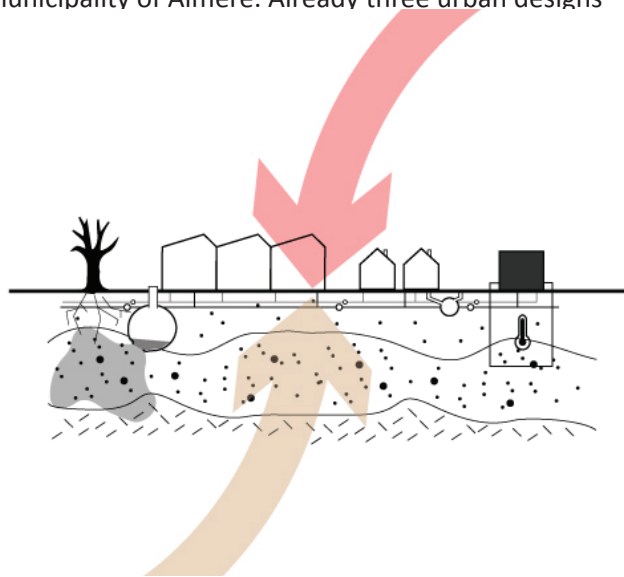
subsoil aspects should be investigated at the beginning of experimenting.

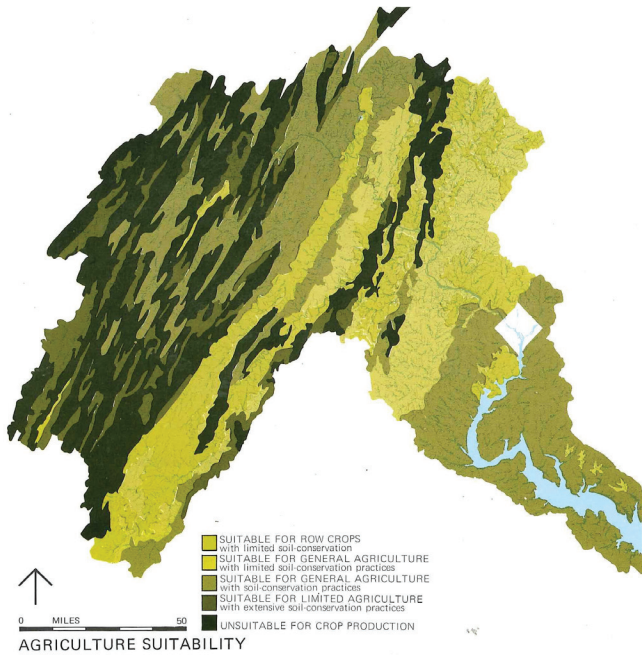
Another approach to taking into account subsoil conditions is to start the design process with investigating the subsoil characteristics of a location and see what the subsoil can desire on surface level. This looking up from underneath approach was for years the topic of research of Ian McHarg, professor at the University of Pennsylvania, who published his book 'Design with Nature' in 1969.

His years of research stemmed from his course Man and Environment, in which he invited the most prominent speakers to increase his and his students knowledge about subsoil conditions. This way he learned to thoroughly analyze a location on geological, hydrological and topographic features, its soil type and the current vegetation. These characteristics were compared in suitability with all possible developments and were translated in zoning maps. The development of a location now comes from its own characteristics.

McHarg's ideas about designing with nature were criticised for being too elaborated, taking too much time and therefore costing too much money for clients. It can be questioned if all the topics analyzed by McHarg are tasks of landscape architects and urban designers. The subsoil include a wide variety of aspects and with that a lot of expertises outside the grasp of urban designers. To successfully include subsoil conditions in the urban design, collaboration with the different experts is therefore of great interest.

Moreover, designers argued that the zoning map would reduce the possibility for intuitive designing and experimenting. Even though McHarg put all his effort in researching all the different subsoil conditions, these conditions do not form the guiding theme, but a thoroughly investigated domain.





2.2.2 translating subsoil data into own sketches

The wide variety in aspects come with a wide variety in experts. Their knowledge has to be transferred to the urban designer. Already there are different ways of dealing with this explored.

The municipality of Amsterdam have for every subsoil expertise department a dedicated person who will be joining meetings with urban designers to transfer their knowledge. This way, people are dragged out of their office and forced to exchange their knowledge, discuss subsoil aspects and find interdisciplinary solutions. Another method made to explicit the relation between subsoil aspects and their influence on surface level is the System Exploration Environment & Subsurface (SEES). This scheme encourages understanding and open communication focused on the direct exchange of different expertise knowledge dealing with the subsoil (Hooimeijer & Maring, 2013).

Since 2013 subsoil data is gathered on the website www.bodemloket.nl, giving urban designers an open door to instant subsoil information. Moreover, in Ordening van de ondergrond, een fysiek en juridisch afwegingskader (translated: Planning of the substrate, a physical and Legal assessment framework) the necessity is stated for visionmaps on the scale of municipalities and provinces in which is made clear how municipality and province want to use and protect the subsoil (Bonte, et al., 2010). It is also discussed if a tool like bestemmingsplan (translated: zoningplan) could be used in the same purpose. It can become a catalyst for taking into account subsoil conditions.

With all the subsoil conditions data gathered, still the relation with the surface has to be made. Here, the urban designer comes in place. He has to understand the data, explore its potential influence and spatial effect on surface level and make a design. But since all the data comes from different

professions it comes in different languages (Cramer, Van den Berg, & Boonsma, 2013). Translating all the data into his own language of sketches and models, the urban designer becomes familiar with the different aspects and their spatial effect.

For the harbour of Scheveningen, I had access to GIS data of a lot of subsoil aspects. By redrawing all of this information into one subsoil potential map I forced myself to investigate the data, understand it and then research their potential spatial effect on surface level.

For every location different subsoil aspects can play a key role. In the example of Scheveningen harbour, parts of the quay are in bad state and need to be redesigned. The area is prone to flooding and in some parts need to be heightened. From a financial point of view, the most attractive way is to solve this within the site itself. Besides that, the municipality of The Hague have set goals for lower energy use for the whole city. Different aspects from the subsoil can contribute to these goals. By looking into these different aspects, relations can be found between them, which can even strengthen each other.

An example of this in Scheveningen harbour is the solution for heightening parts of the area. By digging out an old filled channel, located on the same site, the costs of heightening can be reduced. Besides, the excavated channel can form a natural waterdrainage and -storage system, reducing unnessacary energy costs of draining clean rainwater in sewersystems and processing it in watertreatmentplants. Halfway the old channel an old lock was located, which can be brought back and act as a bridge for bicycles and pedestrians, giving the whole area sense of its historical identity.

2.2.3 experimenting & guiding theme

As mentioned before, designers argued that the method of McHarg reduced the possibility for intui-

	INTERCOMPATIBILITY OF LAND USES										NATURAL DETERMINANTS										CONSEQUENCES	
	URBAN	SUBURBAN RESIDENTIAL	INDUSTRIAL	INSTITUTIONAL	MINING	QUARRYING	VACATION SETTLEMENT	AGRICULTURE	FORESTRY	RECREATION	WATER MANAGEMENT	SOIL	VEGETATION	WATER TABLE	WATER QUALITY	WATER FLOODING	WATER POLLUTION	SOIL EROSION	CLIMATE AND CLIMATE CONTROL	BIODIVERSITY		
URBAN																						
SUBURBAN RESIDENTIAL																						
INDUSTRIAL																						
INSTITUTIONAL																						
MINING																						
QUARRYING																						
VACATION SETTLEMENT																						
AGRICULTURE																						
FORESTRY																						
RECREATION																						
WATER MANAGEMENT																						



DEGREE OF COMPATIBILITY

tive designing and experimenting. But the thoroughly investigated subsoil aspects are only the starting point of designing. Just like other domain aspects they form the conditions of a curtain site. By understanding the conditions, we can integrate the design in their context better.

While experimenting with subsoil aspects, a guiding theme or a certain quality will guide the way in how we deal with the aspects. They are not only to be protected, but can also contribute to a certain strived quality. The theme or quality does not have to be related to the subsoil domain. It will influence all the different domains the urban designer is experimenting in.

2.2.4 frame of reference

Taking into account subsoil conditions in the design process of urban designers is rather new. There is a lack of experience and with that a frame of reference. My recommendation for urban designers is to dive into the unknown and find for themselves how they can relate design on surface level with subsoil conditions. With more experience, it will become a familiar act costing less time and energy. This will also contribute to a frame of reference, so generic solutions can be found and used while experimenting.

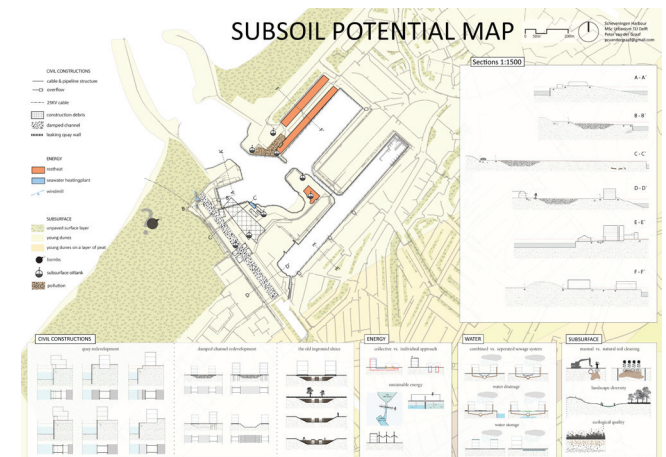
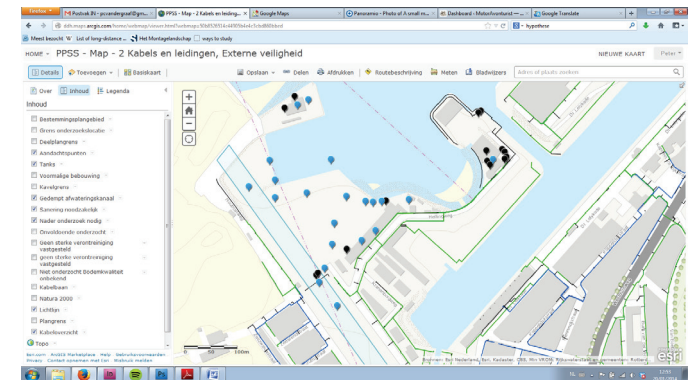
2.3 Conclusions

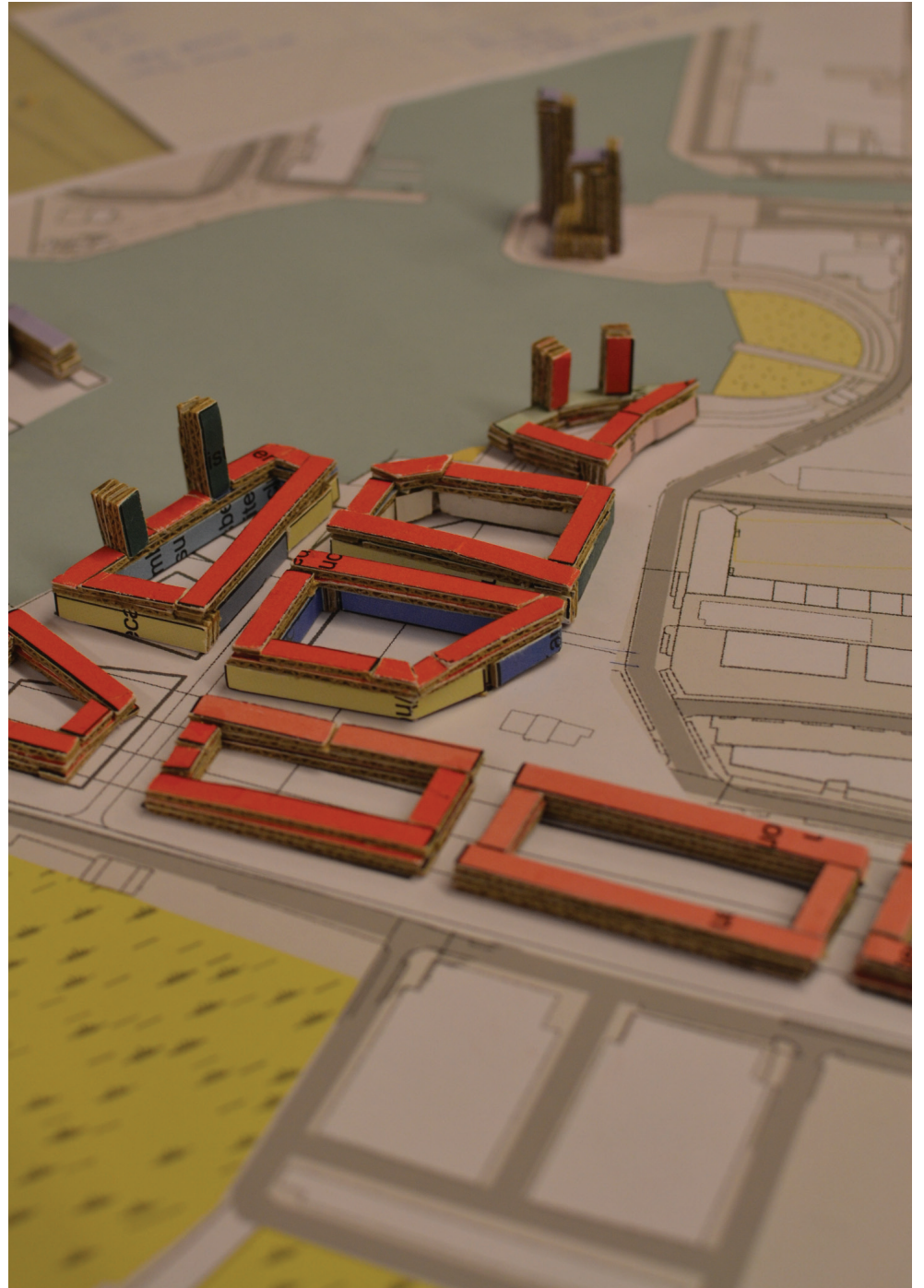
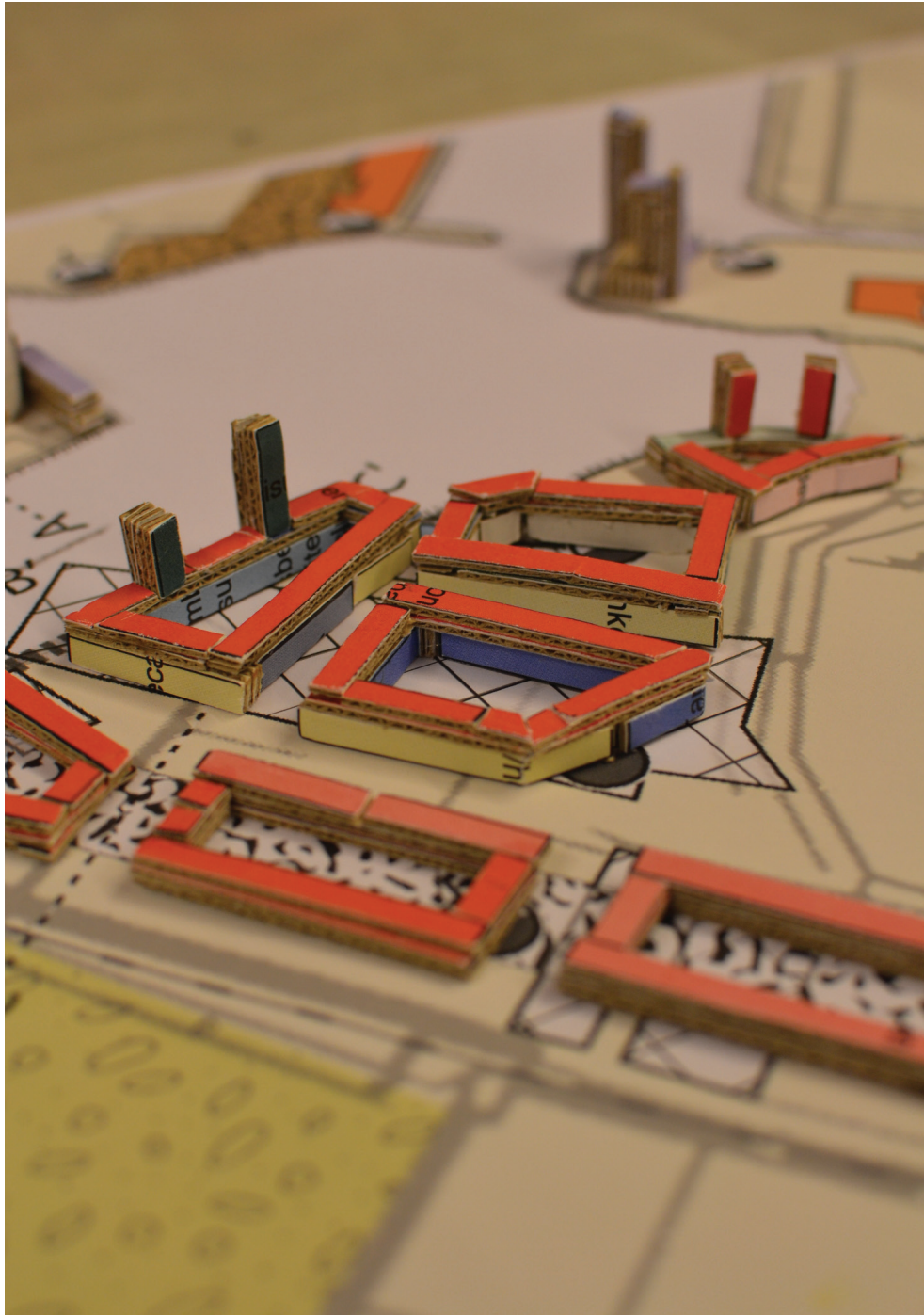
It can take some time before urban designers are used to deal with subsoil conditions, but the benefits are great. To take advantage of the potential qualities of the subsoil, its aspects should be investigated at the beginning of experimenting in the design process.

Although subsoil aspects derive from a wide variety of expertises, it is not to the urban designer to investigate all of them himself. By collaborating with the different experts, the urban designer can get an understanding of the context. It is to the designer to investigate the spatial effect on surface level and create a coherent design, which relates to the subsoil characteristics of a site.

The urban designer can get a better understanding of subsoil condition by translating the data into his own language of sketches and models. This could be a subsoil potential map in which the main characteristics of the subsoil and their spatial effect on surface level are made clear. This way, the urban designer can start experimenting and make relations between different solutions, which can strengthen each other and contribute to a coherent end result.

Urban designers should start experimenting with the unknown aspects of the subsoil, so they expand their knowledge and experience. If the urban designers becomes familiar with modelling the data, know how subsoil aspects effect their spatial design on surface level and can pick generic solutions from a frame of reference, then taking into account subsoil conditions becomes as common as relating urban designs to the spatial context of the built environment. Subsoil conditions should not be seen as an obstruction in the urban design process, but rather as a potential to enrich the final design.







3 LOCATION

In this chapter I will explain the design assignment and give an overview of the subsoil conditions, their potential and the spatial characteristics of the site. This will result in the starting points for the design process.

3.1 Redesign assignment

The approach of using subsoil conditions in the design process will be tested on Scheveningen harbour. This is an interesting location, since it will be transformed in a mixed urban area. Therefore the subsoil conditions of the site will have to match to this new function. Besides that, the municipality already made a partial inventory of subsoil conditions and provided me access to WebGIS.

In the redesign assignment of Scheveningen Harbour, I will take over the vision of the municipality to transform this area into a mixed urban area and use their design requirements for the site.



Scheveningen harbour and Norfolk line area in orange (source: Google maps edited by author)



Norfolk line area (photo by author)

In 2005 the Norfolkline shipping company decided to leave the harbour of Scheveningen, since the location left too little room for any further growth. When the last shipping boat left the harbour on 26 November 2006, a large area is left empty and deserted.

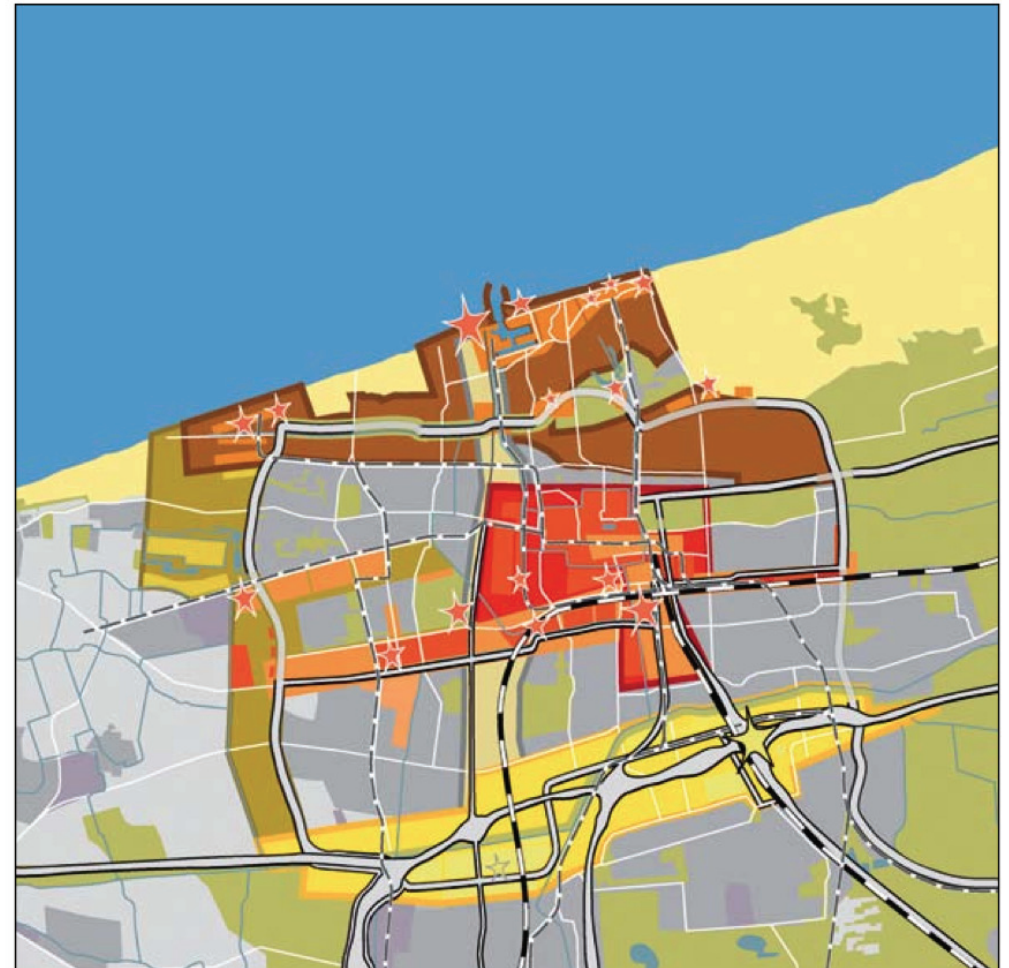
In Structuurvisie Den Haag 2020 (translated: Structurevision The Hague 2020), the harbour of Scheveningen plays a key role in the transformation of Scheveningen into a metropolis at the sea, i.e. a multicultural city, an international city, a city at the sea with a monumental residence (Projectteam Scheveningen Havens, 2007, p. 8).

Scheveningen has to become a more vibrant centre at the sea, attracting tourists four seasons in a year with the boulevard and harbour as main attracters and the historical village in between as a smaller scaled cultural historical area. In the structurevision the unique position of The Hague as a city at the sea is emphasized. Enstrengthening this characteristic is one of the main ambitions.

For Scheveningen Harbour the goals are:

- Creating an authentic urban centre, with a mix of fishery, catering, leisure and residences.
- Realising a particular provision for international allure, translated in an architectural icon on one of the harbour sides.
- Connecting the harbour with The Hague via tramway.
- Improving the connection for bicycles along the coast and with the city

I will strive to implement these goals of the municipality in my design for the harbour, but using the potential of the subsoil will be the main goal and will get priority when interfering with the above mentioned goals.



Structurevision Scheveningen 2020 (source: denhaag.nl)

Design requirements as opposed by the municipality:

• dwellings	150 x 125 m ²	18750 m ²	• hotels (5 star and 3 star)	30260 m ²
• apartments	550 x 75 m ²	41250 m ²	• congress	2000 m ²
• fishery (existing buildings)		23000 m ²	• wellness	2500 m ²
• combined leisure and fishery		7200 m ²	• social functions	4000 m ²
• leisure		5200 m ²	• companies and facilities	7000 m ²
• fishing facilities at high boulevard		1880 m ²		
• shops and catering		8000 m ²		
• offices		7000 m ²		





(source: haagsebeeldbank.nl)



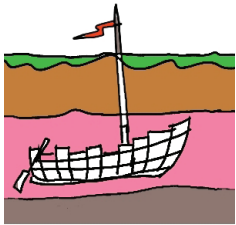
3.2 Subsoil aspects

I made an inventory of the different subsoil conditions that are located in the Norfolk line area in Scheveningen harbour. The inventory is made on the basis of GIS information I received from the Municipality of The Hague and interviews with experts.

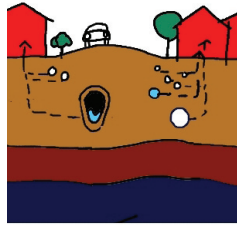
The inventory map will be the base for an appreciation map, which will result into typologies of the elaboration of the subsoil conditions into urban design solutions. A first step is made in exploring the possibilities on my site and can be seen in this chapter.

Analysis based on subsoil qualities (ruimtexmilieu.nl, 2014) categorized in four groups (Hooimeijer & Maring, 2013).

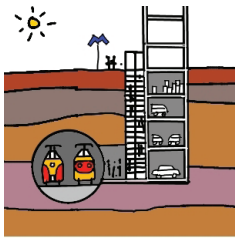
Civil constructions



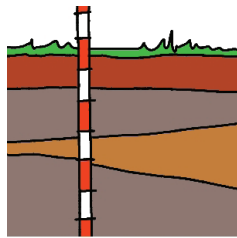
Archeologische waarden



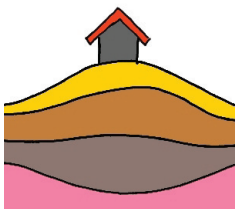
Kabels, leidingen, en riolering



Ondergronds bouwen

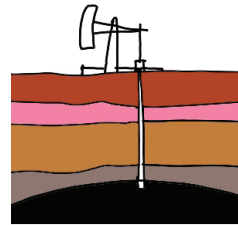


Stabiele bodem

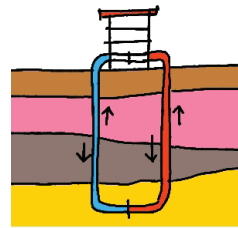


Draagkracht om te bouwen

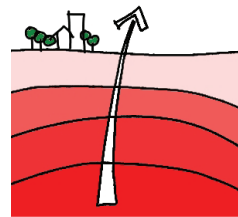
Energy



Voorraad fossiele energie

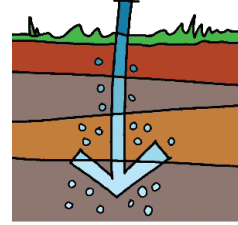


Warmte/koude opslag

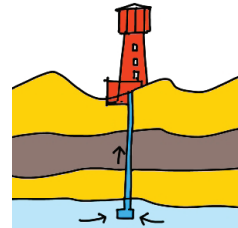


Geothermische energie

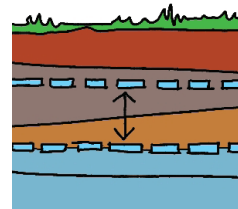
Water



Waterfilterende bodem



Voorraad drinkwater

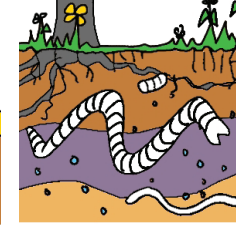


Waterbergende bodem

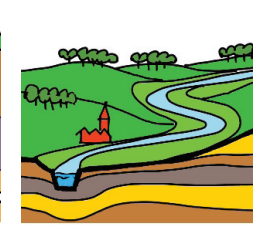
Soil



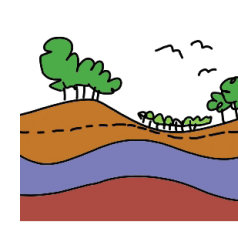
Schone en veilige bodem



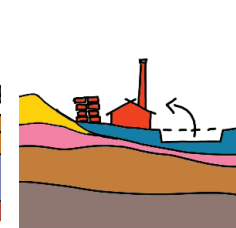
Levende bodem



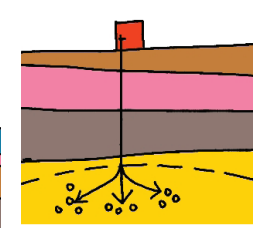
Landschappelijke diversiteit



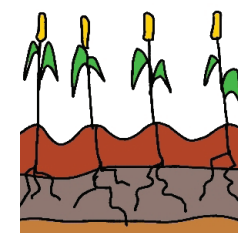
Ecologische diversiteit



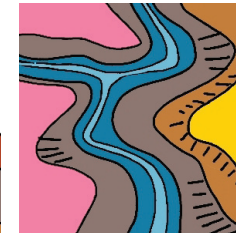
Voorraad delfstoffen



Opslag van stoffen



Gewasproductiecapaciteit



Aardkundige waarden

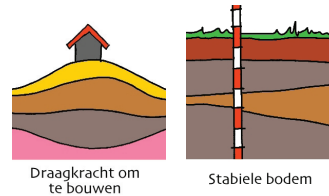
civil constructions inventory



Archeologische waarden

Pursuant to the Monuments Act of 1988 municipalities must take in account the archaeological values and expectations in adopting a zoningplan. The instrument for doing this is the Municipal archaeological expectation and policy map. This map shows three categories in expectation value; low, medium or high.

- The historical centre of Scheveningen has a high value. Spatial interventions less deep than 50 cm have exemptions on compulsory archaeological examination of the location.
- Rest of Scheveningen, including the project location, has a medium value. Spatial interventions smaller than 50 m² or less deep than 50 cm have exemptions on compulsory archaeological examination of the location.
- On the project location further examination was done by the municipality. In Scheveningen harbour, residues of old foundation structures and an old sluice of the channel can be found.

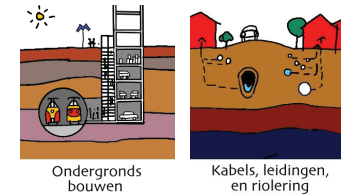


Draagkracht om te bouwen

Stabiele bodem

The subsoil provides bearing capacity to building structures. The bearing capacity refers to the extent to which the subsoil is prone to setting. Setting, or the lowering of the ground surface, occurs when the surface is loaded by for example pressure of building structures. Setting can also occur by the abstraction of groundwater, most common in areas where clay or peat is present.

- The subsoil of Scheveningen harbour contains of sand. Sand is a solid material that is hard to be compressed. Therefore the setting in sand is low.

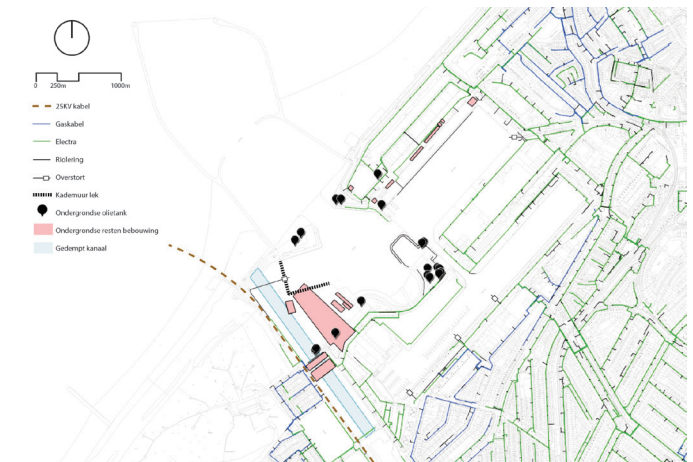
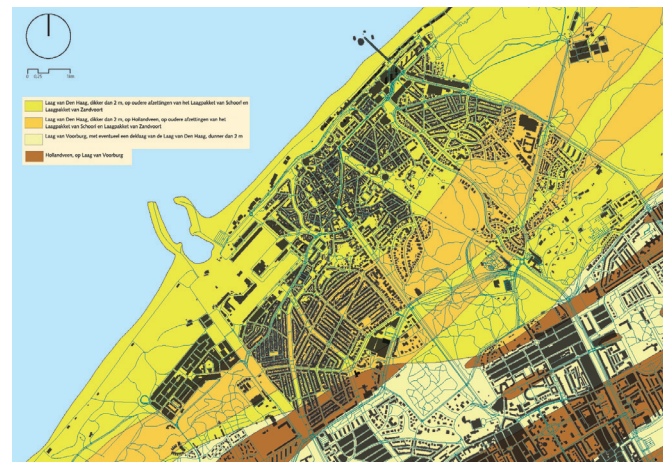


Ondergronds bouwen

Kabels, leidingen, en riolering

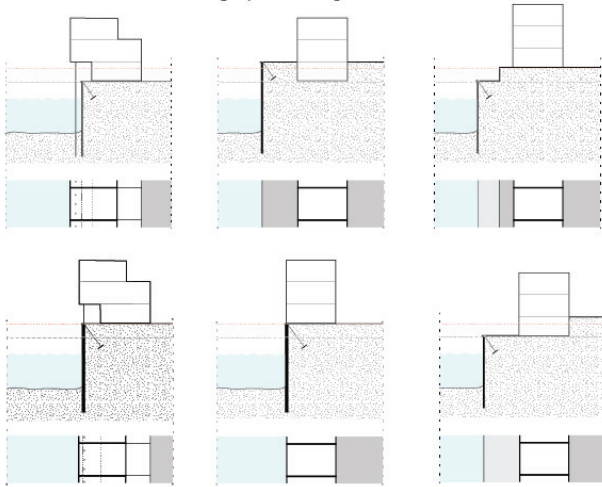
Being a harbour area has left its footprint on underground structures.

- Quay walls are designed for mooring boats. Some of the quay walls are in poor condition. They are leaking sand into the harbour's waters. The leakage works in both ways. Salt water from the sea is moving into the hinterland.
- The subsoil contains residues of the channel which lead to the sea. The revetments of basalt blocks are still present. The industrial functions in the harbour have also left behind pollution and underground oil tanks.
- Furthermore, the cable and pipeline structure form a strong direction towards the sea, with a 25KV electricity cable passing through an old sewer pipeline and connecting with an oil platform into the sea.
- The sewer system is combined, leading clean rainwater and brown water from households to the water treatment plants.



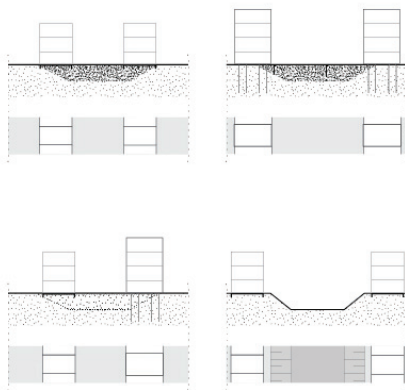
civil constructions potentials

quay redevelopment



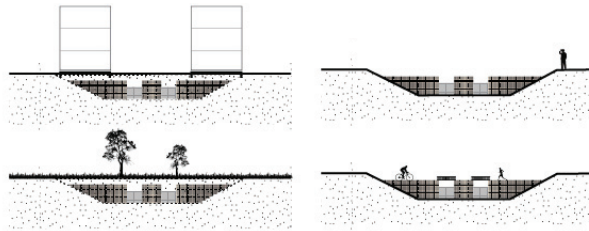
The quays are designed for mooring boats and can therefore not be built on top of it. Buildings can be placed with a distance from the quay. The bad quays that are in bad shape can be renewed and made buildable.

damped channel redevelopment



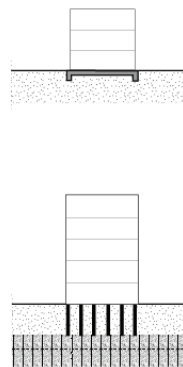
The landfills and the residues of revetments of the damped channel can be an obstruction for foundations on poles. Using shallow foundations this problem is evaded. The damped channel can also be excavated to store water.

the old inground sluice



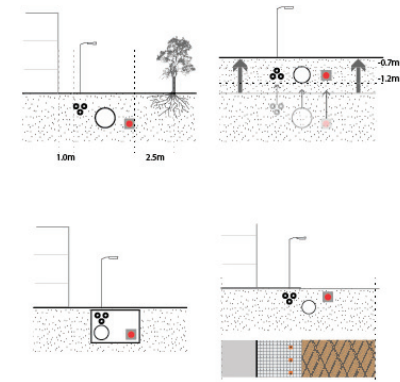
The former sluice of the channel is located halfway the damped area. It can cause for problems with underground activities. The sluice can be ignored by building on top of it using a shallow foundation or placing no buildings at this location, but for example a park. The sluice can also be excavated and show the historical characteristics of the site. Moreover, it can be made into a passage over the dugout channel.

foundations



The bearing capacity of the sandy subsoil in Scheveningen give the possibility to use shallow foundations instead of foundations on poles. Not only are there no problems with underground obstructions, it is also a lot cheaper. Larger building structures might even though need a foundation on poles.

cables and pipelines

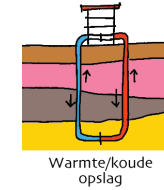
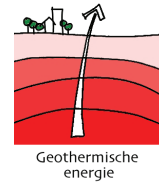
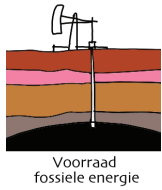


Cables and pipelines need to be reachable for maintenance. Therefore we should not built on top of them. Root growth of trees can cause problems for pipelines, so trees should be planted with a distance of 2,5 from them.

When an area is heightened, the cables and pipelines have to be heightened as well, to keep them reachable and reduce the pressure of the soil and paving. Cables and pipelines have a covering of 60-80 cm.

To improve reach ability, the paving can be changed above the cables and pipelines structure. Moreover, the structure can be placed in a gutter. Or in dense urban areas even in a tunnel, where the cable and pipeline structure

energy inventory



- On the project location there is no supply of fossil energy.

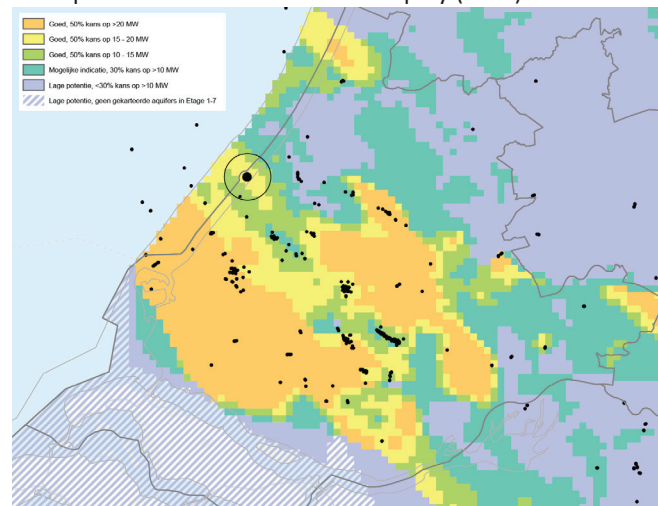
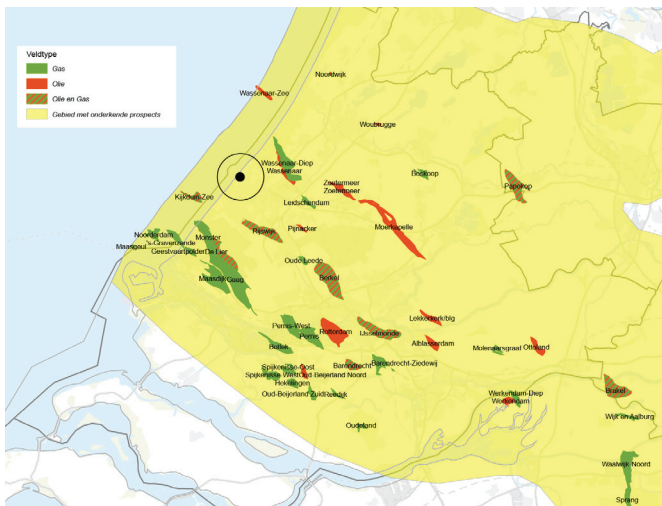
Conventional geothermal energy is extracted by a doublet which in a single well hot water from deep aquifers is pumped up and after release of its energy in a heat exchanger is injected again through another well in the same aquifer (bron fossiele stoffen).

Cold/heat storage is a method to store energy in the form of cold and heat in de subsoil. Buildings that produce rest heat can store heat in the subsoil and use it in the winter. In summertime cold can be extracted to cool buildings.

The potential for extracting geothermal energy is here defined as the chance that at a given location given a quantity of thermal power can be produced with a single conventional doublet. The map shows three classes of a good chance (50%) of producing more than 10, 15 or 20 mW and a class in which a possible indication (30% probability) is for the production of at least 10 MW.

- In Scheveningen harbour there are fishing industry buildings that produce rest heat.

- The Hague has a high potential for geothermal energy and contains the largest geothermal project in The Netherlands for providing households. As of July 2013 this project has been put on hold because of bankruptcy (bron).



energy potentials

collective vs. individual approach

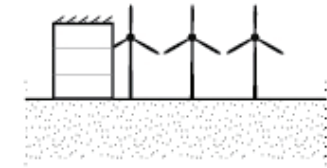
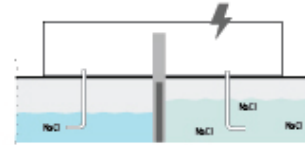


Because of new technological possibilities, we can look at the subsoil with new perspectives on sustainable energy use. The subsoil can be seen as a resource. Techniques like cold/heat storage and CO_2 storage are possible on the Norfolk line area.

sustainable energy

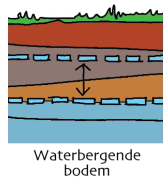


Energy can be generated from the difference of salt and fresh water. The channel contains fresh water and the harbour salt water.



In Scheveningen Harbour energy is produced with a seawater heating plant for the neighbourhood of Duindorp. Right now it is generating an overstock, which can be used for the developments at the Norfolk area.

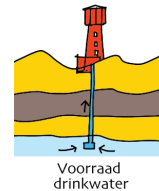
water inventory



Water storage capacity is the ability to store water underneath surface level. Water should be able to infiltrate in the subsoil. The soil itself needs to have enough space between in pores to retain water.

Land use largely determines the ability of the soil to store water. Green structures and water structures enhance the water storage capacity. Infrastructure and buildings weaken this ability by the pressure they exert on the ground and by covering the surface and retaining the water from infiltrating. Moreover, they can influence the physical, chemical and biological soil quality which can adversely affect the water storage function of the soil (bron soilpedia).

Since the Norfolk area is fully paved, it is hard to infiltrate water in the soil. The dunes, beach and channel around the Norfolk area do provide infiltration possibilities.

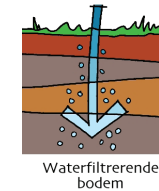


The supply of drinking water is composed of usable fresh water of sufficient quality. In the Netherlands, 70% of the drinking water comes from groundwater. The remaining 30% is extracted from surface water.

In the area immediately surrounding the groundwater resources it is in principle prohibited to develop activities or functions other than water extraction. Around the groundwater resources protected zones are set by the province. Here people can be living and working, though storing oil, the use of pesticides and (artificial) fertilizer and other malicious activities are not allowed.

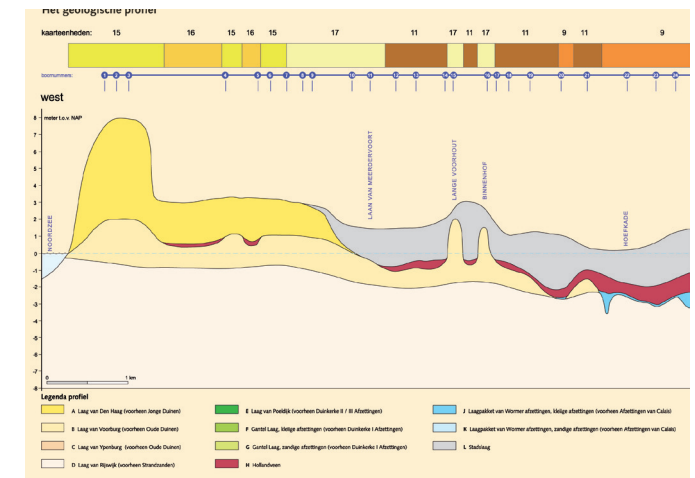
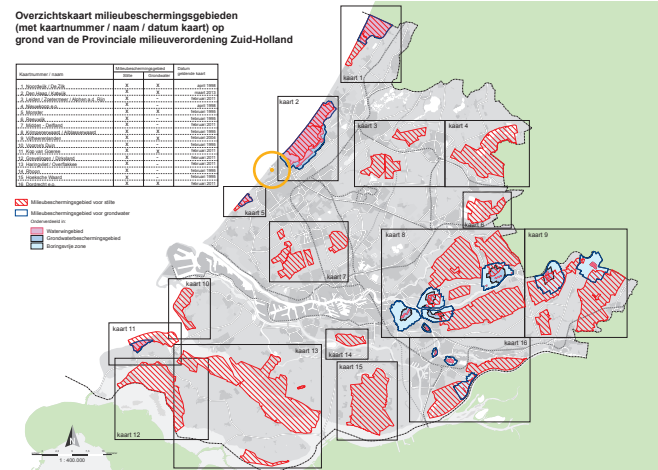
The harbour of Scheveningen is not located in or next to a water source and is thereby not influenced by the regulations of drink water supply zones.

The industrial activities in the harbour do conflict with these regulations and it is therefore not likely that water will be extracted from its subsoil.



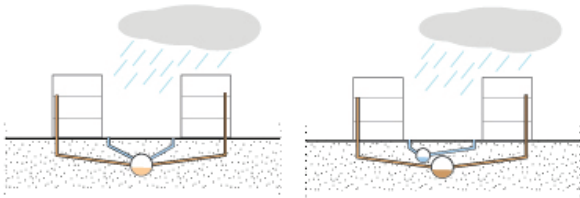
A water filtering soil removes its soil groundwater from contamination and salt on the long-term journey through the various layers of clay, sand and other strata. The soil acts as a buffer for (light) contamination and other harmful substances, so that it can maintain its functions. The water filtering soil also offers protection for water.

The subsoil in Scheveningen harbour consists of sand, which can act as a filter. Water that infiltrates in sand loses impurities that are larger than the space between the grains of sand. Impurities like algae and solutes will not be filtered.



water potentials

combined vs. separated sewage system

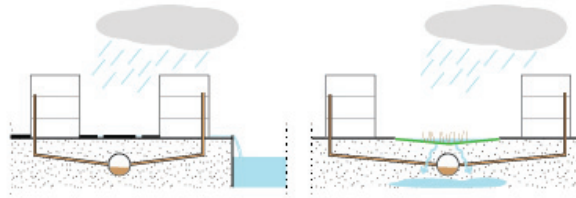


The Hague mainly contains a mixed sewer system. This means rainwater and dirty water from households flow into the same sewer pipes and will be cleaned in the water treatment plants. Therefore energy is used to clean rainwater, which was already clean.

A more sustainable concept is a separate sewer system. Rainwater is collected in a different pipe system, which flows into waterways. Only the dirty water will get to the cleaning plants.

A separated sewer system is not always possible. To prevent pollution, it is better to drain rainwater that catches dirt of heavy used car roads in the sewer system containing dirty water.

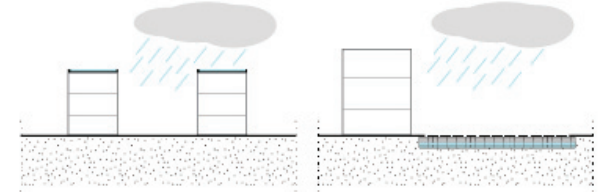
water drainage



If the sewer system is separated, rainwater can be drained into the waters of the harbour area.

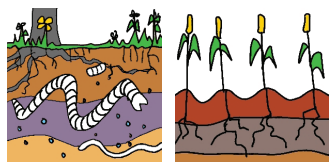
Another way is to drain the water naturally into the soil. The soil of Scheveningen harbour contains of sand, which has a good permeability and can filter contaminations from the water.

water storage



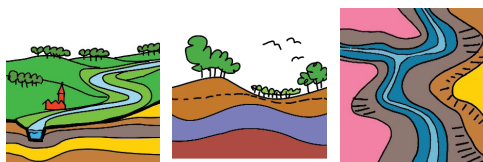
During peak periods of precipitation, water can be stored on roofs, underneath the surface in infiltration crates or in waterways.

soil inventory



Levende bodem

Gewasproductie-capaciteit



Landschappelijke diversiteit

Ecologische diversiteit

Aardkundige waarden



Schone en veilige bodem

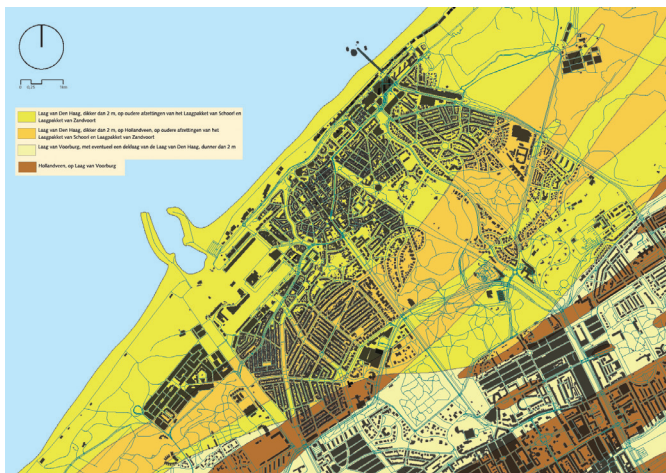
Living soil concerns the ecological system in the subsoil with innumerable organisms such as bacteria, fungi, algae, earthworms and nematodes. A living soil is important to keep our environment healthy through decomposition of organic matter and pollutants, water retention and climate functions (including prevention of heat stress in urban environment). A healthy living soil contributes to the water storage capacity and water filter product quality, self-cleaning capacity of the soil and determines the quality of the drinking water supply. The living soil improves soil fertility, pest and disease control and CO2 sequestration (soilpedia).

The former industrial harbour activities have a negative effect on the ecological quality of the subsoil. But the Norfolk area is located next to a preserved dune area, where the ecological quality is high.

Looking at the diversity in landscape and ecology and the geological value of Scheveningen harbour, we can see that the main characteristics result from its location at the sea.

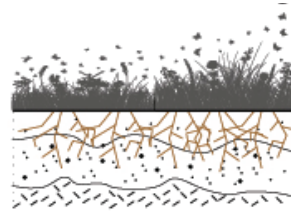
It is surrounded by dunelandscape Westduinpark, which has a large biological variation. To the east of the harbour, there is a small forest, planted in the 12th century, called Scheveningse Bosjes. To the north another large dunelandscape and water resource called Meijendel can be found.

Some industrial harbour activities have polluted certain areas. Furthermore, there are underground oil tanks and there is a possibility that old bombs from the Second World War are buried in de coast.

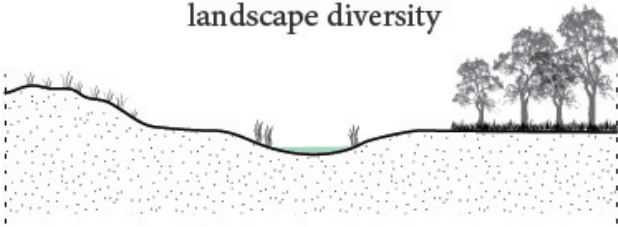


soil potentials

ecological quality



landscape diversity

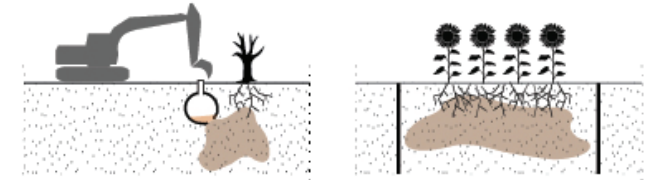


Around the harbour of Scheveningen, green structures can be found which can be connected to form one coherent ecological structure.

If these different type of landscapes are connected with Scheveningen harbour, the project location will also benefit from these qualities. Especially the dunes located at the boarder of the project location, Westduinpark, form a large potential to give the characteristics of living at the sea

Connect new parks to existing green areas and make use of soil quality. It is better to place a new park on a location which already used to be a park (bron: soilpedia).

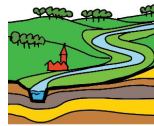
manual vs. natural soil cleaning



There are different methods in cleaning the subsoil.

One way is via phytoremediation, a slow process of cleaning in which plants are used to absorb the pollution. This way the cleaning process can for example become a temporary park.

flooding inventory



Landschappelijke
diversiteit

Due to global warming the sea level is rising. Glaciers and ice caps will melt and sea water will expand. Besides that, storms will become fiercer. At the North sea, storms during winter will increase in strength (BRON Storch), especially coming from the west and north. Since the harbour of The Hague is an outer dike area, it is prone to floods.

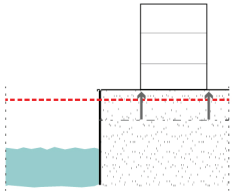
Many calculation are made to predict the sea water level in the future. For Scheveningen Harbour I made a prediction for a heavy flood in the year 2100. In the prediction I have used the current data on sea level rising of KNMI, the heavy floods in The Netherlands of 1953 and predictions of professor H. Storch on the rising of heavy floods compared to now. In these predictions, different scenarios are portrait showing a curtain degree in intensity. In my own prediction, the most extreme scenario is chosen.

- sea level rising (KNMI, 2014)	+0.85 m
- floods of 1953 (KNMI)	+3.05 m
<u>- increased intensity of floods (H. Storch)</u>	<u>+1.10 m</u>
Extreme flood scenario for the year 2100	+6.00 m

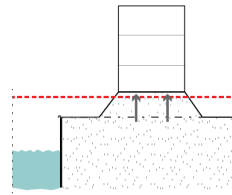
Using AHN.nl, I made a map showing the area in Scheveningen harbour prone this extreme flood scenario.



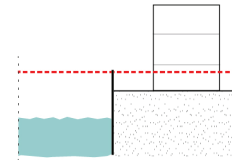
flooding potentials



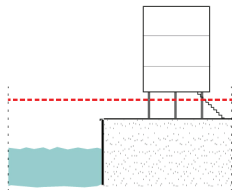
The whole area can be heightened.



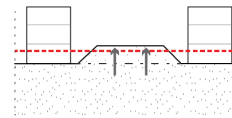
Buildings can be placed on mounds to save the amount of soil for heightening.



Quay walls can be extended.



Buildings can be placed on poles.



A safety dike can be made for fleeing.

3.3 Subsoil potential map

With all the data gathered, I translated all the subsoil conditions in my own language of drawing into one map; the subsoil potential map. This map shows the main characteristics of the subsoil of Scheveningen harbour and their spatial potentials on surface level. By making this map I forced myself to understand the subsoil conditions of the site.

Exploring the spatial potential of the subsoil characteristics is done in collaboration with the different experts. Together the benefits of the subsoil and how to relate it to the surface is investigated. In my case this is done in meetings with the municipality and mostly by looking into literature and reference projects.

The subsoil potential map plays an important role in the design process. Relations between different solutions can be searched, which can strengthen each other and contribute to a coherent end result. The sections are crucial to continuously make the relation between the urban design on surface and the subsoil.

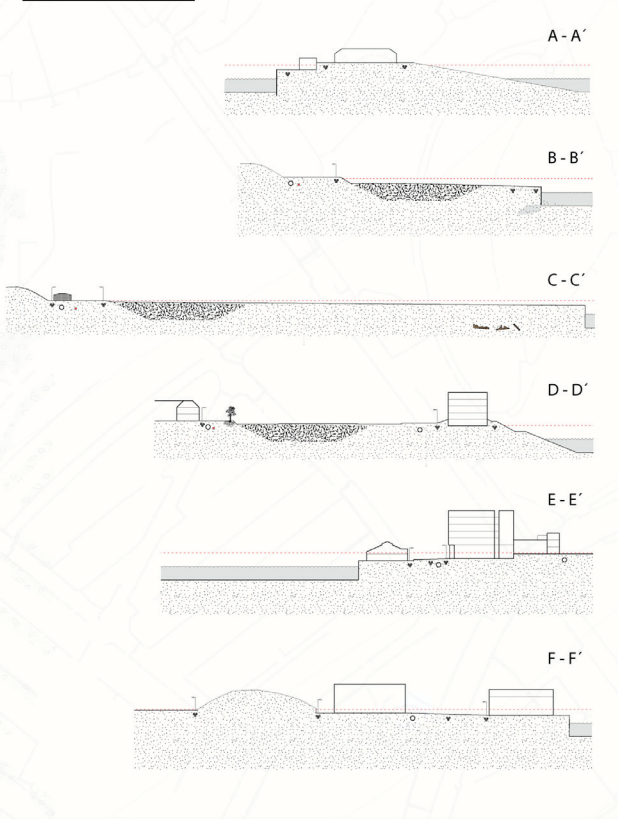
SUBSOIL POTENTIAL MAP



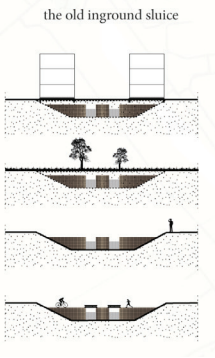
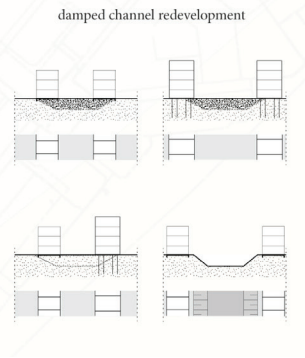
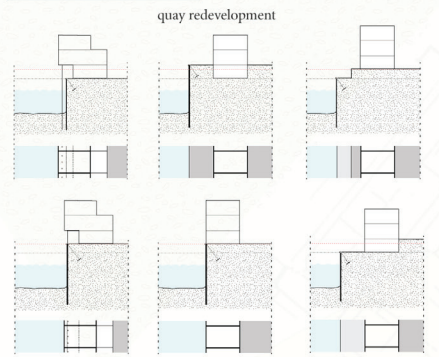
Scheveningen Harbour
MSc Urbanism TU Delft
Peter van der Graaf
pcvandergraaf@gmail.com

- CIVIL CONSTRUCTIONS**
 - cable & pipeline structure
 - overflow
 - 25KV cable
 - ▨ construction debris
 - ▨ damped channel
 - ▨ leaking quay wall
- ENERGY**
 - restheat
 - seawater heatingplant
 - ⚙ windmill
- SUBSURFACE**
 - ▨ unpaved surface layer
 - ▨ young dunes
 - ▨ young dunes on a layer of peat
 - bombs
 - subsurface oiltank
 - ▨ pollution

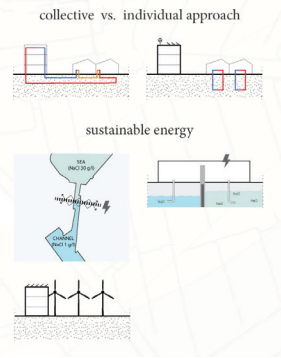
Sections 1:1500



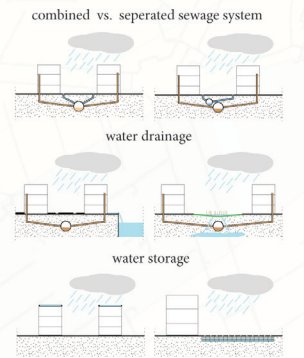
CIVIL CONSTRUCTIONS



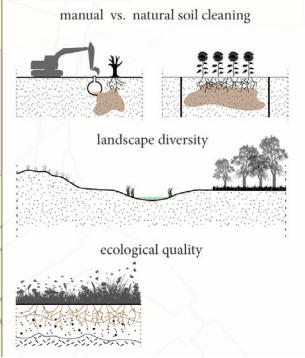
ENERGY



WATER



SUBSURFACE

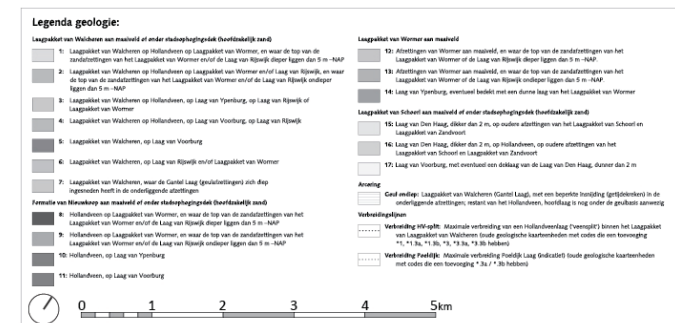
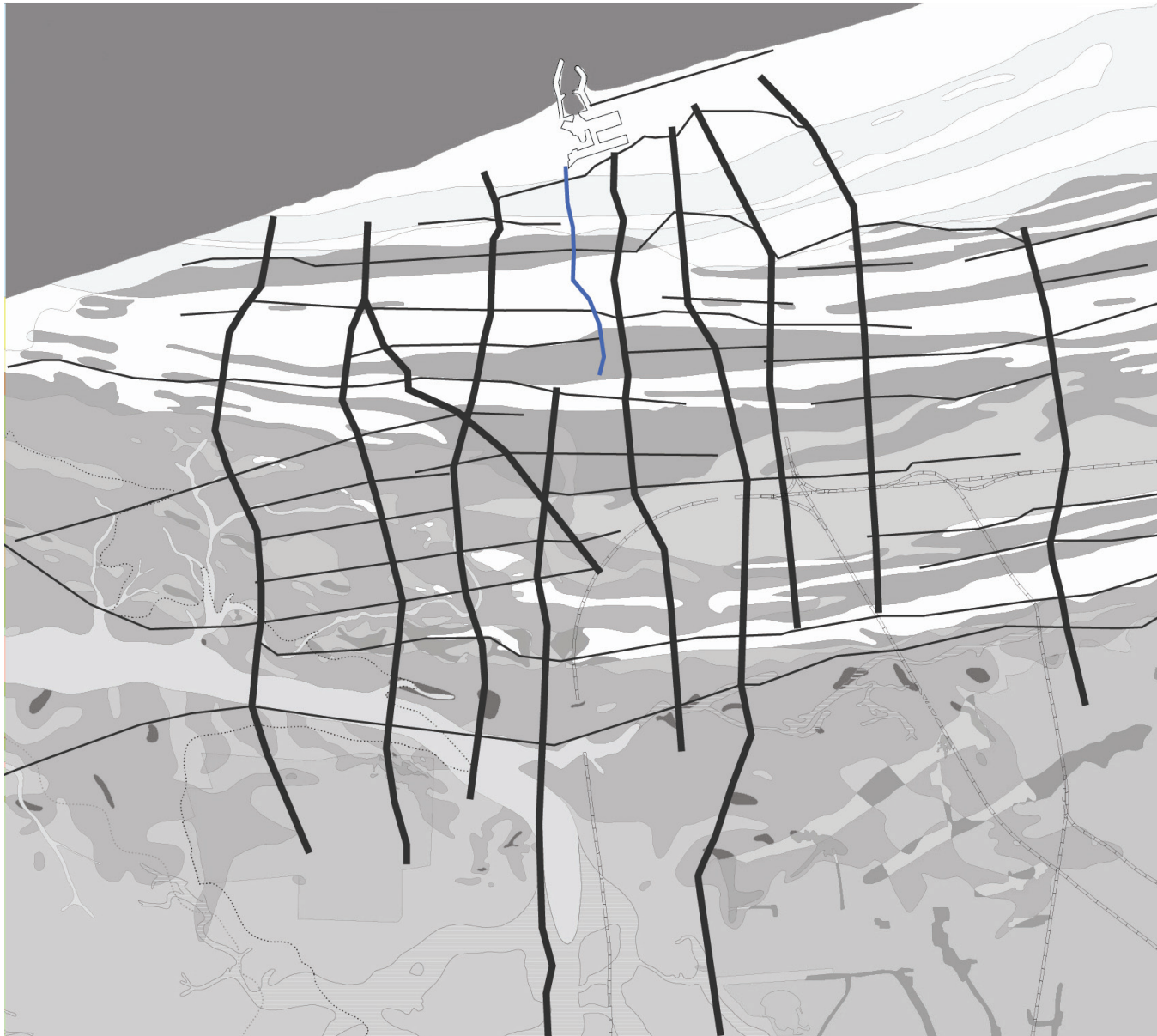


3.4 Spatial analysis

The structure of The Hague is mostly determined by its location at the sea, where the geomorphologic situation plays an important role.

The Hague is situated on a beach wall complex. Historically, the city articulated in the direction perpendicular to these beach ridges.

Scheveningen Harbour is situated as an artwork in the coast, forming an endpoint of two axes leading right to the sea; the refreshing channel and the road Statenlaan.



Relationship Schevening <> The Hague

The Hague wants to present itself as a city by the sea. But at the moment the city does not reach the beach and Scheveningen is with its boulevard more of an urban accent (D.EFAC.TO stedenbouw, 2011).

By redeveloping Scheveningen as a mixed urban area, a second centre of The Hague can be created. By creating a good connection between the centre of The Hague and the new redeveloped centre of Scheveningen, the identity of The Hague as a city at the sea To strengthen The Hague's identity as a city at the sea will be strengthened.

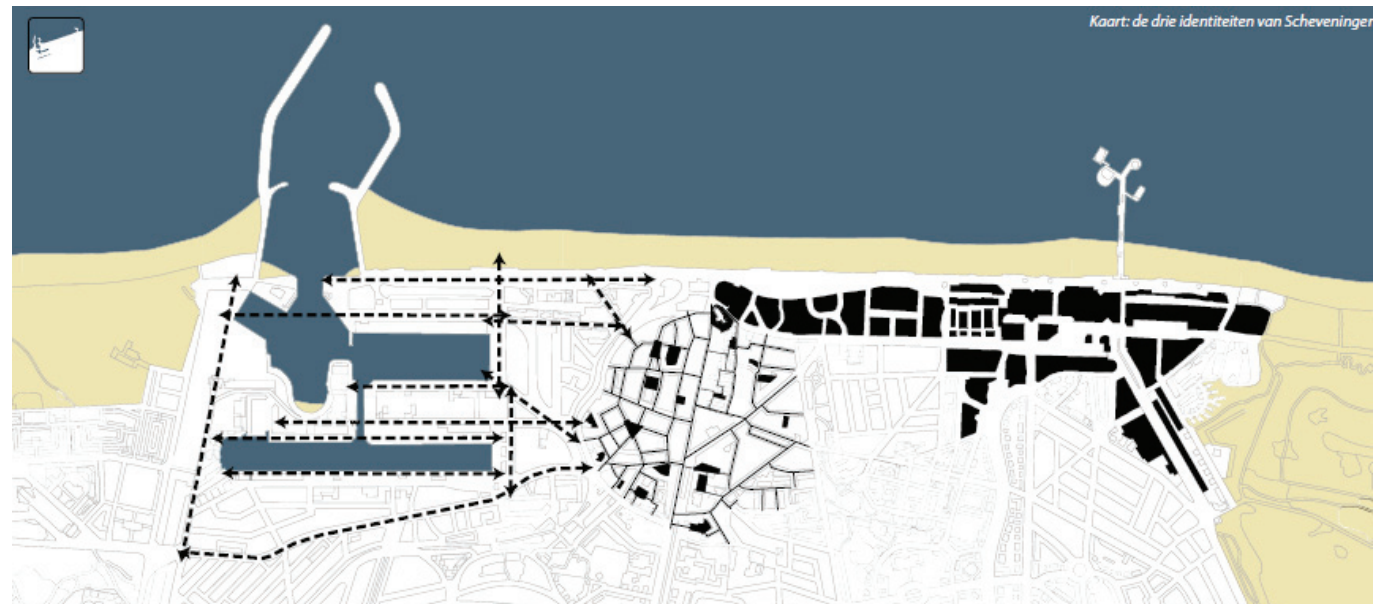
If we look into Scheveningen itself, we can identify three areas.

- Scheveningen Harbour
- Scheveningen dorp (historical core)
- Scheveningen Bad (tourist core)

One of the assignments is to create a better connection between three areas, while maintaining their own identity (Projectteam Scheveningen Havens, 2007).



The Hague, a city at the sea? (source: Atelier Kust Kwaliteit - Stad aan Zee 1)



Three identities of Scheveningen (source: Atelier Kust Kwaliteit - Stad aan Zee 1)

3.4.1 Brief historical growth of Scheveningen

1818



Scheveningen today is mainly known for being the most popular beach resort of The Netherlands, attracting millions of visitors every year. But tourism had not been around until the year 1818 when Jacob Pronk built the first bathhouse.

Scheveningen had always been a fishing village in the dunes. Proof of its first existence is from around the year 1284, as it occurred in the ducal register being described as 'terram de Sceveninghe' (land of Scheveningen).

The developing of neighboring The Hague into a rich city, caused more fisherman to settle along the coast and supply The Hague with sea fish like flatfish, codfish and mackerel. They used the 'bomschuit' as fishing-boats, which landed on the beaches.

1876



The development of the seaside resorts causes prosperity for the town of Scheveningen. Extra connections with the city of The Hague are made via road, tramway and a channel for transporting fish to the hinterland (D.EFAC.TO stedenbouw, 2011). The channel was also meant to reach the sea to discharge The Hague's water, but this was never done, because the Bathhouse resort visitors would had to swim in dirty water.

From around the year 1850 the fishery is focused on catching herring. With the new fishing technique of vleetvisserij making its appearance for which the bomschuit was not usable anymore, the new loggerboot was introduced by the shipowner Adrien Eugène Maas from Scheveningen. But this ranker and thus faster boat could only be stationed in harbours and therefore sailed from the harbour of Vlaardingen.

1900



In 1880 a new channel was dug from The Hague to Scheveningen, to let the dirty water from its canals flow into the sea. This also created another good connection for transporting fish and tourist to the upcoming bath-houses. Besides that, a new train connection was built, going from The Hague through the higher grounds of the dunes to Scheveningen-Dorp.

When on Christmas eve in 1894 a devastating storm damaged and partly destroyed the boats on the beach, it was decided Scheveningen needed a harbour.

1911



In 1904 the harbour of Scheveningen is put into use. The hearing fishery excelled and attracted many fisherman to settle in Scheveningen. For many years, Scheveningen is the biggest exporter of hearing in Europe.

But it were not only heydays for the fishery in Scheveningen. The seaside is built full with bathhouses. The Kurhaus and its pier attract many visitors.

Along the railway to Scheveningen, the new neighbourhoods Statenkwartier and Geuzenkwartier are built. Furthermore, villa parks are made in the dunes.

1943



A second harbour is developed, where next to fishery also industrial activities evolve. For the workers new sober neighbourhoods are created to replace the old slums. The street patterns are mainly rational.

Scheveningen is also expanding with new villa parks in the dunes, like Duindorp en Belgisch Dorp.

The open connection of the channel with the sea is closed off and is now discharging into the harbour via a lock.

2013



Because of overfishing of the Northsea, outdated fishing boats and changed fishing techniques, the heydays for the fishery come to an end around the 1960s. A third harbour is created to give space to the shipping-company Norfolk. From Scheveningen shippingboats would sail to England, transporting trucks and tourists. Later on the harbour is giving more space for recreational boats and its surrounded buildings are focusing more and more on leisure.

Scheveningen Bad loses its grandeur, when it becomes a beach resort for the ordinary people. Being the most popular beach resort of the Netherlands, its attracting mass tourism.

3.4.2 Structure map

Next is the analysis of the structure of the harbour of Scheveningen and its surroundings.

The harbour is surrounded by different structures:

- The old center with its small street patterns
- The herringbone structure of Geuzenveld and Statenkwartier
- One homogeneous neighbourhood of Duindorp

There are three strong axes perpendicular to the sea:

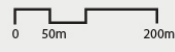
- Scheveningsweg (old road to Scheveningen)
- Statenlaan (ending at a square with a view on the harbour)
- Verversingskanaal (refreshing channel ending in the harbour)

The harbour is poorly connected to its surroundings:

- Scheveningen harbour forms a border between boulevard and dunes
- The channel coming from the city centre of The Hague stops abruptly at the beginning of the area.
- Statenweg stops at a parallel road to the harbour. Building blocks are also placed parallel to the harbour and thus form a poor visibility to the harbour.
- The connection with the boulevard of Scheveningen is poor and reachable via a long detour around the harbour.

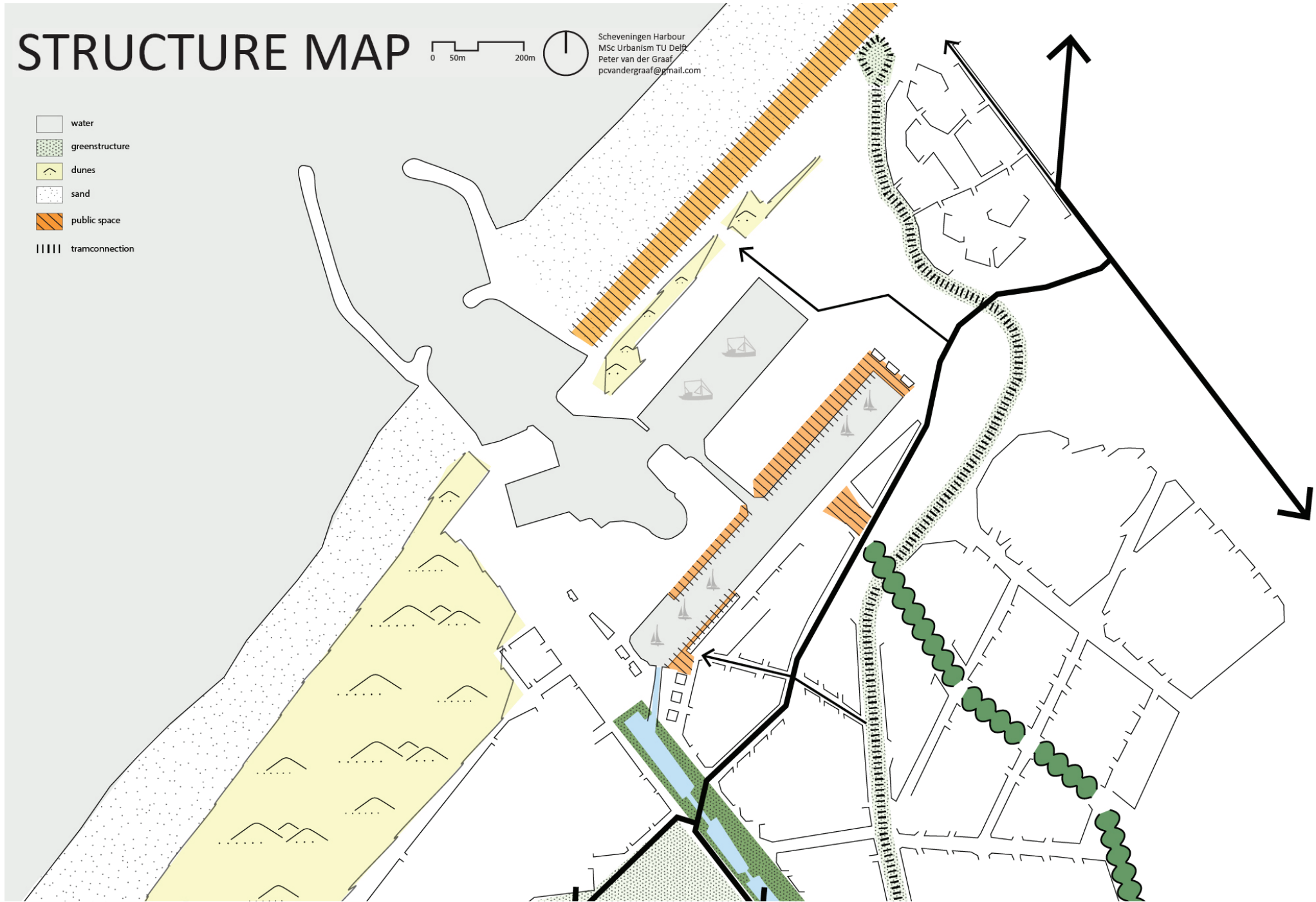
Public space is situated around the quays, but they do not form one coherent public space structure.

STRUCTURE MAP



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- water
- greenstructure
- dunes
- sand
- public space
- tramconnection

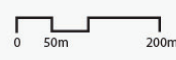


3.4.3 Preconditions map

From the analysis of the structure of the harbour and its surroundings, I set up five preconditions for the urban design.

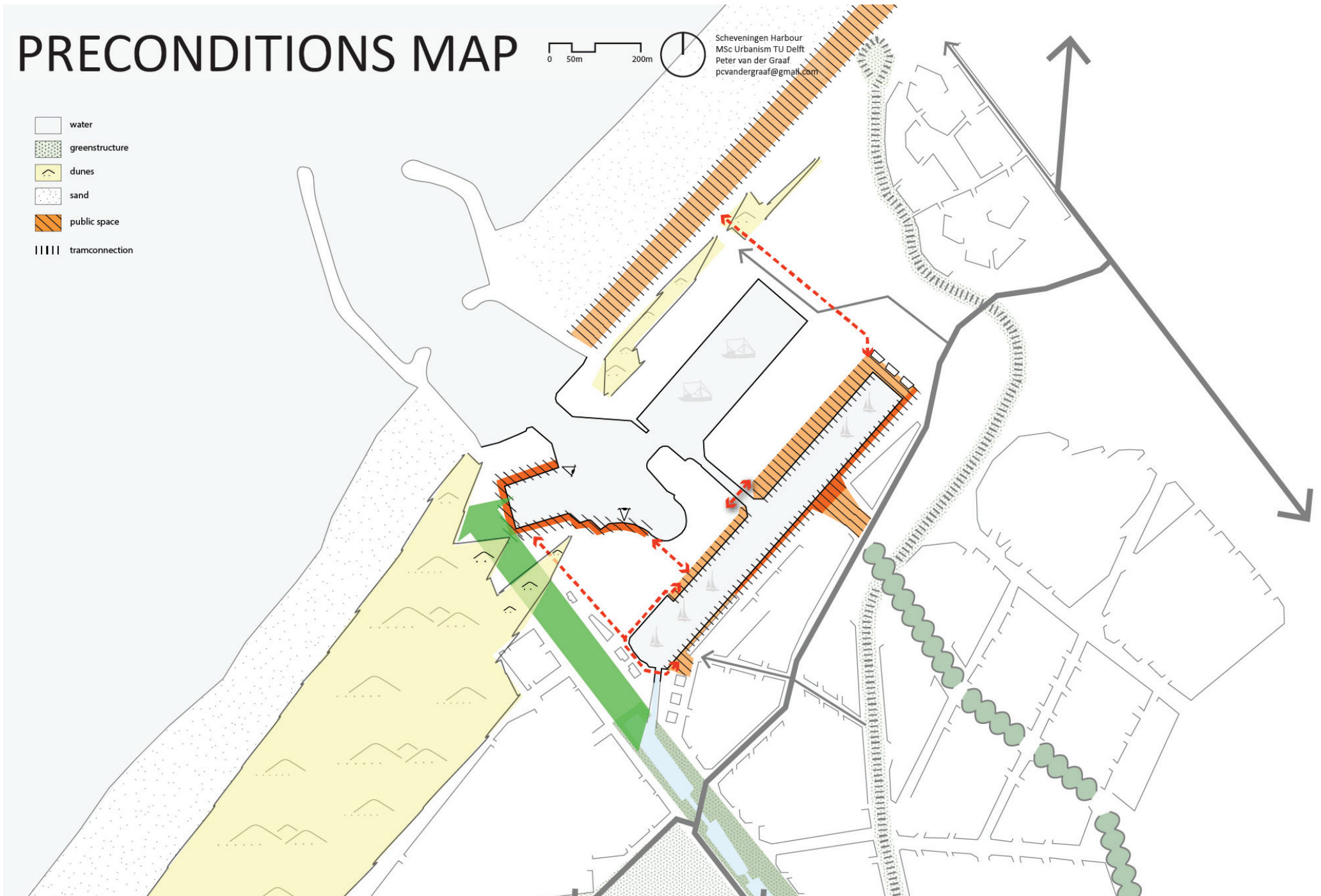
- Verversingskanaal as a green connection between The Hague and Scheveningen Harbour.
- Open up the dunes to the harbour.
- Connect new development to existing buildings and structures.
- Quay as a unifying element of public places, creating a more clear connection between the harbour and the boulevard.
- Create a viewpoint on southern port head, from there the whole quay is visible.

PRECONDITIONS MAP



Scheveningen Harbour
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- water
- greenstructure
- dunes
- sand
- public space
- tramconnection



A photograph of a physical architectural model made of cardboard. The model consists of several rectangular and irregular shapes, some with red-painted top surfaces and others with yellow or blue-painted sides. Some pieces have small black rectangular tabs protruding from them. The model is placed on a white surface with faint black lines and some text, possibly a blueprint or a site plan. A semi-transparent white banner is overlaid across the center of the image, containing the text "4 APPLICATION" in a bold, black, sans-serif font.

4 APPLICATION

4.1 Design method

To come to a spatial solution, I used the design method of making a variation study. The main goal of this method is to widen the search for possible solutions for a particular research question. The possible solutions are evaluated on the basis of criteria, then whether or not combined, are implemented in the design (Cross, 2000, p. 124)

In my case the variation study shows the different solutions for how the subsoil aspects can be implemented in the design and moreover how these aspects can be handled in relation with each other. The variation that benefits the most from the subsoil, will be elaborated into my urban design.

While making variations, I continuously switched between subsoil potential map and the map showing the current situation on the surface as underlayer for the design. The techniques that I used for designing changed during the process. I started of sketching, then making physical models and ended up making 3d computer models with Sketchup. Sketchup worked for me very well, since it gives a very fast spatial image.

The design process was not as linear as proposed in my theoretical frame work. Halfway true the process new subsoil aspects were discovered and researched for their potential and the situation on surface level was investigated rather late.



4.2 Three variations

Next are three design variations, in which different ways of dealing with the subsoil conditions are investigated. The designs are made with the perspective from the subsoil, but differ in approach.

Preserving the subsoil conditions

The first variation is a design on the bases of the current subsoil conditions. These are not altered and form the boundary conditions for the development on surface level. The process of building can start right away and building preparation costs are kept minimal.

Exploiting the subsoil conditions

In the second design variation the subsoil conditions are adjusted to needs. To come to a more sustainable urban design, the different spatial potentials of subsoil conditions are chosen in relation to each other chosen.

Combining preservation and exploitation

The third variation is a combination of the first and second variation. The advantages of preserving and exploiting the subsoil conditions are combined.

variant 1

preserving subsoil conditions

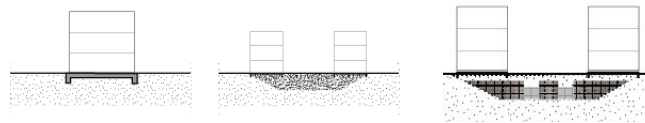
Cable and pipeline structure

Respecting the current cable and pipeline structure has the result that buildings have to be placed with a distance from this structure. Heightening the area is not possible, since cables and pipelines have to be at a certain height under the surface because of accessibility reasons and soil pressure. Moreover, plants and trees can damage the structure with their roots, so they cannot be placed near the cable and pipeline structure. Respecting the cable and pipeline structure has the advantage of saving costs, since moving this structure is very expensive.



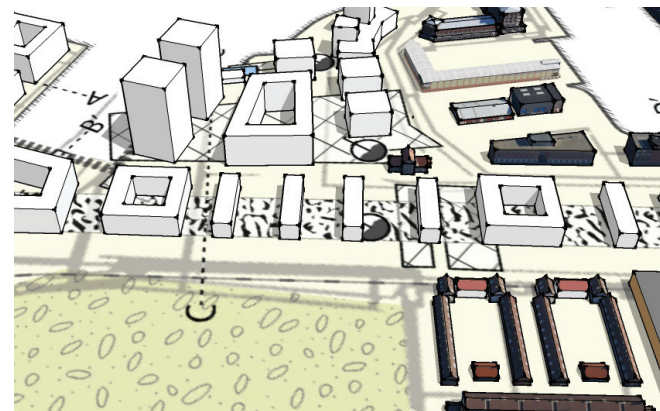
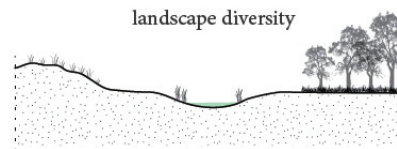
The damped channel

By using shallow foundations, the remains of revetment of the damped channel and the old sluice will cause no problems in the building process. This type of foundation is also cheaper than a foundation on poles.



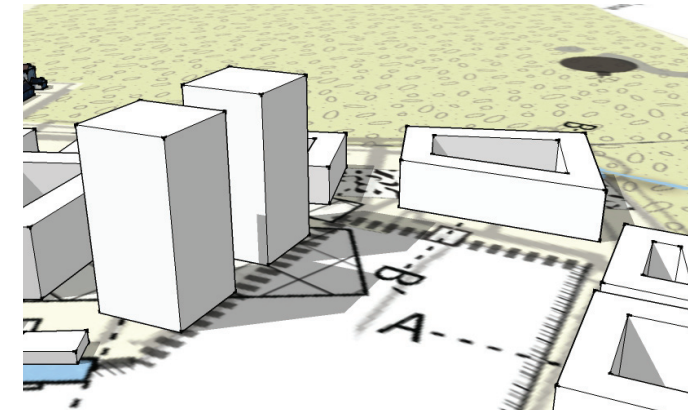
Landscape diversity

The building blocks are placed perpendicular to the damped channel, this way we can benefit from the landscape diversity by connecting the harbour with the dunes.



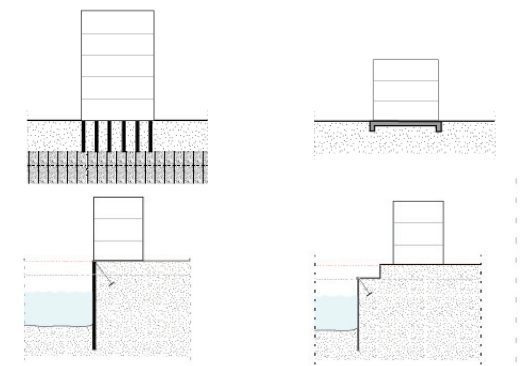
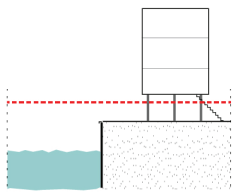
Quay redevelopment

By combining the renewal of the quays that are in bad shape with a strong foundation on poles, we can make the quay buildable and take advantage of it. The quays that are in good shape are designed for mooring boats and cannot bear pressure from buildings on top of them. Therefore buildings are placed with a certain distance from the quays.

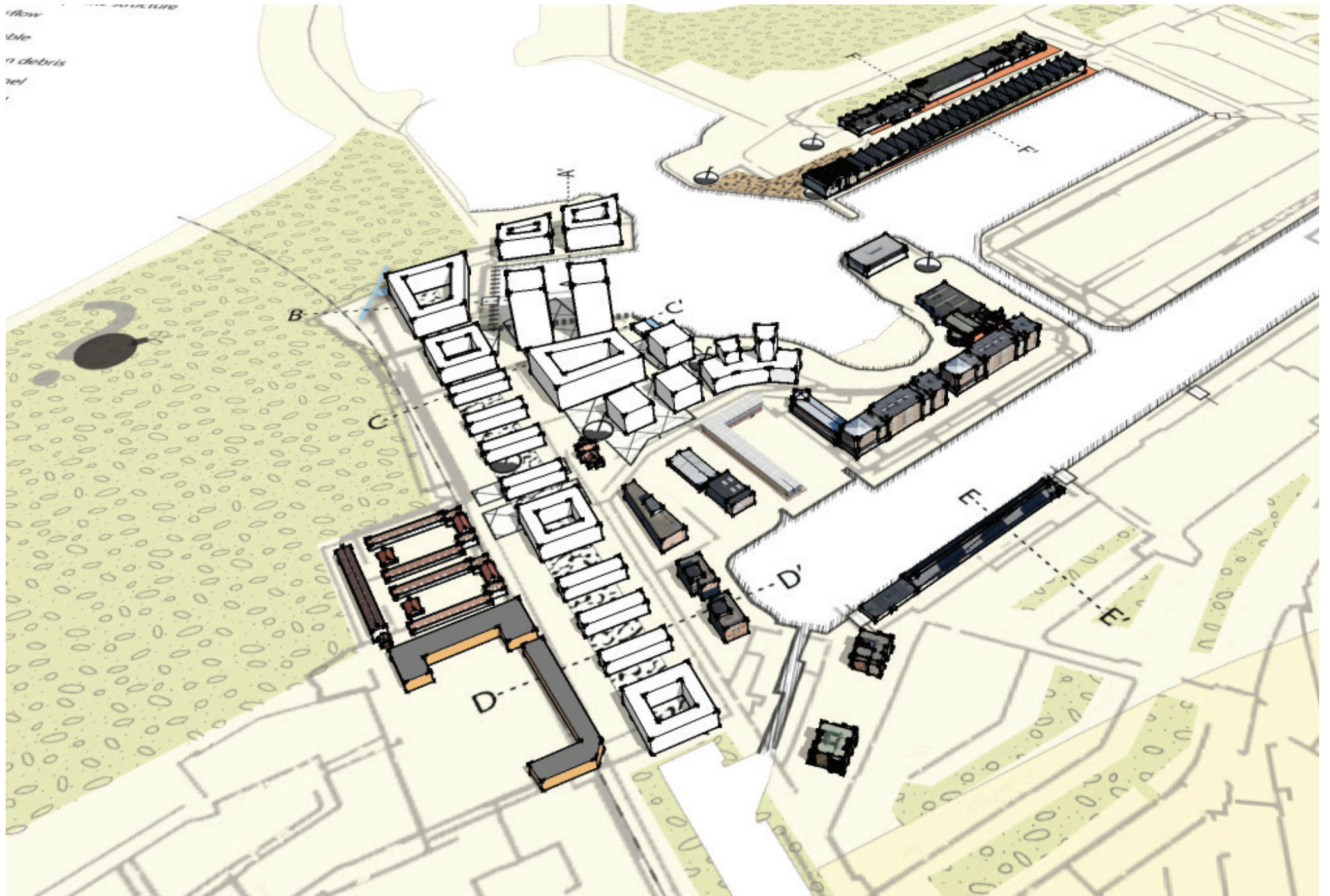


Flooding

In this variation, the water safety will be solved by placing building blocks on mounts and poles, or placing curtain program at ground level, which have less consequences for people when flooded.



flow
ble
n debris
rel

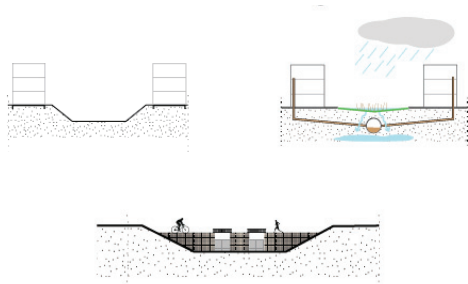


variant 2

exploiting subsoil conditions

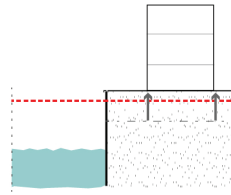
The damped channel

In this variation the damped channel plays a big role in creating a more sustainable end result. By partly digging out the channel, a gully is created for catching rainwater. The combined sewer system can be transformed in a more sustainable separated system. Furthermore, the old sluice will be excavated and form as a bridge over the gully.



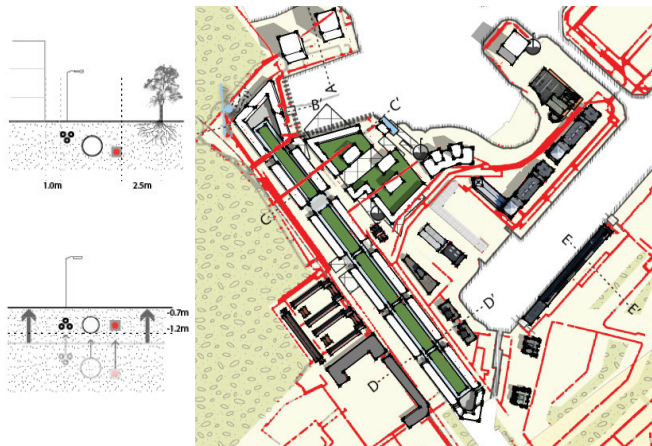
Flooding

The dug out sand can be used in heightening the area to guarantee safety against floods. By solving the soil balance within the project location, costs are saved.



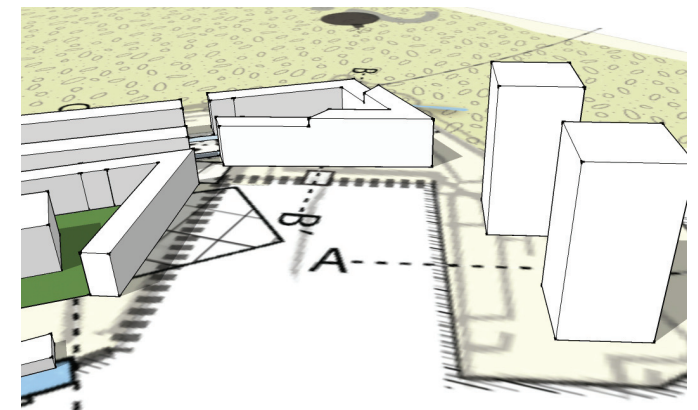
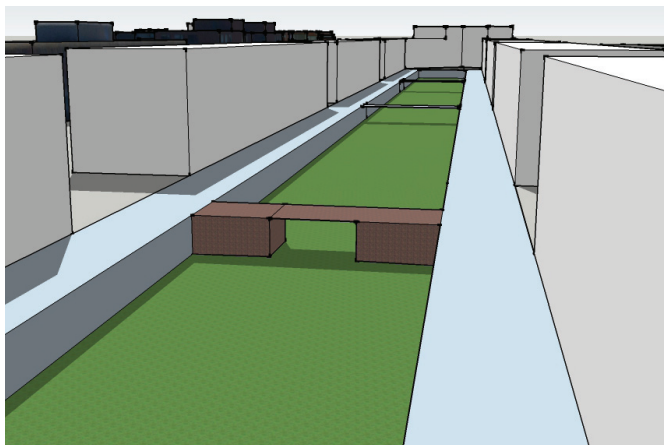
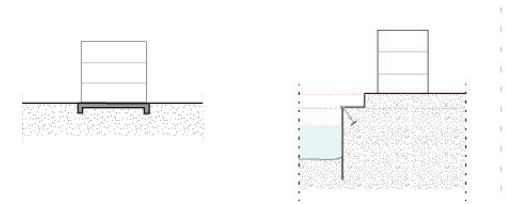
Cable and pipeline structure

The cable and pipeline structure parallel to the damped channel can be respected. However, in the areas that will be heightened a new cable and pipeline structure has to be made, since cables and pipelines have to be at a certain height under the surface because of accessibility reasons and soil pressure.

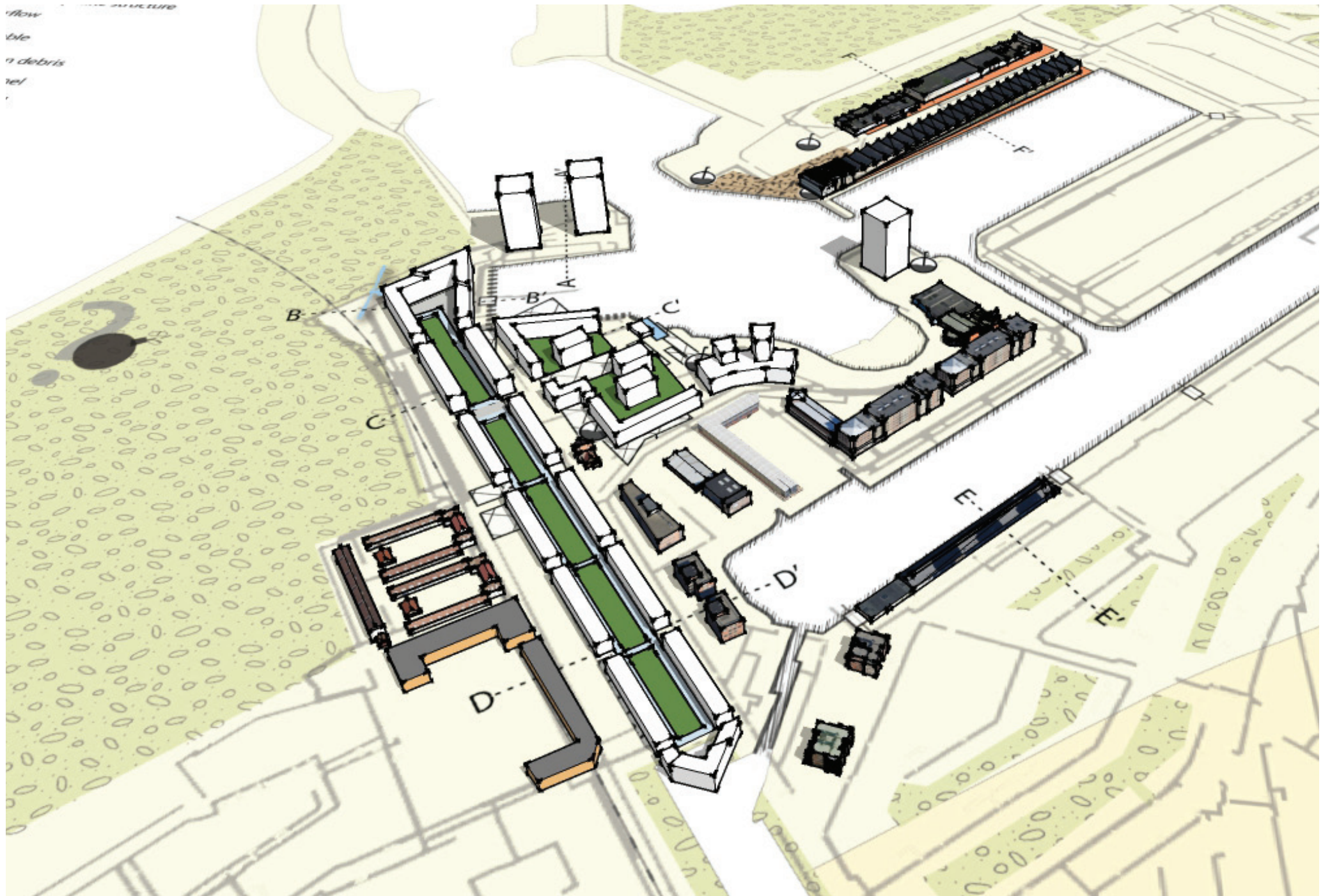


Quay redevelopment

In variant 1 the building blocks were placed to get an open atmosphere. There is a lot of public program. In this variant a more secluded space is created for the residents. By taking distance from the quays with long building blocks, public space along the water and semi public space between urban villas is confined.



flow
ble
n debris
rel

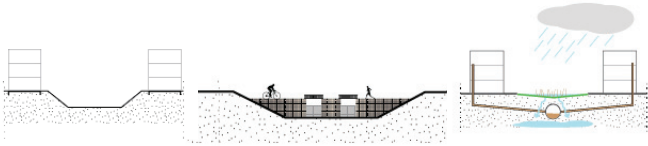


variant 3

preservation and exploitation

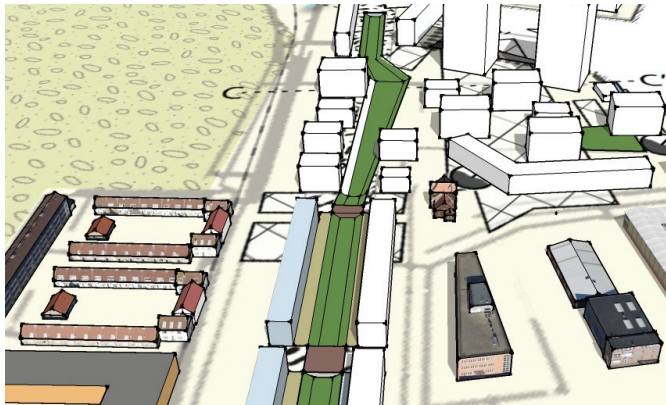
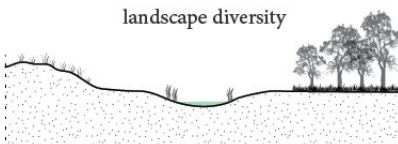
The damped channel

In this variation the damped channel will also be dug out to catch rainwater and heighten certain areas. The old sluice will also be excavated to create a bridge over the gully.



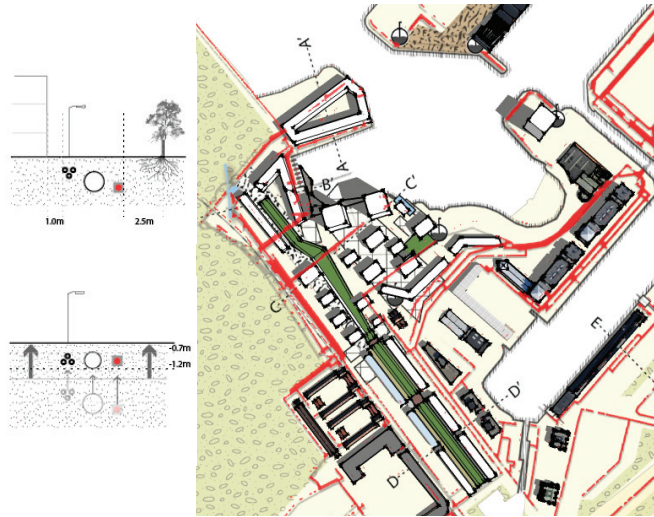
Landscape diversity

However, in this variation the long building blocks parallel to the damped channel are transformed into urban villas at the location of the dunes. This way there is space to make a connection between the harbour and the dunes and create a differentiation of the characteristics of the gully.



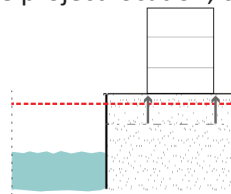
Cable and pipeline structure

The cable and pipeline structure parallel to the damped channel can be respected. However, in the areas that will be heightened a new cable and pipeline structure has to be made, since cables and pipelines have to be at a certain height under the surface because of accessibility reasons and soil pressure.



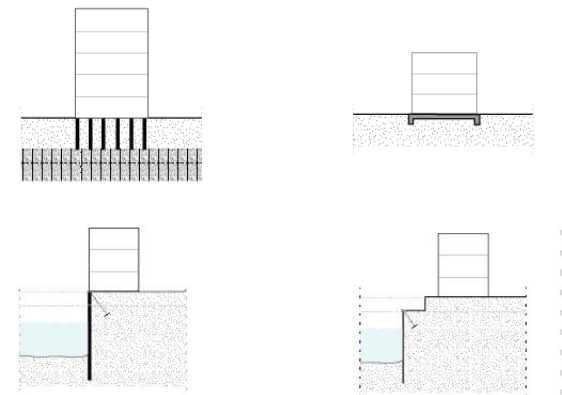
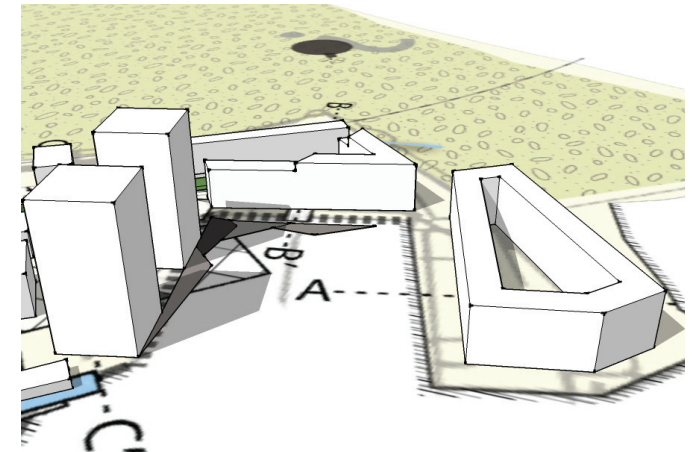
Flooding

The dug out sand can be used in heightening the area to guarantee safety against floods. By solving the soil balance within the project location, costs are saved.

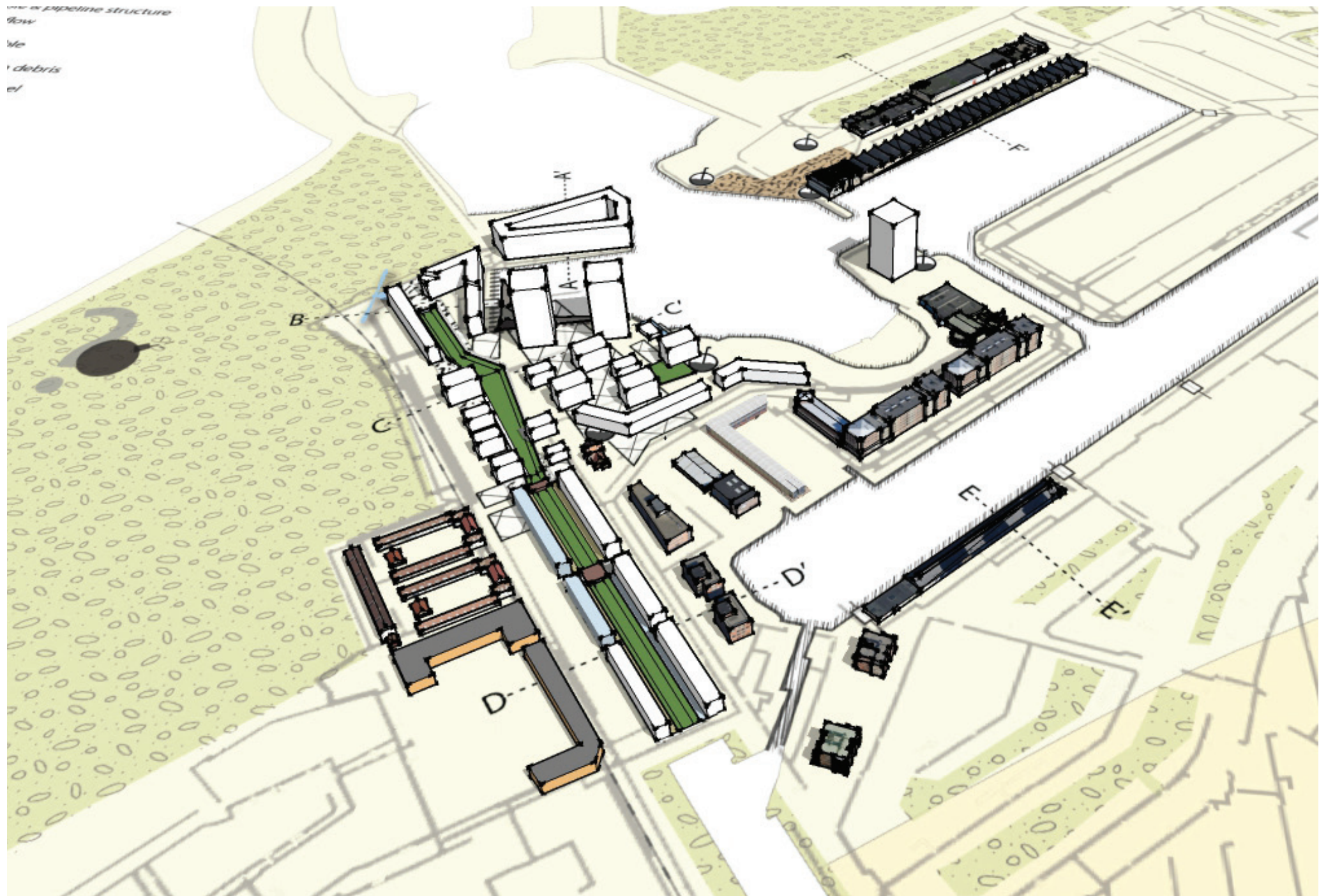


Quay redevelopment

Just as the first variant, the renewal of the quays that are in bad shape are combined with a strong foundation on poles, so the quay will be buildable. The quays that are in good shape are designed for mooring boats and cannot bear pressure from buildings on top of them. Therefore buildings are placed with a certain distance from these quays.



--- pipeline structure
flow
debris
el

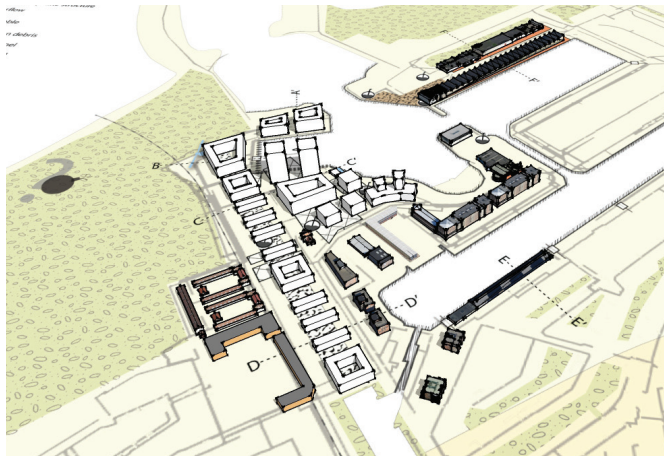


4.3 Choosing a variant

The different variants show the search for benefitting as much as possible from the subsoil aspects. Variant 3 is a combination of the ideas in variant 1 and 2 and therefore also contains the most weight in using subsoil aspects in the design. Looking at the structure on surface level, variant 3 also takes in account the goals of the preconditions map. Thus variant 3 will be elaborated into an urban design.

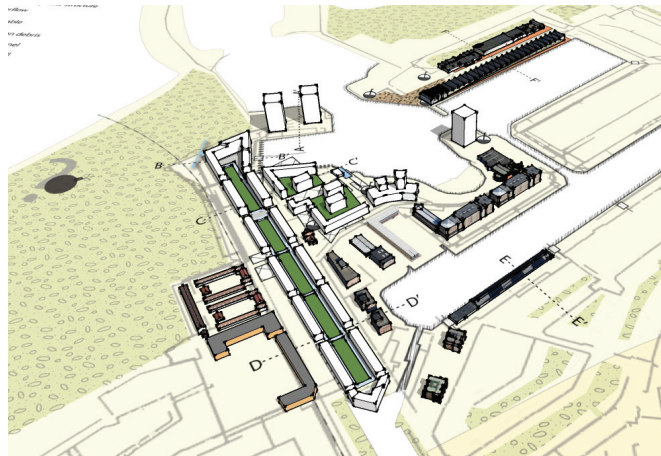
variant 1

preserving subsoil conditions



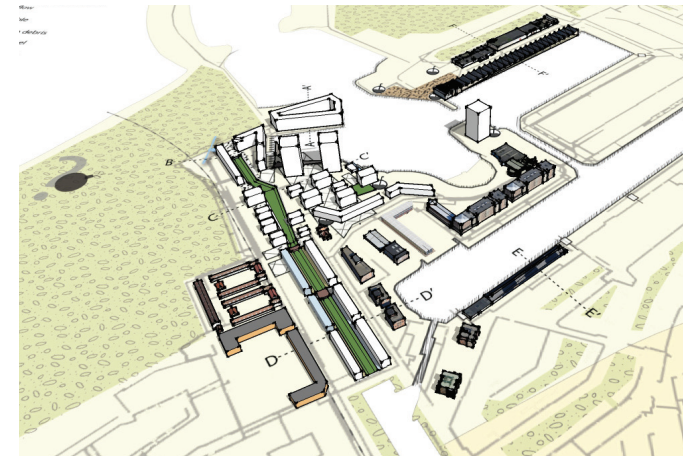
variant 2

exploiting subsoil conditions



variant 3

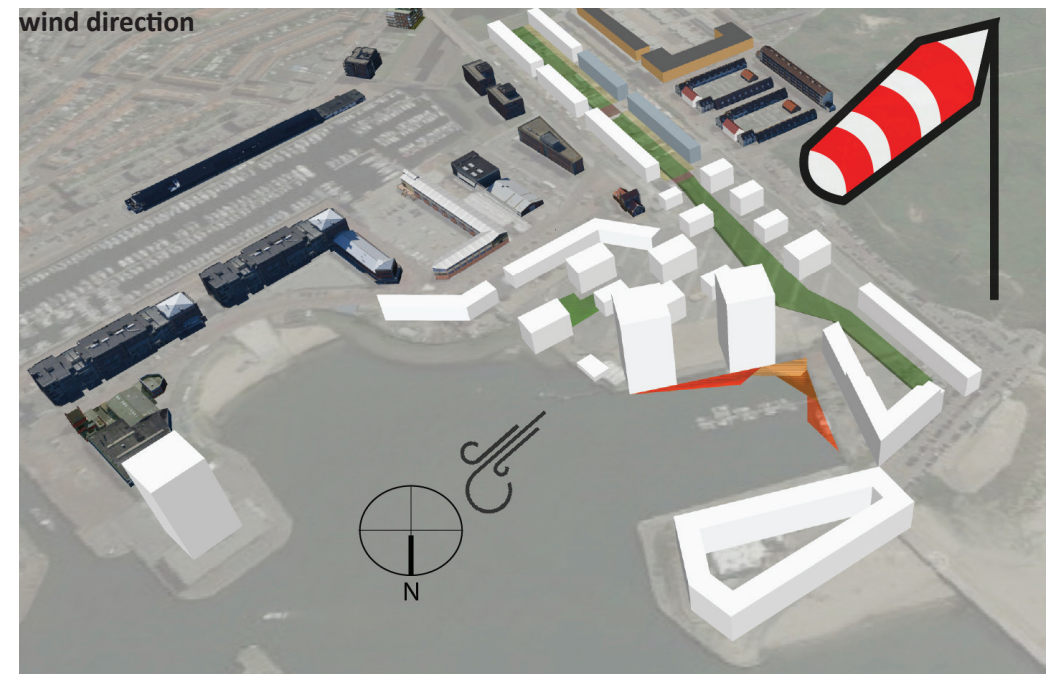
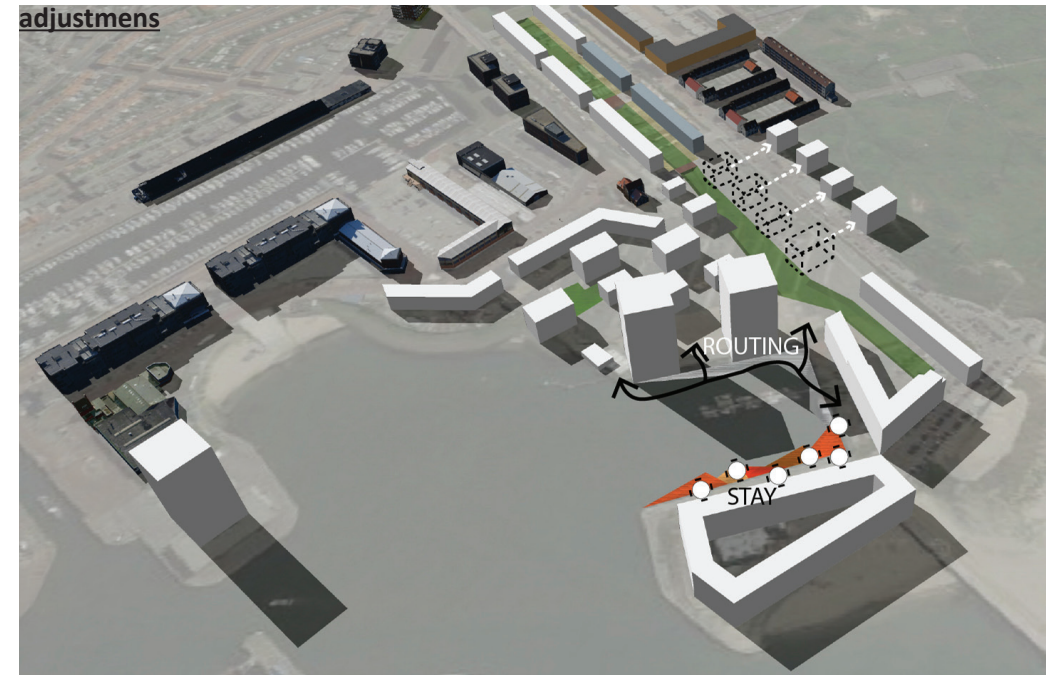
preservation and exploitation



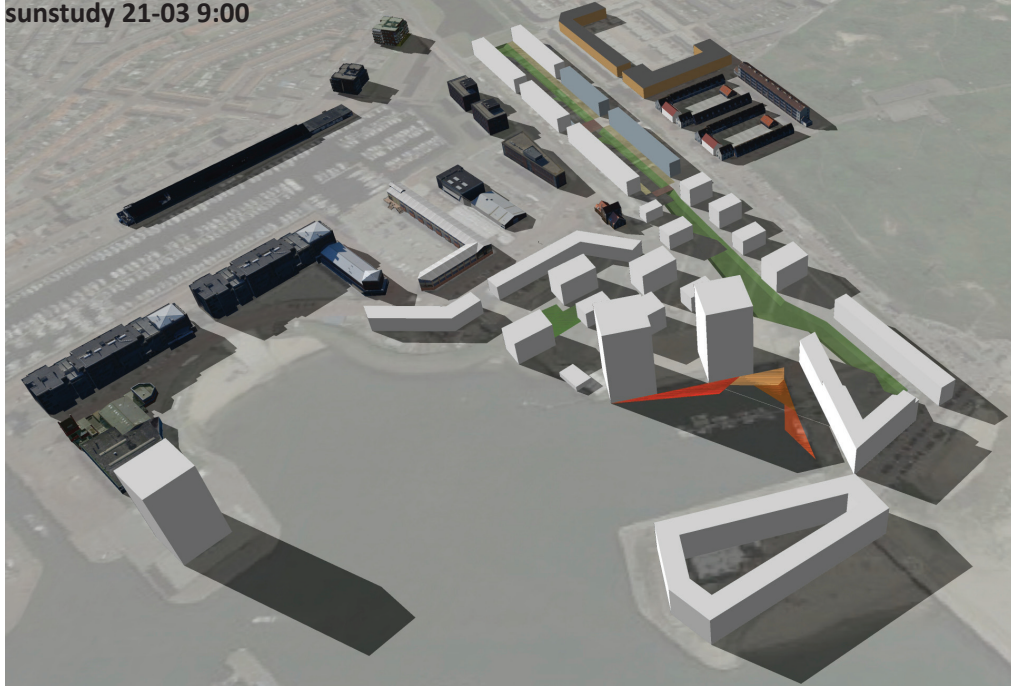
4.4 Sun and wind study

After doing a sun and wind study I adjusted the design. I relocated the public space and moved building blocks to take away the shade on the green gully.

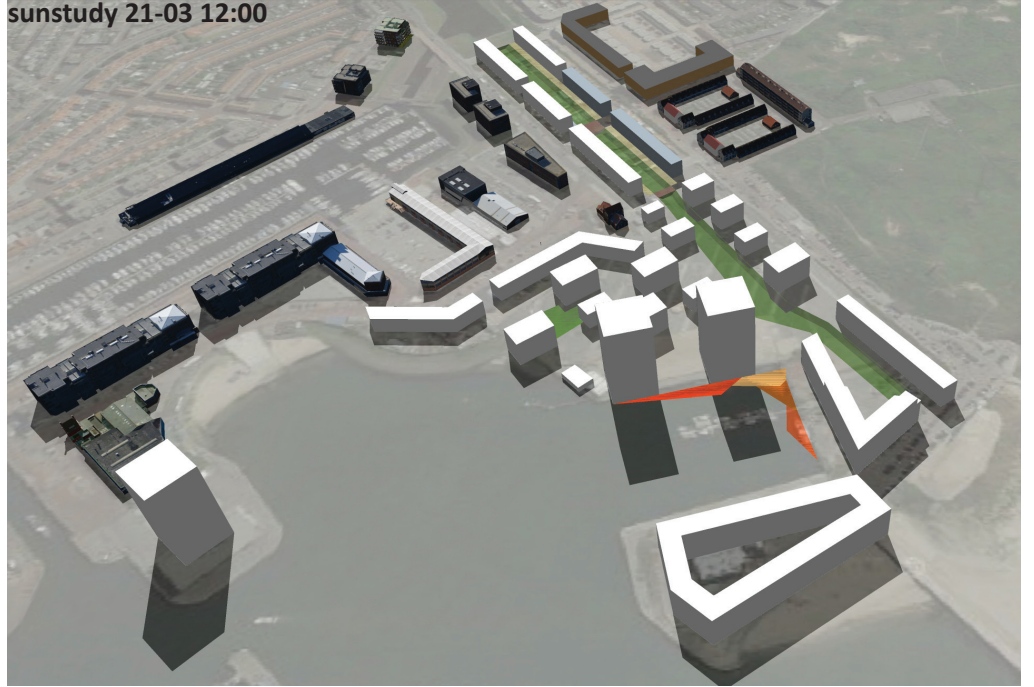
Where the gully meets the dunes, now an open green area is created, opening up from the main road.



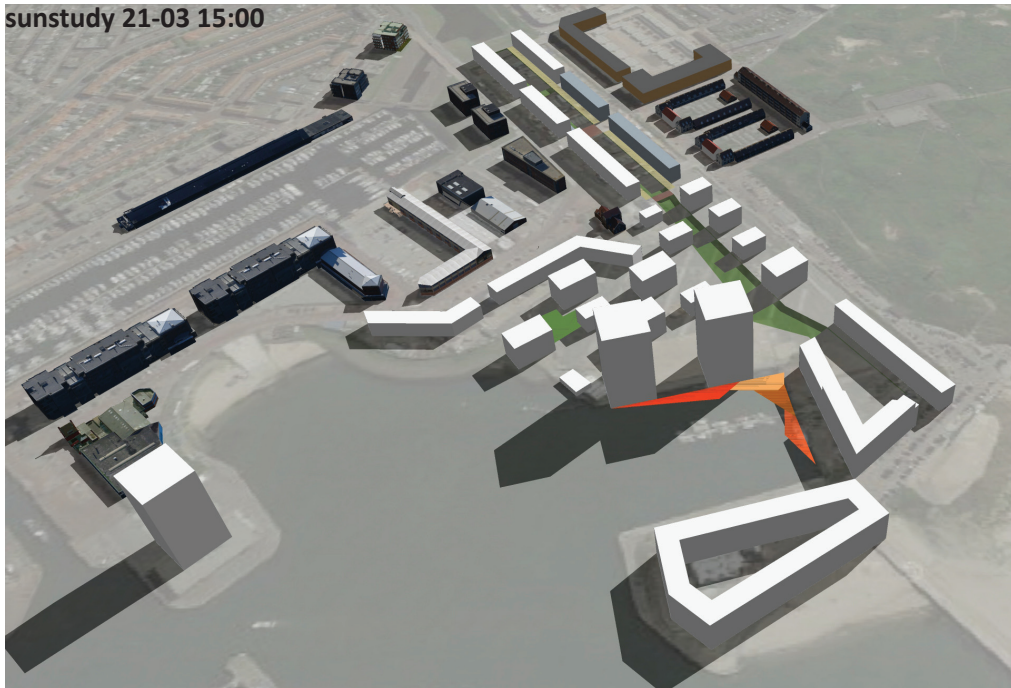
sunstudy 21-03 9:00



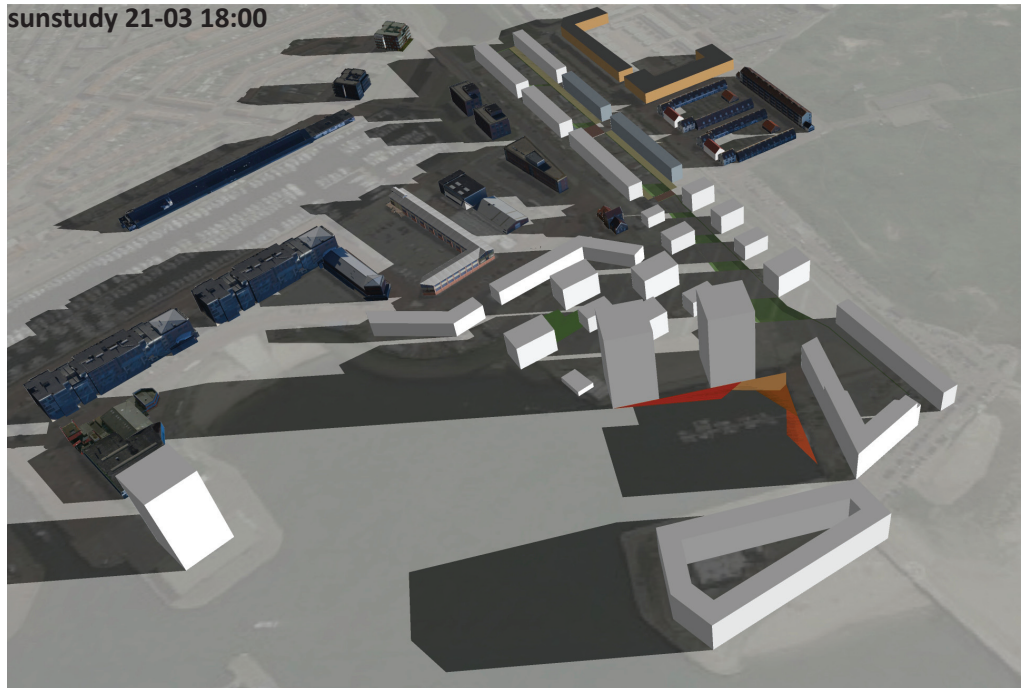
sunstudy 21-03 12:00



sunstudy 21-03 15:00



sunstudy 21-03 18:00

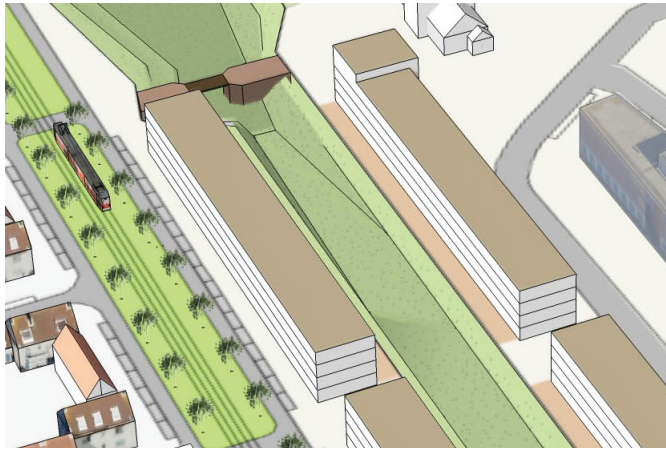


4.5 Elaboration

After further elaborating the design spatially, the map on the right shows the end result. The design in this graduation project plays the role of a test case of the method given in chapter 2. From this perspective, the design should be judged in the first plays on how the subsoil conditions have spatial influence on surface level and how the relation between them is made.

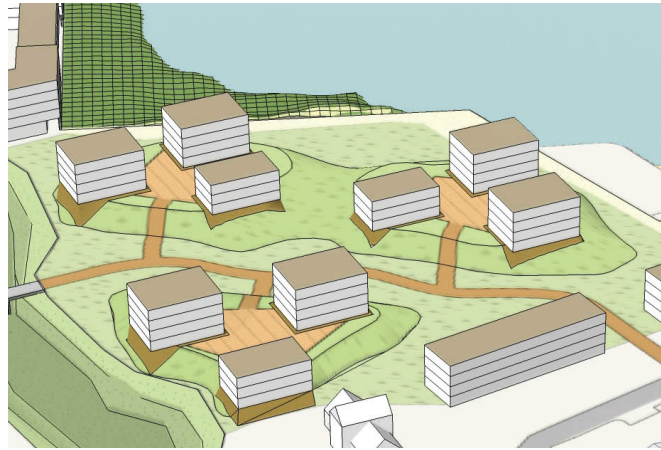
In this section I will explain the elaborated design. First I will give an overview of the plan and the different building typologies. Then I will show two key location in which the spatial influence of the subsoil conditions is made clear.





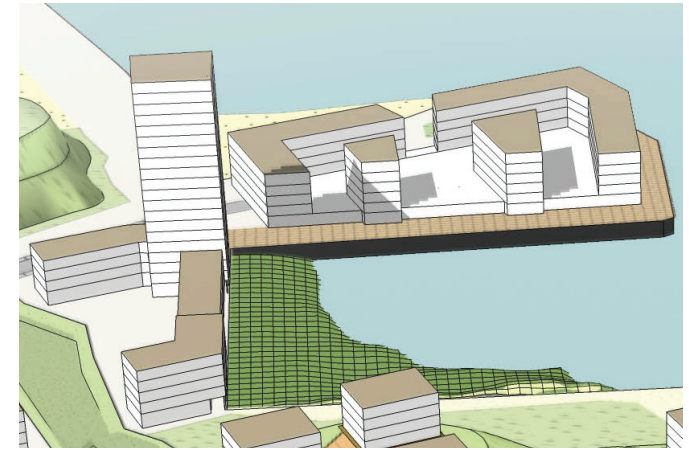
Apartment blocks

Apartment blocks of four stories high are situated along the partly dug out channel. The dug out channel forms the common public space. Being enclosed by the apartment blocks it has a semi private nature. The apartment blocks direct the long axis towards the sea and form an enclosure to the dune area with the urban villas.



Urban villas

The Urban Villas follow the dune landscape going into the harbour area. The subsoil not only contains remains of old historic houses obstructing the use of pole foundations for larger building structures, it also needs to be heightened. The Urban Villa accompany the sloping landscape, without reducing the open character of the landscape.



Urban blocks

In the north of the harbour, a more dense urban area is created with urban blocks. Public functions are situated in the base of the buildings along the waterfront. Public space is created along these facades. Parking for residents or visitors is also situated on the ground floor. On the roof of the parking and public functions, private space is created for residents and hotel visitors.

Typology references:



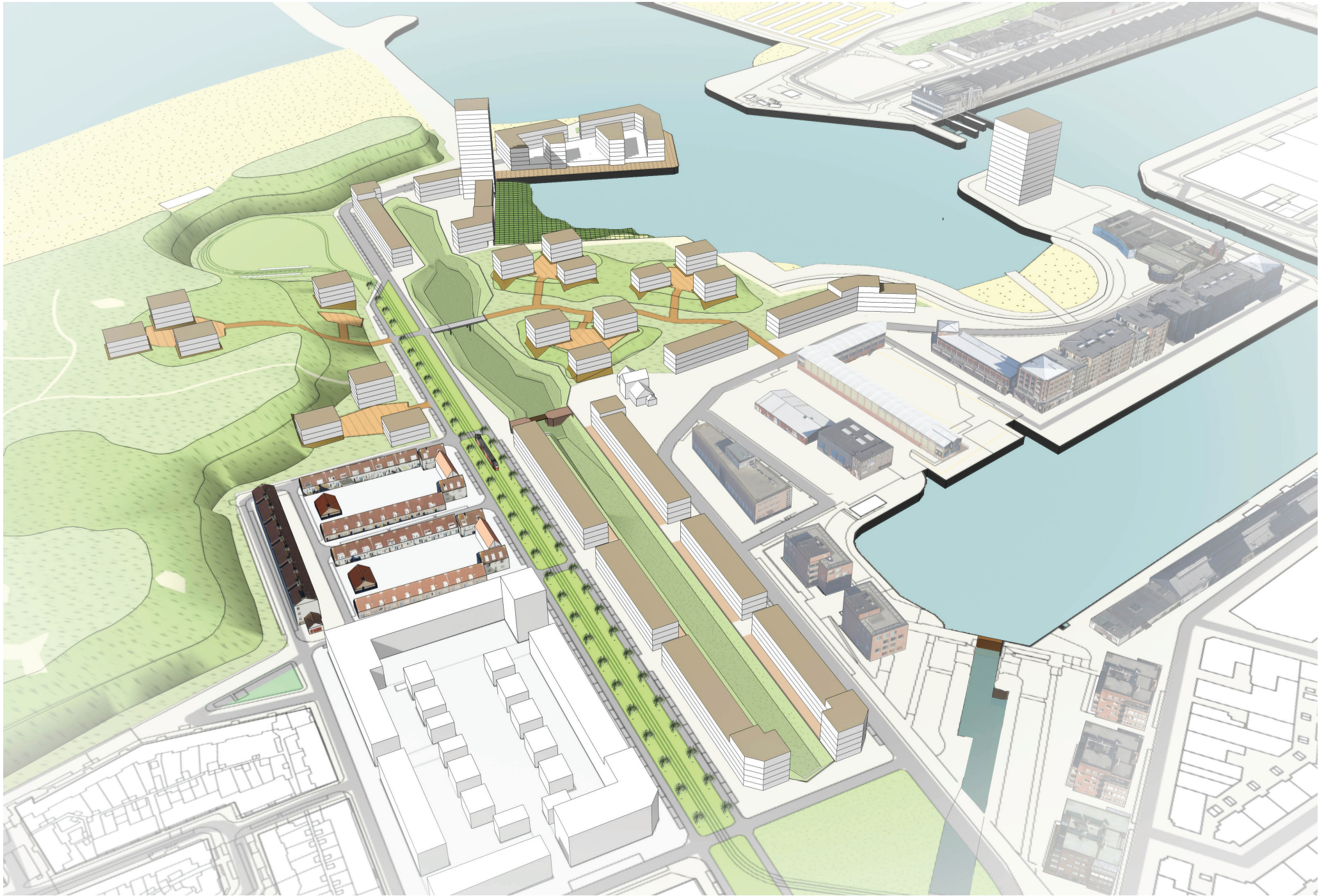
apartments in Oslo, Norway by Make Studio (source: makestudio.co.uk)



Urban Villa, Velsbroek by ONX architecten (source: ONX-architecten.nl)

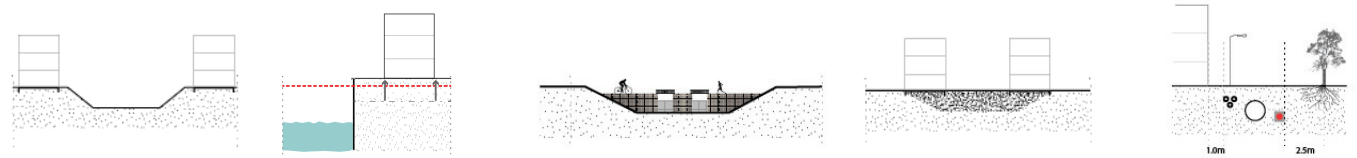
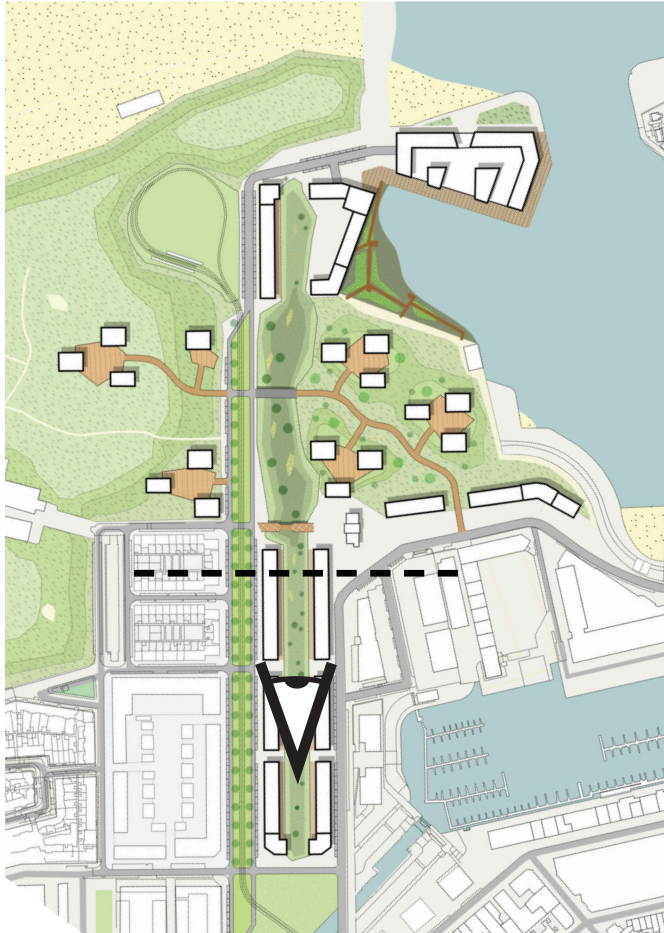


Urban Block in Hamburg Hafencity (source: hafencity.com)



elaboration 1

hollow in the dunes



The hollow in the dunes is created by digging out the channel and use the sand for elevating the lower areas. By doing this, the landscape characteristics of the dunes is continued in the harbour area.

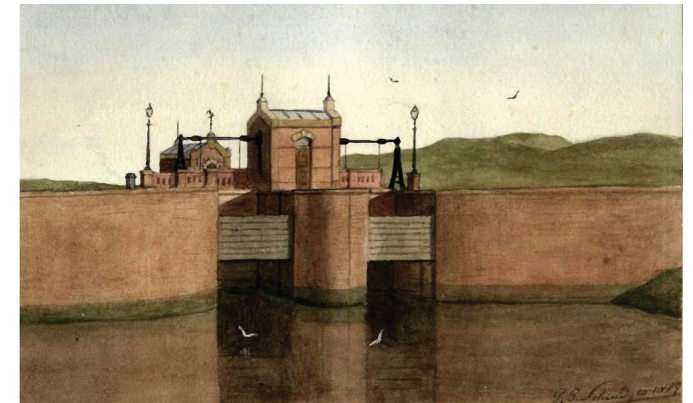
The hollow also forms a continuation of the refreshing channel coming from the centre of The Hague. Planted similar as the reference of Kronsberg below, the hollow gives character to the apartment blocks. The former

old sluice, still underneath the surface, will be excavated and transformed into a bridge, contributing as well to the local identity.

The remains of the revetments will be ignored by building on shallow foundations. Trees are placed with distance from the current cable and pipeline structure, to prevent problems as roots damaging it.



Kronsberg, Hannover, Germany (source: groenblauwenetwerken.nl)



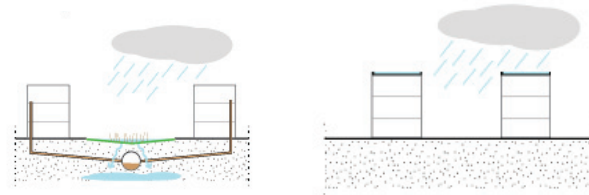
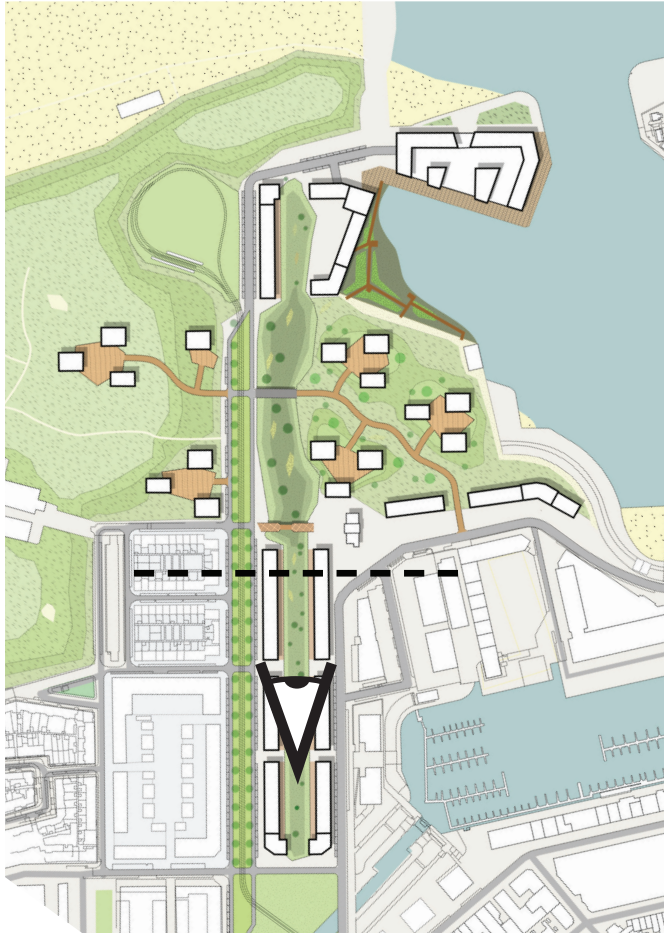
Sketch of the old sluice of Scheveningen harbour (source: haagsebeeldbank.nl)

elaboration 1
hollow in the dunes



elaboration 1

hollow in the dunes



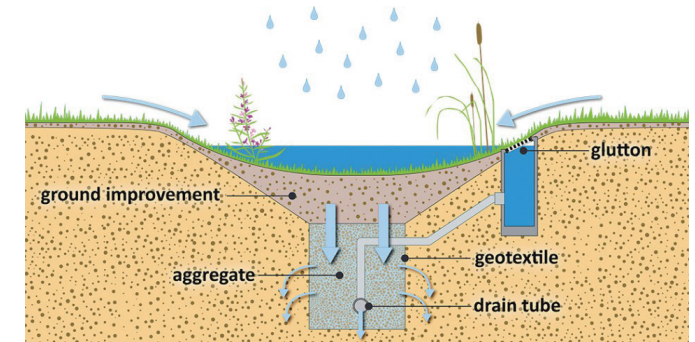
The hollow in the dunes also acts as a sustainable drainage of rainwater. Instead of letting the water flow into the mixed sewage systems, the inlets for catching rainwater are disconnected.

Rainwater is now directed to the hollow via small sunken roads (see reference below). This way the drainage of rainwater becomes visible to the people. This is important, since this way of draining comes with certain rules. Residents cannot clean their cars, when dirt water can flow to the hollow, since it will pollute the soil.

The hollow is a wadi in which rainwater is caught and slowly drained. A variety in vegetation is not only important to keep the soil pervious with their roots, they also play a big role in increasing the biodiversity. Animals will find a home between the higher plants.

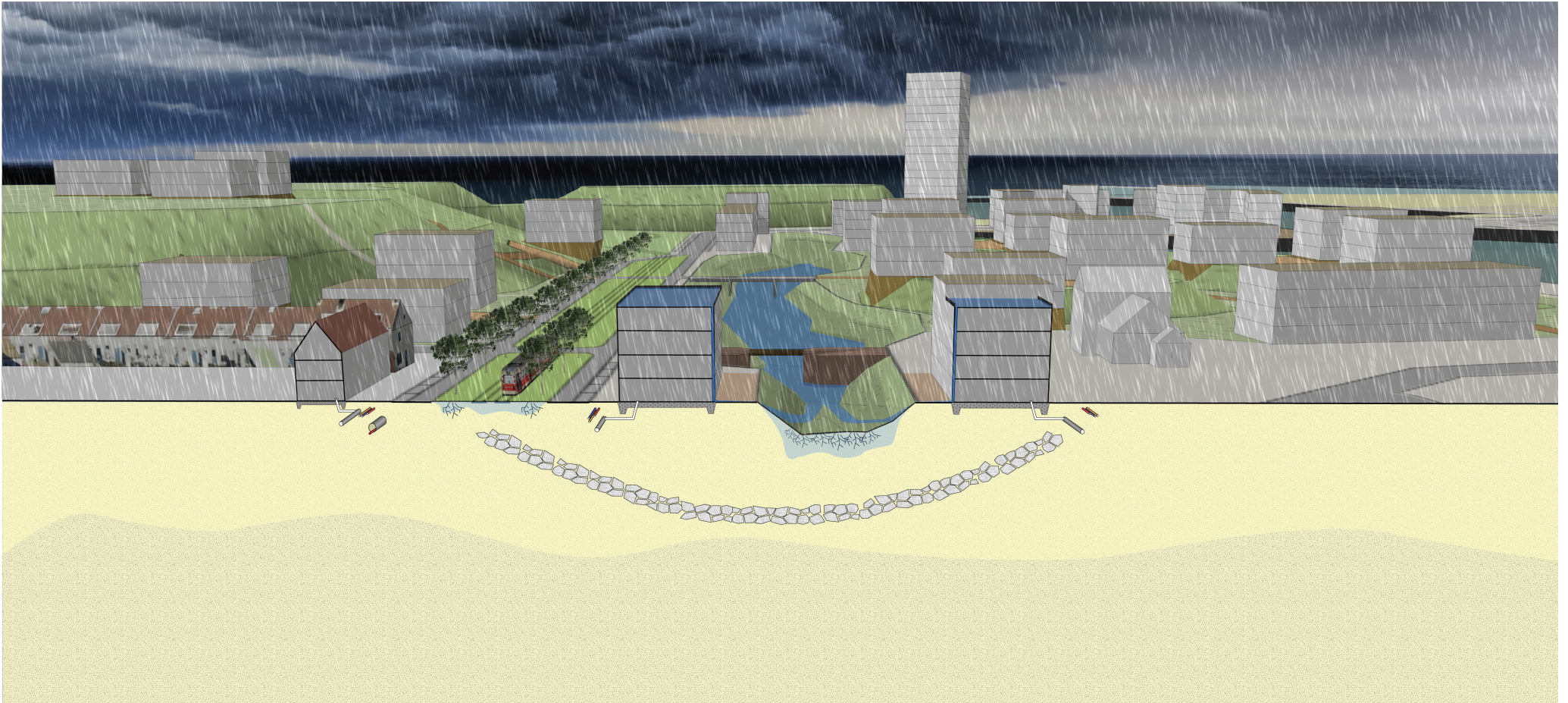


Sunken road in Kronsberg, Hannover, Germany (source: groenblauwenetwerken.nl)



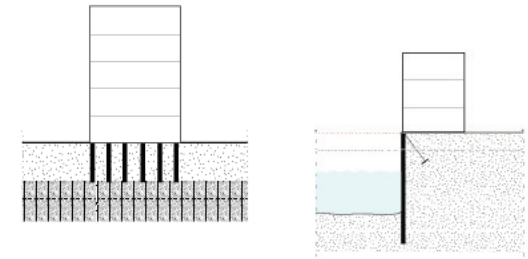
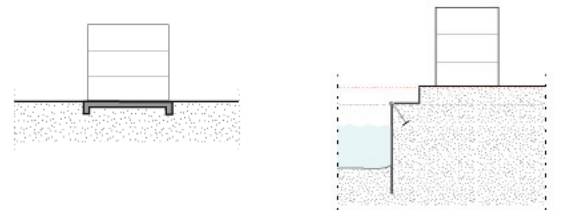
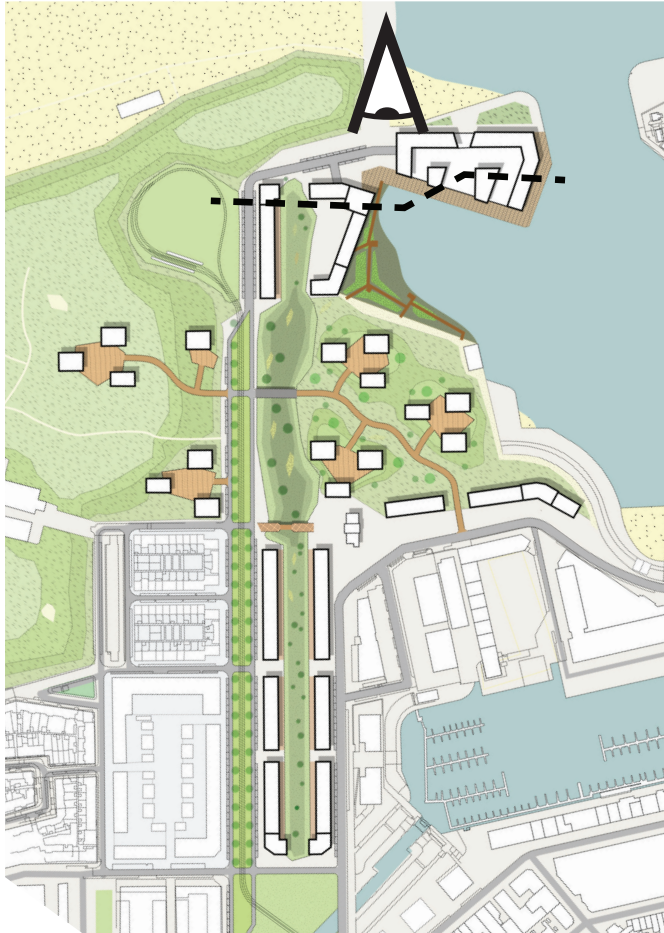
Wadi (source: Wadi's - Aanbevelingen voor ontwerp, aanleg en beheer, 2006)

elaboration 1
hollow in the dunes



elaboration 2

a new quay



The current state of the quays had a big influence on how they are redeveloped in my design.

Quays in good shape that are retained cannot be build on, since they are designed to bear pressure from mooring boats and not pressure from buildings built on top of them. In this situation, an urban block is placed with distance from the quay. On ground floor, there is parking and public functions facing the waterfront. This way the old quays are formed as the main public space in my plan.

The major intervention of redeveloping the quays in bad shape is taken as a possibility to build a high rise, using a foundation on poles, and building an underground parking.

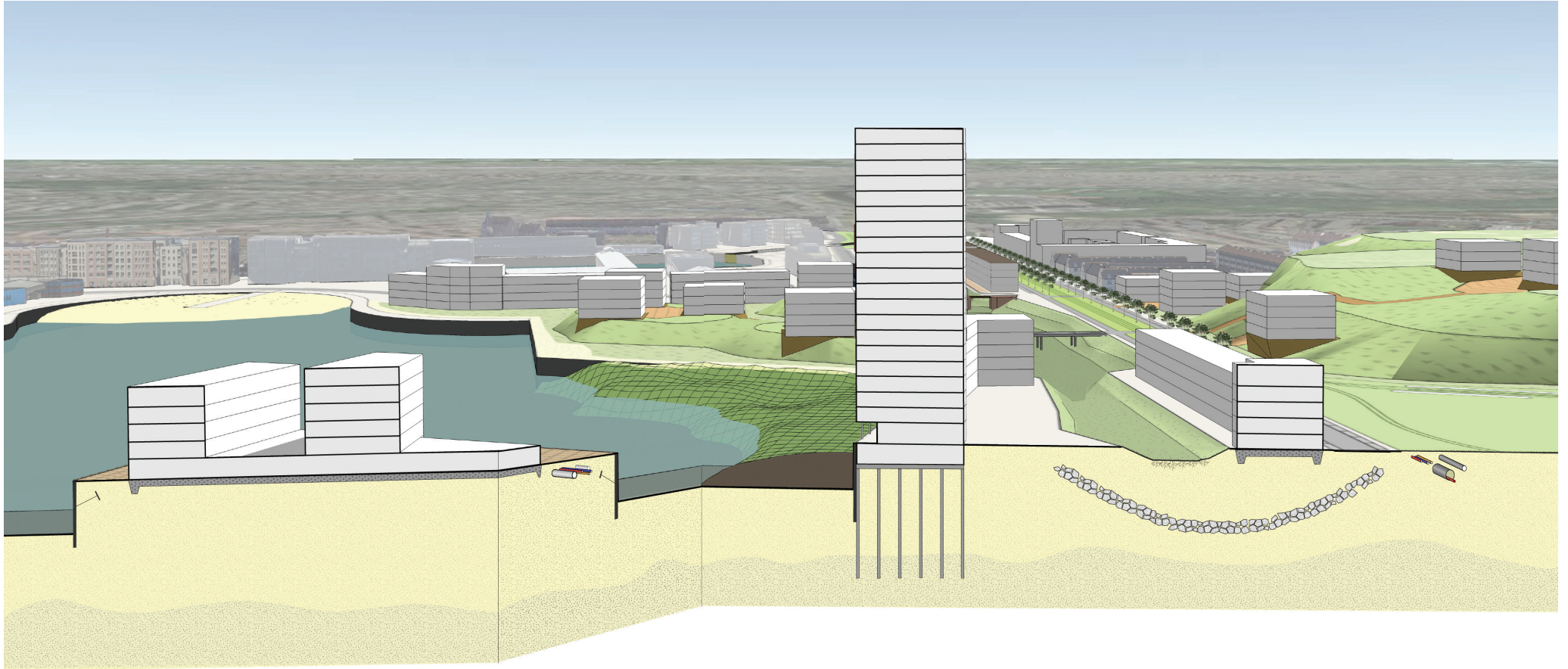
Furthermore, the dune landscape coming into the harbour area will change the characteristics of the new

waterfront by creating natural banks with footbridges between reeds.



Footbridge between reeds, Hammerby Sjöstad, Stockholm, Sweden (photo by author)

elaboration 2
a new quay





5 DISCUSSION

5.1 Conclusions

[METHOD]

Design with subsoil is briefly the broadening of the urban designer's perspective on the conditions of a project location. Not only the surface layer is understood in terms of structure and social aspects, but also the subsoil. It can take some time before urban designers are used to deal with subsoil conditions, but the benefits are great. Building and maintenance costs can be reduced and natural systems can be used to decrease energy consumption.

To take advantage of the potential qualities of the subsoil, its aspects should be investigated at the beginning of experimenting in the design process, since they have a big influence on the spatial design. Subsoil aspects derive from a wide variety of expertise, it is not to the urban designer to investigate all of them himself. By collaborating with the different experts, the urban designer can get an understanding of the context.

The urban designer can get a better understanding of subsoil condition by translating the data into his own language of sketches and models. This could be a subsoil potential map in which the main characteristics of the subsoil and their spatial effect on surface level are made clear. This way, the urban designer can start experimenting and make relations between different solutions, which can strengthen each other and contribute to a coherent end result. It is to the designer to investigate the spatial effect on surface level and create a coherent design, which relates to the subsoil characteristics of a site.

Within the process of designing, the subsoil conditions can be found in the different domains. They form the conditions of a project site. You still need a theme

to guide yourself in the process of designing and to choose how to deal with the subsoil conditions.

Design with subsoil is a method that recently has come into the spotlight, especially within municipalities. It is a method not only deriving from the aim to develop more sustainable, but also to a large extent resulting in our need to reduce the costs because of the financial crisis. If in the future finances form no bottleneck, it can be questioned if this method can withstand wishes for megalomaniac building projects.

[DESIGN]

The design itself should be seen as a test case of the method. To determine if the design has succeeded, we have to look at what the influence of the subsoil conditions are on surface level and if relations are made between the different subsoil conditions. From that perspective, I think the end result satisfies. Looking at the design from an esthetic point of view, I wanted to put more energy in the design and look into details.

The focus on designing with the subsoil has moved the vision of The Hague, to transform Scheveningen in a bustling international centre to the sea, to the background. My design proposal shows a more careful and reluctant attitude to the transformation assignment of Scheveningen Harbour.

In my design, the subsoil aspects of civil constructions and water are most strongly represented. Not only is it location specific which subsoil aspects are in the limelight, it also derives from my personal interest. Since I researched the spatial potential of subsoil aspects myself and did not as proposed in my theory, search for the spatial potential with experts, the design lacks depth on certain topics.

[RECOMMENDATIONS]

Urban designers should start experimenting with the unknown aspects of the subsoil, so they expand their knowledge and experience. If the urban designers becomes familiar with modeling the data, know how subsoil aspects effect their spatial design on surface level and can pick generic solutions from a frame of reference, then taking into account subsoil conditions becomes as common as relating urban designs to the spatial context of the built environment. Subsoil conditions should not be seen as an obstruction in the urban design process, but rather as a potential to enrich the final design and embed it better in its context.

5.2 Reflection

This graduation project has had its ups and downs. With the lack of reference projects and little literature on this young subject, this project took some time to take off. The cancellation of the internship at the municipality of The Hague pushed me away from the fire. Fortunate enough, I had ensured myself access to the GIS data of the location.

With some meetings I was able to ask important questions. Still, translating all the data meant mostly understanding the data derived from all the different fields dealing with the subsoil myself. The design process was thereby not as linear as proposed in my theoretical frame work. Halfway true the process new subsoil aspects were discovered and researched for their potential and the situation on surface level was investigated at the last moment.

For a long time, the step to design was hard to make. I handled the subsoil as the theme in my design. With the realization that the subsoil forms the conditions of my location and that I needed separated themes to deal with these conditions, it was a lot easier to create different variants for my location.

Another breakthrough in the design process was changing design tools. With the lack of experience in designing, making models is a liberation. It becomes far more easier to directly see the influence of an interventions. Using the 3D modeling software Sketchup has clearly been a catalyses for the design process.

In the end this graduation project is about the method of designing with the subsoil. It shows another role the urban designer can take. He can be a bridge builder between different fields dealing with the subsoil.

The subsoil potential map is the tool to negotiate and to translate the interest of the different expertise into one coherent end result.

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