

# URBAN WATER STRATEGY *for Gdansk*



PARTNERS VOOR WATER  
*Samenwerking van krachten*



GDAŃSK



**PROJECT PARTNERS:**

Supported by



Beneficiary



Lead Consultant



Partner Consultant



# URBAN WATER STRATEGY *for Gdansk*



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## PREZYDENT MIASTA GDAŃSKA

Dear Sir/ Madam,

Throughout history the City of Gdansk always had a strong relation with its waters from the rivers and the sea. The Motława, Vistula and Baltic sea offered tremendous possibilities for trade, military defence, food production and leisure and enjoyment. As Hansa city the water connected Gdansk already in the late Middle Ages with other Northern European cities. Since then the waters created an open connection with the world and thereby moulded the character of the citizens of Gdansk. Water has become at the heart of the history and identity of the city.

Maybe more than ever, in the our modern times the waters offer a huge potential to create an attractive living environment with highest quality of life for the citizens of Gdansk. Water can be used for functional, natural and aesthetical purposes and also to strengthen the socio-economic position of Gdansk in a globalizing world.

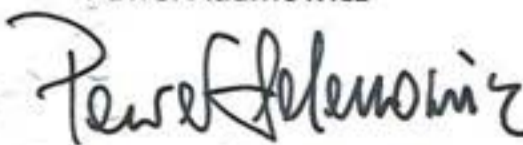
The potential role of water in Gdansk was the topic of a Golden Triangle meeting in June 2013, that was attended by representatives from regional and local authorities, universities and business. During this meeting the shared intention was expressed to research the possibility of development of an integrated urban water strategy. The initiative originated to apply for a Dutch governmental subsidy called 'Partners for Water' to financially support the project to prepare an Urban Water Strategy for Gdansk. In December 2013 this subsidy was awarded to the project.

During the last year the City of Gdansk has worked together with local and Dutch experts on urban planning and water management. Several urban and water related institutions from Gdansk were involved in a variety of workshops and meetings on the Urban Water Strategy.

It is with great enthusiasm that the City of Gdansk can present the results of these works in this report. The strategy offers the City of Gdansk with a perspective on how the waters of the city can be used to stimulate an attractive and future resilient development of the city.

The Urban Water Strategy for Gdansk will inspire us to bring back water at the core of the identity of the city.

Paweł Adamowicz



Mayor of the City of Gdansk

PREZYDENT MIASTA GDAŃSKA

## **COLOPHON**

The *Urban Water Strategy for Gdansk* was initiated by the City of Gdansk and the Dutch office for urban planning and design KuiperCompagnons. The report comprises the study on the potentials of Gdansk's waters and the development strategy, which proposes an integrated approach for urban and flood protective developments towards a more climate resilient future for Gdansk

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# INDEX

<b>PREFACE</b>	<b>05</b>		
<b>1. INTRODUCTION</b>	<b>09</b>	<b>5. URBAN AND WATER RECOMMENDATIONS</b>	<b>59</b>
1.1. Background of the Assignment	10	5.1. Location Specific Strategies Required	61
1.2. Objective of the Project	11	5.2. Urban Recommendations	62
1.3. Adopted Methodology	11	5.2.1. Develop a Compact City	
1.3.1. Integrated Approach		5.2.3. Increase Green/Blue Transport	
1.3.2. Transparent Approach		5.2.4. Use Water!	
1.3.3. Generic and Location Specific Approach		5.3. Hydrological Recommendations	64
1.3.4. Urban Water Agendas		5.3.1. Introduction	
1.4. Process of the Project	14	5.3.2. Storm Surge	
1.5. Partners in the Project	15	5.3.2. Rainfall Runoff	
		5.3.3. Groundwater	
<b>2. WATER IN THE CITY OF GDANSK</b>	<b>17</b>	5.4. Urban Water Strategy	76
2.1. Introduction	18	5.4.1. Explanation of Legends	78
2.1.1. Gdansk in the European Context			
2.1.2. Gdansk in the Polish Context			
2.1.3. Gdansk in the Triple City Context			
2.2. Municipal Context	22		
2.2.1. Spatial Layers			
2.2.2. Networks Defining the City			
2.2.3. Urban Identities			
2.3. Urban Water Agendas	28		
2.3.1. Environment & Climate			
2.3.2. Identity & Heritage			
2.3.3. Society & Culture			
2.3.4. Economy & Knowledge			
2.3.5. Connectivity & Mobility			
2.3.6. Transformation & Innovation			
2.4. Thematic Challenges & Opportunities	42		
2.5. Existing Plans and Projects	44		
2.5.1. "Studium"- Conditions and Directions for Spatial Development			
2.5.2. Municipal Projects			
<b>3. GDANSK WATER SYSTEM</b>	<b>47</b>		
3.1. Introduction	48		
3.2. Fresh Surface Water	49		
3.3. Sea Water	50		
3.4. Rain Water	51		
3.5. Ground Water	51		
<b>WORKSHOP 01</b>	<b>52</b>		
<b>4. AMBITIONS FOR AN URBAN WATER STRATEGY</b>	<b>55</b>		
4.1. Threefold Ambition	56		
4.1.1. Making Gdansk Climate Resilient and Flood Proof			
4.1.2. Increasing the Urban Quality of Gdansk			
4.1.3. Increasing the Socio-Economic Strength of Gdansk			
		<b>WORKSHOP 02</b>	<b>80</b>
		<b>6. PRIORITY AREA: PORT &amp; CENTRE</b>	<b>83</b>
		6.1. Location of the Priority Area	84
		6.1.1. Highest Flood Risks (High Urgency)	
		6.1.2. Highest Financial-economic Damage As Result of Possible Floods	
		6.1.3. High potential for Urban and Economic Development	
		6.2. Characteristics of the Priority Area	86
		<b>ROOM FOR THE RIVER INSPIRATION</b>	<b>88</b>
		<b>7. TWO ALTERNATIVE APPROACHES</b>	<b>91</b>
		7.1. Introduction	92
		7.2. Two Alternatives	92
		7.2.1. Description of the Two Alternatives	
		7.2.2. Strategic Elements of the Two Alternatives	
		7.2.3. Social Cost Benefit Analysis	
		7.2.4. Funding Opportunities	
		7.3. Preferred Alternative	97
		<b>WORKSHOP 03</b>	<b>98</b>
		<b>8. RECOMMENDATIONS FOR PRIORITY AREA</b>	<b>101</b>
		8.1. Introduction	102
		8.2. Adopt Programmatic Approach	102
		8.3. Compose Gateway Task Force	104
		8.4. Two Main Development Zones	106
		8.5. Development Sequence	108
		<b>LIST OF MATERIALS</b>	<b>110</b>





# *introduction*

# 1.1.BACKGROUND OF THE ASSIGNMENT

## THE PAST

The delta of the River Vistula has a long history of settlement of inhabitants that dates back to several centuries BC. The City of Gdansk also has a long and lively history since its foundation in the 10th century by the Polish ruler Mieszko and it is one of the oldest cities in present day Poland.

Over the centuries Gdansk has experienced a rich and dynamic history in which several periods of dominance by different rulers interchanged. Throughout this, a quest for freedom and autonomy has always been part of the spirit of the inhabitants.

The location of Gdansk along the river and coast, made it an important naval city. In the past for grain trade, and later for ship building. The waters created an open connection with other parts of the world, which opened the minds of the citizens of Gdansk towards the outside world.

Throughout history the Gdansk waters created possibilities for military defence, food, trade and entrepreneurship. The waters of Gdansk became an essential part of the cultural heritage, identity and image of the city.

## THE PRESENT

Due to global competition many water related industries have left the Port areas of Gdansk. The result is that large areas along the water have become neglected and desolate. The waters are no longer in use like they were in the past.

The socio-economic development of Gdansk changed the role that water plays in the city. From one time friend it is becoming more often an enemy due to the dangers and to large financial, economic and social impacts of floods and climate change.

Urbanization of the city's western parts has resulted in a decreasing capacity to cope with excessive rain water. The flood that was experienced in 2001 was another sign that the city and its waters are not in harmony any more.

## FUTURE GDANSK

A modern city has to be appealing to its own citizens as well as to visitors and investors. In the global perspective the city has to distinguish itself, and be competitive to other cities and regions in order to keep existing, and attract new businesses and economies.

The history of Gdansk has resulted in a DNA for the city that represents its open attitude towards the outside world, and free movement of people, goods and ideas. It results in a vibrant and active city that is willing to adapt to a changing world.

The waters of Gdansk can be used to exploit this full potential of the city, and to increase the quality of life for its citizens and visitors.

**1840**

Vistula river floods lead to the construction of the "Daring Vistula" in 1840. Construction of the Vistula Mouth in 1890-1895.

**1844**

Areas along the Dead Vistula become part of the Royal Prussian Government. A depot and anchoring space called **Marinedepot** is established. Later these areas become the Kaiserliche Werft Danzig, followed by the Danzig Shipyard in the 20th century.

**1530 - 1788**

Polish polders constructed by Dutch Mennonites.

**1400 - 1650**

Hansa Trade Union

**1895**

SKM tram connection Gdansk- Sopot- Gdynia.

**980**

Gdansk is established along the Vistula River.

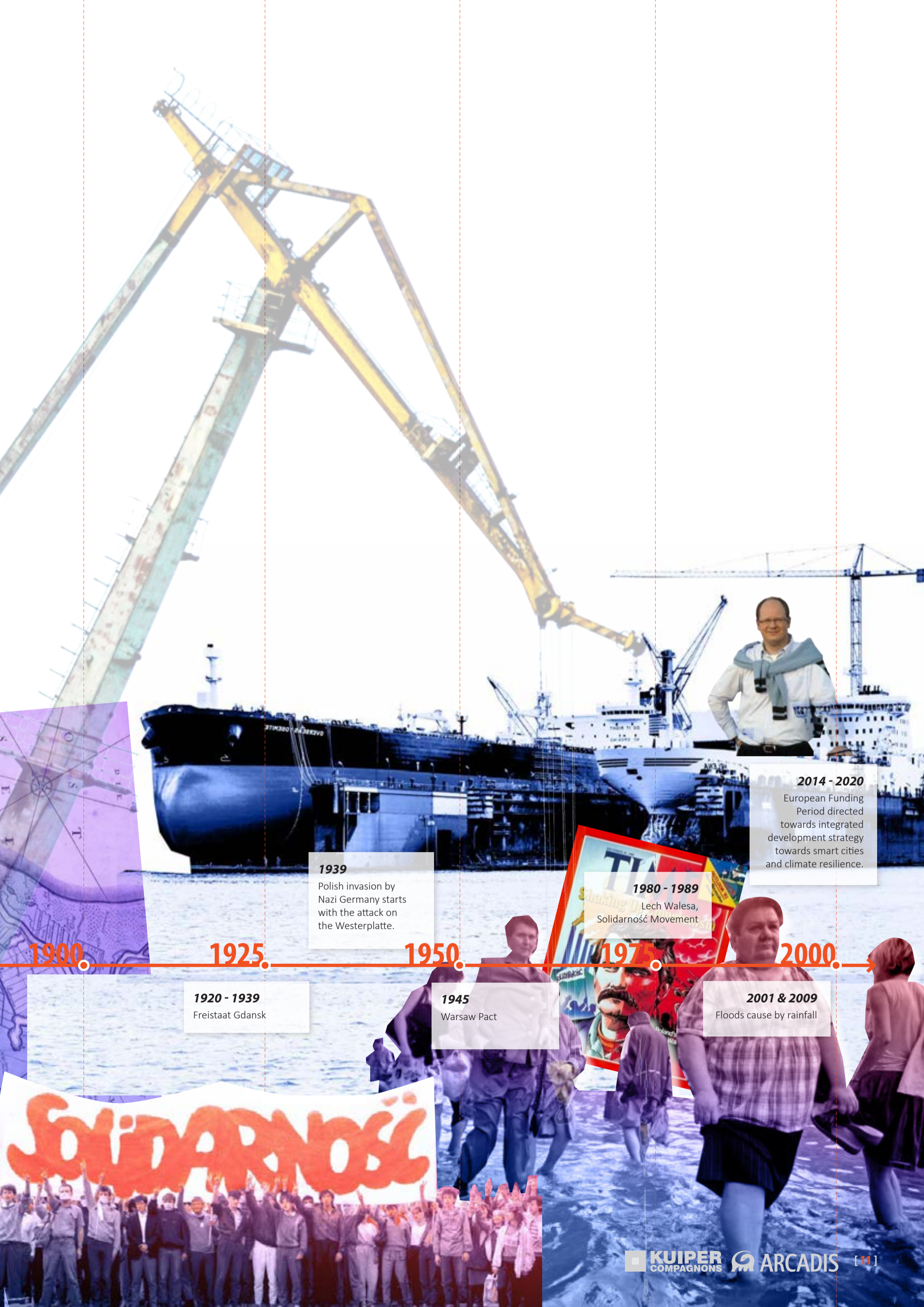
1000

1200

1400

1600

1800



1900

1925

1950

1975

2000

**1920 - 1939**  
Freistaat Gdansk

**1939**  
Polish invasion by  
Nazi Germany starts  
with the attack on  
the Westerplatte.

**1945**  
Warsaw Pact

**1980 - 1989**  
Lech Walesa,  
Solidarność Movement

**2001 & 2009**  
Floods cause by rainfall

**2014 - 2020**  
European Funding  
Period directed  
towards integrated  
development strategy  
towards smart cities  
and climate resilience.

## 1.2. OBJECTIVE

The waters of Gdansk are a forgotten quality with the potential to play a crucial role in increasing the attractiveness of the city. At the same time the city is facing threats from water, and climate change is increasing the necessity for a climate resilient future.

In the Urban Water Strategy for Gdansk, interventions are proposed to use water to increase the social, economic, environmental and cultural strengths of the city. At the same time interventions are proposed to increase water safety and to prevent future floods.

## 1.3. METHODOLOGY

### 1.3.1. INTEGRATED APPROACH

The methodology used for the Urban Water Strategy for Gdansk integrates a variety of perspectives and expertise's that are all relevant and important to create a feasible strategy. The adopted approach integrates:

1. *spatial and urban aspects;*
2. *hydrological aspects;*
3. *financial / economic aspects.*

By integrating these different perspectives a variety of goals (such as urban, social, ecological, economic, hydrologic, cultural) can be achieved at the same time. Single interventions can create synergy and serve different objectives.

Integration of the three perspectives is required in order to achieve a truly cohesive Urban Water Strategy that creates an attractive, water resilient future vision and that is also financially and economically feasible.

The proposed methodology to implement the Urban Water Strategy is explained in the later chapters of this report.

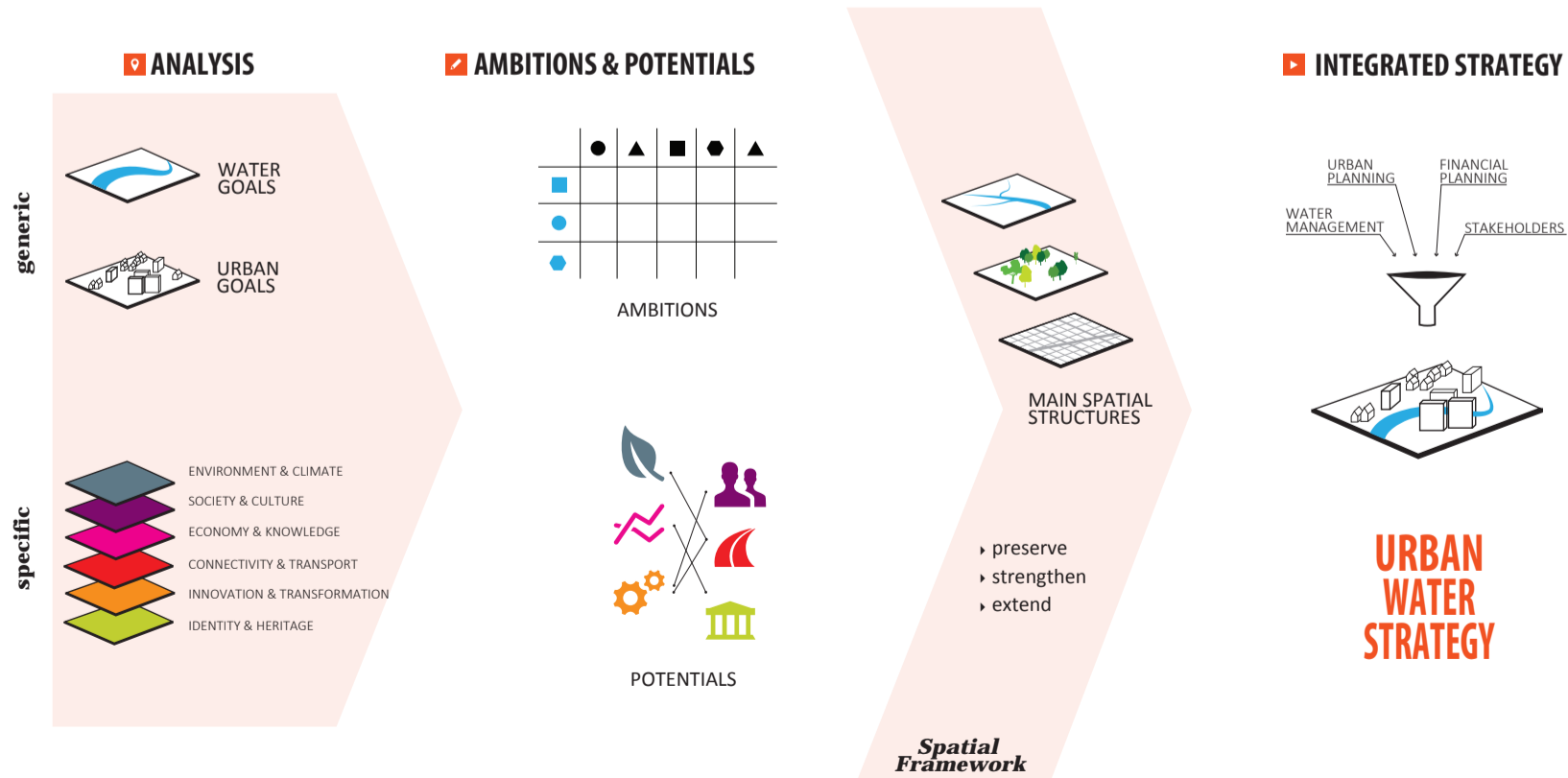
### 1.3.2. TRANSPARENT APPROACH

The project can be characterized as a joint achievement by a large and diverse group of stakeholders from different expertise's and backgrounds (such as Biuro Rozwoju Gdańska, several City of Gdansk Departments, Marshall Office, RZGW Gdansk, IMGW, Port of Gdansk, Technical University of Gdansk, Maritime Office). Several interactive workshop sessions have been organized during which representatives of these stakeholders have actively cooperated to commonly discuss the possibilities, challenges and opportunities of the future of the water related areas of Gdansk.

This interactive and transparent approach made the different stakeholders aware of each other's problems and suggestions. This resulted in a commonly shared approach towards the Urban Water Strategy.

### 1.3.3. GENERIC AND LOCATION SPECIFIC APPROACH

The adopted methodology combines generic ideas and best practices from other global 'water city's', with the specific context of the City of Gdansk. International expertise on integrated urban planning and water management have been matched with the local circumstances. The international composition of the Polish-Dutch project team combined a generic and a location specific approach.



### 1.3.4. URBAN WATER AGENDAS

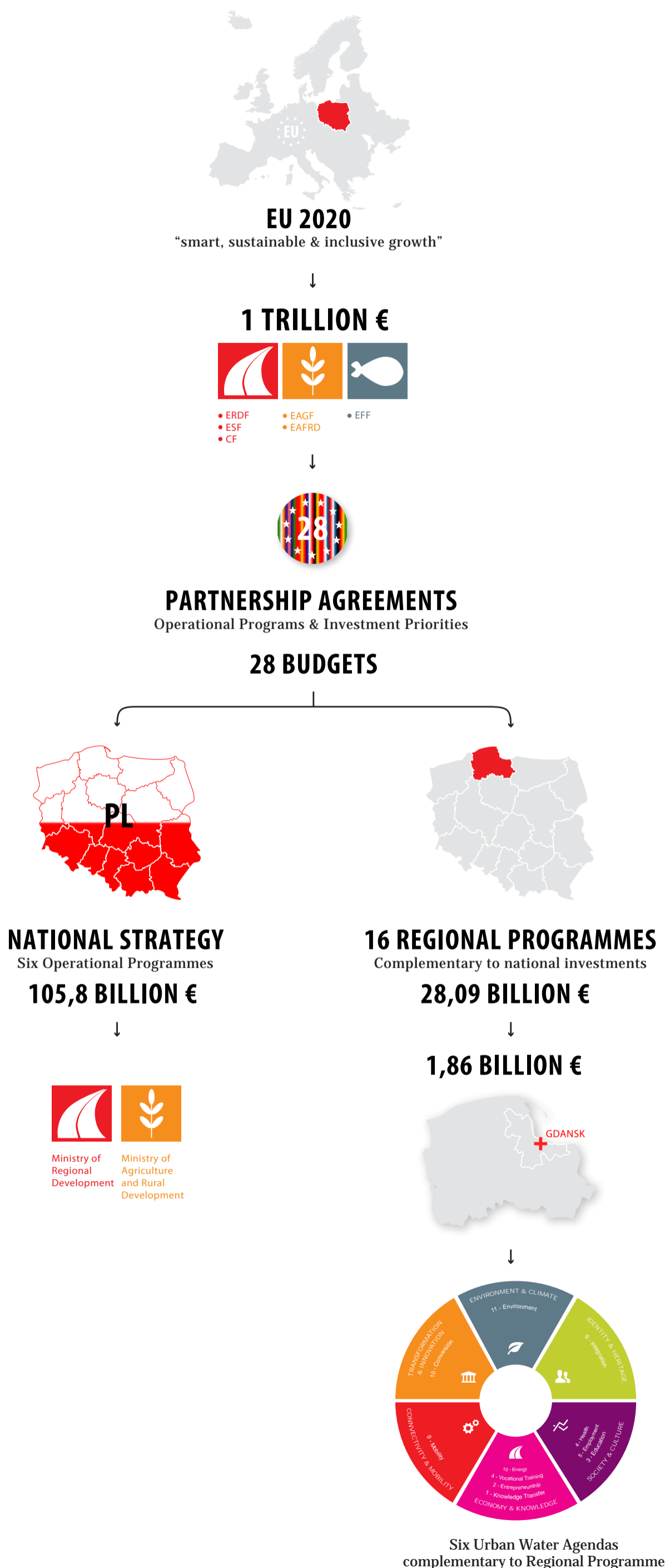
A key element of the adopted methodology for the Urban Water Strategy of Gdansk is the focus on the topics that are considered of high importance by the European Union and by both National and Provincial policies. By linking the strategy to these topics, the possibilities for implementation and feasibility increase.

The objectives of the European Union's policies (2014-2020) are implemented on a national scale by Partnership Agreements with all EU member states. Within Poland, this National Agreement (and its budgets) are further divided into national and provincial strategies. The Pomeranian strategies (Strategy Pomorskie 2020, 6 RPS's and the Regional Operational Programme) thereby largely reflect the original objectives as set out by the European Union.

For Pomerania, and Gdansk in specific, the following six topics for the urban development are abstracted from these policies:

1. Environment & Climate;
2. Identity & Heritage;
3. Society & Culture;
4. Economy & Knowledge;
5. Connectivity & Mobility;
6. Transformation & Innovation.

For each of the so called 'Urban Water Agendas' the strategy will identify how water can be used to strengthen these.



# 1.4. PROCESS OF THE PROJECT

The Urban Water Strategy for Gdansk originated during a Golden Triangle meeting in June 2013. This meeting was attended by representatives from regional and local authorities, universities and business. During this meeting the future of brownfield sites that are located along the city's waters, their revitalization, urban development strategies and the role of water in the city were discussed. The goal of this event was to create an open discussion and exchange ideas on the future of these urban areas and their linkage with the waters of Gdansk.

During the Golden Triangle meeting the shared intention was expressed to research the possibility of development of an integrated water development strategy for the City of Gdansk. From this, the initiative originated to apply for the Dutch subsidy called 'Partners for Water' in order to financially support the project on how water can be used and integrated in the future development of Gdansk.

In September 2013 the subsidy application was submitted to the Dutch National Government, who awarded the project in December 2013.

The project has been structured around three interactive workshop weeks in which intermediate results were presented and discussed with a large variety of stakeholders. The results from the workshops were integrated in the projects products.

In addition to the workshops there have been several meetings with key stakeholders to discuss the projects content and progress.

During the first stage of the project an inventory and analysis from both the urban and water perspective was conducted for the City of Gdansk. The urban analysis focused on the potential that water can have for the broad socio-economic development of the city. The water analysis focused on identifying the main issues to be solved with regards to sea, river, rain and ground water.

Based on the identified challenges and opportunities from the urban and water perspectives, the ambition for the City of Gdansk has been defined. This ambition describes how water can be used to improve the quality of life in, and the attractiveness of Gdansk.

Recommendations are made to achieve the described ambition. These recommendations focus on what will be the best possible strategy to realize the ambition of enabling Gdansk to fully exploit the presence of its waters.

For the area with highest urgency from flood risk perspective, highest potential financial-economic damage as result of flood, and highest development potential, there is a more in-depth study. This study reveals the success factors and appropriate approaches to utilise the waters of Gdansk for the benefit of the city.

## GOLDEN TRIANGLE

May/June 2013



2014

## OBJECTIVES



## THEMATIC OBSERVATIONS



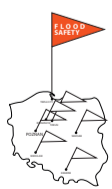
## WORKSHOP 2

September 2014



## START OF PROJECT

January 2014



## URBAN WATER AGENDAS



## WORKSHOP 1

May 2014



## INTEGRATED URBAN WATER AMBITIONS

# 1.5. PARTNERS OF THE PROJECT

The *Urban Water Strategy for Gdansk* was initiated by City of Gdansk and the Dutch office for urban planning and design KuiperCompagnons. The following text provides a short introduction to each of the partners in the project.



### CITY OF GDANSK

#### Beneficiary

The City of Gdansk is the beneficiary for this project and has been represented by the Department of Revitalization. The Urban Water Strategy for Gdansk is the first step to integrate water in the climate resilient urban development of the city ([www.gdansk.pl](http://www.gdansk.pl)).



### KUIPERCOMPAGNONS

#### Lead Consultant

KuiperCompagnons is a leading international Consultancy Firm specialized in development planning, master planning, urban design, landscape architecture and architecture. The company has its home base from 1916 in The Netherlands, but operates internationally, both in the Public and Private sectors. Within this project KuiperCompagnons is responsible for project management, integrated urban planning and design, and communication ([www.kuiper.nl](http://www.kuiper.nl)).



### ARCADIS

#### Partner Consultant

ARCADIS is a Dutch based, leading worldwide knowledge driven enterprise that provides design-, consultancy- and engineer services. ARCADIS is internationally known for its water knowledge. ARCADIS is responsible for the water (hydrological) and economy related input to the strategy ([www.arcadis.com](http://www.arcadis.com)).



### PARTNERS FOR WATER

#### Subsidy Programme

The Dutch Governmental 'Partners for Water' programme was established in 2000 to support the Dutch water sector to capitalise on its technologies and expertise internationally, but also to ensure that Dutch technologies and knowledge contribute to solving world water challenges.

The Partners for Water programme financially supported the Urban Water Strategy for Gdansk ([www.partnersvoorwater.nl](http://www.partnersvoorwater.nl)).

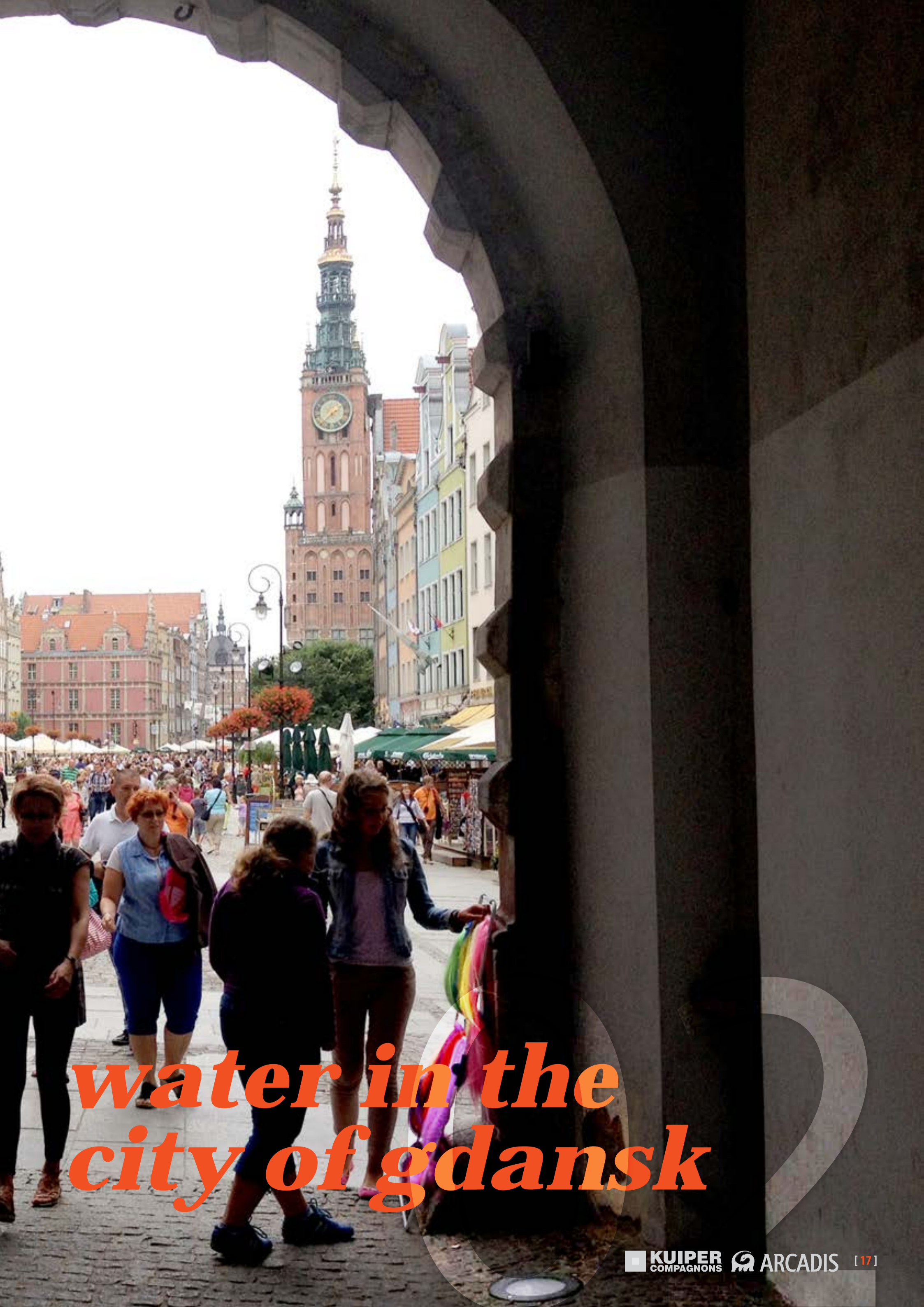


### LOCAL EXPERTS

In addition to these partners there were also a large variety of local experts who delivered their professional and enthusiastic input for the strategy, particularly during the workshop weeks. Amongst these experts were representatives of Biuro Rozwoju Gdańska, several City of Gdansk Departments, Marshall Office, RZGW Gdansk, IMGW, Port of Gdansk, Technical University of Gdansk, Maritime Office.







***water in the  
city of gdansk***

## 2.1. INTRODUCTION

If one desires to increase the urban quality and quality of life of a city, one first needs to fully understand that city. It is therefore of importance to study the physical and functional situation of Gdansk, from the outside (international, national and regional context) and from the inside.

This chapter gives a short overview of the main urban aspects of Gdansk that were studied, and the main relevant conclusions for the Urban Water Strategy. Firstly from a larger geographical perspective, and subsequently for different elements and themes within the city boundaries.

The analysis aims to 'capture' the most important spatial and functional characteristics of Gdansk based on study and feedback during workshops with local experts. It therefore does not aim to be comprehensive on detail level, but it does aim to identify and describe the specific characteristics and qualities of urban Gdansk.

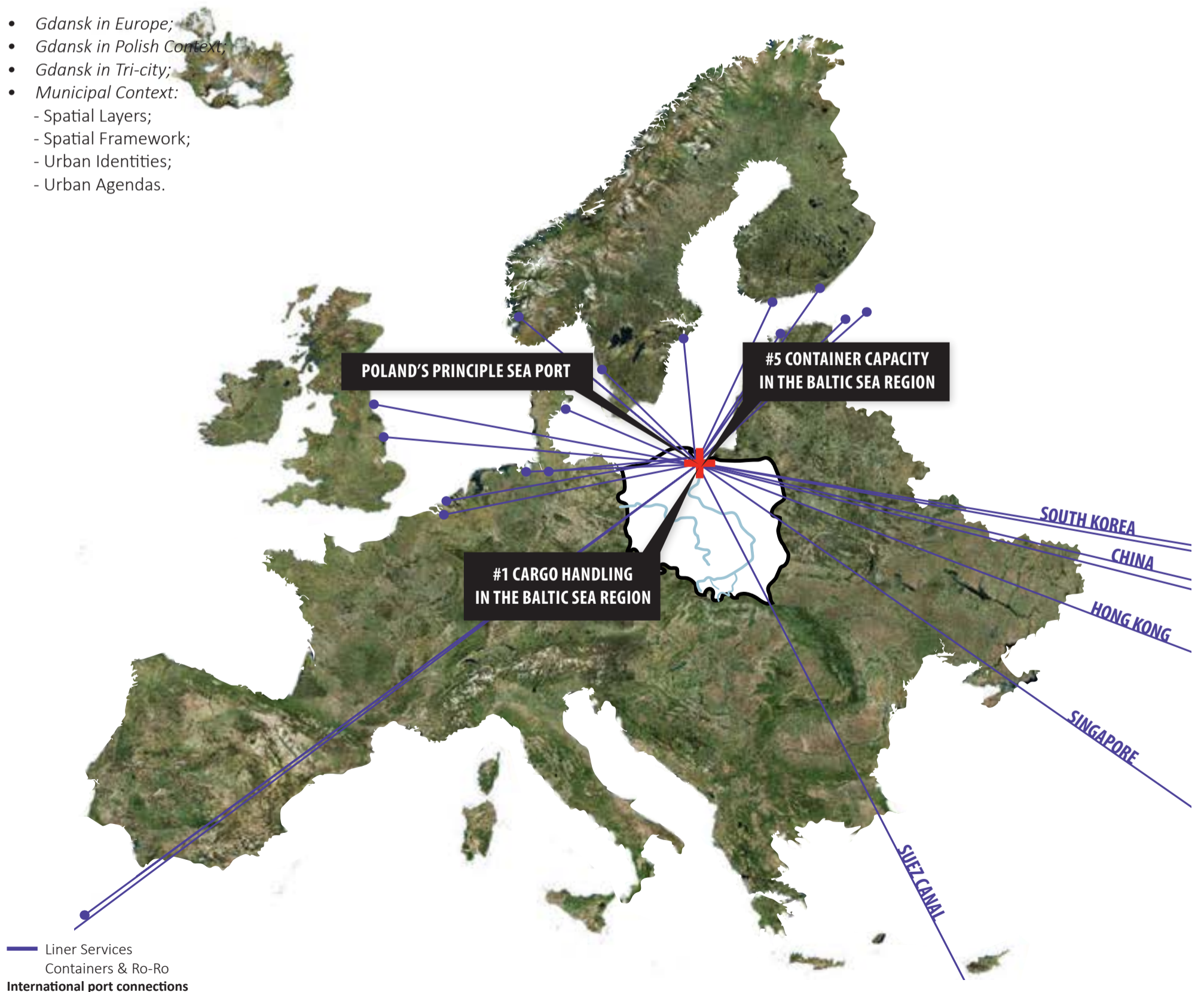
This chapter first focusses on Gdansk from a larger perspective, and subsequently focusses on the urban characteristics of the city itself:

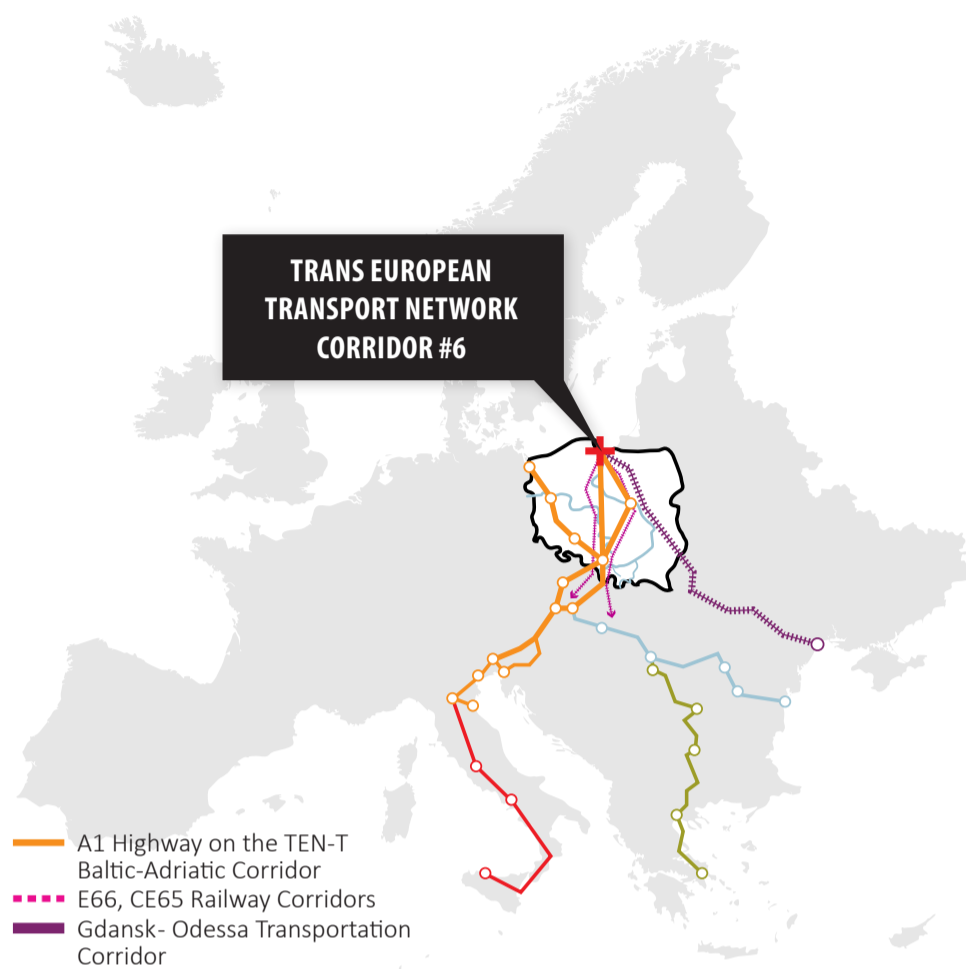
- *Gdansk in Europe;*
- *Gdansk in Polish Context;*
- *Gdansk in Tri-city;*
- *Municipal Context:*
  - Spatial Layers;
  - Spatial Framework;
  - Urban Identities;
  - Urban Agendas.

### 2.1.1. GDANSK IN THE EUROPEAN CONTEXT

For centuries Gdansk has taken a special position in Poland and in Europe. The history of Gdansk has resulted in an open minded city that looks beyond its borders. From an infrastructure (water, road, rail) perspective the city has taken a central position as a transportation hub. However also from geopolitical perspective the city has become more and more on the edge of east and west, and of north and south.

The location along the Baltic Sea opens up more opportunities for Gdansk from trade, logistics, commercial and touristic perspectives.





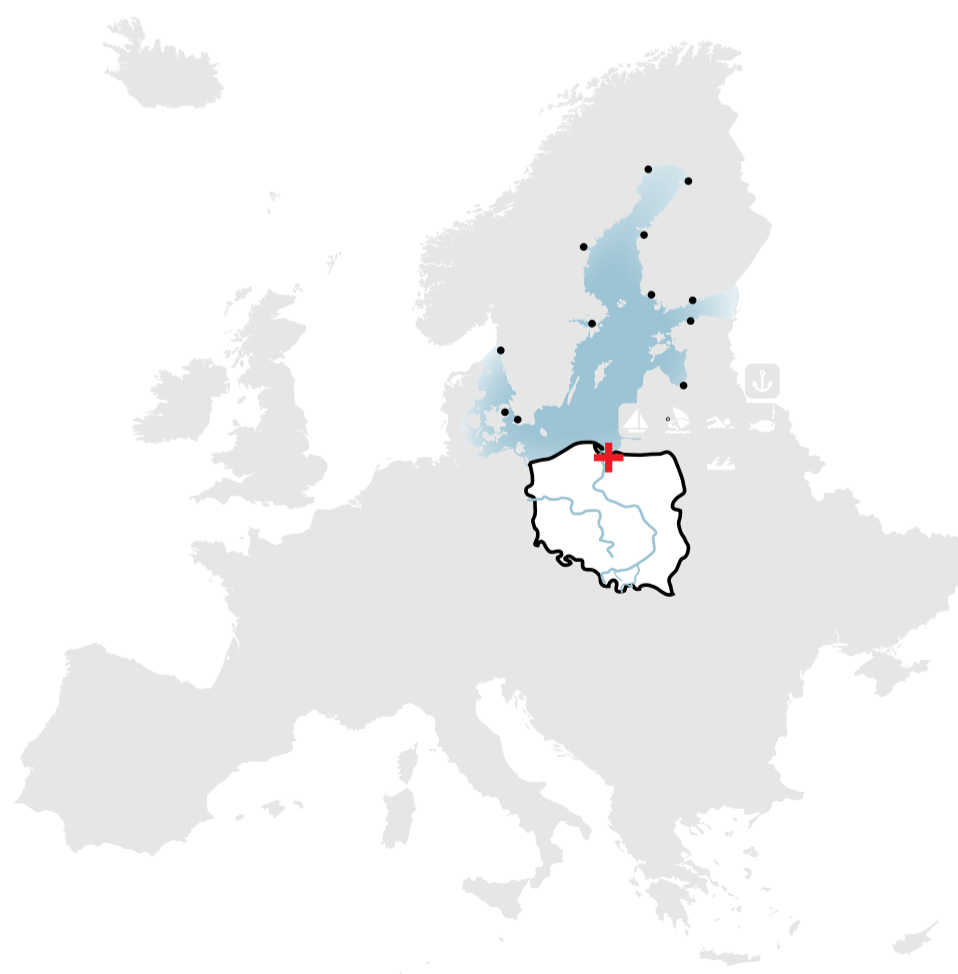
Trans European Transport Network



EU border condition



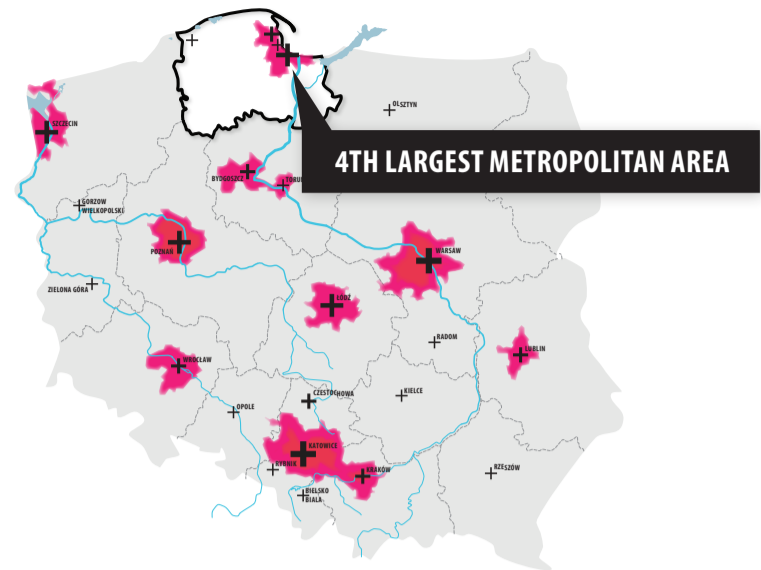
Baltic sea pollution



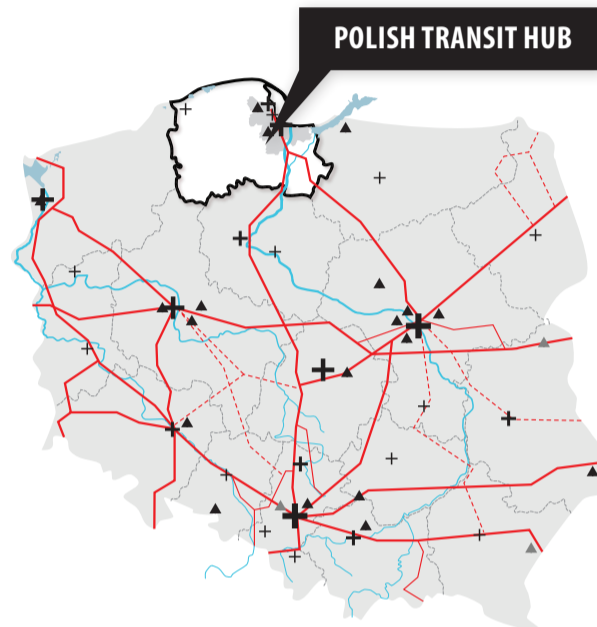
Baltic sea recreational destinations

## 2.1.2. GDANSK IN THE POLISH CONTEXT

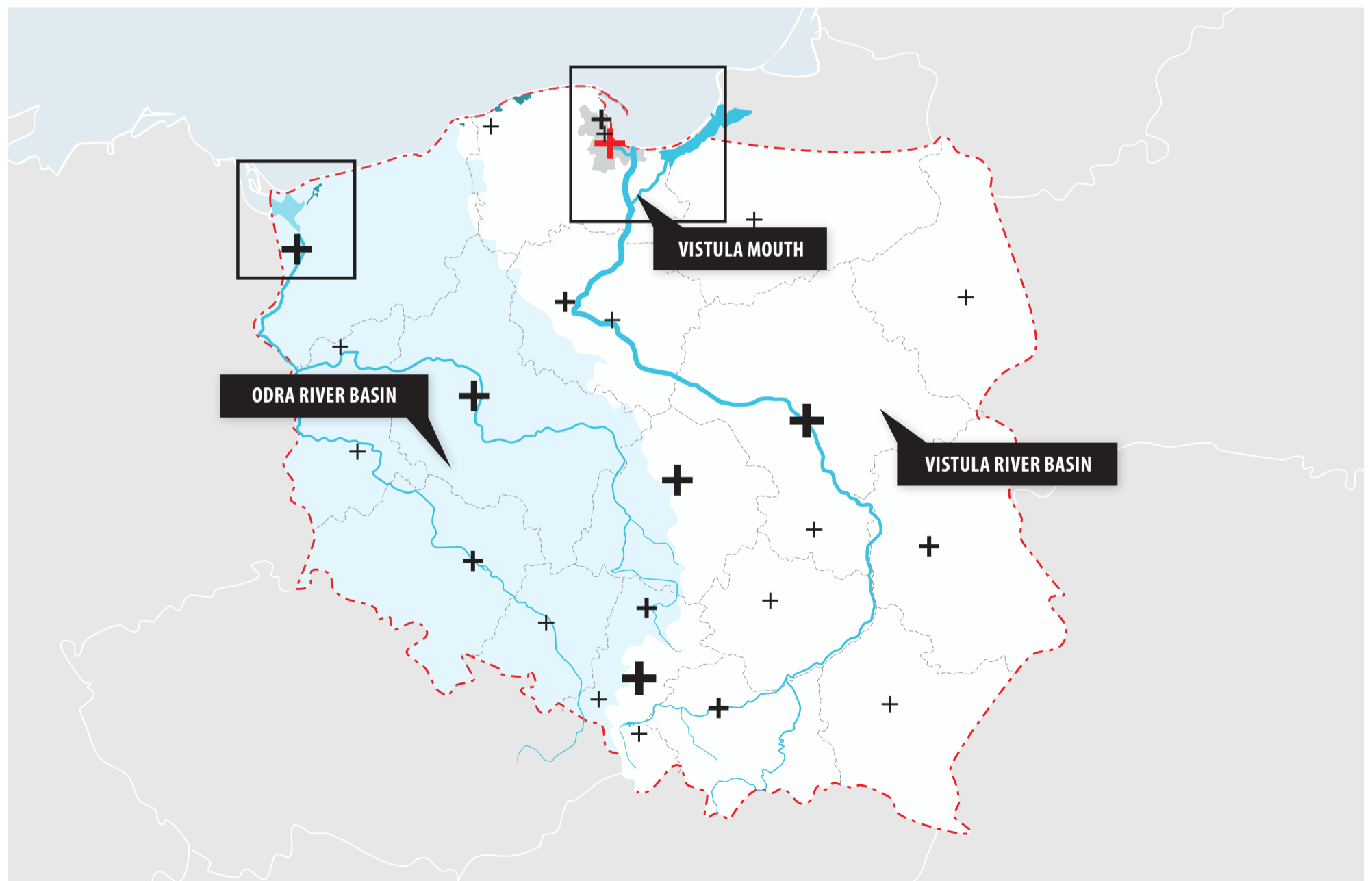
The position of Gdansk as a City in one of two Polish river deltas has not only shaped the city in the past, but also creates very specific opportunities for the future of Gdansk. Being one of the nine main Polish agglomerations, and one of two situated along the coast, Gdansk experiences a special set of characteristics. Multi-modal transport, logistics, tourism, and spectacular landscapes and rich cultural heritage are amongst the specific characteristics of the City.



Poland's metropolitan regions



Poland's railnetwork and cargo hubs

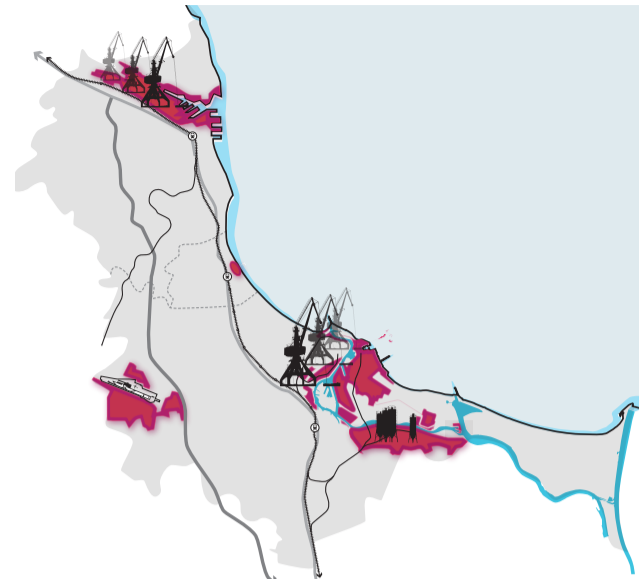


Poland's Deltas: the Vistula and Odra rivers

### 2.1.3. GDANSK IN THE TRIPLE CITY CONTEXT

Gdansk, Sopot and Gdynia each have their very own character and identity. Located along the Baltic coast, all three cities originated on grounds where high and dry moraine hills met the (advantages of) the sea.

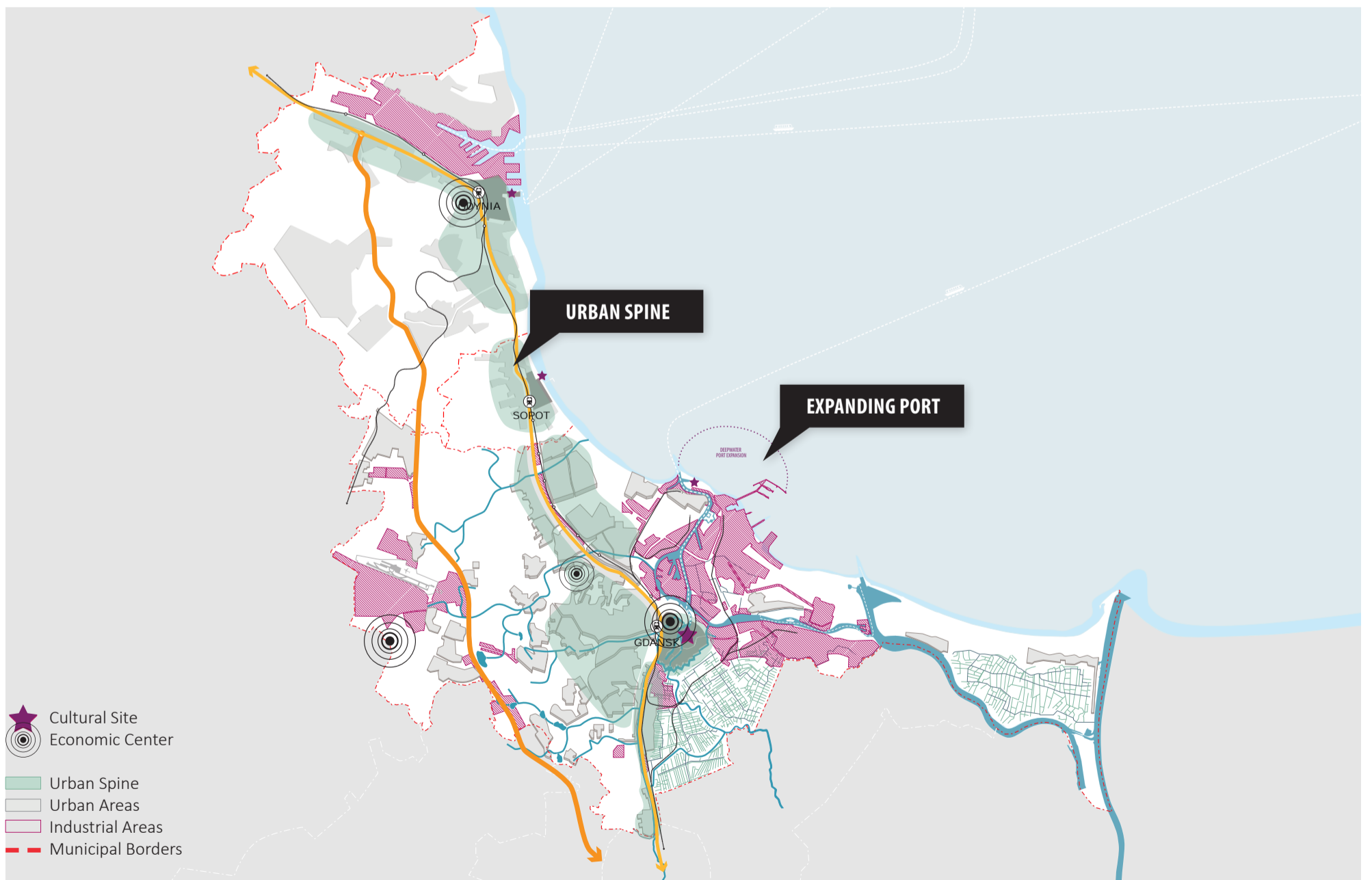
Over time the cities became more and more connected and during the last decades Gdansk, Sopot and Gdynia became one urban agglomeration. Spatially their centres are connected by an urban spine of rail and road links, and a Metropolitan Ring connects the cities on a higher level. Furthermore, water (sea) is a connecting element between the three cities, and functionally they complement each other to become one strong socio-economic centre.



Tri-City water and air logistics



National & international corporations



The urban agglomeration of the Triple City

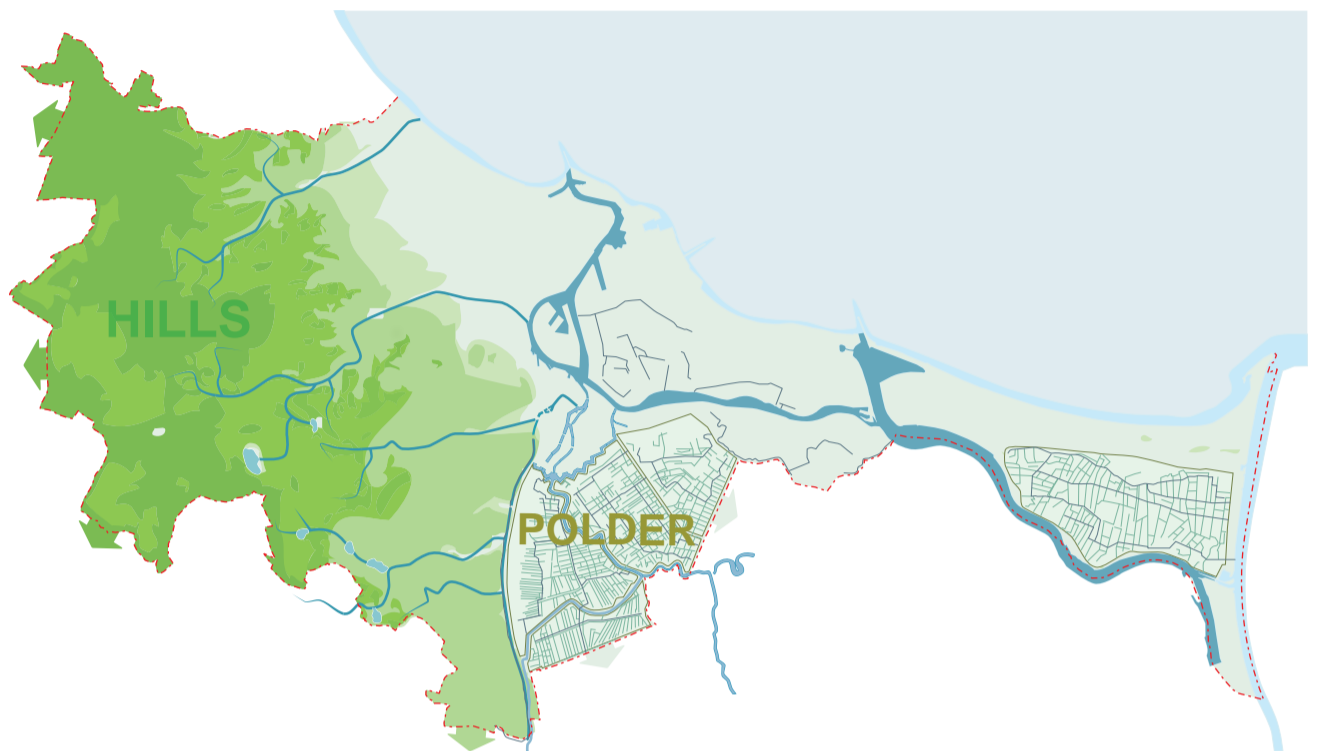
## 2.2. MUNICIPAL CONTEXT

### 2.2.1. SPATIAL LAYERS

The spatial configuration of the municipal areas of Gdansk can be analysed by approaching it as a set of layers that interact with each other, and together define the existing spatial context of the city. The separate layers are described briefly below.

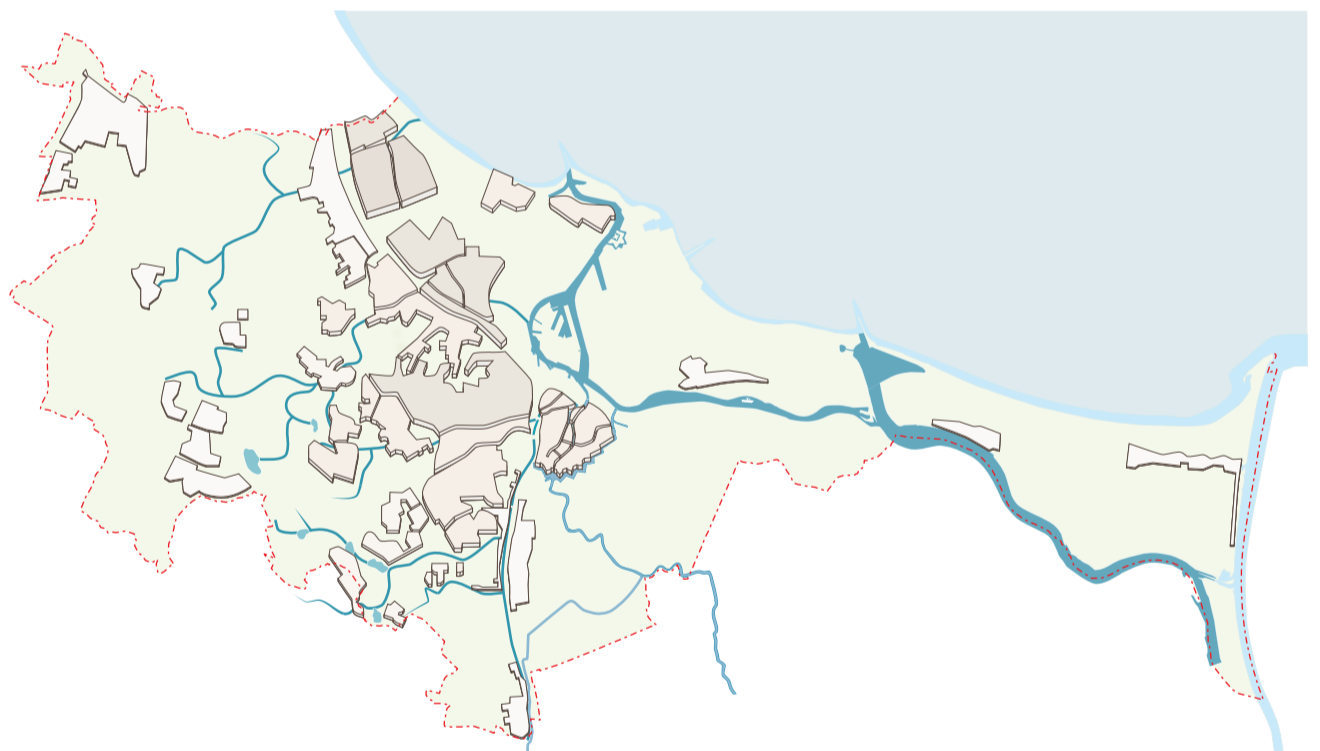
#### **TOPOGRAPHY**

The higher moraine hills and plateau in the western part are in contrast with the low lying flat polder areas in the east. Together the differences in gradients, heights, natural characters create a valuable combination of highly attractive landscapes.



#### **URBAN STRUCTURE**

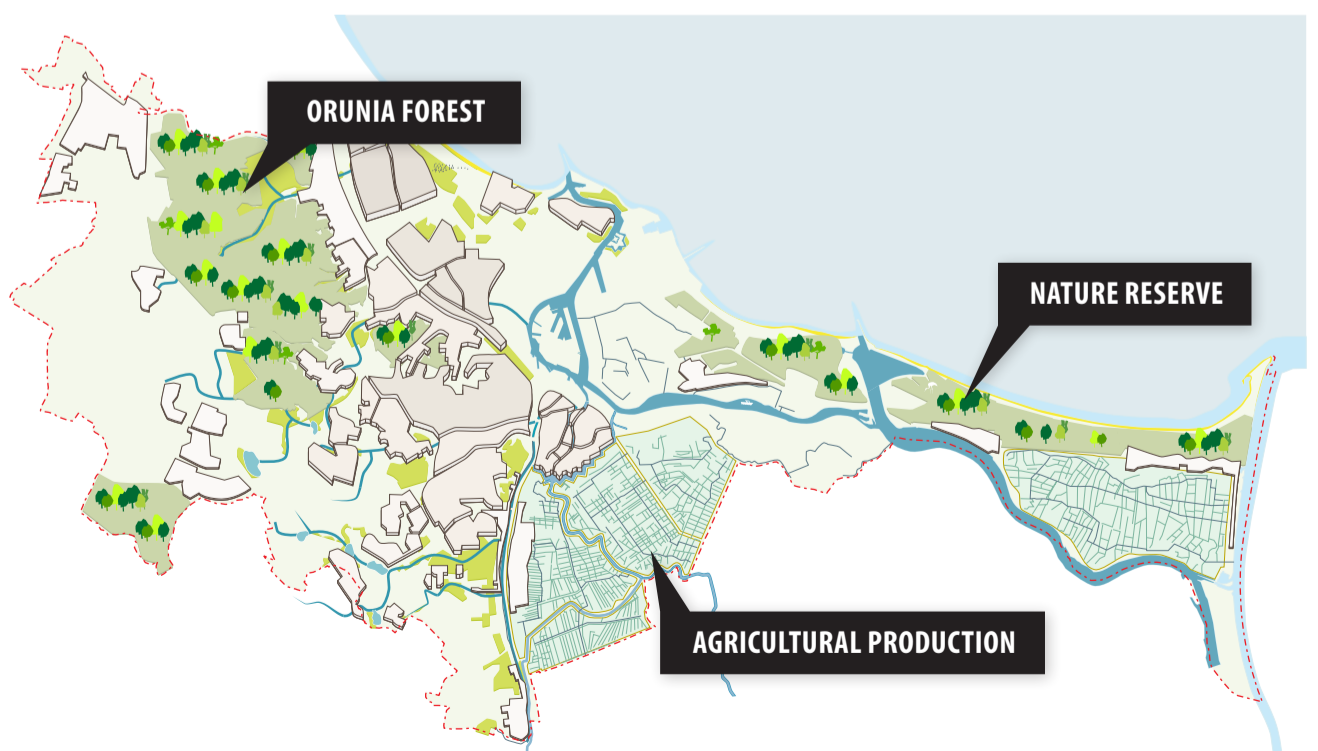
The origin of the positioning and structure of the urbanized areas of Gdansk can be related to the topographic situation. The oldest urbanized parts are located on the edge of the higher grounds and the lower rivers and polders. At later stages further urbanization took place along the urban spine towards Sopot and Gdynia, and in recent decades the moraine hills to the west of the city centre have become more intensively urbanized.



#### **GREEN STRUCTURE**

Gdansk is privileged in having a variety of different attractive landscapes surrounding the urban city parts. It is a unique situation to have sea, coastal areas, open agricultural polders, hills and forests at such a short distance.

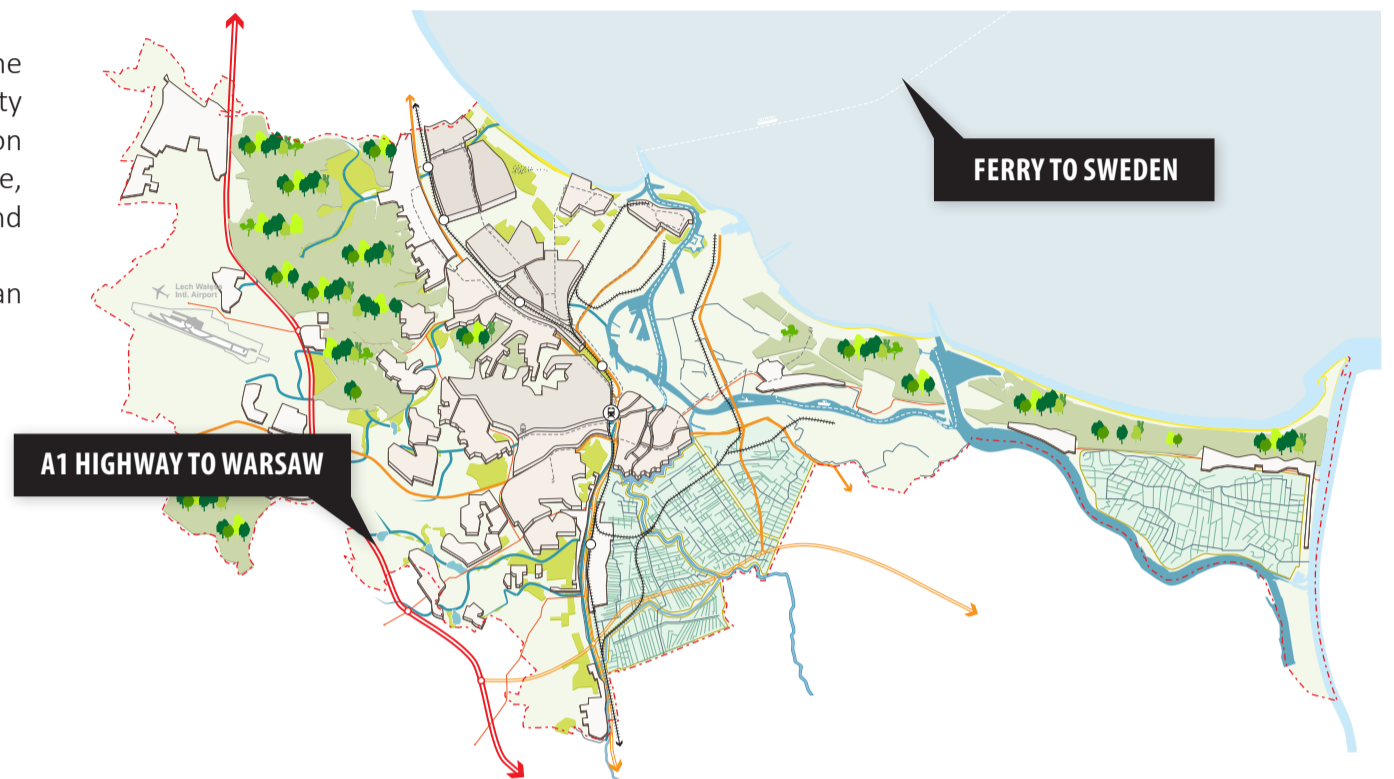
Inside the urban areas of the City there is a rather dispersed green structure of limited size and natural, ecological and leisure quality.



### INFRASTRUCTURE

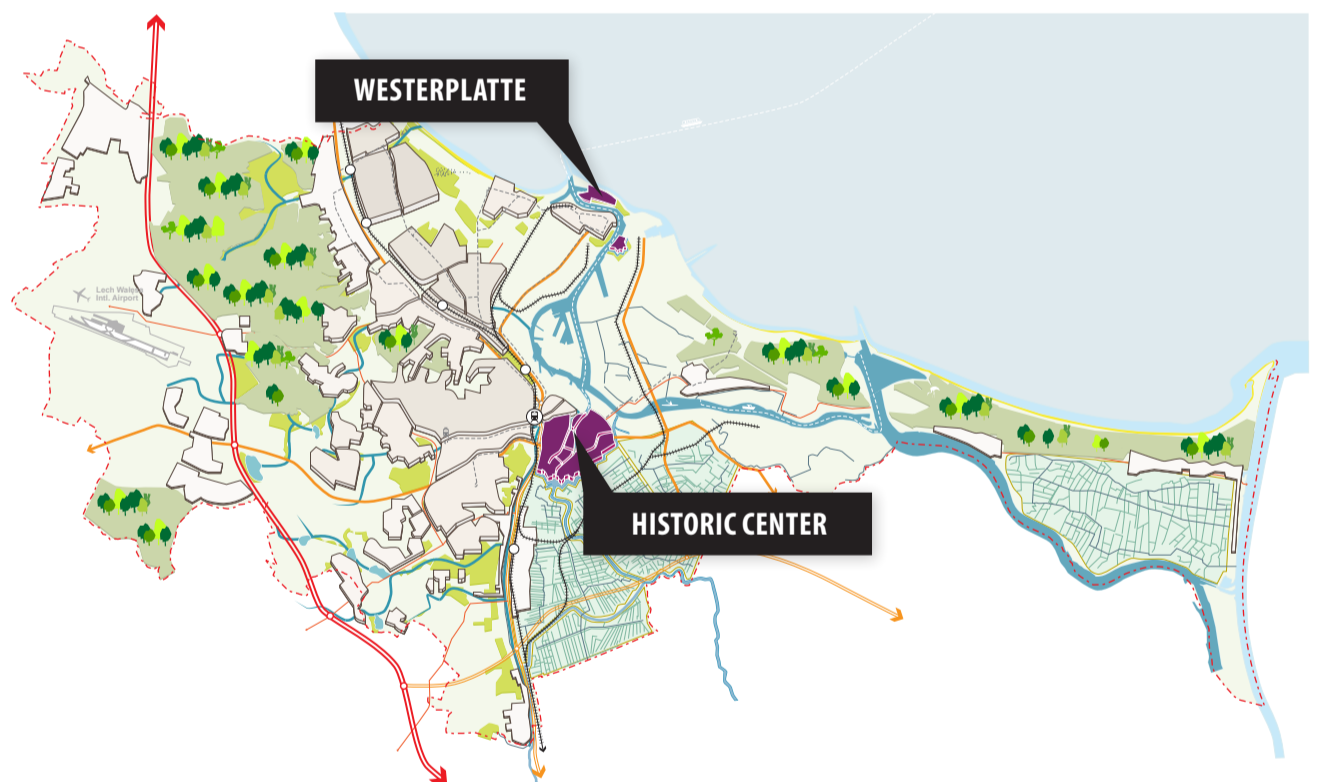
On a regional scale the main connection is the A1 Highway that efficiently connects the Tri-City (and airport) at the highest level. The completion of the inner city ring road in the nearby future, will improve the internal connectivity and accessibility of the centre.

The road system that interconnects the urban areas is less efficiently organized.



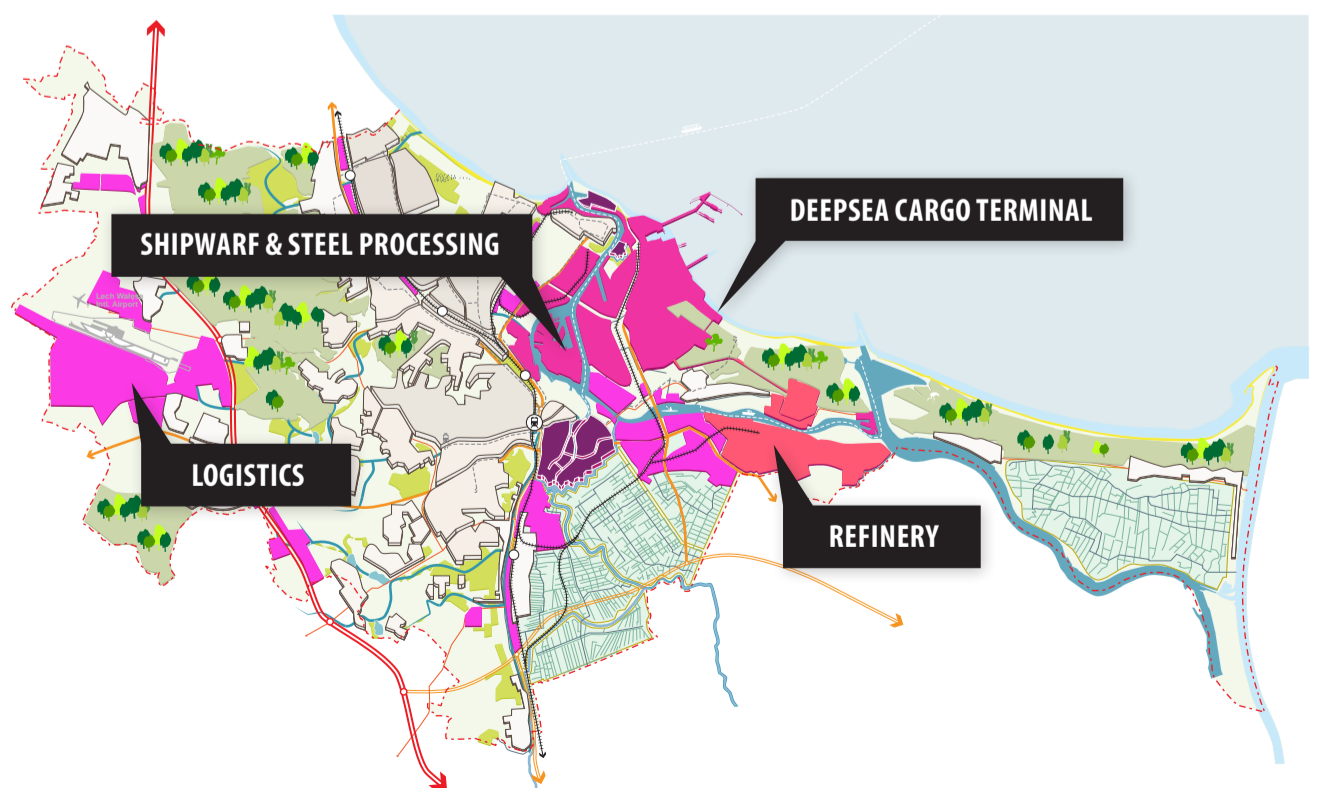
### HISTORIC CENTER

History and culture are important assets to the City of Gdansk. The historical centre is an attractive and clearly defined central area in the City. There are several other areas and locations related to the historical identity and image of Gdansk such as Westerplatte and the Stocznia's.



### INDUSTRIAL AREAS

Industrial areas have for a long time, been of high importance to the City. In particular water related industries have played an important part in the far and recent history. Nowadays other industries are also of increasing importance such as knowledge industries and (airport related) logistic industries.

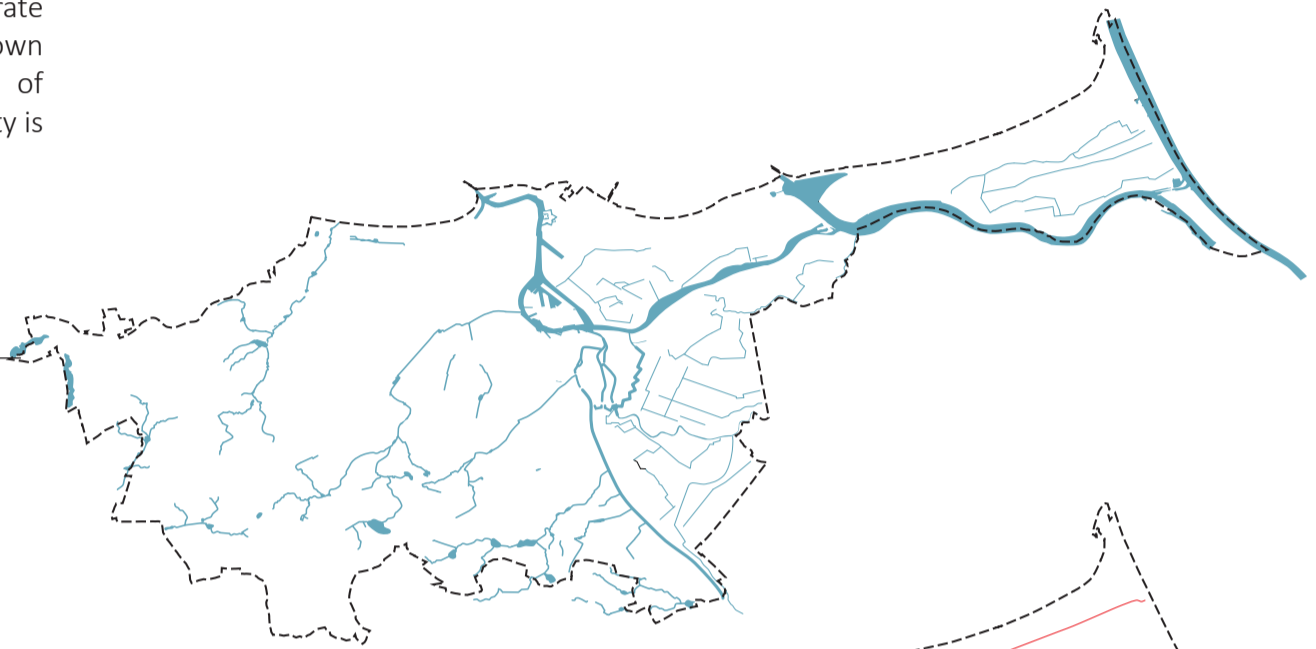


## 2.2.2. NETWORKS DEFINING THE CITY

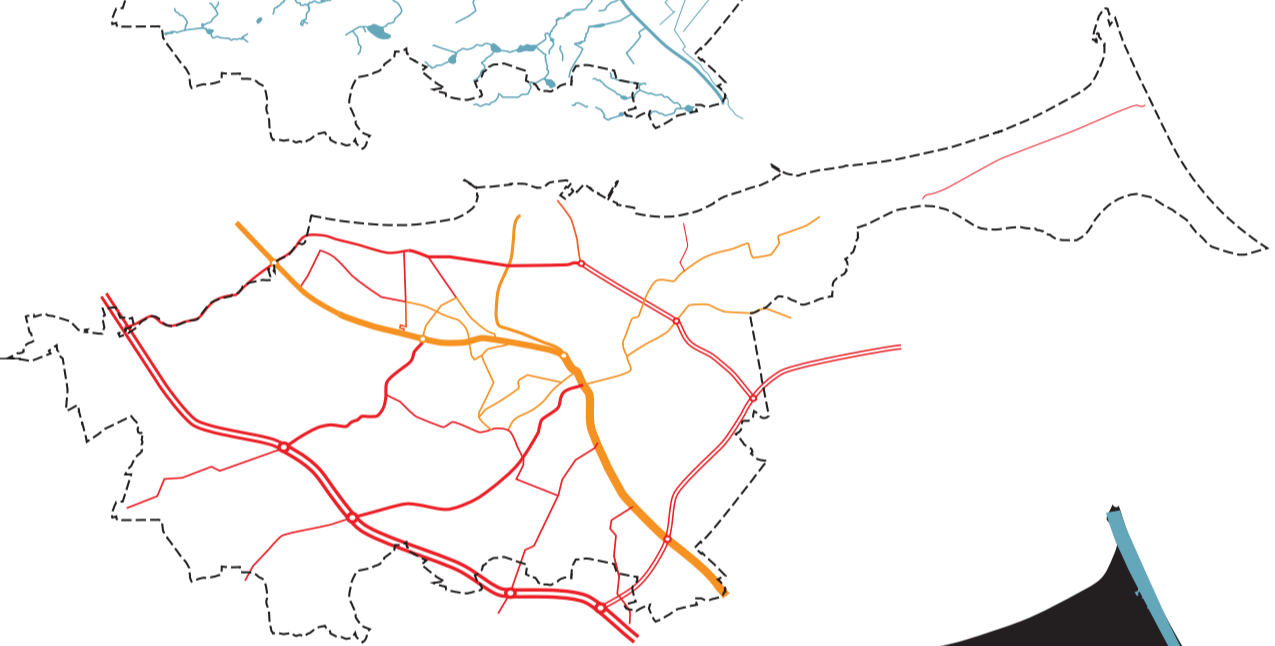
By analysing the city by its spatial layers it was observed that the spatial configuration of Gdansk is defined by its networks of water, road and rail.

During history first a water network, and later road and rail have developed which connected inner and outer city locations, but which also created edges and boundaries within the city. These boundaries have ultimately resulted in the creation of a large variety of separate neighbourhoods that each have their own identity. The characteristic of a collection of neighbourhoods with their own urban identity is unique for Gdansk.

**WATER NETWORK**



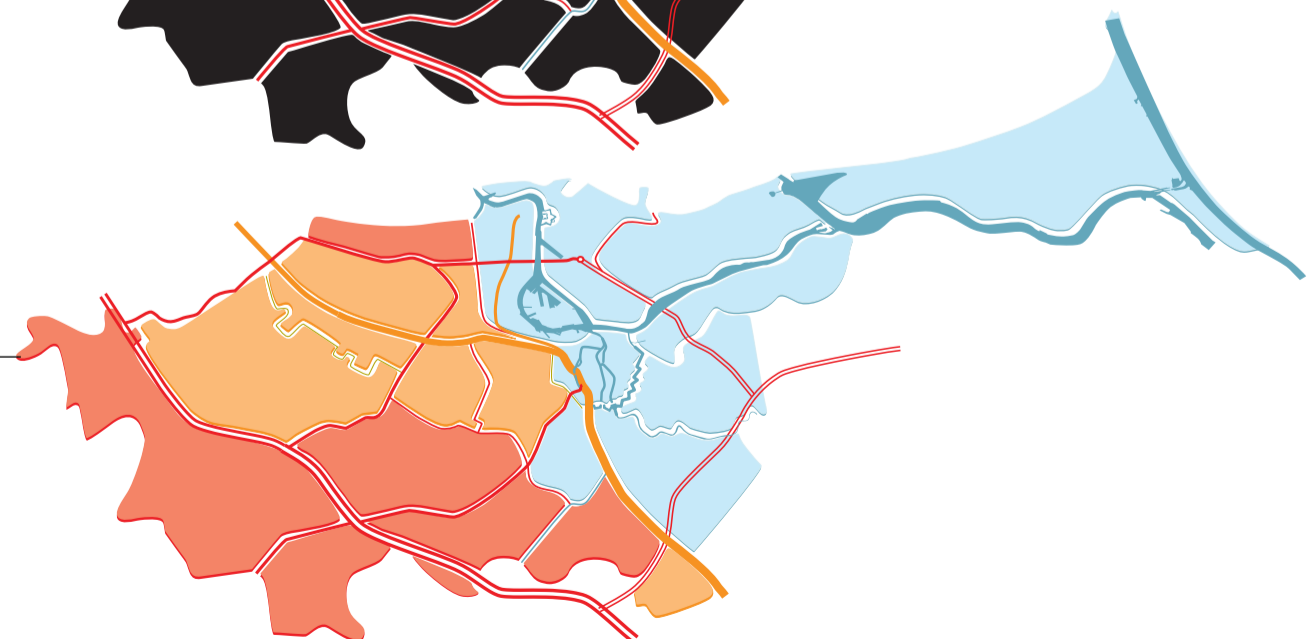
**ROAD NETWORK**



**NEIGHBOURHOODS  
DEFINED BY NETWORKS**



**HISTORIC URBAN DEVELOPMENT  
ALONG INFRASTRUCTURAL  
NETWORKS**





Spatial Networks guiding urban growth and framing Neighbourhoods



The zones defined on the spatial network are characterized by individual urban identities

### 2.2.3. URBAN IDENTITIES

A special characteristic and quality of Gdansk is the large variety of urban identities within the city. Within the city boundaries there are several natural, industrial, residential and other areas with their own specific set of characteristics. On the three sections a visualization is given of this variation.

In comparison to many other cities the mosaic of urban identities and typologies of Gdansk, results in a more diverse and thereby more attractive city.



**01**

Lech Wałęsa  
International Airport

Oliwa Forests



**02**

Suchanino

Aniołki

Park  
Steffensa

Train  
trucks

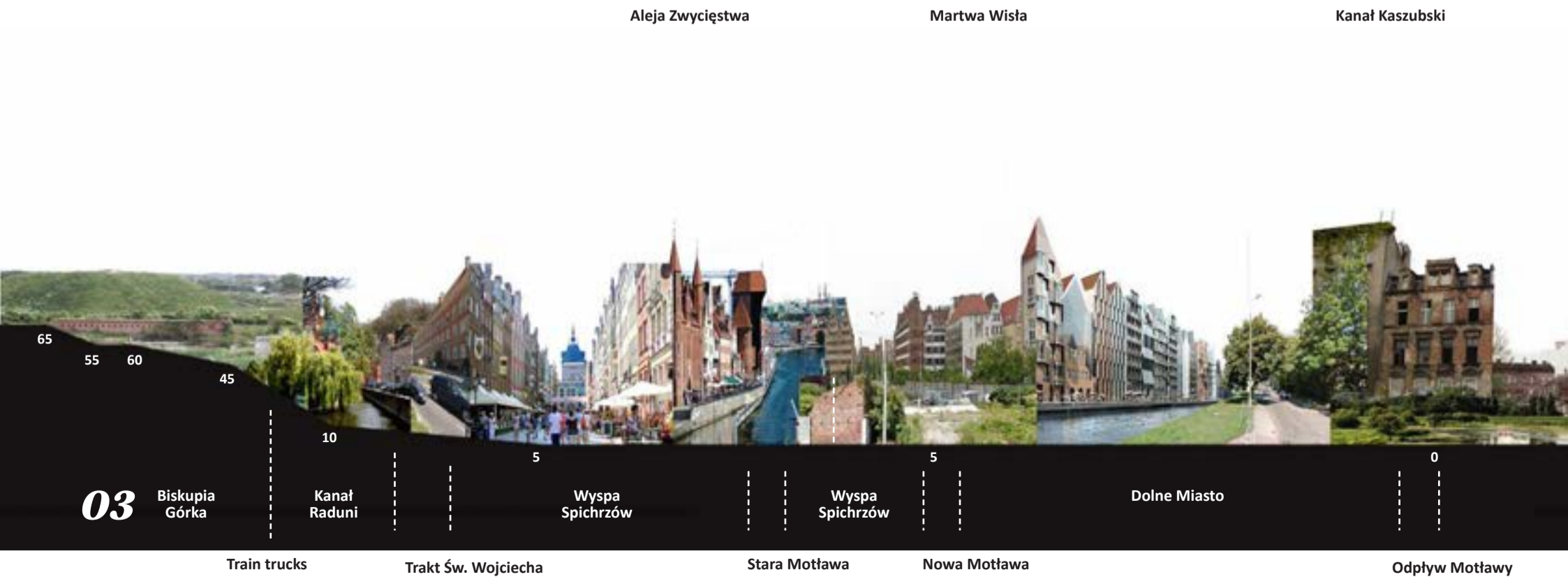
Harbour

Harbour

Aleja Zwycięstwa

Martwa Wiśła

Kanał Kaszubski



**03**

Biskupia  
Górka

Kanał  
Raduni

Wyspa  
Spichrzów

Wyspa  
Spichrzów

Dolne Miasto

Train trucks

Trakt Św. Wojciecha

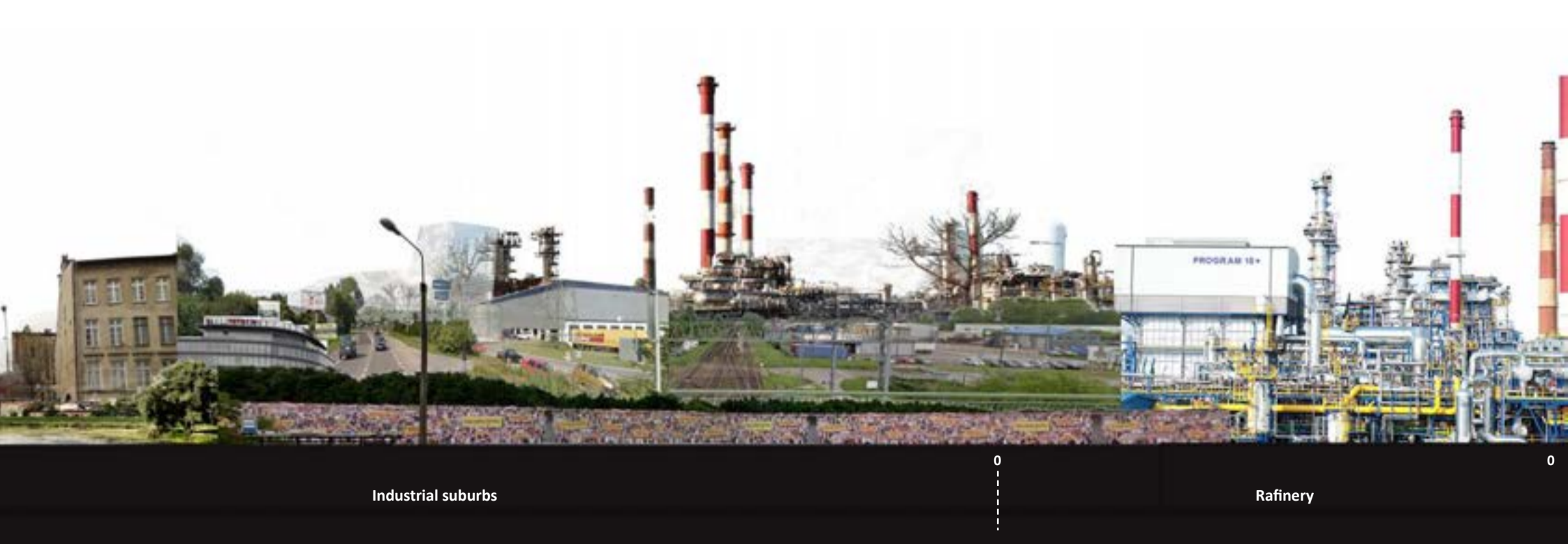
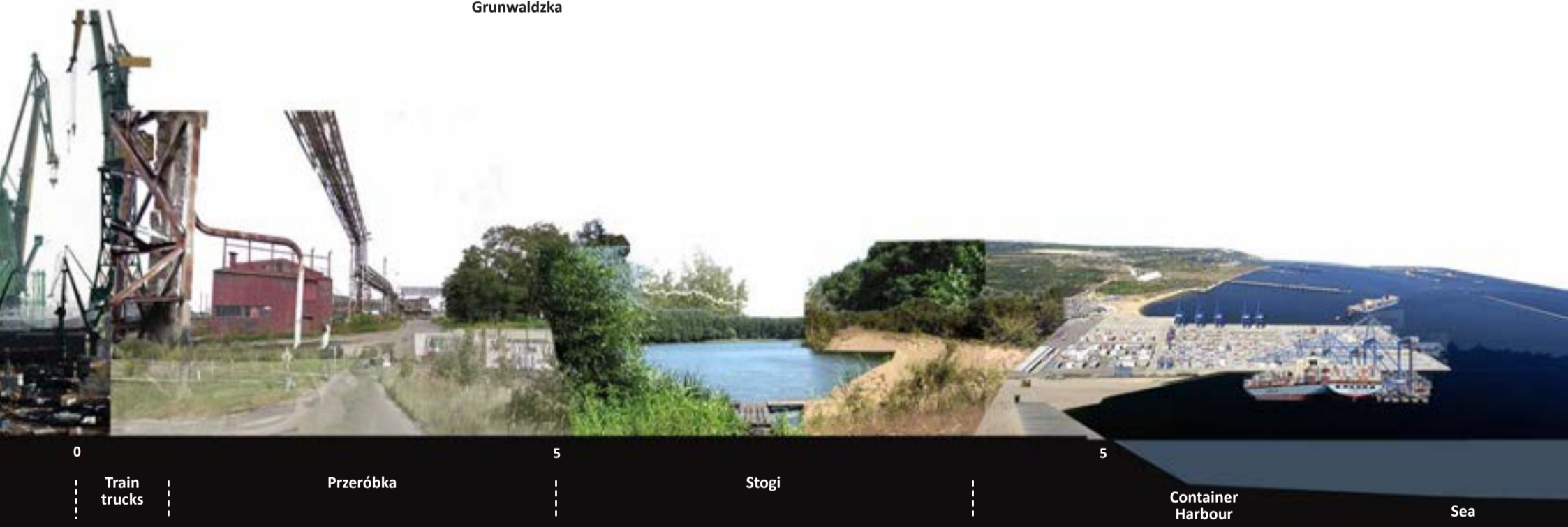
Stara Motława

Nowa Motława

Odpyw Motławy



Aleja  
Grunwaldzka



## 2.3. URBAN WATER AGENDAS

Besides the spatial structure of the city also the thematic issues related to the urban development of the city are of importance to the future of Gdansk. Therefore an analysis has been made of the main Urban Water Agendas for Gdansk.

These Urban Agendas are abstracted from European Union's Policies, Strategy Pomorskie 2020, 6 RPS's and the Regional Operational Programme for the coming EU policy period. Reviewing the urban development perspectives the following six agendas can be defined:

1. *Environment & Climate;*
2. *Identity & Heritage;*
3. *Society & Culture;*
4. *Economy & Knowledge;*
5. *Connectivity & Mobility;*
6. *Transformation & Innovation.*

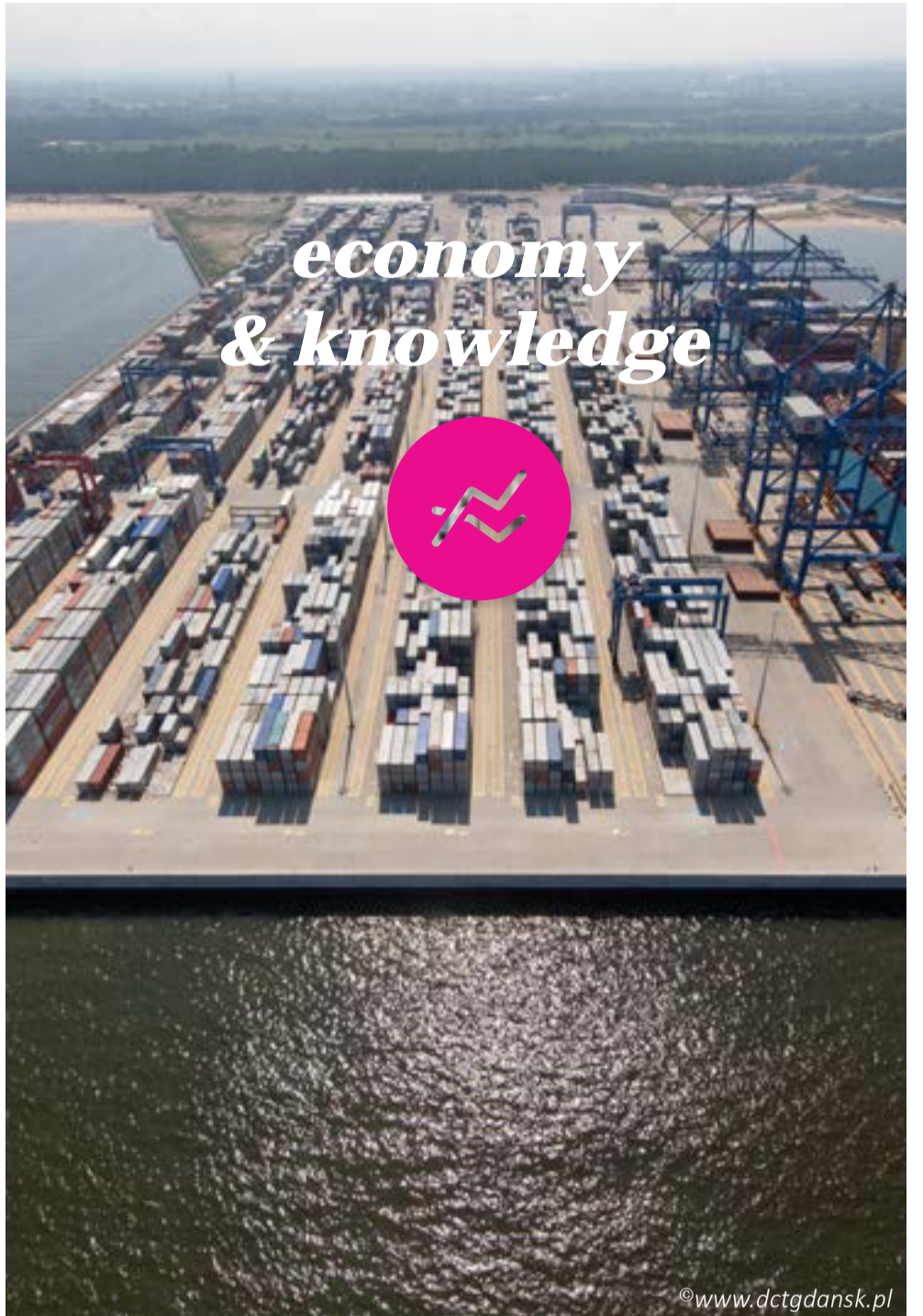
For each of the six Urban Water Agendas, analysis has been made considering how water can be of added value and how water can be used to strengthen the Urban Water Agenda goals. The main observations are listed on the following pages.





*society  
& culture*

©www.outdoorgallerygdansk.eu



*economy  
& knowledge*

©www.dctgdansk.pl



*connectivity  
& mobility*

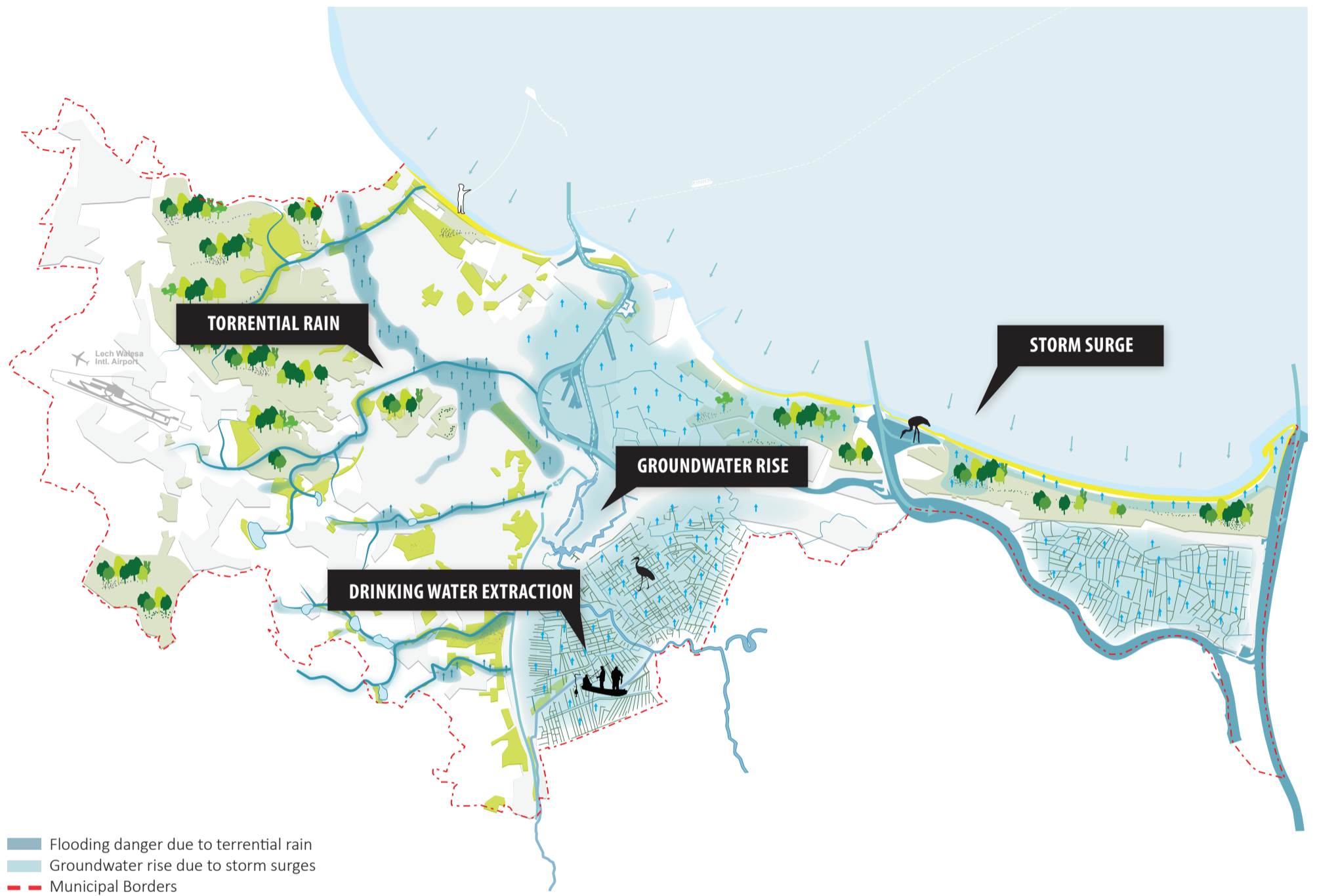
©www.johnandkristie.com



*transformation  
& innovation*

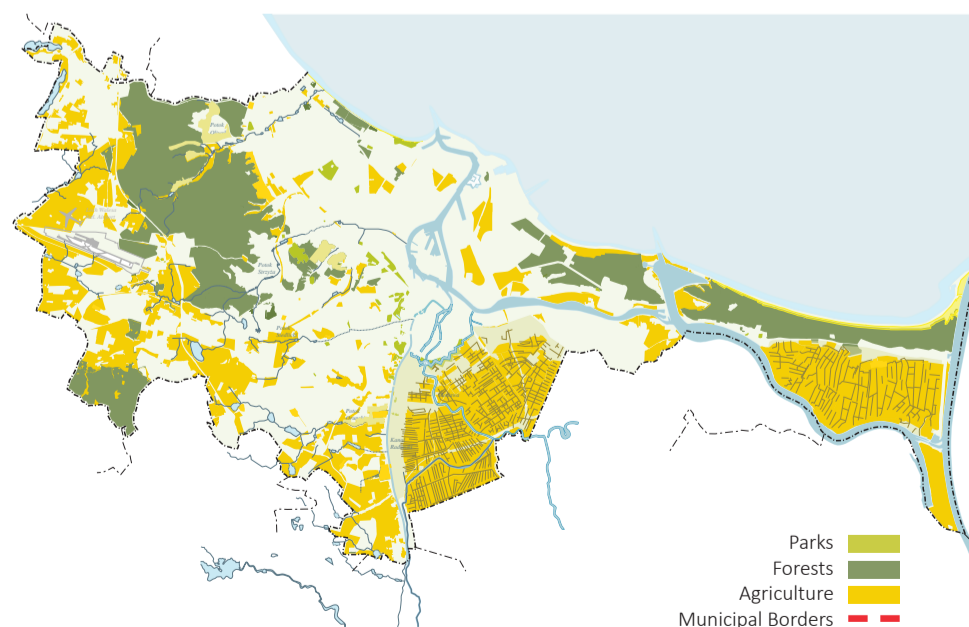
©www.moldovaoffrecord.wordpress.com

## 2.3.1. ENVIRONMENT & CLIMATE

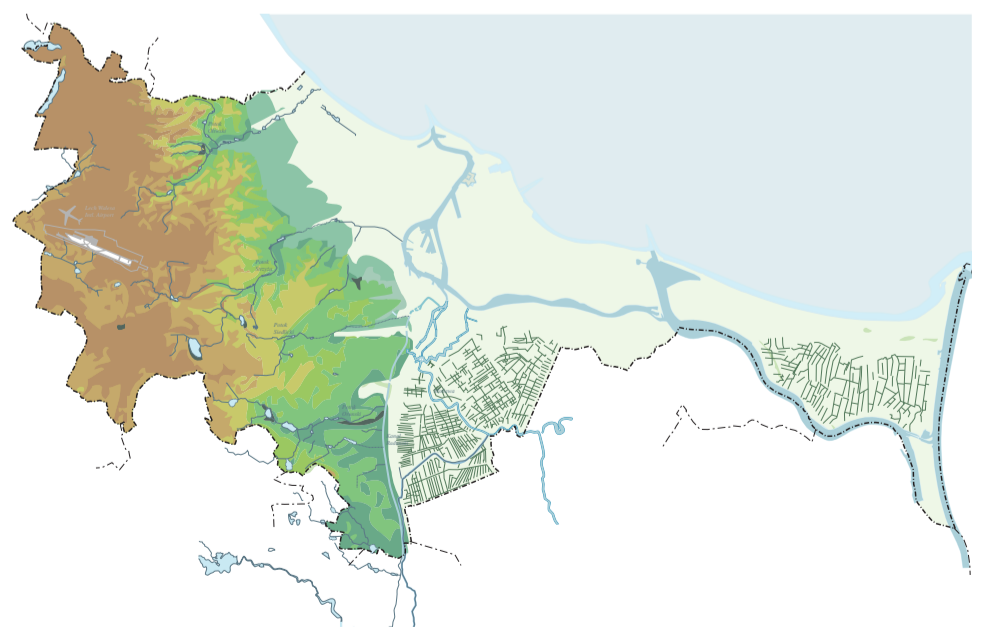


Main observations related to the urban agenda **Environment & Climate**:

- *The City is embedded in a variety of attractive landscapes;*
- *Water is present in all landscapes and within the city;*
- *The City is prone to the consequences of climate change;*
- *Large urban areas have limited water retention capacity;*
- *Water is at the heart of green and ecological structures;*
- *Gdansk has a unique and attractive natural sea shore / coastline;*



Landscape characteristics

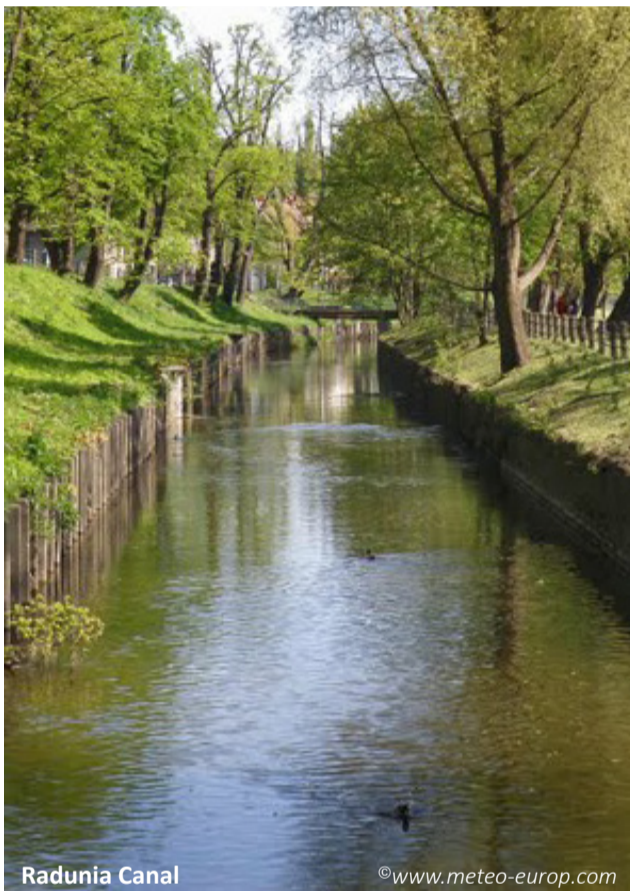


Topography



Mewia Lacha Nature Reserve

©www.outdoorgallerygdansk.eu



Radunia Canal

©www.meteo-europ.com



Sobieszewska Island

©www.fotovideopro.pl

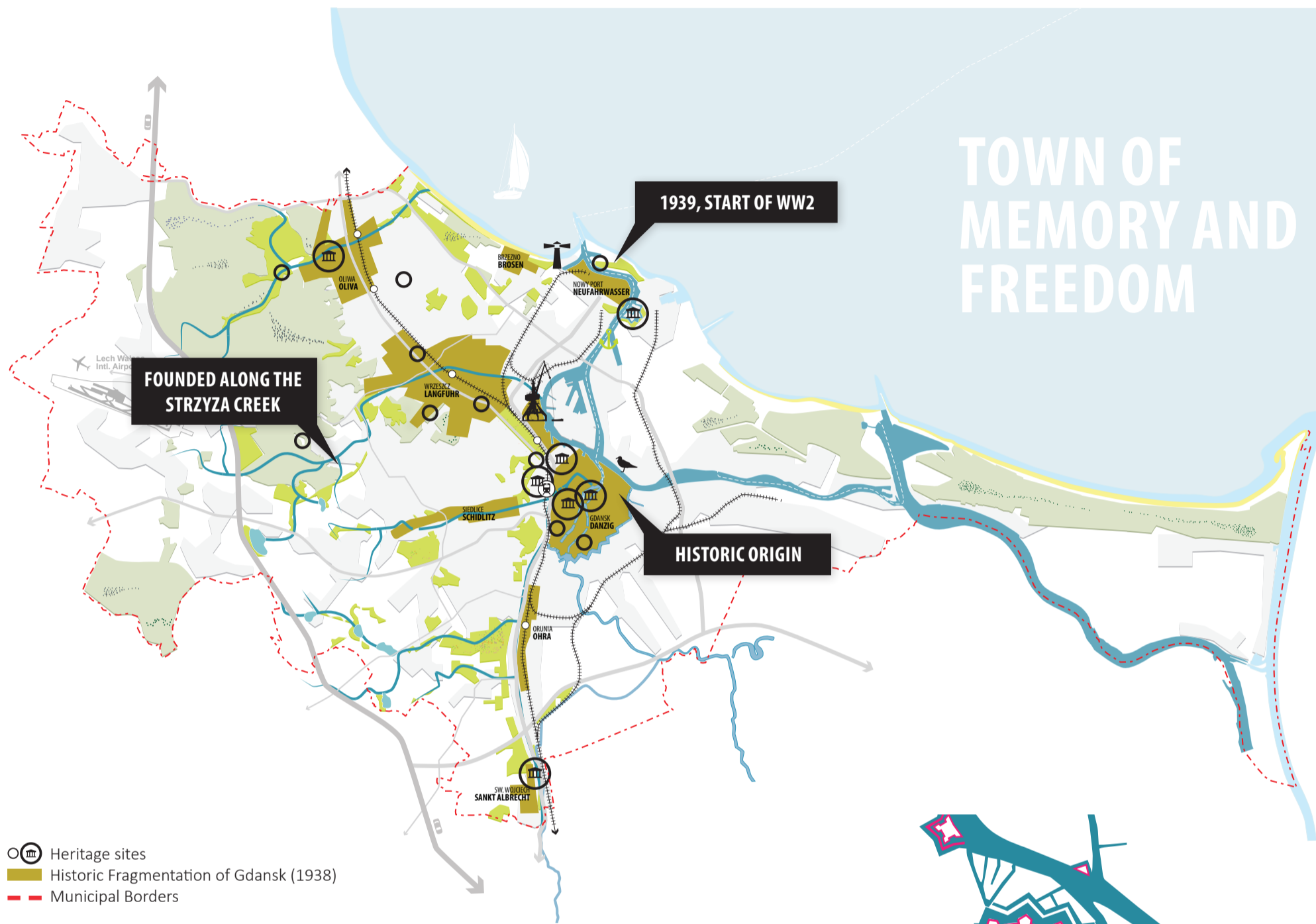


Oliwa Forest

©www.nadlesnictwo.gdansk.lasy.gov.pl

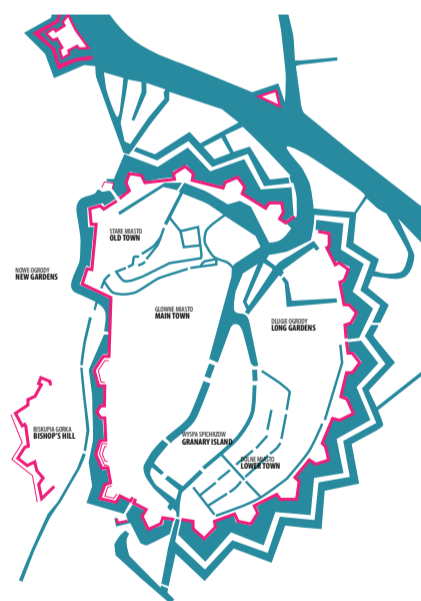


## 2.3.2. IDENTITY & HERITAGE

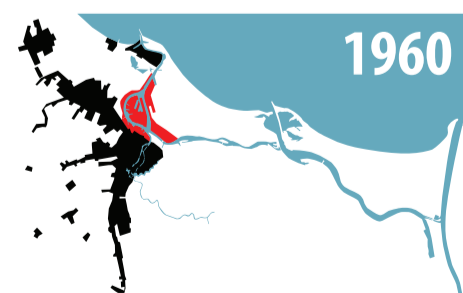
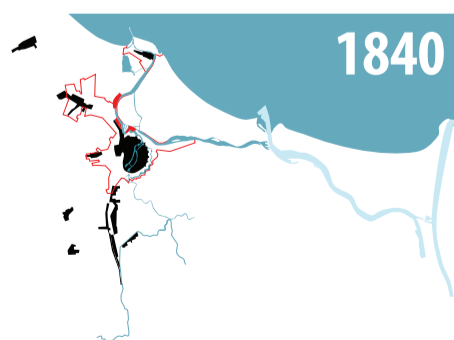
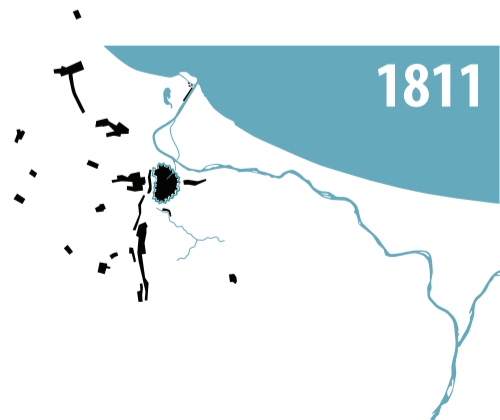
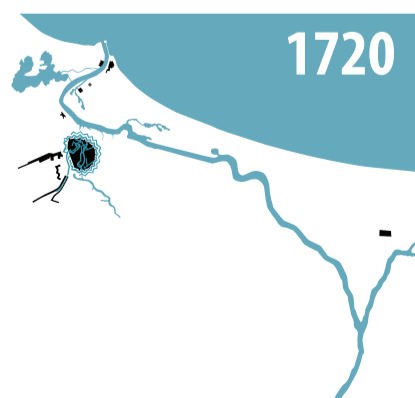


Main observations related to the urban agenda **Identity & Heritage**:

- *Water is important to the history and identity of Gdansk;*
- *The historical and touristic heritage sites are mainly located in the historic city centre;*
- *There are important historic relicts (Fort, Westerplatte) along the Dead Vistula.*



1700, Gdansk Network of Canals



Gdansk urban and water development



Vistula Flood, Winter 1888

©www.zulawy.info



Lech Walesa as he leaves the Gdansk Shipyards, 1983

©www.reuther.wayne.edu



Vistula Flood, Winter 1888

©www.zulawy.info

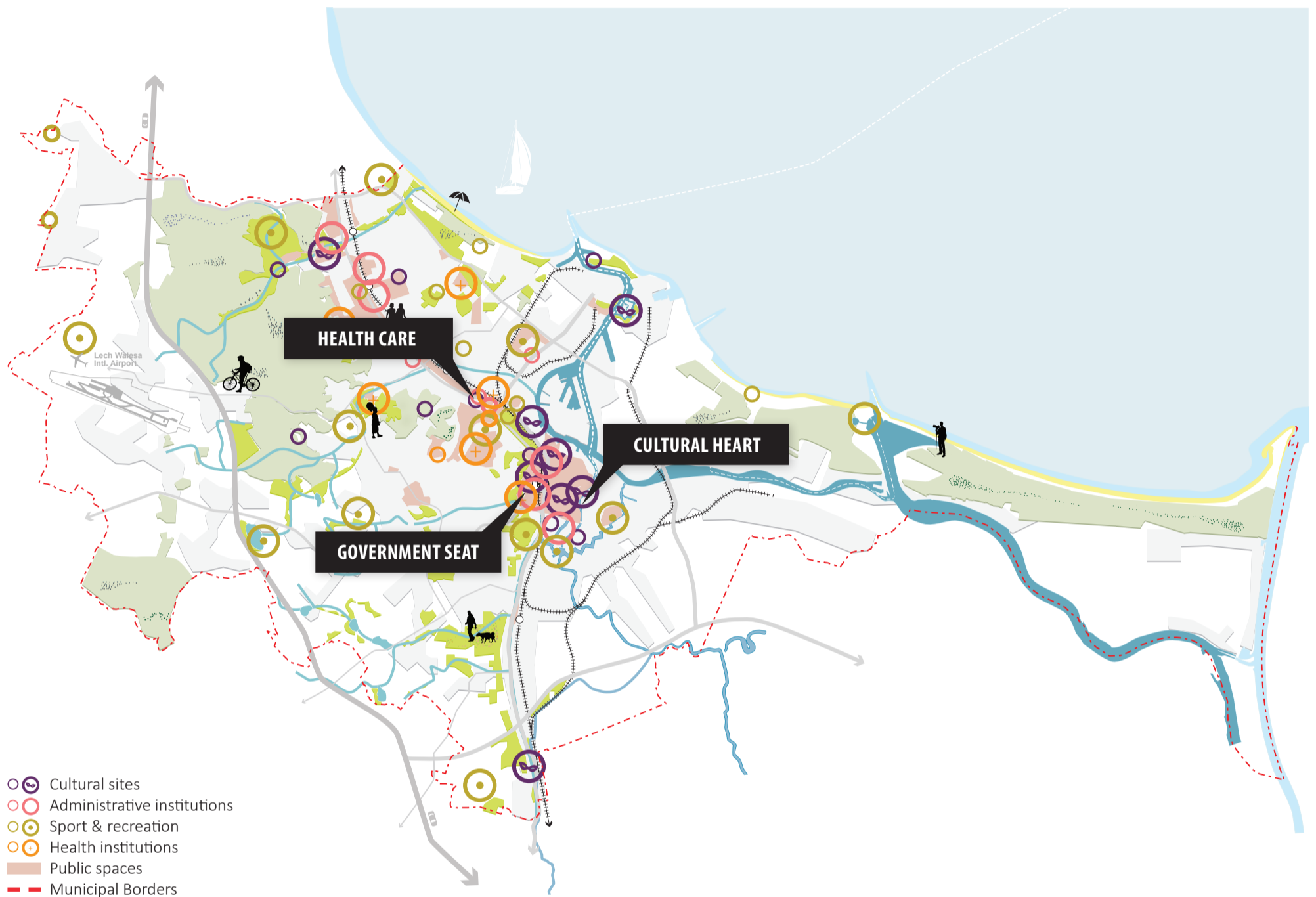


Vistula Delta, 1811

©www.grek.amzp.pl

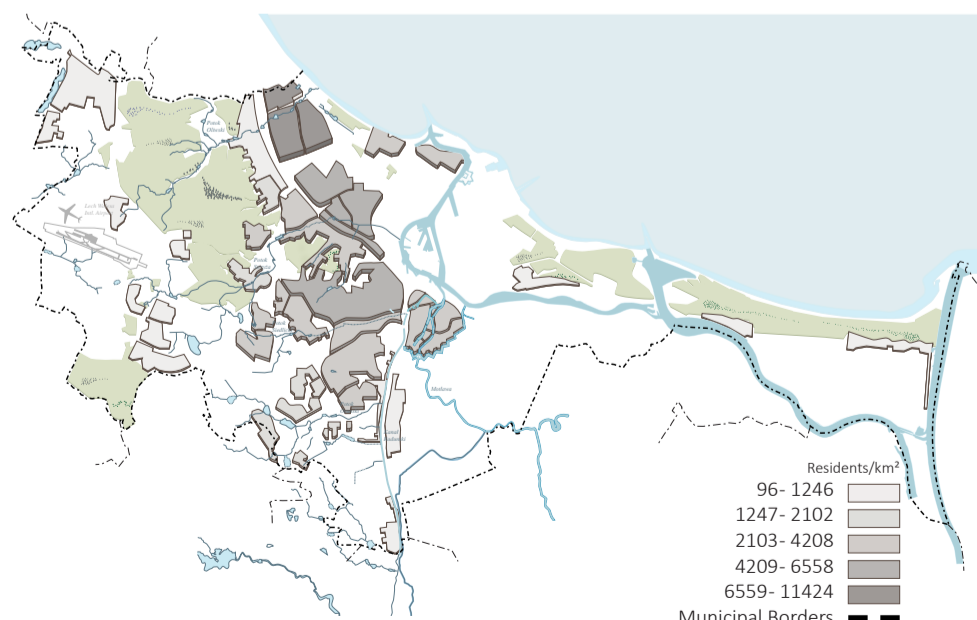


### 2.3.3. SOCIETY & CULTURE

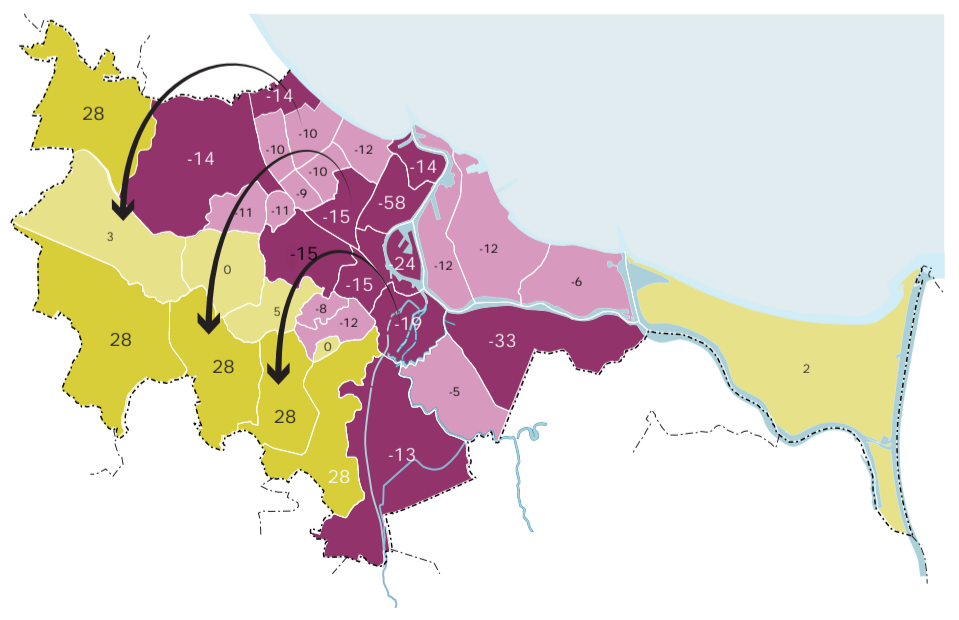


Main observations related to the urban agenda **Society & Culture**:

- *The cultural heart of Gdansk is in the historic city centre;*
- *Migration is occurring from inner city to suburban areas;*
- *The city has a large variety of areas with their own social identities.*



Population density



Migration from innercity to suburban districts



Public installations in the area of the Dolne Miasto, 2014

©www.outdoorgallerygdansk.eu



Fish Market in Gdansk, 2013

©www.plgr.pl



Baltic Sail Gdansk Festival, 2013

©www.towernaskipperow.pl



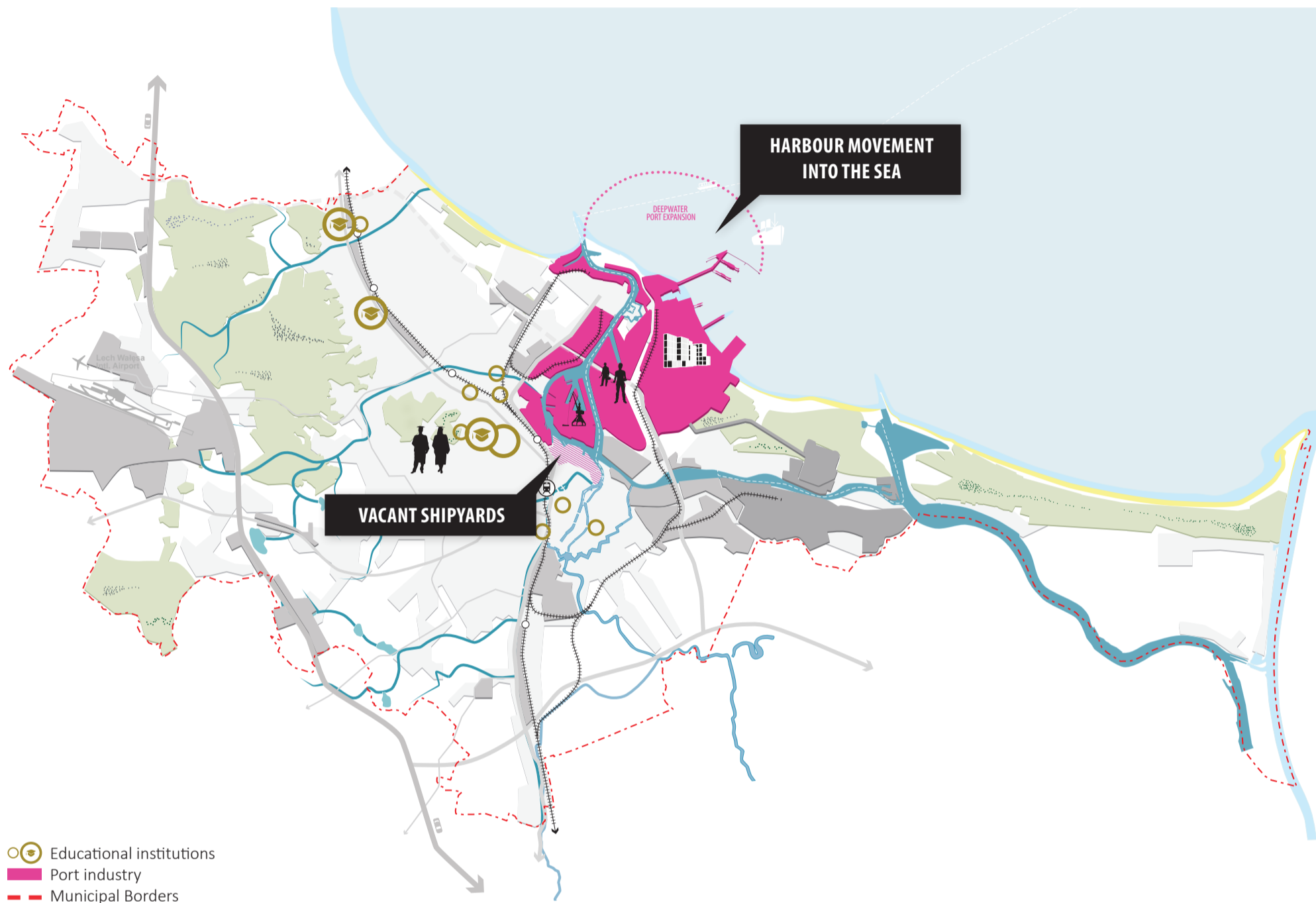
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Public installations in the area of the Dolne Miasto, 2014

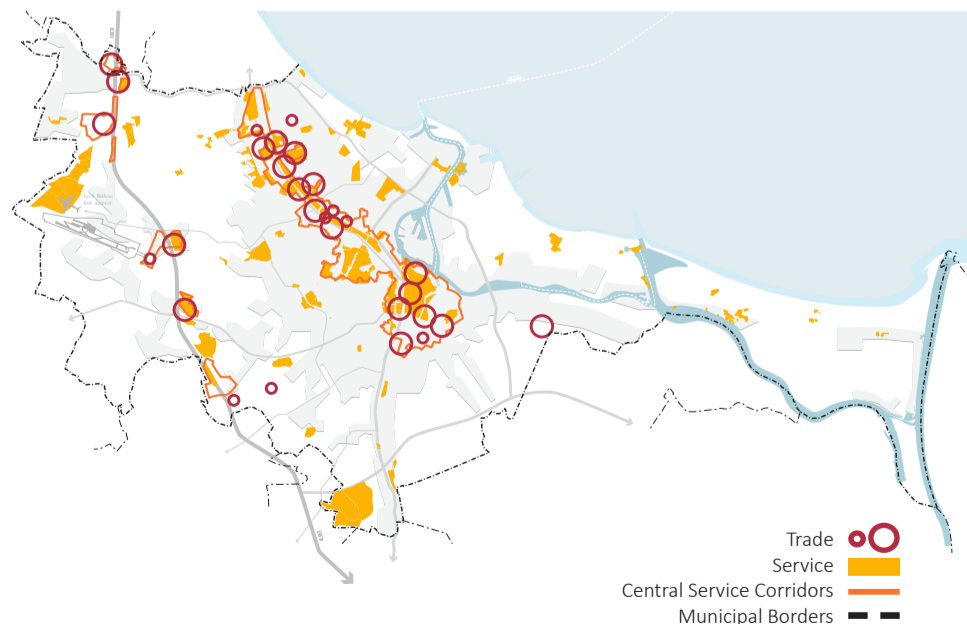
©www.outdoorgallerygdansk.eu

## 2.3.4. ECONOMY & KNOWLEDGE

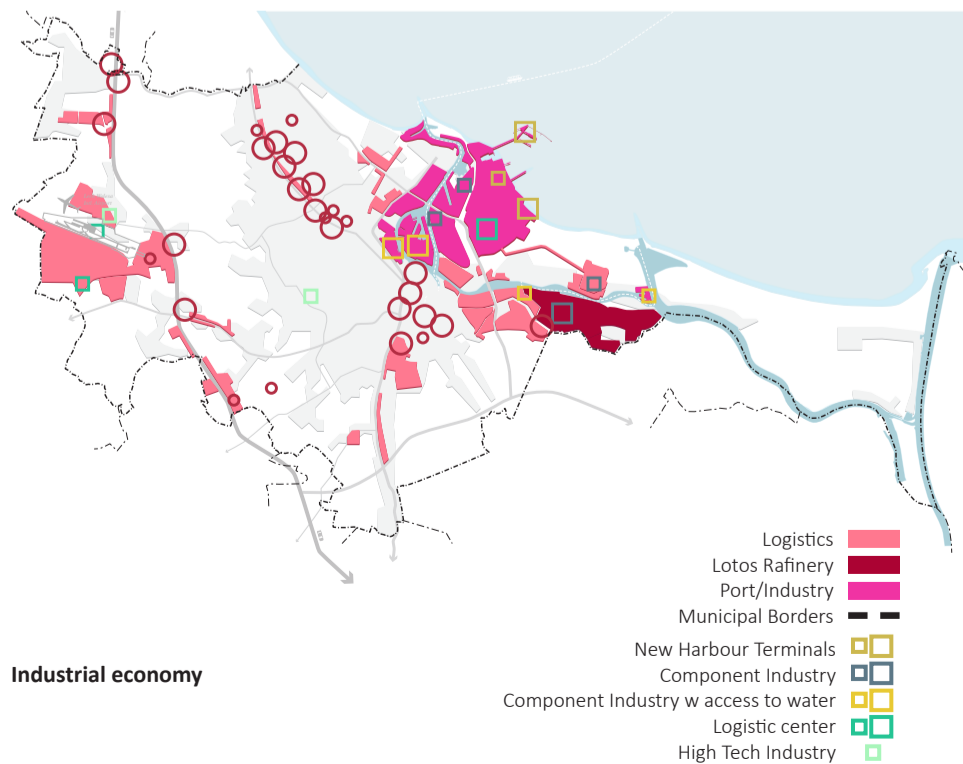


Main observations related to the urban agenda **Economy & Knowledge**:

- *Commercial & business economies are located along Gdansk-Sopot-Gdynia link;*
- *The large abandoned ship wharfs are mainly to the west of Dead Vistula;*
- *Active port activities are to the east of Dead Vistula;*
- *Touristic economy is concentrated in the historic centre;*
- *Agriculture is located in polders.*



Service economy



Industrial economy



DCT (Deepwater Container Terminal) Gdansk

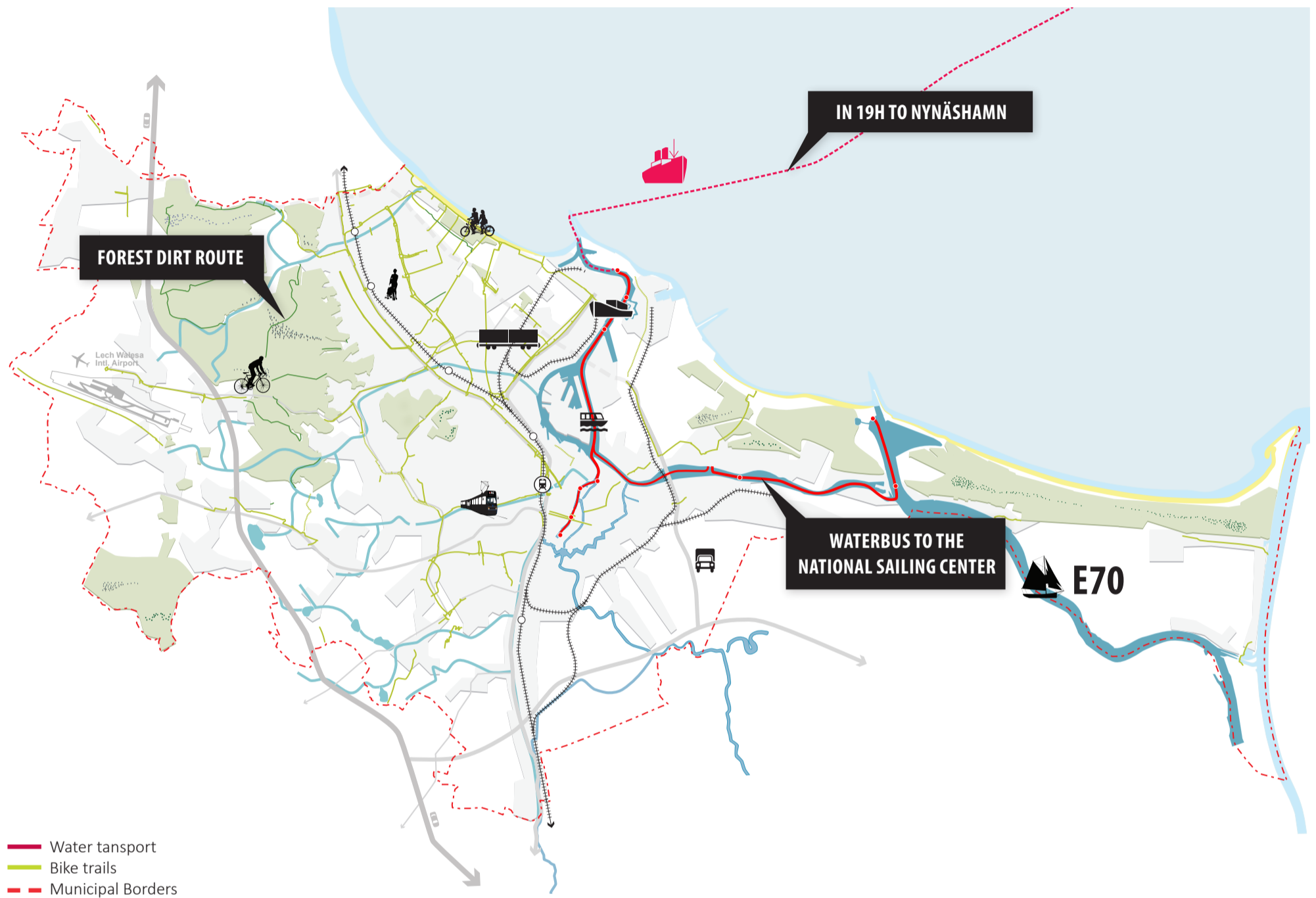
©www.dctgdansk.pl



Port of Gdansk

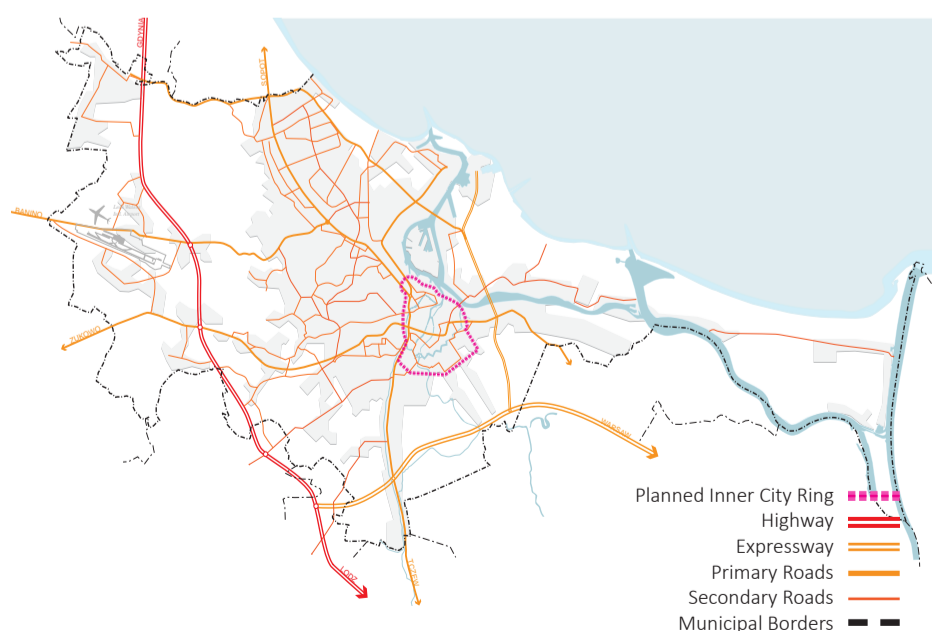
©Julia Sobota

## 2.3.5. CONNECTIVITY & MOBILITY

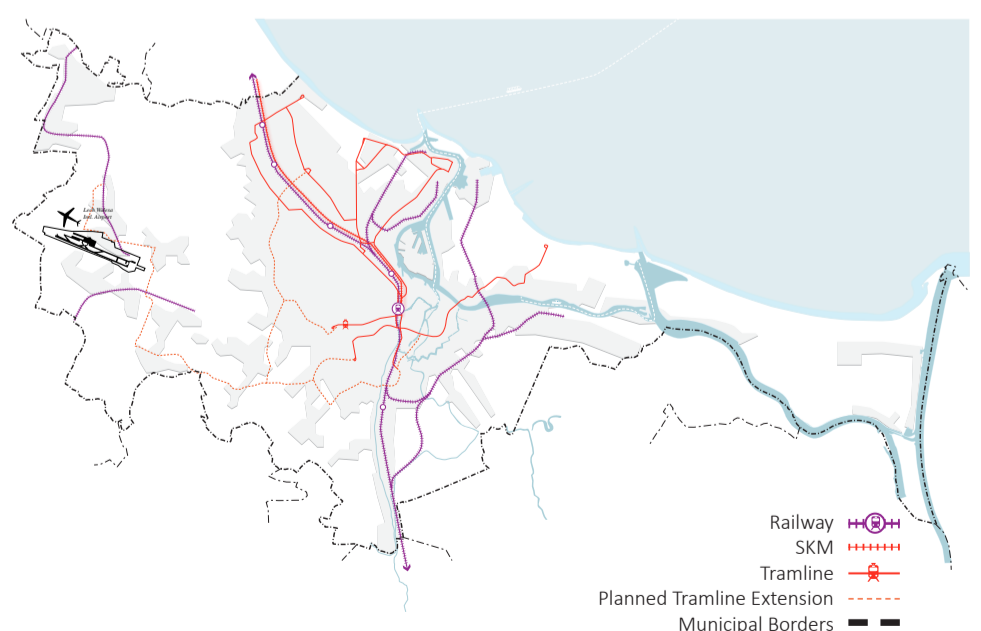


Main observations related to the urban agenda **Connectivity & Mobility**:

- *There is intensive port related water transport;*
- *There is limited water related to public and recreational transport;*
- *There is limited waterfront accessibility within city.*



Road network



Railway and tram network



DCT (Deepwater Container Terminal) Gdansk

©www.dctgdansk.pl



Water Tram

©www.trojmiasto.pl



Water Tram

©Michał Czajka/trojmiasto.pl

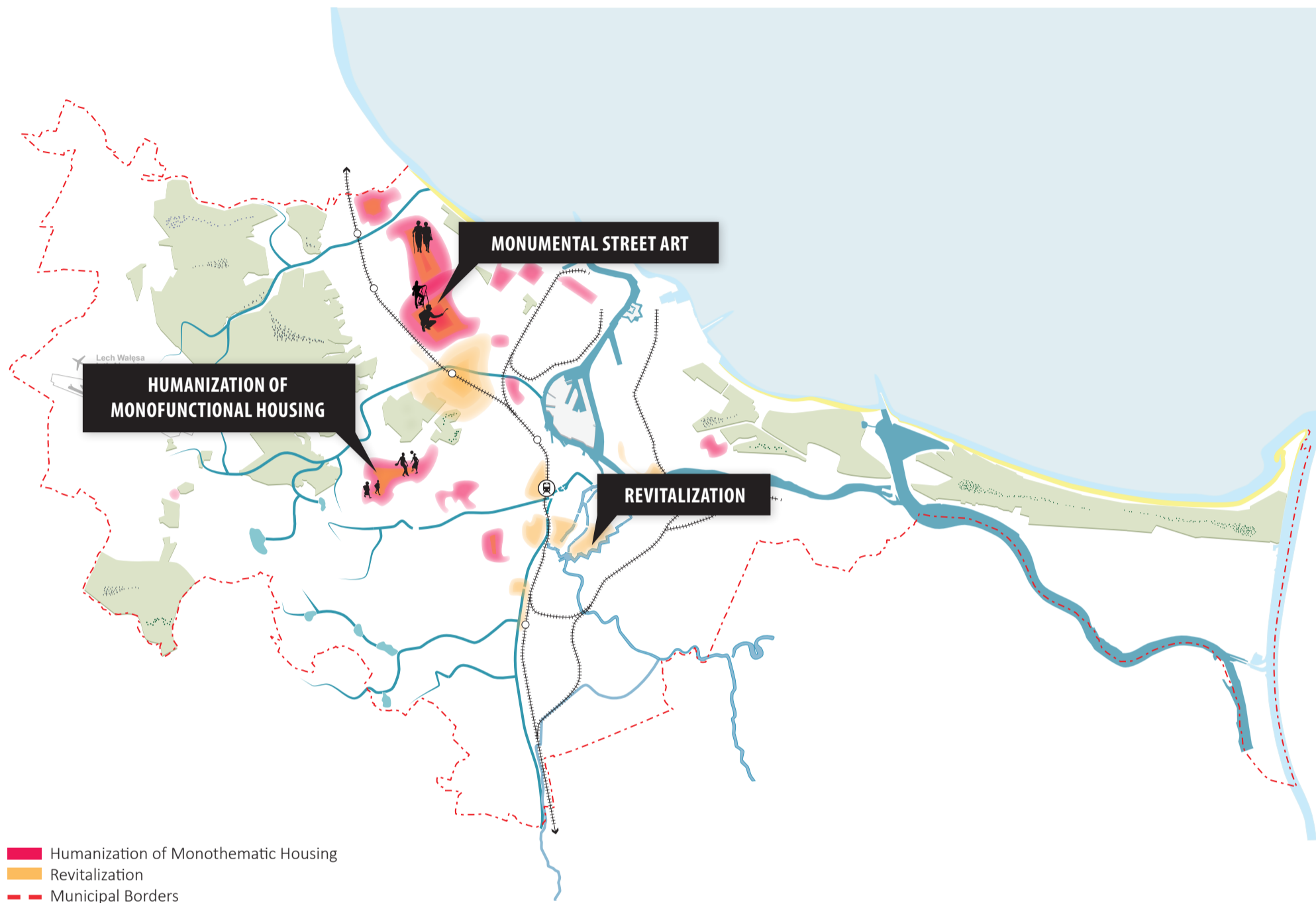


Port of Gdansk

©Julia Sobota

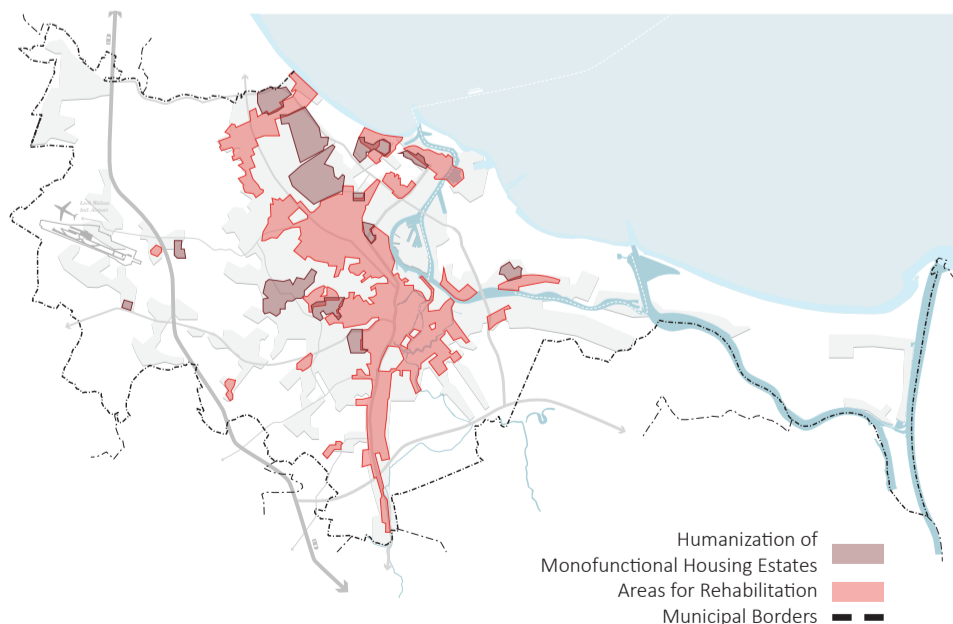


## 2.3.6. TRANSFORMATION & INNOVATION

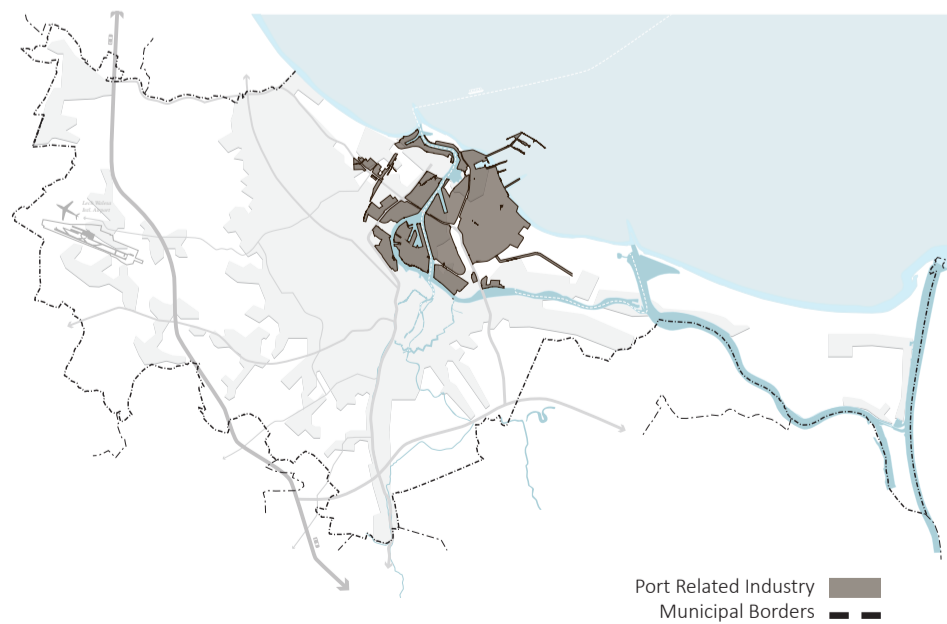


Main observations related to the urban agenda **Transformation & Innovation**:

- *There are large urban revitalisation areas such as Nowy Port and Dolne Miasto;*
- *In the port there is presence of abandoned ship wharf areas;*
- *Residential extensions and major new residential developments are located outside of the inner city.*



Areas in need of revitalization



Port related industry



Strzyza Creek, Wrzeszcz

©www.fotopolska.eu



Nowa Motława, Dolne Miasto

©KuiperCompagnons




Port of Gdansk

©Julia Sobota

## 2.4. THEMATIC CHALLENGES & OPPORTUNITIES

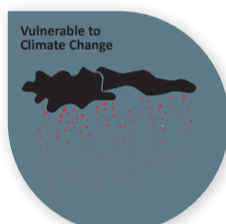
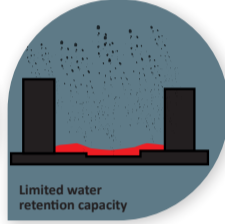
The observations from an urban perspective are categorized in challenges and opportunities per identified urban theme. This overview of challenges and opportunities for the urban aspects of Gdansk does not claim to be all-inclusive however it does comprise the main components that can or should be addressed to create a socio-economically strong and attractive Gdansk for its citizens.



**Environment  
& Climate**


**CHALLENGES**


- Vulnerable to climate change
- Limited water retention capacity
- Storm surge risks
- Protection of green / landscapes

**OPPORTUNITIES**

- Improve connections between the city and its waterfronts
- Connect the city to the natural values and landscapes in its surrounding
- Make use of water to increase urban quality inside the city





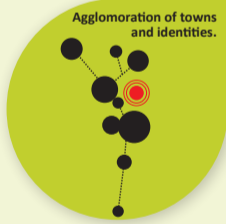

**Identity  
& Heritage**


**CHALLENGES**

- Re-use of former port industry
- Create a liveable historic centre
- Create a complementary tri-city

**OPPORTUNITIES**

- Experience water as historic cradle of Gdansk
- Agglomeration of towns and identities
- Strong water related identity for Gdansk

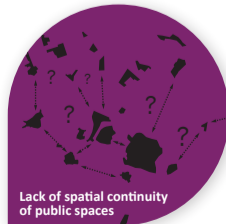
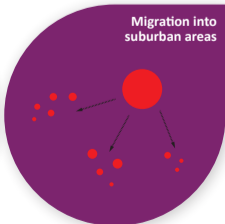
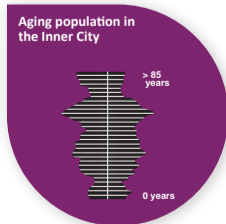





**Society  
& Culture**

**CHALLENGES**

- Large migration from centre to suburban areas
- Aging population in city centre
- Lack of spatial continuity of public spaces

**OPPORTUNITIES**

- Using the potentials of the historic city centre
- Strong local communities
- Active young population
- Attractive (living) climate for entrepreneurs



**Economy & Knowledge**



**CHALLENGES**

- Lack of new economies in the areas of the former ship yards
- Keep educated young population



**OPPORTUNITIES**

- Strong international position
- Highly educated young population
- Knowledge & research institutes present
- Attractive (living) climate for entrepreneurs



**Connectivity & Mobility**



**CHALLENGES**

- Improve green urban transport (pedestrian / bike)
- Decrease car traffic congestion
- Connecting landscapes with city



**OPPORTUNITIES**

- Multimodality on local and national scale
- Stronger link on a Tri-City scale
- Extended water ways for private and public transport
- Develop compact city



**Transformation & Innovation**



**CHALLENGES**

- Monothematic housing estates
- New uses for old ship wharfs
- Create diverse living environments



**OPPORTUNITIES**

- Revitalization of deprived water related areas
- Large areas available for functional transformation
- Many industrial relicts in the port area





## 2.5.2. MUNICIPAL PROJECTS

The images on this page represent a selection of municipal plans categorized according to the six urban agendas. These plans and projects bear the potential to be linked, and thereby strengthened, by an integrated Urban Water Strategy.

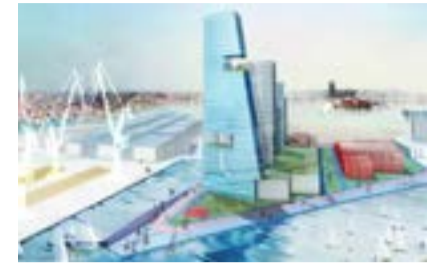
The graphic illustrates that a comprehensive strategy can give guidance to the city's separate plans and projects, which together can create synergy and strengthen the overall objectives for Gdansk.



01 TRAM NETWORK



03 BISKUPIA GORKA | 2012, 2013



04 DREWNICA HEADLAND | 2010



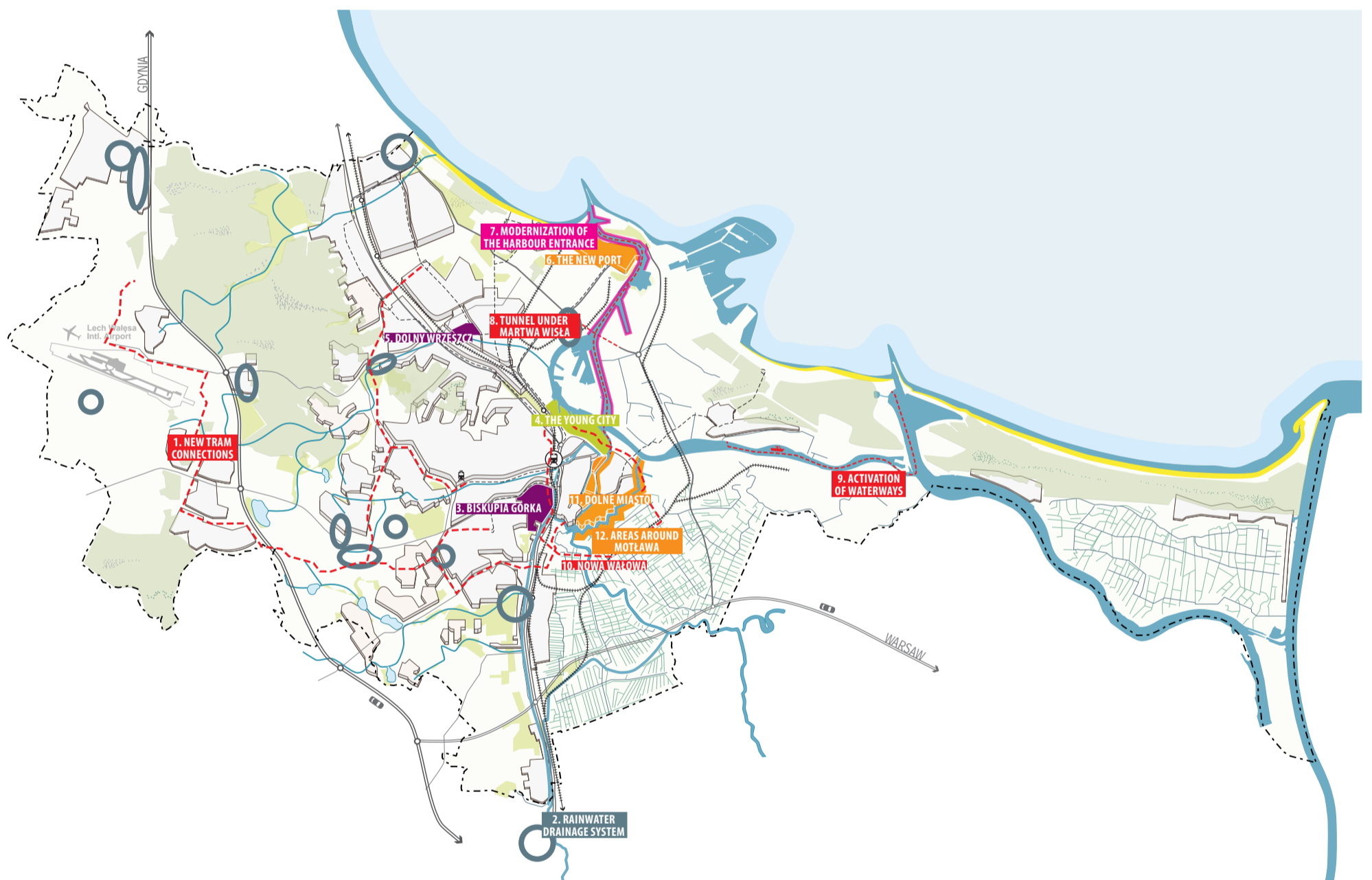
02 RAINWATER RETENTION | 2011



04 ROAD TO FREEDOM | 2013



04 EUROPEAN CENTER FOR SOLIDARITY | 2014



05 GALERIA METROPOLIA | 2016



07 MODERNIZATION PORT ENTRANCE | 2014



09 ACTIVATION OF WATERWAYS | 2012



11 DOLNE MIASTO | 2008



06 NOWY PORT | 2013



08 MARTWA WISLA TUNNEL | 2014



10 NOWA WALOWA | 2014



12 VII HOUSING BLOCK | 2012



*gdansk*  
*water system*

03

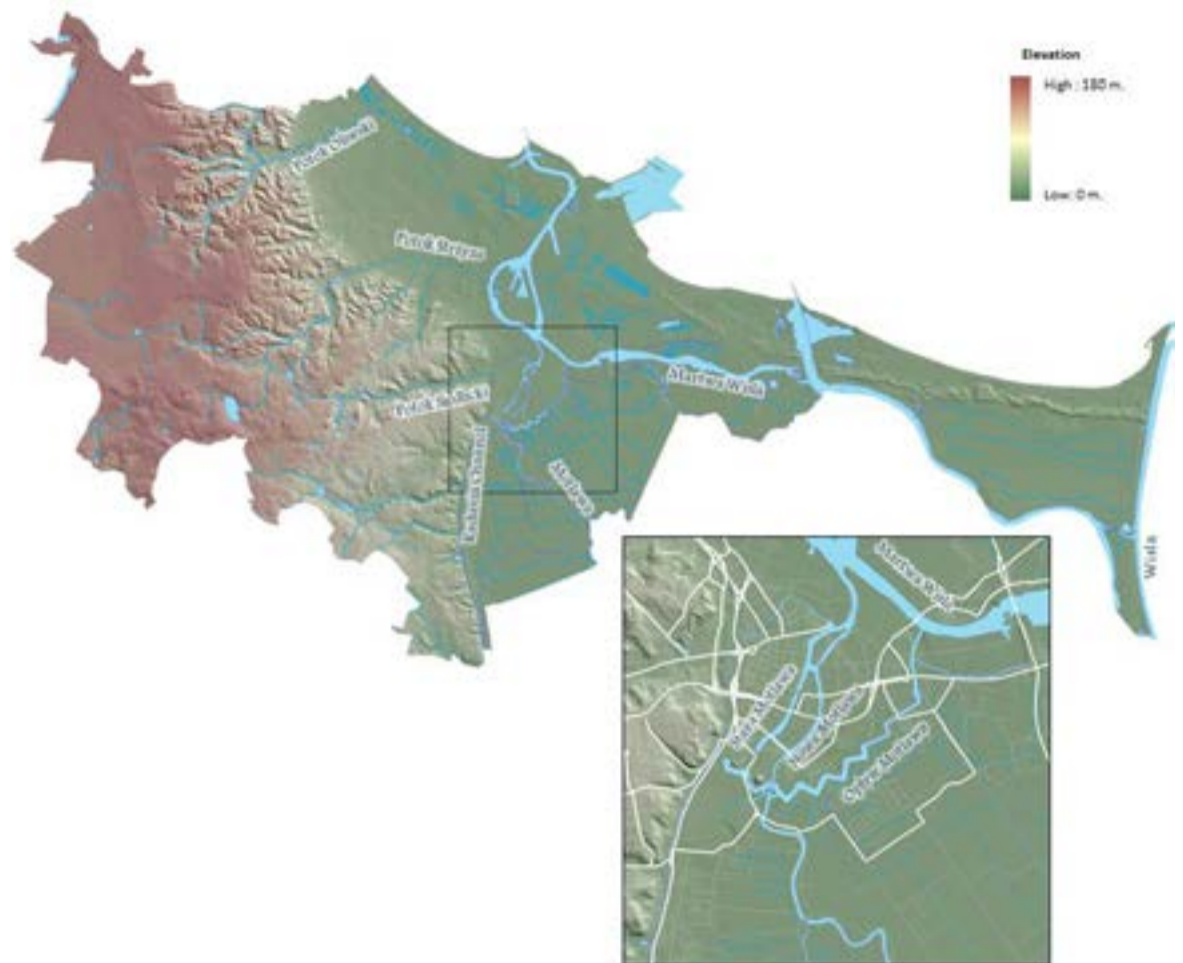
# 3.1. INTRODUCTION

Gdansk is situated in the delta of the Vistula river. In the North, Gdansk is bordered by the sea. To the Southeast lie the distinct polders of the Zulawy. The (South)western part of Gdansk lies on moraine hills. The Martwa Wisla has a special character as it has been cut off from the Vistula river yet remains in open connection to the sea and thus exposing this water to storm surge and salt water influences.

*Gdansk is a city with a strong water identity. The city is located on the transition between hills, polders, rivers and the sea.*

The following elements of the water system in Gdansk were identified and will be briefly described in this chapter:

- Fresh surface water;
- Sea water;
- Rain water;
- Ground water.



**Aerial Map: Gdansk and its waters**  
Source: ARCADIS



**Gdansk and its waters**  
Source: Field visit ARCADIS

## 3.2. FRESH SURFACE WATER

There is a very distinct difference between the polder area and the moraine hills. The flat and low lying polders have been under development from the 14th century onwards. This area consists of separate units, polders, where the (ground)water level is artificially controlled. Polder water management is aimed at optimizing agricultural production and at the prevention of flooding of the area by utilising dikes, ditches and embankments.

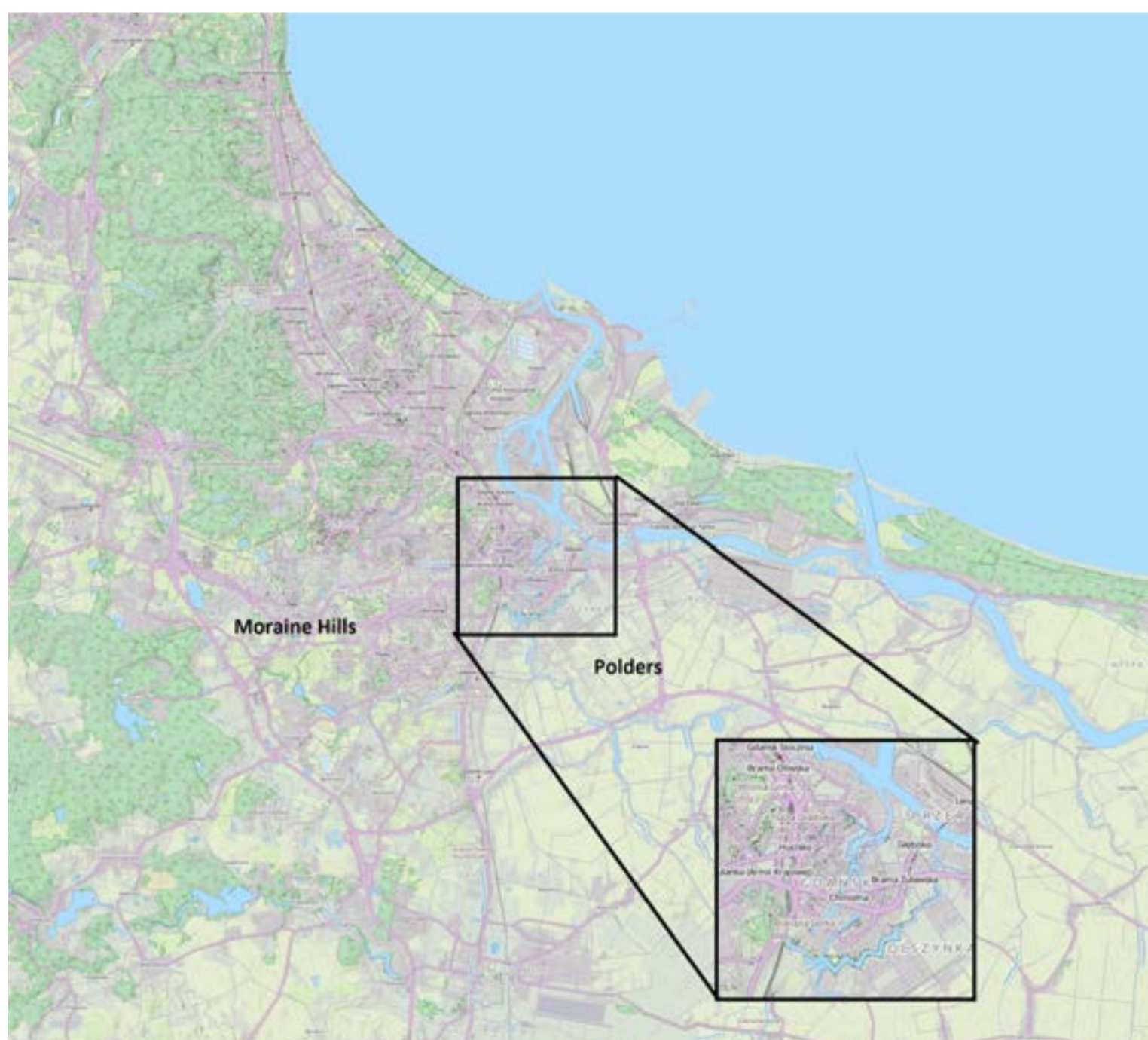
The moraine hills have a fundamentally different water system. These hills have a free drainage system. Historically these hills were covered by a mix of forests and pastures. In this natural situation rainfall was captured and (partly) stored in the green areas. Peak discharges were tempered by storage in vegetation. Nowadays urbanization occurs resulting in faster rainfall – runoff resulting in high discharge peaks. The construction of a storm water sewage system has resulted in less inconvenience due to inundation of the new urban areas. However the receiving systems are exposed to a more severe discharge. The failure of embankments on the canal Radunia in the year 2001 is at least partly due to this more severe discharge.

The fresh water system consists of the following distinguishable canals and rivers:

- *Coastal Radunia;*
- *The Martwa Wisla;*
- *Motlawa, including the branches in and around the historical center such as the Oplyw, Nowa and Stara Motlawa;*
- *Canal Kaszubski*

In addition there are also of course, the many smaller canals and ditches in the polders.

The canals around the historic Centre and the Martwa Wisla, being a more brackish water system, have an open connection to the sea as has the harbour. All of these fresh water and brackish water systems have their own history and characteristics. In addition to these water systems the moraine hills have natural streams and an artificial storm water sewage system.



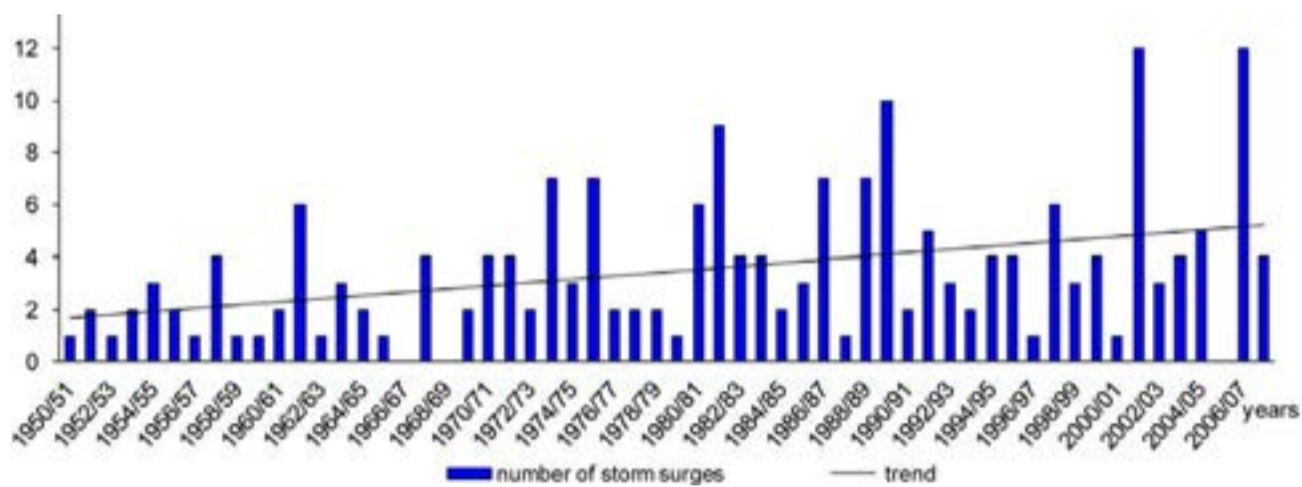
Elements of the water system in Gdansk  
Source: OpenStreetMap

## 3.3. SEA WATER

The Baltic Sea near Gdansk has a very limited tidal regime. The tidal range is on average limited to less than 10 cm (Tide Tables). The threat for Gdansk comes therefore from storm surges. These storm surges can cause setup up to 6.4 meters (local datum) which is around or somewhat over 2.5 meters above average levels. Alarm level is 5.7 m local datum.

Predictions show the sea level can rise this century between 0.2 and 0.8 meter. Sea level rise is partly compensated by eustatic rise of the land. Both future predictions and historical measurements show an increase in storm surge frequency and intensity.

Sea water quality is reasonable to good according to local measurements. Sea water quality is / can be threatened by discharge from rivers and the discharge of effluent waters. To prevent pollution, Poland has taken measures to limit the flow of polluted waters. The city of Gdansk has sewage treatment plants with high efficiency and is improving the storm water sewage systems to prevent polluted waters from reaching the sea. There is however an ongoing debate regarding the amount of pollution coming from farming. Poland's annual contribution to nitrogen and the phosphorus loads is significant, some sources report Poland contributes 30% to the total nitrogen and 37% to the phosphorus loads (2010 numbers, Baltic sea trends, Helcom).



Long term variation of number of storm surges in Świnoujście, 1955 - 2008 (from 1950/1951 to 2007/2008)

Source: TransNav, International Journal on Marine Navigation and Safety of Sea Transportation, March 2012, Storm-surges Indicator for the Polish Baltic Coast, Stanislawczyk, Institute of Meteorology and Water Management, Maritime Branch in Gdynia, Poland

## 3.4. RAIN WATER

Rainfall under normal day-to-day circumstances does not lead to any difficulties in the water system. In some places water can temporarily collect forming puddles. If the puddles are large or if the puddles exist for a longer period these can form a nuisance.

Under extreme circumstances rain can lead to problems with inundation. The polder area is sensitive to inundation when rainfall exceeds the design criteria. From ongoing analysis we know that the pumps and water system have enough capacity to prevent flooding for events more frequent than approximately once in ten years. However if urbanization occurs, the water system and the pump capacity have to be adjusted to this new form of land use.

The moraine hills have low storage capacity for rainfall. The build up of the subsoil results in

low infiltration and storage capacity. Ongoing urbanization will further decrease the storage capacity. The construction of storm water sewage systems will help to relieve the hilly area from inundations, but will also result in increased discharge peaks which have to be handled in the receiving waters.

Currently Gdansk experiences disruptions caused by rain water every few years. Further work is needed to decrease this nuisance and to improve the water safety of and for Gdansk. Part of the required work is already ongoing by way of the construction of storage basins. Furthermore, urbanization is not the only cause of pressure on the water system. Climate change will, in the long term, also result in more excessive rainfall. The current design criteria will have to be re-evaluated on their robustness against climate change.

## 3.5. GROUND WATER

When considering the groundwater in and near the city of Gdansk there are 2 main items which can cause concern:

1. *Groundwater tables, influencing crop production and inundations;*
2. *Quality of the groundwater, as it is the source of water for human consumption.*

Groundwater tables in the polders are controlled by the water system and pumps. These water levels are aimed at agricultural production. When a polder has a change in land use the water levels can and should be adjusted in such a way that the new function is adequately supported.

Groundwater tables in the hills cannot be artificially maintained / managed in the same way as in the polders. Local drainage and natural occurring streams, together with adequate

spatial planning, should be sufficient to avoid problems with inundation occurring from the groundwater.

Groundwater levels within the city of Gdansk can pose a problem. During the workshops and in bilateral meetings it was mentioned that low lying areas are prone to occasional ground water inundations. Climate change and the predicted sea level rise will worsen this problem.

Groundwater quality is more complex. Historically pollution of the groundwater system has occurred and there are indications that saline or brackish groundwater is protruding more landwards. Both phenomena can have an adverse effect on the availability and quality of water for consumption and in the long run salination of groundwater in the polders can lead to reduced crop harvests.

Flood caused by cloudburst in July, 2001



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ASTRA research project ©Wojtek Jakubowski/KFP



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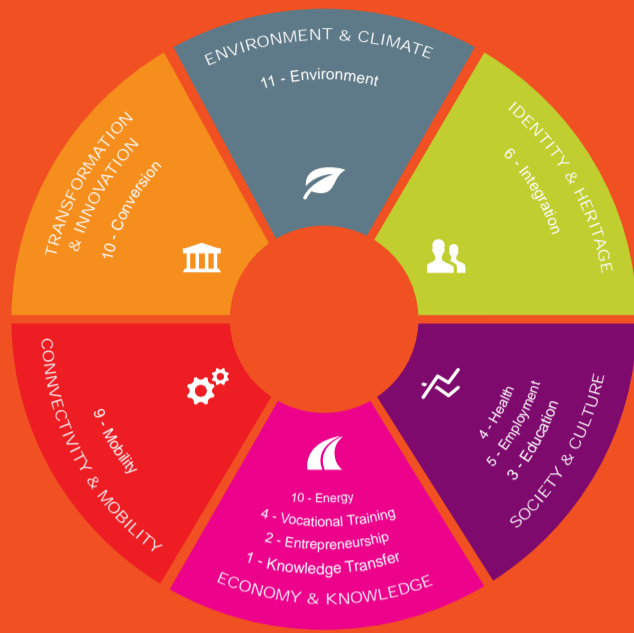
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# 26. - 28. MAY, 2014

HOSTED BY THE MUNICIPALITY OF GDANSK



Six urban water themes



During the first workshop the backgrounds of the project, the methodology and objectives of the Urban Water Strategy were discussed with a large variety of involved experts and stakeholders. First results of the inventory and analysis from urban and water perspective were presented, and during interactive sessions the participants gave feedback and suggestions for further deepening of the analysis.

Meetings and discussions took place in workshop settings and in individual meetings with Biuro Rozwoju Gdanska, where several urban perspectives of the city were discussed.



WODNA



**Participants**

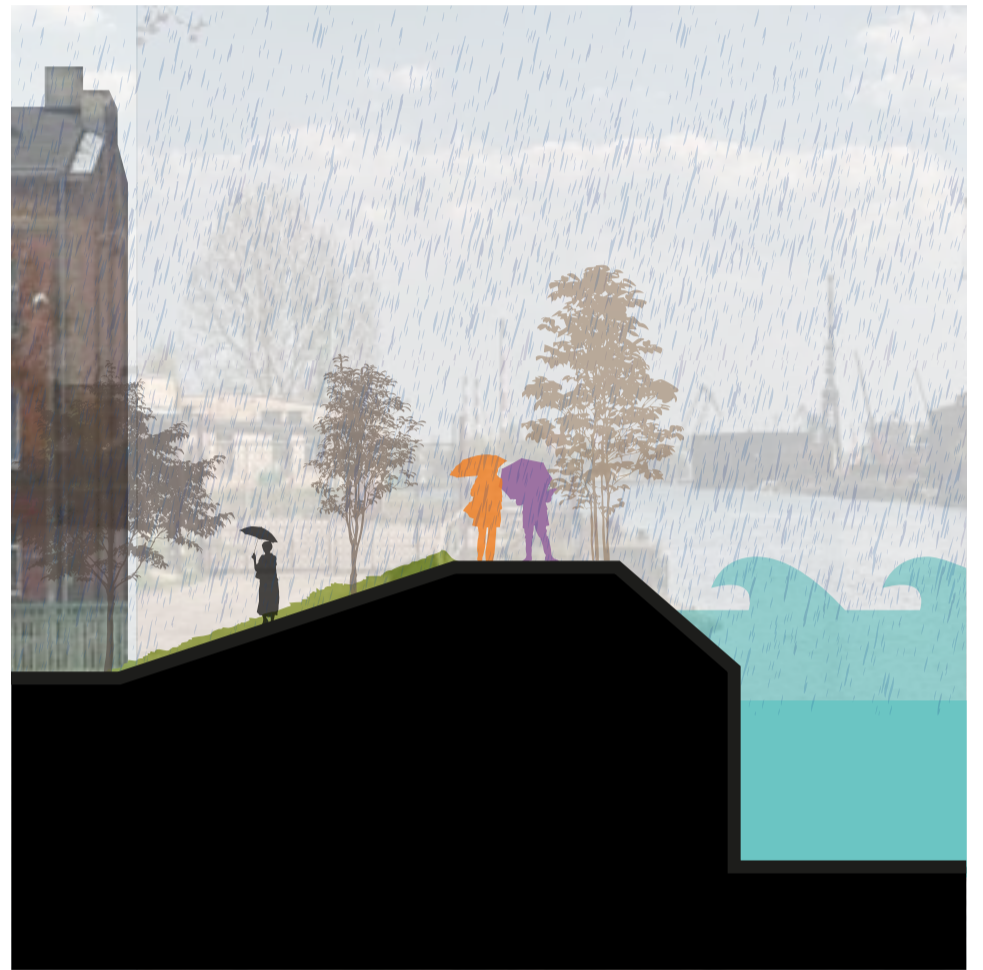




*ambitions for an  
urban water  
strategy*

## 4.1. THREEFOLD AMBITION

Based on the inventory and analysis of the opportunities, challenges, and of the characteristics of the urban and water related aspects of Gdansk, the ambition for the Urban Water Strategy has been defined. The purpose of these ambitions is to clearly state for what long term objective water can be used for the benefit of the City of Gdansk. These ambitions are guiding in further decision making within this strategy.



### 4.1.1. MAKING GDANSK CLIMATE RESILIENT AND FLOOD PROOF

The ambition to achieve a climate resilient and flood proof city has large benefits for especially the safety of people and property in the future. Thereby it improves a secure environment for living and investing in Gdansk.

- *Prevents large (financial/economic/social) damage as result of floods;*
- *Creates pleasant urban micro climate within city;*
- *Improves healthy city environment;*
- *Creates security for investments due to higher safety for floods.*

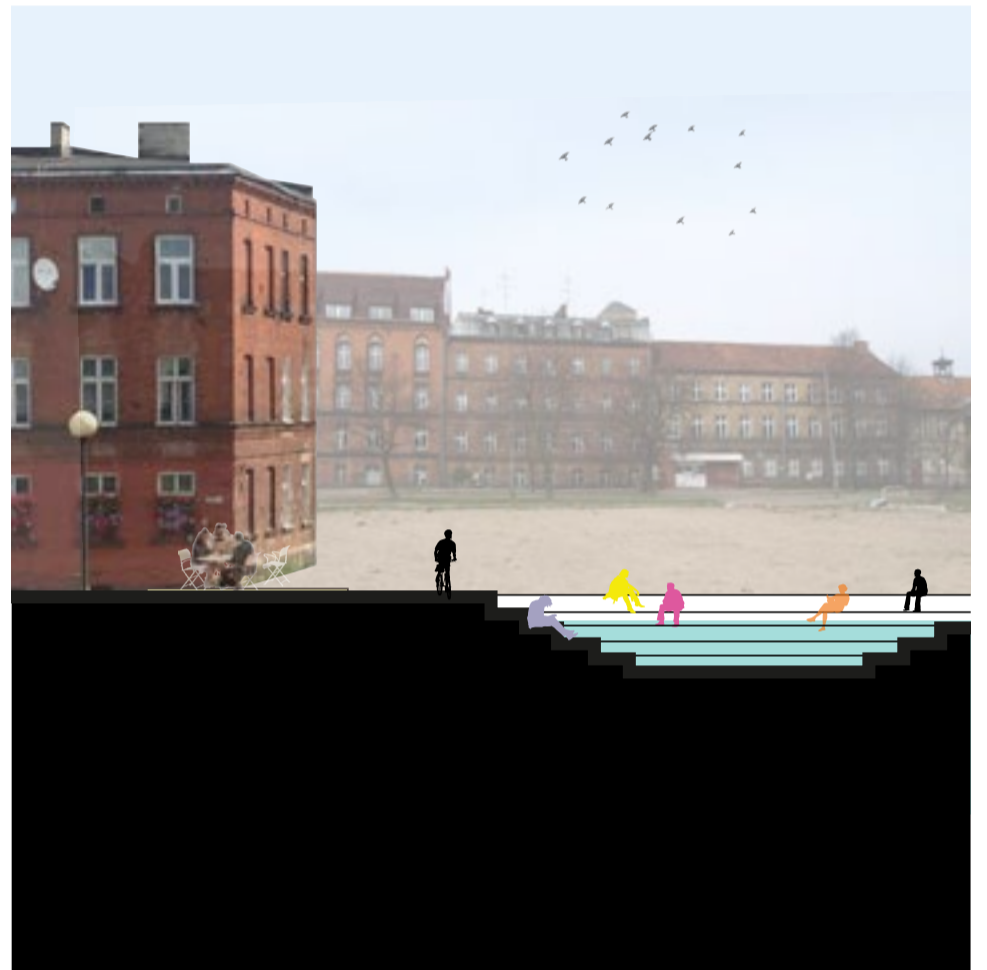




#### 4.1.2. INCREASING THE URBAN QUALITY OF GDANSK

The overall quality and attractiveness of the built and un-built environment of the city is of great importance to the well-being of the citizens of Gdansk. A high level urban quality strengthens identity and creates an excellent and competitive image of the city for visitors and investors.

- *A beautiful city increases civic pride of Gdansk citizens;*
- *Improves the living quality of citizens;*
- *Urban biodiversity and natural values can be strengthened;*
- *Increase the value of the real estate;*
- *Creating quality can decrease negative migration and attract new citizens;*



#### 4.1.3. INCREASE THE SOCIO-ECONOMIC STRENGTH OF GDANSK

To increase the prosperity of its citizens it is important to live in a stable society with a strong economy. In Gdansk, old economies are changing to new modern economies that have a different relationship with water. Not only water related (heavy) industries are important, but more and more knowledge driven economies are entering the city. In order to secure a long term sustainable development these require a high level living quality. Water inside the city can be used to create attractive leisure and living areas, support green water transport and contribute towards a healthy environment.

- *Creates attractive urban environment and conditions for new businesses;*
- *Improves competitiveness of Gdansk with other cities;*
- *Results in a stable society;*
- *Add value to the level of prosperity and well-being.*







# *urban and water recommendations*



## 5.1. LOCATION SPECIFIC STRATEGIES

The ambitions that are defined in the previous chapter are generic objectives for the City of Gdansk as a whole. They describe how water can be approached and used within the city.

However, more concrete recommendations and suggestions have to be made that indicate by what means these ambitions can be realised. Because these recommendations react and anticipate on the existing circumstances, they vary for different areas and locations within Gdansk. For some areas different recommendations have to be made, than for others. Therefore the Urban Water Strategy requires location specific solutions.

In this chapter location specific recommendations are made to realize the set out ambitions.

In the next paragraph recommendations are made on how water can be used to strengthen the urban characteristics of Gdansk. These holistic recommendations integrate the use of water for Environment & Climate, Identity & Heritage, Society & Culture, Economy & Knowledge, Connectivity & Mobility, and Transformation & Innovation.

The following paragraph focusses on specific hydrological recommendations to increase the flood safety of Gdansk.



## 5.2. URBAN RECOMMENDATIONS

### 5.2.1. DEVELOP A COMPACT CITY

#### **CREATE A LIVELY AND VIBRANT CITY CENTRE**

The historical city centre of Gdansk has the potential to be the lively and vibrant heart of the city where people meet, cultural institutions gather, commercial and public facilities are located, and tourists come to enjoy history. By increasing the number of residents and by stimulating a variety of functions in the centre, the risk that the centre will become more and more desolated, may be avoided. Water can play an important role in increasing the city centers attractiveness.

#### **PREVENT URBAN SPRAWL**

Adopting a compact city approach (that focusses development in the central part of the city) can prevent further urban sprawl. This would reduce the problems that coincide with urban sprawl such as the reduction of rain water infiltration capacity (by increasing urbanization) that causes flooding hazards in these areas.

#### **REDUCE TRAFFIC CONGESTION**

Concentrating further urbanization in the city centre will also have positive effects on the reduction of traffic congestion between the urbanized areas on the moraine hills and the city center.

#### **PRESERVE SURROUNDING LANDSCAPES**

The highly attractive surrounding landscapes are an important asset to the people of Gdansk. By concentrating urbanization in the central areas of the city, these surrounding landscapes have higher chances of being protected from urbanization and other functions that would harm their ecological and natural values. Preserving the surrounding landscapes will avoid a further decrease of rain water retention capacity.

### 5.2.2. INCREASE GREEN/ BLUE TRANSPORT

#### **INCREASE WATER TRANSPORT**

Gdansk has an open water system with excellent opportunities for use by environmentally friendly and efficient water transport systems. Public water transport services could even be extended towards as far as Sopot and Gdynia, but also for touristic purposes within the city. These measures would further strengthen the image of Gdansk as a 'water city'.

#### **EMBED ROADS IN GREEN ZONES**

By embedding the main roads of Gdansk in green zones, the urban attractiveness of the city and rain water retention capacity would further increase. These green zones can function as water retention areas in times of intense rain fall to absorb precipitation and avoid floodings. They will also strengthen the green network resulting in higher biodiversity and environmental quality.

#### **DOWNGRADE ALEJA GRUNWALDZKA TO PARKWAY**

In the current situation the Aleje Grunwaldzka (/Aleja Zwycięstwa) is primarily a traffic transportation road. Due to its central location, the liveability of the city would benefit significantly if this main artery would have a more attractive characteristic. The completion of the city ring, would increase possibilities to downgrade this traffic transportation road to a more attractive parkway.

### 5.2.3. USE WATER!

#### **TO INCREASE URBAN QUALITY**

Open waters are present in many variations and on many locations within Gdansk. Sea, rivers, canals, basins and streams offer excellent opportunities to increase the living quality in Gdansk. The aesthetic values as well as the functional values of these waters can be used for the benefit of the people and nature of the city.

#### **TO SUPPORT BLEU TRANSPORT**

The open waters within the city, and sea connecting tri-city, can be used for convenient, attractive, efficient and clean transportation.

#### **TO STRENGTHEN THE IDENTITY OF GDANSK**

Bringing back water to the cityscape, and in the hearts and minds of the people of Gdansk will strengthen identity and image of the city. The historical connection of Gdansk with its waters can be restored and made visible again to citizens and visitors.

#### **TO INCREASE ECOLOGICAL AND NATURAL VALUES**

The water network of river, streams and canals also functions as an ecological network for migrating species of flora and fauna. Extending and developing this network can have large benefits for the ecological and natural values within and surrounding the city.



## 5.3. HYDROLOGICAL RECOMMENDATIONS

### 5.3.1. INTRODUCTION

Gdansk is a city that lives with water. Historically the city has benefitted from its ideal location at the mouth of the river Vistula, evidenced by the beautiful historic warehouses in the city center, the modern seaward terminals and all in between. In the future the city can further benefit from its location and identity as a city that lives with water.

Living with water also has its risks. Historically, currently and in the future. Historically these risks were accepted as a part of living in such a location. In recent times increased urbanization, increased wealth, technological advances and more informed and demanding citizens has led to a decreased acceptance of hindrance due to water. To ensure that in the future the risks and hindrances that water can cause are minimized the following three major pressures on the water system were identified and analysed:

- Storm surge;
- Rainfall runoff;
- Groundwater.

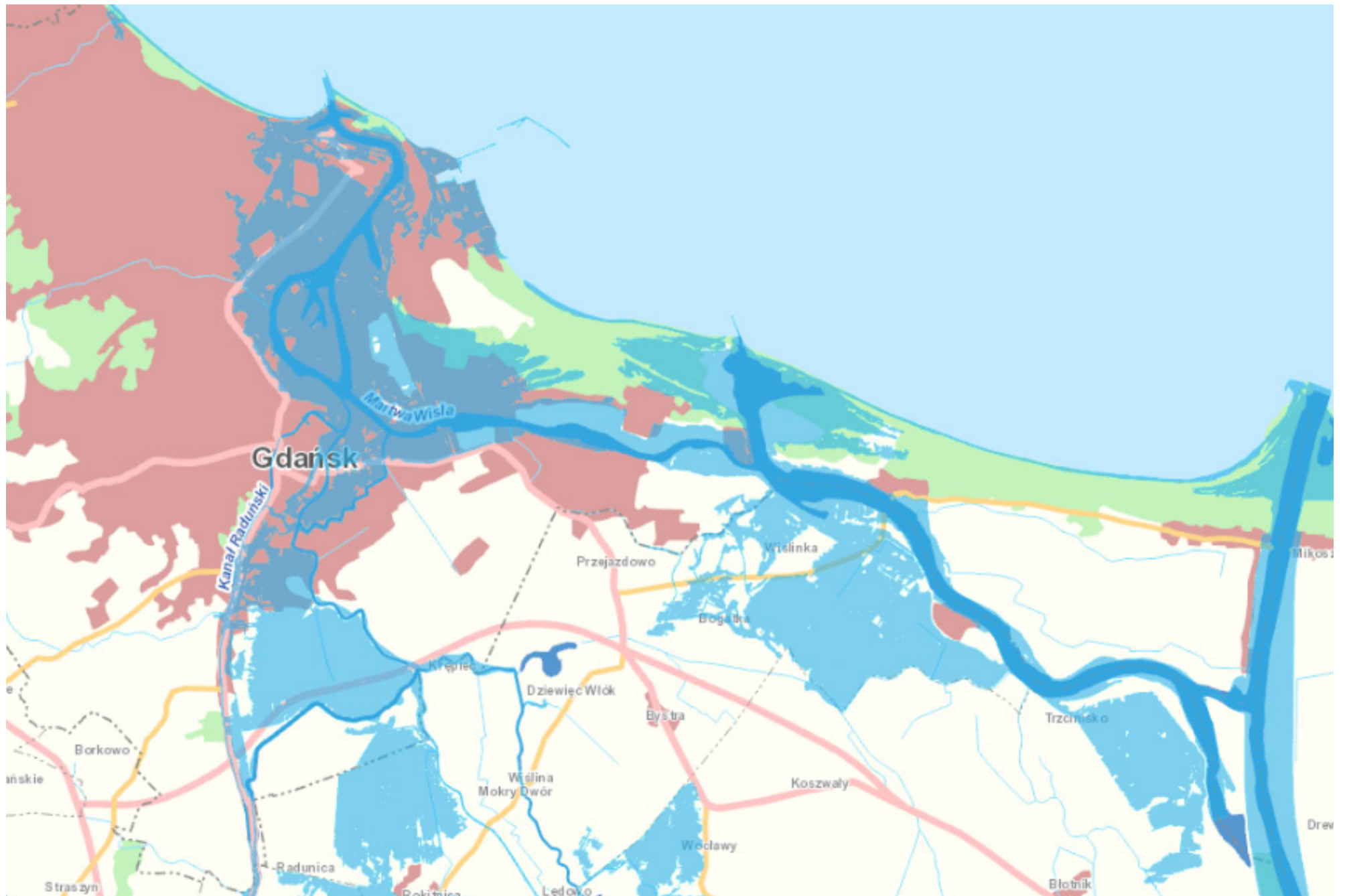
### 5.3.2. STORM SURGE

For large parts of Gdansk the main challenge is storm surge from sea. Gdansk is a city with many activities and a lot of people living on the edge between land and water. These activities have developed around the rivers Martwa Wisla, Stara Motlawa, Nowa Motlawa and the Motlawa Moat and along the coast line. Together this creates an extensive boundary of land and water on which storm surge can have an effect.

Storm surge becomes a serious issue when the increasing pressure from sea becomes a threat to areas with insufficient protection and of certain value. In the following zones flooding due to storm surges can be such a serious issue:

- Coastal zone;
- Industrial seaward terminals;
- Older industrial sites;
- Redevelopment sites;
- Petrochemical plants;
- Historic center.

In these zones rainwater, fresh water and groundwater are either not an issue or only a challenge in combination with storm surges. Model results from the ISOK project show inundation of waterfronts along all the rivers connected to the sea (see map below). Furthermore coastal beach areas are vulnerable to the storm surges.



ISOK Flood model (1/100 year)  
Source: <http://mapy.isok.gov.pl/imap/>

## COASTAL ZONE

### CHARACTERISTICS

A large part of the coast line of Gdansk consists of natural sand beaches forming the boundary from land to the shallow waters of the Gdansk Bay. The beaches are vulnerable to storm surges because they are relatively narrow and could be depleted of sand. Natural regeneration of beaches following such an event would take a long time, because of the low energy system in this part of the Baltic Sea. Reconstruction will speed up the reestablishment of the beaches, but would imply at least one season with machinery on the beaches limiting their use for tourism and recreation. Regardless of the recovery, damages to the coastal zone will lead to economic losses.

### CHALLENGES

The predicted increase in intensity and frequency of storms, coupled with sea level rise will increase the risks of beach and dune erosion. An exceptional storm could cause problems in the near future and the risk will increase in time. The occurrence of such an event will have an adverse effect on tourism and recreation, which are two important sources of revenue and that also increase the value of this land.

### URGENCY

For this zone it is urgent to prevent 'lock in', i.e. creating a situation which cannot be resolved later or otherwise will be very (prohibitively) expensive to do so. Taking preventive measures is a mid-long term urgency, but it is the making of decisions in the short term that will ensure these preventative measures can be taken in the future. Part of this process is to evaluate the changes that further development of these areas will entail and to block developments that make necessary future measures impossible.

### RECOMMENDATIONS

To prevent 'lock in' there is need for a spatial plan and a financial plan. These plans together should lead to legislation and guidelines which will facilitate future technical measures. (See recommendations in table 1.)



Coastal Zone in the Tri-City  
Source: Field visit ARCADIS

**TABLE 1: RECOMMENDATIONS FOR THE COASTAL ZONE**

<b>TECHNICAL</b>	Preventive beach restoration and sand supplementation, which can be more cost effective and less intrusive than repairing damage.
<b>STAKEHOLDER INVOLVEMENT</b>	Create awareness with owners and project developers of hotels and other tourist facilities whilst also developing and enforcing building regulations aimed at preventing damage to buildings and infrastructure.
<b>PLANNING</b>	It is advisable to start policy development and financial planning should be started in short term, depending on available research and validity.
<b>FINANCIAL</b>	Reserve budgets for the proposed technical measures.

## INDUSTRIAL SEAWARD TERMINALS

### CHARACTERISTICS

These terminals are recently developed and development plans for new terminals exists. The need for seaward terminals stems from larger cargo ships and insufficient space in the existing port. Seaward development gives advantages of ease of use and sufficient space. These terminals are designed according to recent insights and can be considered safe for a 1/100 year storm surge.

### CHALLENGES

The seaward terminals are modern and high enough to withstand most storm conditions. The point of focus for this area is where the jetties meet land. Here inundation occurs in a once in ten year situation.

### URGENCY

These areas need to be kept in mind as damage to them will lead to significant losses, but are not a short term priority.

### RECOMMENDATIONS

To ensure the functionality of the jetties during a storm an access route in case of flooding could be constructed. (See table 2 for recommendations.)



**Industrial Seaward Terminals**  
Source: RZGW Gdansk

**TABLE 2: RECOMMENDATIONS FOR THE INDUSTRIAL ZONES, REDEVELOPMENT AREAS AND THE HISTORIC CITY CENTRE**

<b>TECHNICAL</b>	Depending on chosen alternative 1. Storm surge barrier 2. Separate measures consisting of dikes, embankments, flexible barriers & adaptive building
<b>STAKEHOLDER INVOLVEMENT</b>	Depending on chosen alternative 1. Funding, maintenance to be decided upon by National government, Harbour authority, Marine office, main industrial industries as most important stakeholder 2. Project developers, Municipality, governmental organisations, RZGW It is important to create a RACI (Responsible, Accountable, Consulted, Informed) table for stakeholder analysis.
<b>PLANNING</b>	Planning is urgent as the legislation will be/is active from 2015. The problem has been known since 2009 when the ISOK results were published. It is unclear if municipalities and / or governmental organizations, such as RZGW, could be held liable for damage due to inaction or whether or not there is an action plan available in 2015.
<b>FINANCIAL</b>	Preliminary investigation in damages ranges from 400 mln. PLN for 1/10 to upward of 1,3 billion PLN for the 1/100 year situation. Statistically the expectancy value of damages for a 100 year period is above 1,3 billion PLN. It is important to assess the financial possibilities in the short term and implement these in a plan.

## OLDER INDUSTRIAL SITES

### CHARACTERISTICS

North of the historic city centre is the old harbour stretching all along the Martwa Wisla. Development here started when economic prosperity grew and there was not enough room within the historic centre. These areas along the river were often low lying. This can still be seen as the waterfronts appear to be only 1.5- 2.0 meters above mean sea level, therefore making flooding in this area very likely.

### CHALLENGES

The ISOK results show parts of the waterfronts in the old harbor have a 10% chance of flooding annually, while many other parts in this area have a 1% chance of flooding. In recent times the functionality of this part of the city is changing from the predominantly industrial use to a more living and office type area. This change also instigates increased capital on these waterfronts, which will increase the economic necessity for flood protection.

### URGENCY

Due to the increased risk of storm surges and the increase in value, this zone is subject to a short term, immediate threat. Based on the flood maps and damage this should be a priority area.

### RECOMMENDATIONS

For this area technical measures in the short term are a necessity. Technical measures together with redevelopment plans will provide legal safety and improvements in living standards. (See table 2 recommendations.)



Older Industrial Sites  
Source: Field visit ARCADIS

## REDEVELOPMENT SITES

### CHARACTERISTICS

The redevelopment areas are spread throughout the city. The sites are partly older industrial areas with a direct relation with water or older residential areas.

### CHALLENGES

The ISOK results show that large parts of these areas have a 10% chance of flooding annually, while many other parts in this area have a 1% chance of flooding. These results show the area as it was and not how it will be and therefore developments including measures to prevent floods may change the chance of flooding.

### URGENCY

Due to changing laws and regulation this is a short term urgency. New national laws prohibited development in areas which are prone to flooding and could therefore halt further development.

### RECOMMENDATIONS

For this area technical measures are a necessity in the short term. If the technical measures can be implemented in the redevelopment plans then these can provide the legal safety and improve the living standard, but in other situations the technical measures must be built around these areas. Alternatives could be adaptive building, such as buildings built above the maximum water level. (See table 2 for recommendations.)



Redevelopment Sites  
Source: Field visit ARCADIS

## **PETROCHEMICAL PLANTS**

### **CHARACTERISTICS**

In the industrial areas along the Martwa Wisla to the east of the historic city centre, the petrochemical plants appear to be better protected to flooding. Under European law these sites need to be protected from flooding to prevent major environmental damages and the sites appear to meet these requirements.

### **CHALLENGES & URGENCY**

The ISOK results show no inundation however, these areas do need to be kept in mind as damage to them will lead to significant losses. They are classified as not a short term priority.

### **RECOMMENDATIONS**

For this area there are no specific recommendations.

## **HISTORICAL CENTRE**

### **CHARACTERISTICS**

In the historic city there are many clues that point out that the city was built to co-exist with occasional high water levels. The historic part of the city was built with high quays and the historic buildings in the vicinity of the waterfront have high windows and entrances to prevent the ground level floors of these buildings from being inundated. Occasional inundation was accepted. This acceptance has diminished mainly due to increasing capital. Modern day cellars are now used as home-offices, storage, kitchen area for restaurants, etc. and on the streets are cars. Understandably, citizens do not wish these assets be damaged by floods and will demand decisive action from governments if this does happen.

### **CHALLENGES**

The numerical simulations show limited inundation during the 1/10 year storm and severe inundation in the 1/100 year situation. National implementation of the EU Flood directive can / will cause spatial planning restrictions and will hinder development of the areas marked as “at risk” for flooding during storm surge.

### **URGENCY**

Due to the increased risk of storm surges and the increase in value this zone is a short term, immediate threat. Based on the (ISOK) flood maps and damage this should be a priority area.

### **RECOMMENDATIONS**

In this area it is possible to take technical measures to protect the area, but it is also possible to implement adaptive building when redeveloping. It is also possible to implement temporary barriers which will help retain the characteristics of the historic centre. (For further recommendations see table 2.)

## **CONCLUSIONS**

### **RECOMMENDATIONS FOR PROTECTION AGAINST THE MAIN RISKS OF FLOODING BY STORM SURGE**

In all above mentioned areas it is important to prevent “lock in”. As the future changes in sea level and return period of storm surges are uncertain, it is best to take into account the worst case scenario, but take measures for the current situation including all certain future changes.

For the industrial zones, redevelopment areas and the historic city centre there are two main alternatives to choose from, as inaction is not

an option under developing legislation. The first alternative is to develop a storm surge barrier which will protect the whole build-up area of Gdansk. The second alternative is to develop a sequence of local measures which will lead, in time, to protection of the areas sensitive to inundation. Each alternative has different advantages and disadvantages. In table 2 the recommendations are split per alternative if the recommendations differ. In the next chapters the two alternatives will be further explained and assessed on their feasibility.



**Petrochemical Plants**  
Source: RZGW Gdansk



**Historic Centre**  
Source: RZGW Gdansk

### 5.3.3. RAINFALL RUNOFF

The 2001 urban flash flood was due to an extraordinary intense precipitation, the intensified peak flow and the limited conveyance of the Canal Radunia. On the 9th of July in that year intense precipitation was 120 mm. Peak flow during 4 hours into the Canal Radunia was estimated to be 100 m<sup>3</sup>/s which far exceeds the 20 m<sup>3</sup>/s channel conveyance. This led to 5 breaches in the Canal Radunia and estimated losses of \$50 million.

Flash floods in general are caused by a combination of an intensive precipitation event, rapid accumulation of water and the inadequate capacity to store and discharge these peak volumes. An analysis of the rainfall data for the years 1951 to 2008 by Woloszyn (2009) revealed that during these years the average rainfall increased by 18%. Further changes in the future are difficult to predict. For the Southern Baltic Sea, modelled average summer precipitation will likely decrease, but with an increase in extreme precipitation (Helsinki Commission, 2013). Therefore it is difficult to say how often the extreme situation capable of causing flash floods in Gdansk will occur.

The other two factors in flash floods, rapid accumulation of water and the inadequate capacity to discharge these peak volumes, are different per area. Areas close to the large open water bodies (Martwa Wisla and Baltic Sea) are less vulnerable as the precipitation can quickly be discharged to these water bodies. The main areas vulnerable to flash floods are the moraine hills, which we divide in two areas: slopes and plateau, Canal Radunia and the polder.

#### MORAINE HILLS – SLOPES

##### CHARACTERISTICS

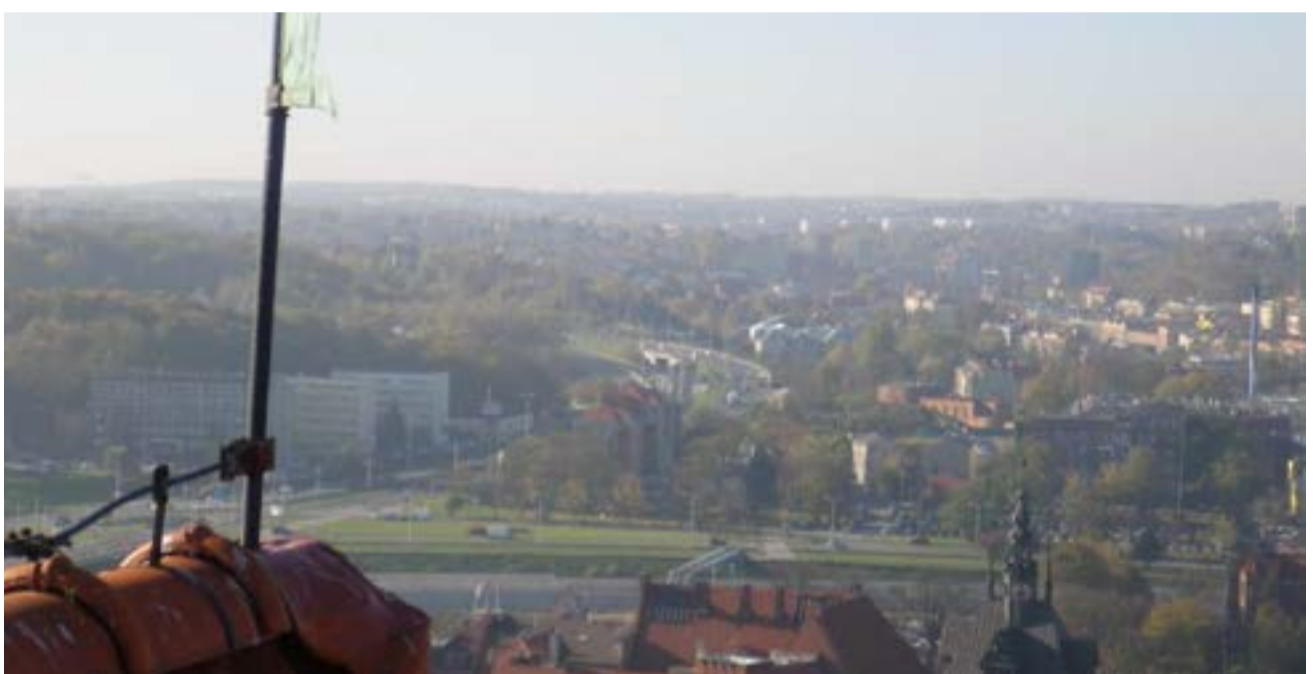
The moraine hills lie in the Southwest of Gdansk and are an increasingly urbanized area. There are two sub-areas, the slopes and the plateau, of the moraine hills. The slopes are steeper, more urbanized and land is more expensive than on the plateau.

Both areas are prone to flash floods due to the terrain, torrential rains and the urbanization of this area. These areas stand apart from the other zones, because they are not vulnerable to storm surges due to their elevation.

##### CHALLENGES

The water system in this area has been put under increasing pressure by the developments in the area. This pressure is predominantly caused by the increased peak flow of rain water discharge, the limited capacity of the sewage system to process this increased peak volume and the limited conveyance of the discharge receiving channels.

In the pre-urban period of this area, the discharge after rains would be gradual, strongly buffered by the retentive capacity of the natural ecosystem.



**Moraine Hills**  
Source: Field visit ARCADIS

After the developments which have occurred in the last century the natural ecosystem has (partially) been replaced by infrastructure and buildings. These structures have always been built to quickly discharge rainwater to the sewer system resulting in a quick and high volume peak in runoff to the sewer system.

The sewage system was not built for these volumes of flow. Development of Gdansk in this area was a gradual process. This resulted in a gradual increase in the waste water discharge. The first sewage systems were not designed and dimensioned to cope with amount of waste water produced by this area in its current state, but for the state of the area as it was in, in that time. Further development of the area created further demand for sewage. These new systems were then attached to the older system, exceeding the capacity that it was designed for.

During rainfall the natural streams, the storm drainage system and hardened surfaces that facilitate sheet flow, quickly discharge to receiving channels (such as Canal Radunia). In Gdansk the inflow to these channels exceeds the capability of these channels to convey this volume. Although this naturally occurs in rain fed streams and channels, the extent of the situation

is increased due to the intensified peak flow, but also strongly by the encroachment due to developments in this area.

##### URGENCY

The city of Gdansk has already implemented and planned measures to decrease the flood effects or prevent floods altogether. In the moraine hills, retention basins are a primary measure to decrease peak flow. Many retention basins have already been realized, while others are planned to be built, mainly on the plateau. Although adding retentive capacity is a durable solution, the prices of land in this area are increasing. This leads to these measures being effective but decreasingly budget efficient.

A second measure by the city of Gdansk is to ensure the runoff per allotment does not increase. In 2001 the percentage of runoff per allotment was defined and this amount was then determined to be the maximum percentage of runoff from the allotment. Changes to the allotment, such as developments, may not increase the runoff percentage. Although this is a decent measure, it became clear during the first workshop there are difficulties in enforcing this regulation.

The feasibility study “Protection of Gdańsk Bay waters – the construction and modernization of rainwater drainage system in Gdańsk”, proposes measures to improve flood safety. This feasibility study is mostly aimed at increasing the water quality and it can be debated if the measures proposed to increase the quality will improve the distribution of water quantity.

**RECOMMENDATIONS**

In this area there are many different stakeholders, including all private home owners. Involving all these stakeholders is the first step to success. By creating awareness and activation more knowledge and financial means can become available. This will also facilitate stricter enforcement of regulations that aid flood prevention. (See recommendations in table 3.)

**PLATEAU**

**CHARACTERISTICS**

The plateau of the moraine hills is less urbanized and less steep than the slopes. Runoff from this area is therefore less immediate.

**CHALLENGES**

Further urbanization of this area will lead to more hardened surfaces and thus to increased peak flow during rainfall events. The retention basins built in this area will not be able to hold increased peak flow and discharge.

For further development in this area the city of Gdansk has already imposed strict regulations to minimize the effect on the water system. This has led to a halt on certain development plans from contractors. The challenge is the inequality in enforcement of the regulations as this only occurs in this area.

**URGENCY**

Similar to the moraine hills slopes, this area has already implemented and planned measures. If further urbanization can be halted or if the effects of urbanization can be mitigated, then this area itself has no urgent needs. It may be possible and most likely also cheaper, to implement measures in the plateau which decrease the flood risk on the slopes and Canal Radunia.

**RECOMMENDATIONS**

As in the moraine hills slopes, this area has many stakeholders to involve and to activate. Making these stakeholders aware of the issues can facilitate taking measures and the acceptance of stricter enforcement of regulations. (See recommendations in table 3.)

**TABLE 3: RECOMMENDATIONS FOR THE RIVER APPROACH FOR THE COASTAL ZONE**

<b>TECHNICAL</b>	Retention basins, Realize more retention in public areas
<b>STAKEHOLDER INVOLVEMENT</b>	Creating awareness Activation of inhabitants Regulation
<b>PLANNING</b>	Current planning
<b>FINANCIAL</b>	Additional funds needed for development of retention in public areas. Investments are minor compared to current program

## CANAL RADUNIA

### CHARACTERISTICS

Canal Radunia is an artificial channel made to drain the polder and to supply water to Gdansk. It is fed by small natural streams from the moraine hills. It has an estimated maximum discharge capacity of 20 m<sup>3</sup>/s.

### CHALLENGES

During the 2001 flash flood Canal Radunia was incapable of conveying the discharge from the streams, storm water and overland flow which accumulated to an estimated 100 m<sup>3</sup>/s. As a result, Canal Radunia breached at 5 places flooding the area East of the channel.

An important conclusion from the 2001 floods is that the conveyance of Canal Radunia needs to be increased (Majewski, 2008). According to Majewski (2008), this proves to be difficult because Canal Radunia is a technical monument. If this is the main restriction, it is advisable to debate what is more important for the city of Gdansk. Of greater short term importance is to stop blocking the Canal Radunia during construction. If the Canal Radunia is blocked during a torrential rainfall event, then the consequences could exceed those of 2001.

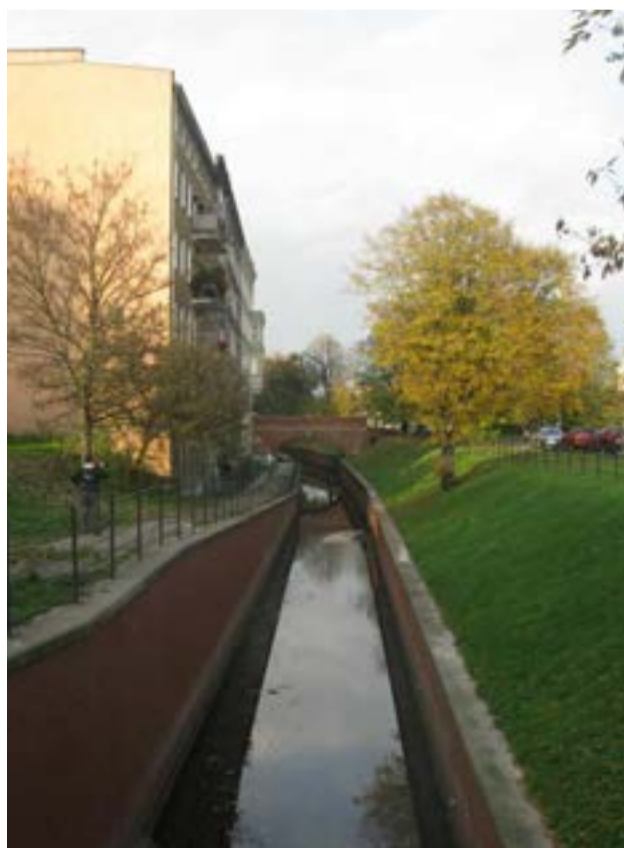
The overflow to the Motlawa Moat can provide relief but the grid iron in front of the valves can cause congestion when clogged by litter (branches, garbage, leaves, etc.)

### URGENCY

The inadequate discharge capacity of the Canal Radunia is a short term issue. Although the rainfall event in 2001 was exceptional, increased urbanization can ensure a repeat of the floods can happen with less rain.

### RECOMMENDATIONS

To avoid a repetition of 2001 flood, constructing extra valves in the canal to the Motlawa Moat can relieve the system sufficiently if the maintenance is done regularly. Advanced analysis of the canal discharge capacity in relation to future loading during heavy rainfall events can clarify the dimensions that are necessary.



Canal Radunia  
Source: Field visit ARCADIS

## **POLDERS**

### **CHARACTERISTICS**

The rural zone currently is best equipped to cope with the water related issues. The polder area in the South East of the city is a manmade area designed for agricultural use and controlled regulation of the water levels. This zone is defined by the problems related to groundwater. The short torrential rains will not affect this area directly as the buffering capacity of this system is adequate. Limited inundation of this area is possible, but the inconveniences will be small. Flooding is possible, as seen in the 2001 flood event, when the discharge capacity of Canal Radunia is insufficient. In that situation the surplus discharge will over flow into the adjacent polder.

### **CHALLENGES**

Momentarily the polder area has no challenges with rainfall runoff. Polders could provide a sound alternative for building in the moraine hills area as the polders are manmade and developed to cope with water. The polder drainage system including the pumping capacity has to be upgraded to compensate for the accelerated rainfall runoff from roofs, roads and other hard surfaces.

### **URGENCY**

This area is not an urgent issue as long as there are no changes to the land use.

### **RECOMMENDATIONS**

From a hydrological perspective this area could be a possible alternative to building on the moraine hills Plateau. Development here would not increase flood risks and the need for holding water per allotment is not necessary.



**Polders**  
Source: RZGW Gdansk

**TABLE 4: RECOMMENDATIONS FOR THE POLDERS**

<b>TECHNICAL</b>	None needed at the moment, but in case building plans are introduced the water system will have to be adapted.
<b>STAKEHOLDER INVOLVEMENT</b>	Only necessary in case there are ambitions to develop this area.
<b>PLANNING</b>	Only necessary in case there are ambitions to develop this area.
<b>FINANCIAL</b>	Only necessary in case there are ambitions to develop this area.

### 5.3.4. GROUNDWATER

The quality of the groundwater is an issue in this area, but since it is not the most urgent water issue in Gdansk, and because it is also not solved on a spatial scale, we will not further digress on this subject.

#### GROUNDWATER LEVELS WITHIN THE CITY BOUNDARY

##### CHARACTERISTICS

The city of Gdansk has low lying areas with an altitude just above current sea level. Especially in the northern part of Gdansk.

##### CHALLENGES

Groundwater levels within the city of Gdansk can pose a problem. During the workshops and in bilateral meetings it was mentioned that low lying areas are prone to occasional ground water inundations. Climate change and the predicted sea level rise will worsen this problem.

##### URGENCY

As the situation occurs infrequently and is partly coupled to storm surges, the urgency of this problem is low to average. With rising sea levels due to climate change the problem will worsen.

##### RECOMMENDATIONS

This problem can be tackled by installing a control system for groundwater levels in correspondence with the existing polder systems east of the city. In a concrete sense this means installing surface drainage and tube drainage controlled by a pumping station.

#### INFILTRATION AREAS

##### CHARACTERISTICS

The moraine hills provide an infiltration area. The water infiltrating in these hills will flow in the direction of the polder areas and the sea. The build-up of the sub soil is very complex with an alteration of permeable and non-permeable layers. This makes the analysis and modelling of groundwater flows very complicated.

Due to the occurrence of a waste disposal site a pollution plume is present in the groundwater system. This plume is considered to be a possible future problem for drinking water extraction from the groundwater system.

##### CHALLENGES

Although the exact groundwater flows are difficult to calculate, available studies show that contamination in the moraine hills just west of this area will flow here due to the subsoil topology.

##### URGENCY

The advance of the pollution plume is reported as slowly proceeding. This makes this threat less urgent.

##### RECOMMENDATIONS

The pollution is coupled to waste disposal site(s) and the pollution plume is extending. In situ cleaning of groundwater is possible in theory. However due to the complex nature of the sub soil and the overlying buildings this could prove to be a difficult and expensive solution. An alternative is monitoring the pollution plume and deciding on moving the pumping wells when the pollution becomes too severe or choosing an end of pipe solution, i.e. treatment of the groundwater before turning this water into drinking water.



Low lying areas prone to inundation of groundwater  
Source: ARCADIS

TABLE 5: RECOMMENDATIONS FOR GROUNDWATER

TECHNICAL	Two main possibilities 1. Cleaning of water 2. Replacement of wells
STAKEHOLDER INVOLVEMENT	Municipality and drinking water company.
PLANNING	Depending on urgency of pollution and salinization problem (to be determined) and depending on reinvestment in pumping wells.
FINANCIAL	Investment plan depending on chosen strategy.

## DRINKING WATER EXTRACTION SITES

### CHARACTERISTICS

Two locations for a drinking water intake are present near the eastern part of Gdansk. These are named Grodza Kamienna intake and Lipce intake. From 1985 onward there is also a drinking water intake from the "Straszybn" surface water intake. Groundwater intake provides the major part of the drinking water.

### CHALLENGES

The drinking water extraction could be complicated by both salinization due to sea level rise and contamination of the groundwater as a result from pollution from former waste dump sites.

### URGENCY

Both salinization as the advance of the pollution plume are reported as slowly proceeding. This makes these threats less urgent.

### RECOMMENDATIONS

Careful monitoring should provide insight in the speed of the processes. Forecasting will help to determine the expected moment when the concentrations become a problem for the drinking water station. Two choices are available: treatment of water to remove pollutants or moving the wells to another location, preferably south of the city.

## SALINIZATION

### CHARACTERISTICS

Salinisation of the groundwater system and soil is a natural process which can be worsened by sea level rise, irrigation practices and / or the pumping of groundwater. In the subsoil, salt is a natural occurring substance. Due to the nearby location of the sea, fresh water is located above a more saline groundwater. Sea level rise will increase the water table and bring the salty water closer to the surface. In the polder areas the water table is controlled resulting in a thinner layer of fresh water overlying the salty water.

### CHALLENGES

Salinization can inhibit growth of certain agricultural products and it is wise to investigate the extent of this phenomenon. Furthermore the amount of chlorides in drinking water should be limited.

### URGENCY

This issue is not very urgent.

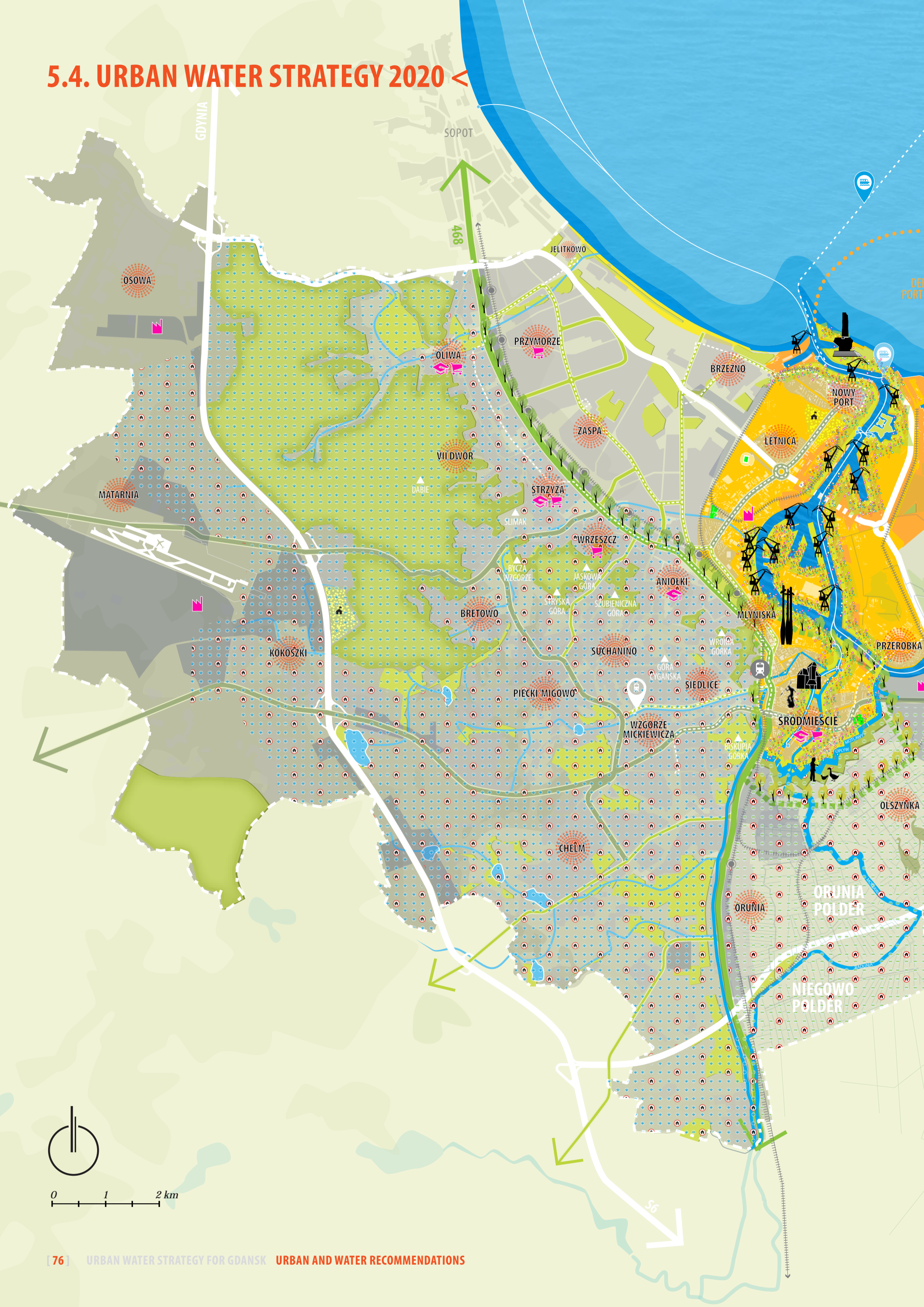
### RECOMMENDATIONS

The development of salinity in the groundwater should be monitored. Trends can be extrapolated and can be used to pinpoint the moment at which further measures are needed.



Drinking water extraction sites  
Source: RZGW Gdansk

# 5.4. URBAN WATER STRATEGY 2020



## EXISTING CITY

-  RESIDENTIAL
-  INDUSTRIAL
-  PARKS/PUBLIC GREEN
-  FOREST
-  POLDER
-  BEACH
-  RIVER
-  CREEK/CANAL
-  WATER RETENTION BASIN
-  KNOWLEDGE/COMMERCIAL/INDUSTRIAL CENTRES
-  HILL
-  ROAD
-  RAIL ROAD
-  RAIL STATION
-  TRAM LINE
-  MUNICIPAL BORDERS

## URBAN WATER STRATEGY

### Zones

-  **PRIORITY AREA**  
highest urgency and potential for water related urban development
-  **URBAN WATERFRONT**  
flood protected, attractive and accessible public space
-  **HERITAGE SITE**  
revitalise and integrate cultural heritage
-  **NEIGHBOURHOOD IDENTITY**  
preserve and strengthen local identity
-  **MORAIN HILLS | ORUNIA FOREST**  
increase water retention capacity
-  **MORAIN HILLS | URBANISED**  
limit urbanisation, increase water retention capacity
-  **ORUNIA POLDER**  
prevent urbanisation, maintain open landscape

### Networks

-  **GREEN METROPOLITAN BOULEVARD**  
downgraded green transport connection Gdansk-Sopot-Gdynia
-  **GREEN URBAN BOULEVARD**  
combine boulevard with functions, green and canal
-  **MAIN GREEN ROAD CORRIDOR**  
embed main roads in green, increase water retention
-  **GREEN ROAD CORRIDOR**  
embed roads in green, increase water retention
-  **WATER TRANSPORT**  
extend water transport network



## 5.4.1. EXPLANATION OF LEGENDS

The previous paragraphs of this chapter identified and described the recommendations on 1) how water can be used in Gdansk to strengthen the Urban Agendas for the city, and 2) how the hydrological water system could be improved to increase flood safety.

In the Urban Water Strategy these recommendations from both perspectives are integrated into one map. In the following section, the legends of this map will be briefly explained.

### ZONES



#### **PRIORITY AREA**

The area of the city centre and the port has the highest risk of storm surge flooding. These areas that would be affected by such a flood event represent a high economic value to the city. Therefore from both flood safety and economic points of view, this area has the highest priority for increasing water safety.

From an urban perspective it is advocated to focus development in this area. Adopting a compact city approach, that will concentrate new development at the core of the city, will limit further urbanization of suburban areas. Thereby rain fall floods in these areas (moraine hills) can be decreased. In addition, the open waters in the priority area offer excellent opportunities for creating an attractive environment for working, living, leisure and tourism. In the next chapter the Priority Area will be discussed in more detail.



#### **URBAN WATERFRONT**

Gdansk has many kilometres of waterfront inside the city. To protect the city from (storm surge) flooding, interventions are required in parts of these waterfronts. At the same time these waters are often very exciting areas located at the interface of water and land. Therefore it is suggested to increase accessibility and to integrate urban functions in the future waterfronts of Gdansk. Connecting the waterfronts could for example create pedestrian and cycling routes throughout the city, along the water.



#### **MORAIN HILLS / ORUNIA FOREST**

The Orunia Forest on the moraine hills has a large retention capacity to absorb heavy rains. Thereby this area has a positive effect on preventing flash floods. This function can be strengthened if water retention capacity is further increased.



#### **HERITAGE SITE**

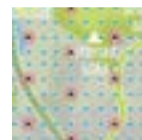
The historical relation of the city with its waters is reflected by many sites and cultural or industrial artefacts along the water. For example the Westerplatte is a strongly water related memorial, and the industrial cranes in the port clearly refer to the intense historical relation that Gdansk has with water.

By revitalising and re-using these sites and artefacts, this relation can be activated and once more enable the area to become an added value asset to Gdansk. The identity of Gdansk as a water city can be restored and used to increase the positive image of the city.



#### **NEIGHBOURHOOD IDENTITY**

Gdansk consists of a collection of neighbourhoods that each have their own identity. Over time the city expanded and these neighbourhoods grew together yet they are still recognizable. In the development of the city it is proposed to preserve and strengthen these local identities, and to concentrate developments (residential, facilities, commercial, etc.) in the core of these neighbourhoods. This will limit further spread (sub)urbanization, and thereby avoid further decrease of rain water retention capacity in the city. It will also activate lively and vibrant neighbourhoods with a strong identity.



#### **MORAIN HILLS / URBANISED**

The urbanization of the moraine hills results in lack of adequate and sufficient retention capacity to absorb water at times of heavy rain fall. This results in flooding.

Therefore for this area it is proposed to limit further urbanization and to increase the water retention capacity. This can be done for example by creating open water in green zones where rain water can infiltrate the earth before discharging into the sewerage system.

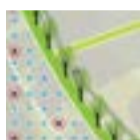
Limiting urbanization in this area will also have positive consequences for the compact city development. New developments are encouraged to-, and are more likely to happen in the centre.



#### **ORUNIA POLDER**

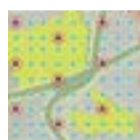
Water (quantity) problems in the Orunia polder are not expected as long as functions do not change. Therefore to protect the valuable landscape and to support the compact city development, urbanisation is to be prevented in this area.

## NETWORKS



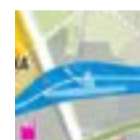
### **GREEN METROPOLITAN BOULEVARD**

The main inner city link from Gdansk to Sopot and Gdynia can be downgraded in traffic intensity, and simultaneously upgraded in quality. A green and attractive boulevard will increase urban quality as well as water retention capacity and thus flood resilience.



### **MAIN GREEN ROAD CORRIDOR**

The main green road network can be embedded in green zones to increase water retention capacity and to increase ecological, natural and urban qualities.



### **WATER TRANSPORT (EXTEND WATER TRANSPORT NETWORK)**

Using the open waters to activate and extend the existing (public) water transport would increase perception of water in Gdansk. It would therefore strengthen the image and identity of Gdansk as water city. Water transport also has benefits from the perspective of efficiency and sustainability in addition to the existing land based transport systems.



### **GREEN URBAN BOULEVARD**

The presence of Radunia Canal can be used to increase urban quality. A green urban boulevard can integrate the canal in the urban environment. The canal can function as a connecting element for urban functions, pedestrian and cycle routings, and as a green network.



### **GREEN ROAD CORRIDOR**

The green road network can be embedded in green zones to increase water retention capacity and to increase ecological, natural and urban qualities.

## 27. - 29. OCTOBER, 2014

HOSTED BY THE MUNICIPALITY OF GDANSK

At the second workshop the further detailed urban and water analyses of Gdansk was presented and discussed. Together with the workshop participants the ambitions for the strategy were set out. For three areas in Gdansk an interactive discussion in workshop groups took place to commonly brainstorm on integrated strategies towards a resilient future of the city.





Historic Center



Moraine Hills



Port

### Participants





STOCZNIA GDAŃSK  
S.A.

©Julia Sobota



*priority area:  
port & centre*

## 6.1. LOCATION OF THE PRIORITY AREA

When observing the flood risks and potential use of water for the socio-economic and urban development of Gdansk, it becomes clear that one area is of special interest. This Priority Area consists of the historical city centre and the port related areas.

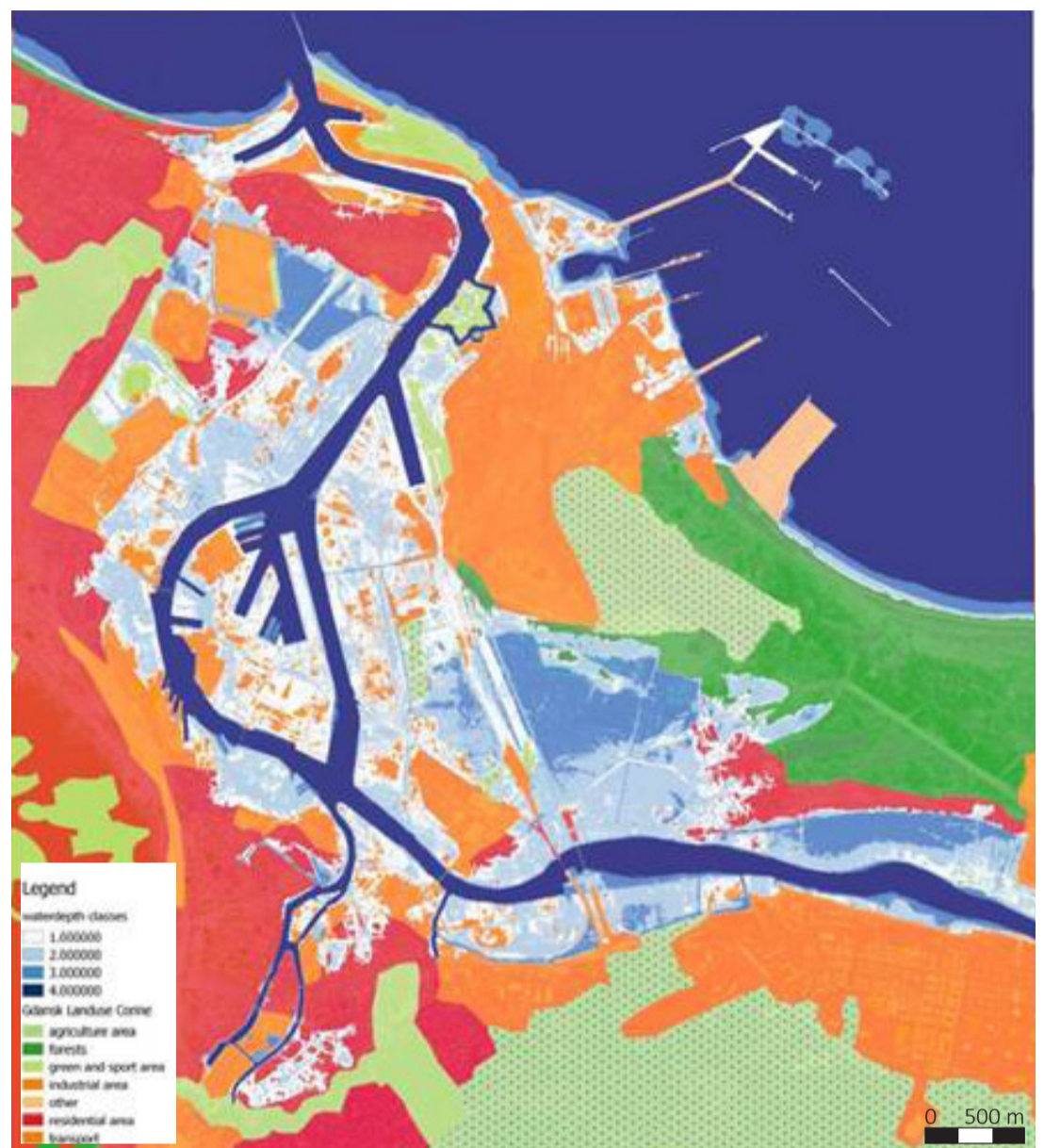
The reason for being an area with high urgency, priority and potential is that:

- it has highest flood risks (from storm surge);
- it would experience the highest financial-economic damage as result of possible flood;
- it has high potential for urban and economic (re)development.

### 6.1.1. HIGHEST FLOOD RISKS (HIGH URGENCY)

The hydrological recommendations indicated that the Priority Area has the highest change for (storm surge) flooding, and the highest priority to decrease this risk.

These indication of flood risk zones are based on ISOK 2009 maps for a 1 in 100 years flood situation. This is in Europe considered as an accepted risk level for urban developments.



**Inundation classes**

ISOK 2009 maps for a 1 in 100 years flood situation.

### 6.1.2. HIGHEST FINANCIAL-ECONOMIC DAMAGE AS RESULT OF POSSIBLE FLOODS

An analysis of the potential financial damage of floods (depth of 1\100 years inundation in combination with the existing land use) results in the identification of the Priority Area as a zone with the probability of highest financial damage in case of flooding.

### 6.1.3. HIGH POTENTIAL FOR URBAN AND ECONOMIC DEVELOPMENT

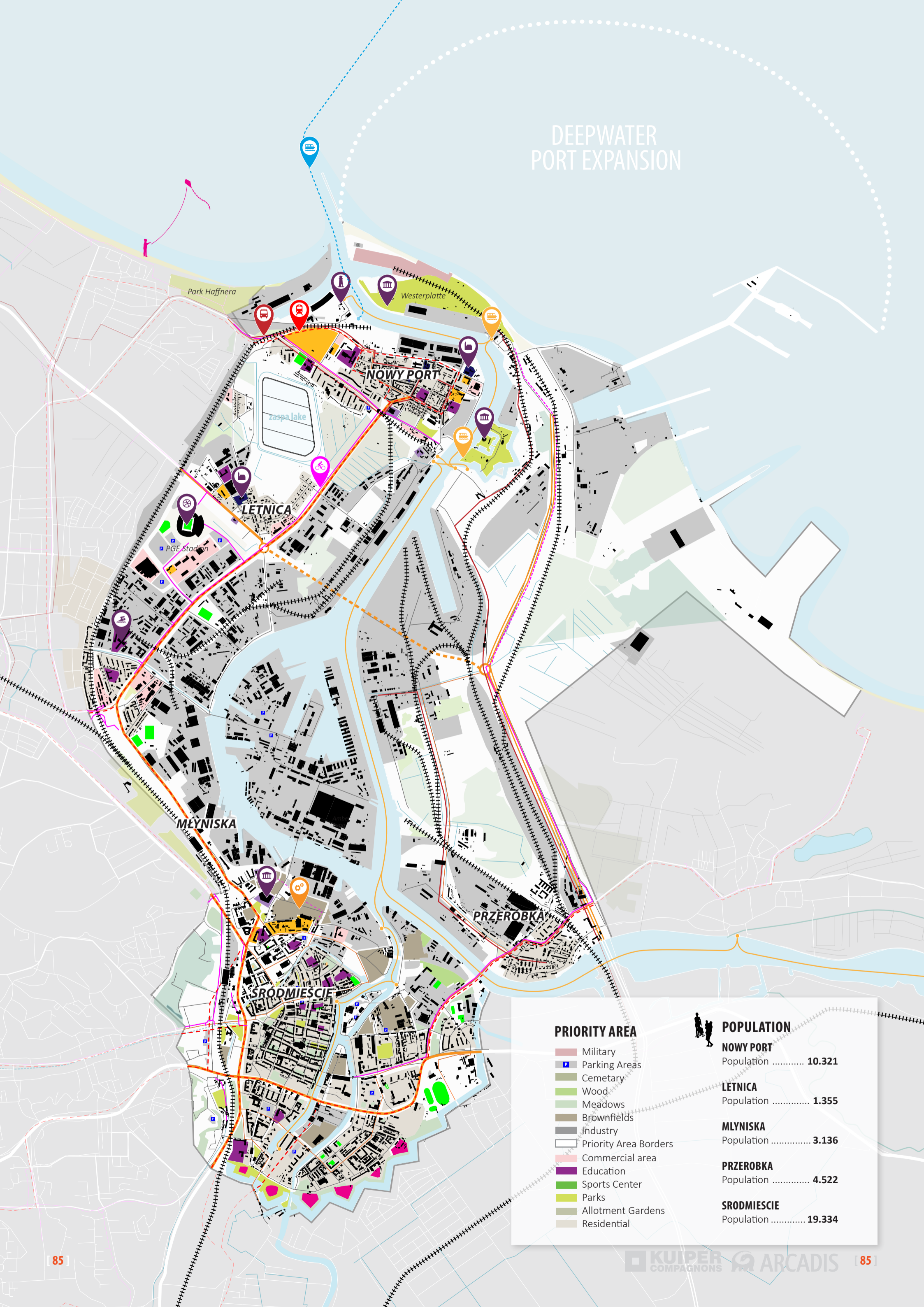
The urban recommendations indicated the reasons for adopting a compact approach. This approach has positive effects on decreasing flood risks (in suburban areas), and creating a strong and vibrant heart for the city where water can be used for aesthetical and functional reasons. Promoting a compact city approach implies to concentrate activities in the central part of town: the Priority Area.



**Total estimate damage amounts to 1,3 mld PLN ~330 mln EUR**

Damage for 1/100 years flood situation, indication of damage for each combination of inundation class and land use in Zloty.

# DEEPWATER PORT EXPANSION



## PRIORITY AREA

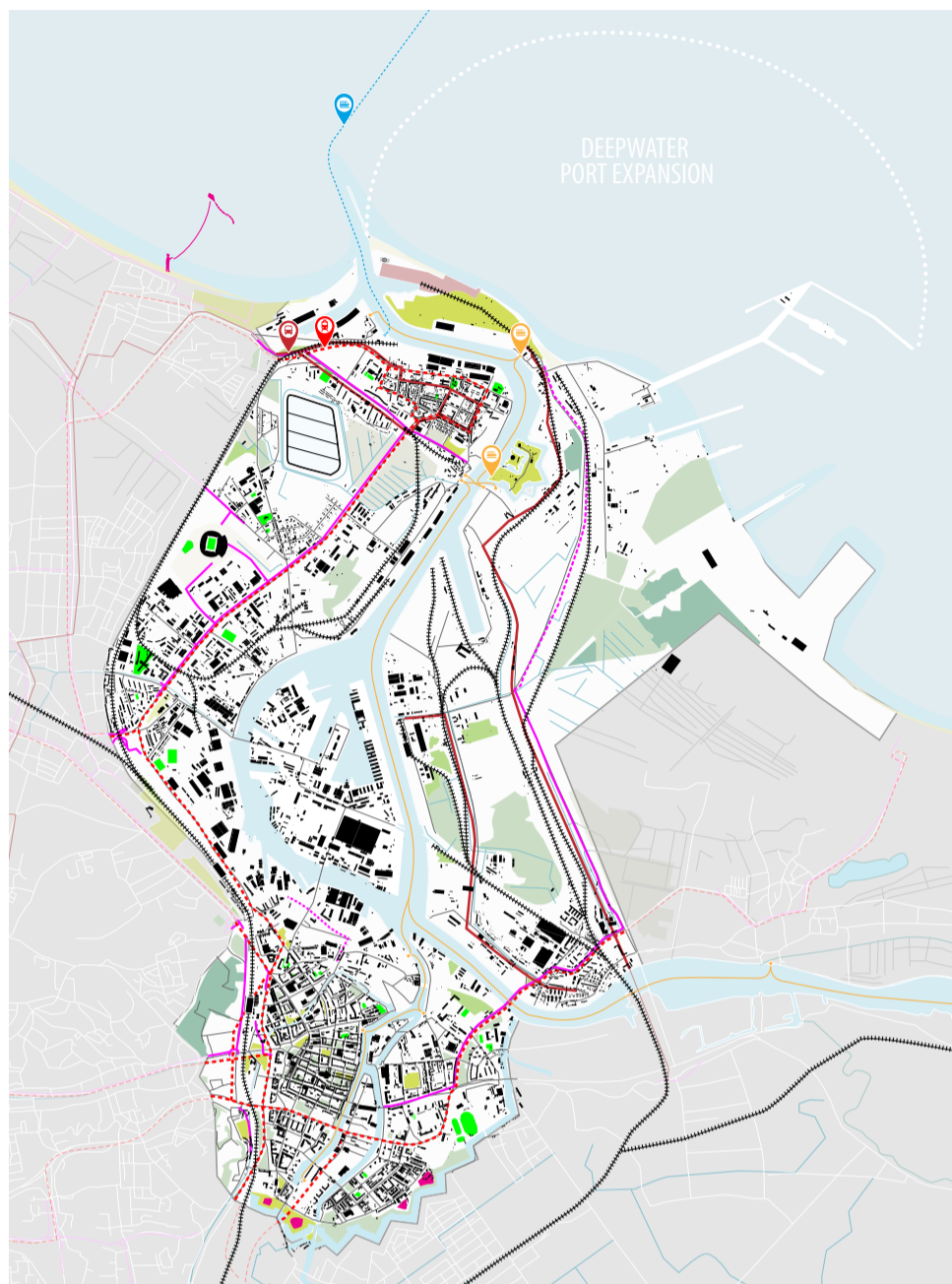
- Military
- Parking Areas
- Cemetary
- Wood
- Meadows
- Brownfields
- Industry
- Priority Area Borders
- Commercial area
- Education
- Sports Center
- Parks
- Allotment Gardens
- Residential



## POPULATION

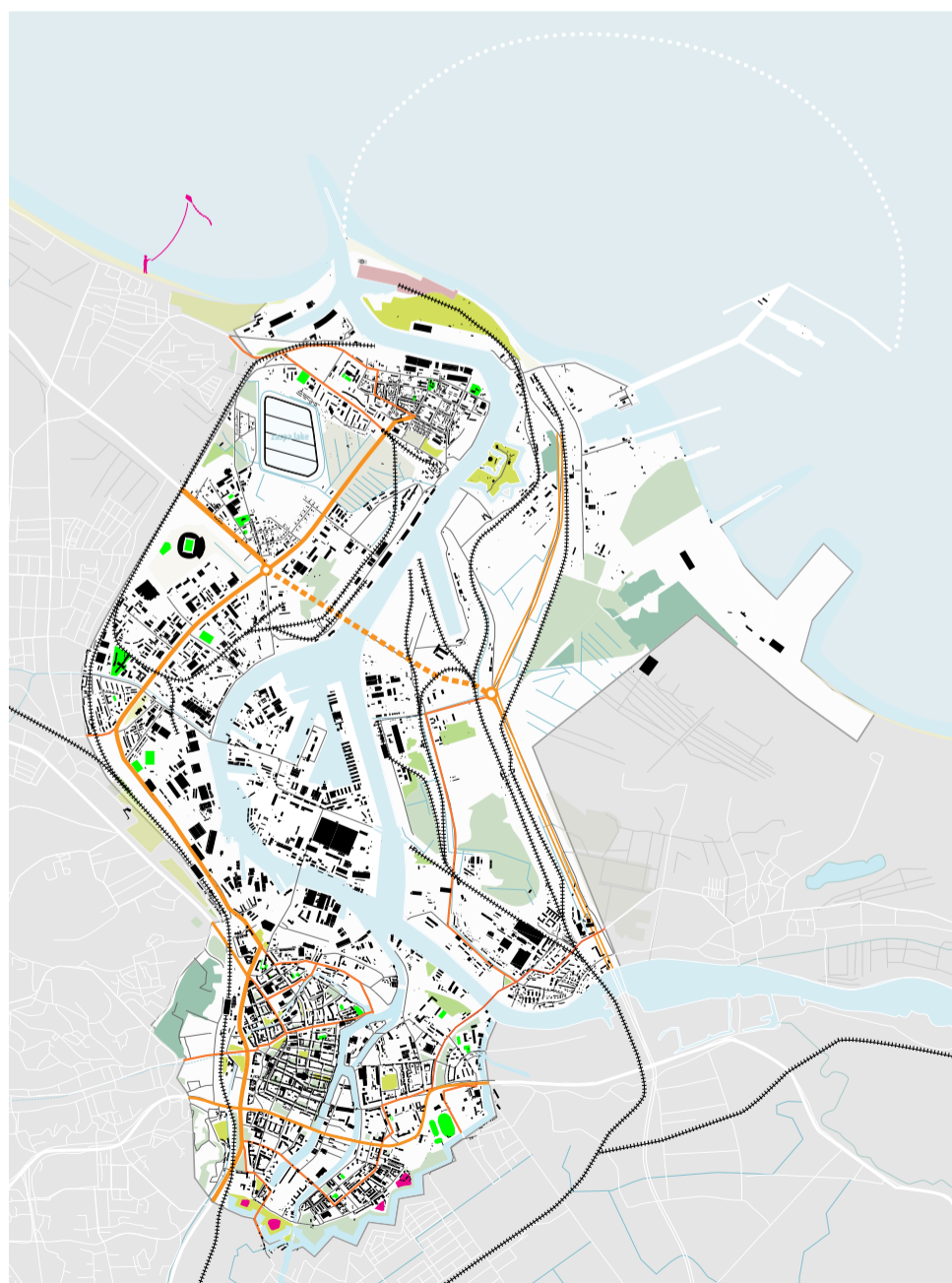
<b>NOWY PORT</b>	
Population .....	10.321
<b>LETNICA</b>	
Population .....	1.355
<b>MŁYNISKA</b>	
Population .....	3.136
<b>PRZEROBKA</b>	
Population .....	4.522
<b>ŚRODMIEŚCIE</b>	
Population .....	19.334

## 6.2. CHARACTERISTICS OF THE PRIORITY AREA



### PUBLIC TRANSPORT MODES

- Bikelanes
- Bus
- - - Tram
- Water Tram
- Intl. Ferry
- Railway
- Priority Area



### MOBILITY

- Tertiary Roads
- Secondary Roads
- Primary Roads
- - - Tunnel
- Highway
- Priority Area

DEEPWA  
PORT EX



Park Brzeziński im. J.J. Haffnera

1 Park Westerplatte



4 Wisloujście



3 ROD Obrótców



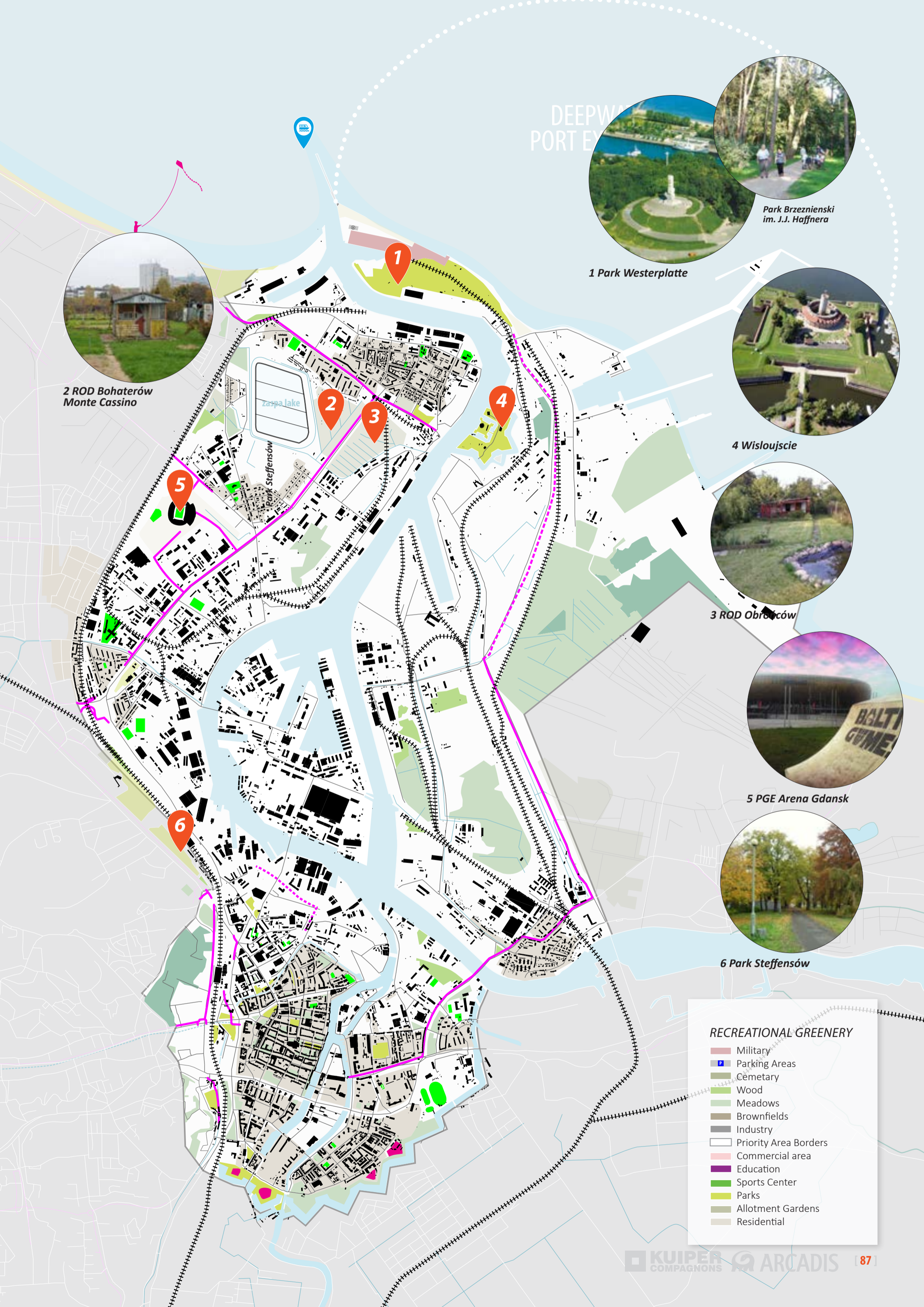
5 PGE Arena Gdansk



6 Park Steffensów



2 ROD Bohaterów Monte Cassino



**RECREATIONAL GREENERY**

- Military
- Parking Areas
- Cemetery
- Wood
- Meadows
- Brownfields
- Industry
- Priority Area Borders
- Commercial area
- Education
- Sports Center
- Parks
- Allotment Gardens
- Residential

# INSPIRATION FROM THE DUTCH

The preferred integrated and programmatic methodology for implementation of the Urban Water Strategy has many similarities and overlaps with the Dutch program 'Room for the River'. Valuable lessons can be learned.

## BACKGROUND 'ROOM FOR THE RIVER'

The opportunities and challenges of waters in the urban areas are well known to the Dutch. For centuries many Dutch cities have been developed in harmony with water and existing water systems (sea, rivers, streams, etc.). In the most recent two decades, the Dutch government together with a number of public and private entities, effectively invented and realized an unique program entitled 'Room for the River'.

'Room for the River' is a national program, in which the Dutch National Water Authority (similar to KZGW) together with Water Boards (similar to RZGW's), municipalities and provinces (similar to Marshal Offices) worked on a dual objective; water safety and realising a more attractive and effective river area.

The program 'Room for the River' was a reaction to the flooding events of 1993 and 1995. These made it clear that the traditional approach of dike raising and reinforcement was not enough to constrain the increasing flood risks. Instead of fighting against the water, The Netherlands introduced a new form of water management: giving more space to rivers and open waters.

34 projects have been executed nationwide that when combined together, will make sure that in 2015 water safety will be in accordance with the design discharges as set in 2001: all within the set time frame, and within the planned budget(s).

## CHARACTERISTICS OF 'ROOM FOR THE RIVER'

The unique methodology of 'Room for the River' consists of a combination of three characteristics:

- *A new approach to water management;*
- *An integrated embedding of flood protection interventions with urban developments;*
- *Public-private cooperation.*

### THE NEW APPROACH TO WATER MANAGEMENT

The historical tradition of raising dikes is not suitable anymore, especially not in densely urbanized areas. Therefore the preferred alternative is to give more space (Dutch 'room') to rivers and open waters. Giving more space can accommodate peak water flows, and the resulting flood waters.

### INTEGRATED EMBEDDING OF FLOOD PROTECTION INTERVENTIONS WITH URBAN DEVELOPMENTS

By coordinating different spatial developments, synergy will grow. By combining developments in a clever way (for example by moving a dike and constructing a new road on top), costs will be divided so results can be improved (when the combined costs do not increase / exceed the costs of implementing the measures separately). Synergy can also rise when interests will be coordinated, spatial claims will be compensated or exchanged, or time savings will be created.

### PUBLIC-PRIVATE COORDINATION

In the 'Room for the River' program, all governmental levels, private parties and citizens work together. The national government, provinces (/Marshal Offices), municipalities and Water Boards (RZGW's) cooperate with landowners, interested parties and citizens. Because all parties listen to each other's point of view, a high level of mutual understanding arises. Therefore, the likelihood of a smooth process will increase.

## RELEVANCE OF THE 'ROOM FOR THE RIVER' IN THE GDANSK REGION

The success of the program was partly based on the close cooperation, participation and dialogue between the State Government, business parties and experts who together prepared, realized and financed the various projects. The Region Gdansk has many similarities with the Dutch river delta, where the program was applied and realized. The fact that local governmental, business and social stakeholders in Gdansk are also committed to work together does provide the unique opportunity in Poland to create a successful, integrated Urban Water Strategy for the City of Gdansk.



Room for the River, project Nijmegen, work in progress



Room for the River, project Nijmegen, future situation

© Rijkswaterstaat



© Johan Roerink



©Julia Sobota

*two alternative approaches*

07

## 7.1. INTRODUCTION

For the Priority Area there are two main alternative approaches to implement a strategy towards water related urban development and flood risk management. The first alternative is to create a central flood gate at the mouth of the Dead Vistula, and the second is to adopt a programmatic approach that connects multiple interventions along the waterfronts to create a flood safe city.

This chapter compares both alternatives resulting in a preferred alternative. Lessons learned in the Dutch National Program “Room for the River” (see intermezzo) are integrated in the assessment of both alternatives.

## A CENTRAL FLOODGATE *Alternative #1*

A central floodgate is constructed in the mouth of the Wisla river, protecting the complete Gdansk area.

## 7.2. TWO ALTERNATIVES

### 7.2.1. DESCRIPTION OF THE TWO ALTERNATIVES

There are two main options for a sustainable development of Gdansk in which economic, social and spatial development can be facilitated in a safe way, protected against the main risks of flooding.

### 7.2.2. STRATEGIC ELEMENTS OF THE TWO ALTERNATIVES

Both alternatives create the opportunity to realise the ambitions of a high quality, climate and economic resilient city. The strategy (the way to go for realising one of the alternatives) is different for both and will require different choices. The main differences of the key strategic elements are presented in the table below.



Study location for Alternative 1: Central floodgate  
Source: RZGW Gdansk



Reference for Alternative 1: Maeslantkering, The Netherlands  
Source: Rijkswaterstaat

# PROTECTION PROGRAMME

## Alternative #2

Protective dikes embankments, flexible barriers & adaptive building will be constructed on an incremental basis, starting with the area's most at risk combined with moments of change/investments. A programme consists of of a coherent set of different projects, some at short term and some at long term.



References of Alternative 2: Protection Programme  
Source: ARCADIS



References of Alternative 2: Protection Programme (Dalmannkai, Hafencity Hamburg GmbH)  
Source: Stichting Toegepast Onderzoek Waterbeheer (STOWA) Multi-level safety: water resilient urban and building design, Amersfoort, June 2014. Photo: LBE&FLUT, Hafencity Hamburg GmbH

	<b>FLOODGATE</b>	<b>PROGRAMMATIC APPROACH</b>
<b>STAKEHOLDERS</b>	<ul style="list-style-type: none"> <li>Limited number stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Stakeholders more stimulated to cooperate (direct involvement in water problems)</li> <li>Many stakeholders</li> <li>Coordinating role for City to prevent gaps in flood protection</li> <li>Developing per location, can be easier</li> </ul>
<b>TIME</b>	<ul style="list-style-type: none"> <li>5-15 years to realize</li> <li>&gt; 15 years: maintenance and replacement</li> <li>Project with fixed end</li> </ul>	<ul style="list-style-type: none"> <li>5-30 years</li> <li>Some areas will not be protected if not necessary</li> </ul>
<b>VALUE</b>	<ul style="list-style-type: none"> <li>One large intervention that secures all areas</li> <li>€ 100 million (+ maintenance)</li> <li>NPV: € 85 million</li> <li>Restriction for port activity</li> </ul>	<ul style="list-style-type: none"> <li>Large added value to attractive development of waterfronts/city</li> <li>Increase ground value</li> <li>Increase quality of life</li> <li>Approximately € 100 million; NPV: € 45 million</li> <li>Public-private development</li> <li>Larger flexibility</li> </ul>
<b>GOVERNANCE</b>	<ul style="list-style-type: none"> <li>Technically controllable</li> <li>Project Organization required</li> </ul>	<ul style="list-style-type: none"> <li>Long term project organisation</li> </ul>

## 7.2.3. SOCIAL COST BENEFIT ANALYSIS

### INTRODUCTION

In a social cost-benefit analysis (CBA) the net effects on welfare (social rate of return) of the selected project alternatives are studied in more detail. This means that for every selected project alternative, the effects are compared to a reference or 'do-nothing' alternative. The study area of a CBA in principle is based on a national (Polish) level. However in practice most effects take place on a specific local and regional level: the urban area and coastal zone of Gdansk and the region with neighbouring cities (Gdynia, Sopot). In this respect redistribution of specific effects (e.g. concerning tourism and international investments) should be considered.

### PROJECT ALTERNATIVES

In the project and hence also in the CBA, the following alternatives have been distinguished:

- Reference or 'do-nothing' alternative: no prevention and/or mitigating measures take place, the current risk of flooding continues;
- Central floodgate: a floodgate is constructed in the mouth of the Wisla river, protecting the complete Gdansk area.
- Protection Programme: protective dikes will be constructed on an incremental basis, starting with the area's most at risk.

### TYOLOGY AND VALUATION OF EFFECTS

The effects included in the CBA are presented in the following Table. The effect classification is based on the official CBA-methodology used in the Netherlands (OEI-guideline), which basically can also be applied elsewhere. In the following table, the CBA effects are briefly explained.

### COSTS

In the cost-benefit analysis costs are defined as the expenditures involved with investment, maintenance and operations of the project alternatives.

#### Investments

Investment costs are involved with the construction of protective measures such as a floodgate, revetments, groins and/or dams and/or mitigating measures. In the 'do-nothing' alternative costs may be also be present, e.g. concerning ad hoc protection measures for the historic centre, major (industrial) assets and/or residential areas.

#### Operation and maintenance costs

Maintenance costs are applicable for both project alternatives (rule of thumb: 1% of total investments costs, starting after 20 years). Operation costs to be assessed, probably this holds mainly for the flood gate alternative.

### BENEFITS

Two types of benefits should be taken into account in the cost-benefit analysis: first of all the effects on economic markets for which – in principle – regular market values are available (market prices). However benefits associated with non-market effects of the project alternatives are also relevant. These types of benefits are related to effects for which no regular economic markets exist. Hence values cannot be straightforwardly derived from market prices, but can sometimes be obtained indirectly (e.g. avoided costs) or can be expressed in qualitative terms.

#### Land and property

In case of the 'do-nothing' alternative, due to (increased) flood risk, public and private properties will be lost or damaged. The respective value of these items can be assessed. No or reduced value losses are incurred in case of the other alternatives. In principle a centrally located floodgate will completely protect all areas from the start. The other alternative will only protect those areas where more local protection works will be constructed (dikes/dams). Assuming that this would primarily concern those areas with main current or potential economic value (historic centre, residential areas, industrial areas), the 'net protective effect' of both project alternatives would be roughly the same.

#### Infrastructure

In case of the do-nothing alternative, due to (increased) flood risk, infrastructure may be damaged, e.g. power plant / utilities infrastructure, port facilities and (rail)roads in the area. Repair costs and – in case of public utilities-foregone turnover during repair will be incurred in the do-nothing alternative. No, or fewer costs will be incurred in the other alternatives.

#### Tourism

In case of the do-nothing alternative, due to (increased) flood risk, tourism may be affected (less turnover due to fewer tourist nights), especially in the historic centre. Visitors may be deterred due to (temporary) inaccessibility, damaged hotels etc. No effects will take place in the project alternatives, assuming that local protection works would start with the main economic areas including the historic centre.

#### Investment climate

In case of the do-nothing alternative, due to further (increased) flood risk, the climate for (international) investments will be negatively affected. In case of the project alternatives a neutral or positive effect is expected. In the CBA this effect can be expressed in qualitative terms.

#### Health and safety

This effect comprises the non-material damage resulting from flooding, e.g. loss of life, hospital visits and disruption of local communities. In the CBA these effects can be expressed in qualitative terms.

#### Ecology

These effects represent the enabling or preserving of ecological values in the coastal zone area. In the CBA these effects can be expressed in qualitative terms.

### DISTRIBUTIONAL EFFECTS

Costs and benefits are usually distributed amongst different stakeholders and between project alternatives a different allocation of costs and benefits may also be the case. This is relevant to be aware of when looking for support for the proposed plan / alternative. Last but not least it should be born in mind that specific effects may differ according to the geographical scale of analysis. For example, the investment climate and tourism may suffer in the do-nothing alternative on the local Gdansk scale, but on a regional or even national level the size of the impact may be much less due to a shift in the regional distribution of investments, tourist nights etc.

#### Net present value

All effects (costs and benefits) in the CBA are projected for a specific time horizon (usually 50 or 100 years). The sum of costs and benefits within this time horizon are then discounted by using a social discount rate in order to calculate the net present value of the project alternatives compared to the do-nothing alternative. In the standard CBA calculations as applied in The Netherlands this implies using the official Dutch rate of 5.5%, consisting of 2,5% real interest rate plus 3% overall risk rate. (Currently no official Polish guideline exists concerning the applicable social discount rate)

For the net present value the phasing of the costs and benefits is important. In this respect the two project alternatives differ: the investment costs of the flood gate will be incurred in a relatively short period at the start of the project life time. For the other alternative however, the protection programme, the costs are spread more evenly over the project life time. This will result in lower net costs for the latter project alternative. Provided the assumption that the benefits will not differ very much between both alternatives, the main difference in net present value will result from a different phasing in the costs.

	<b>ASPECTS</b>	<b>EFFECTS</b>
<b>COSTS</b>	Investments, maintenance and operations	<ul style="list-style-type: none"> <li>• Hard constructions investments / depreciation (€)</li> <li>• Yearly operating costs (€)</li> <li>• Yearly maintenance costs (€)</li> </ul>
<b>BENEFITS: MARKET EFFECTS</b>	Urban development	<ul style="list-style-type: none"> <li>• Land and property (Δ value €)</li> <li>• Infrastructure (Δ costs €)</li> <li>• Tourism and recreation (Δ value added €)</li> <li>• Investment climate</li> </ul>
<b>BENEFITS: MARKET EFFECTS</b>	Health and safety	<ul style="list-style-type: none"> <li>• Non-material flooding damage</li> </ul>
	Ecology	<ul style="list-style-type: none"> <li>• Enabling/preserving ecological functions</li> </ul>

**EXAMPLE: CONSIDER AN EQUAL TOTAL INVESTMENT COST FOR BOTH PROJECT ALTERNATIVES**

- Floodgate: € 100 million, to be incurred in 5 years;
- Protection programme: € 100 million, to be incurred in a more flexible way, building 10 kilometres of dikes every decade.
- The difference in net present value of these investment costs over a 50 years lifetime is substantial: € 85 million versus € 45 million (numbers depending on discount rate and phasing of investment)
- Provided that the benefits of both project alternatives are more or less equal, the chance of achieving a positive net present value of costs and benefits is probably considerably higher for the protection programme alternative compared to the flood gate alternative.

	<b>FLOOD GATE</b>	<b>PROTECTION PROGRAMME</b>
<b>YEAR</b>	<i>Investment</i>	<i>Investment</i>
1	€ 20.000.000	€ 5.000.000
2	€ 20.000.000	€ 5.000.000
3	€ 20.000.000	€ 5.000.000
4	€ 20.000.000	€ 5.000.000
5	€ 20.000.000	€ 5.000.000
11	-	€ 5.000.000
12	-	€ 5.000.000
13	-	€ 5.000.000
14	-	€ 5.000.000
15	-	€ 5.000.000
21	-	€ 5.000.000
22	-	€ 5.000.000
23	-	€ 5.000.000
24	-	€ 5.000.000
25	-	€ 5.000.000
31	-	€ 5.000.000
32	-	€ 5.000.000
33	-	€ 5.000.000
34	-	€ 5.000.000
35	-	€ 5.000.000
50	-	-
<b>TOTAL</b>	<b>€ 100.000.000</b>	<b>€ 100.000.000</b>
<b>NPV (NET PRESENT VALUE)</b>	<b>€ 85.405.690</b>	<b>€ 45.452.984</b>

## 7.2.4. FUNDING OPPORTUNITIES

Next to funding by national, regional and/or local Polish government, co-funding by EU and IFI's may be relevant. This section contains high level information on potential co-funding of the proposed project alternatives.

### EU CO-FUNDING

- **LIFE:**

In the 2014-2020 LIFE programme possibilities exist to fund projects associated with environment and climate action. Recently the Multiannual Work Programme 2014-2017 has been approved. Based on this Work Programme the following 'hooks' have been identified related to the following priority areas:

- Environment and Resource Efficiency / Water, floods and drought: Projects promoting flood and drought risk management through (a) extreme event prevention and protection tools for support of policy, land use planning and emergency management and (b) integrated risk assessment and management approaches based on resilience and social vulnerability, and ensuring social acceptance.
- Environmental governance and information/information, communication and awareness raising campaigns: awareness-raising on WFD obligations and opportunities, targeting authorities and other actors who can contribute to identifying cost effective solutions to be included in River Basin Management Plans and regarding flood protection, sediment management, hydropower, navigation, transport, spatial planning, chemical industry, and agriculture.

The focus within LIFE is on demonstration projects. The construction of large infrastructure does not fall within the scope of LIFE and is therefore not eligible. This means that the project alternative 'flood gate' will not be eligible for LIFE-co funding. The 'protection programme' alternative may (partly) be eligible, depending on how the programme will be aligned (it should be more than 'just hardware').

The overall LIFE budget 2014-2017 is approximately € 1.8 billion, of which € 1.35 billion for the Environment programme. Poland has been allocated 6,37% of this amount, nearly € 86 million.

- **European Green Capital:**

One of the policy tools the European Commission is the European Green Capital Award (EGCA), which recognises and rewards local efforts to improve the environment, the economy and the quality of life in cities. The EGCA is given each year to a city, which is leading the way in environmentally friendly urban living and which can thus act as a role-model to inspire other cities. Cities differ enormously and sharing concrete examples of what a European Green Capital can look like is essential if further progress is to be made. In addition to the EGCA there are a range of European Environmental Action Plans and Policy Instruments in place across Europe which support European cities and communities in becoming more sustainable. Although there is no 'big money' involved, the available, smaller amounts may be useful in order to support (local government) working groups implementing the project (e.g. the URBACT facility). Here again, the alternative 'protection programme' is likely to be more eligible for any co-funding from this perspective than the flood gate alternative.

### INTERNATIONAL FINANCIAL INSTITUTIONS (IFIS)

IFIs may be another relevant source of co-funding, depending on the angle:

- Urban development: the European Investment Bank (EIB) supports so-called Urban Development Funds (UDF). This type of fund invests in public-private partnerships and other projects included in an integrated plan for sustainable urban development. If the Gdansk flooding defence project is to be embedded in a broader urban development scheme, UDF may be a relevant source of co-funding. Also from this perspective a programmatic approach is advised.
- Flood protection / disaster management: the World Bank for instance, is active in Poland supporting / flood protection projects, e.g. along the Odra river. In the current Country Partnership Strategy (2014-2017), protection against floods is one of the priorities.

Climate change is expected to heighten flood risks, to which large parts of the country are already exposed, especially in the basins of the two main rivers (the Odra and the Vistula (Wisla)). Effective protection requires a combination of infrastructure investments (e.g., dikes, reservoirs, etc.) and adequate arrangements for coordination among the

various entities in charge of administering the river basins. The Government has developed a comprehensive program to enhance flood protection along the Upper Odra River (which was affected by a devastating flood in 1997) and is now preparing similar plans for the Lower Odra River and the Upper Vistula River. Over the last period, the Bank has supported these efforts by providing financing and technical leadership and by mobilizing other financiers (the EC and the Council of Europe Development Bank [CEB]) to implement the Odra River program.

- Protecting industrial and public utility assets: Many (international) financial institutions are involved in the financing of major industrial and public utility assets (e.g. waste water treatment, power generation, infrastructure). EBRD for example is active in and near Gdansk concerning marine container terminals and urban transport. In order to safeguard operations, co-funding flood protection measures is an option IFI's may consider.

## 7.3. PREFERRED ALTERNATIVE

Based on the Quick Scan of (Social) Cost Benefit Analysis, the first scan of funding opportunities, and lessons learned in the Dutch Room for the River program, it can be concluded that the programmatic approach is preferred for creating a flood resilient and strong and attractive Priority Area.

The programmatic alternative can be characterised by its integrated approach of combining interventions to create flood safety, and interventions to create an attractive urban environment. Synergy can be created by smart linkages.

This alternative combines private and public stakeholders to find feasible solutions that are profitable and acceptable to all involved.

The programmatic alternative requires an overall long term vision for the area. Based on this long term vision, separate developments can be approved and implemented if they contribute to the vision.



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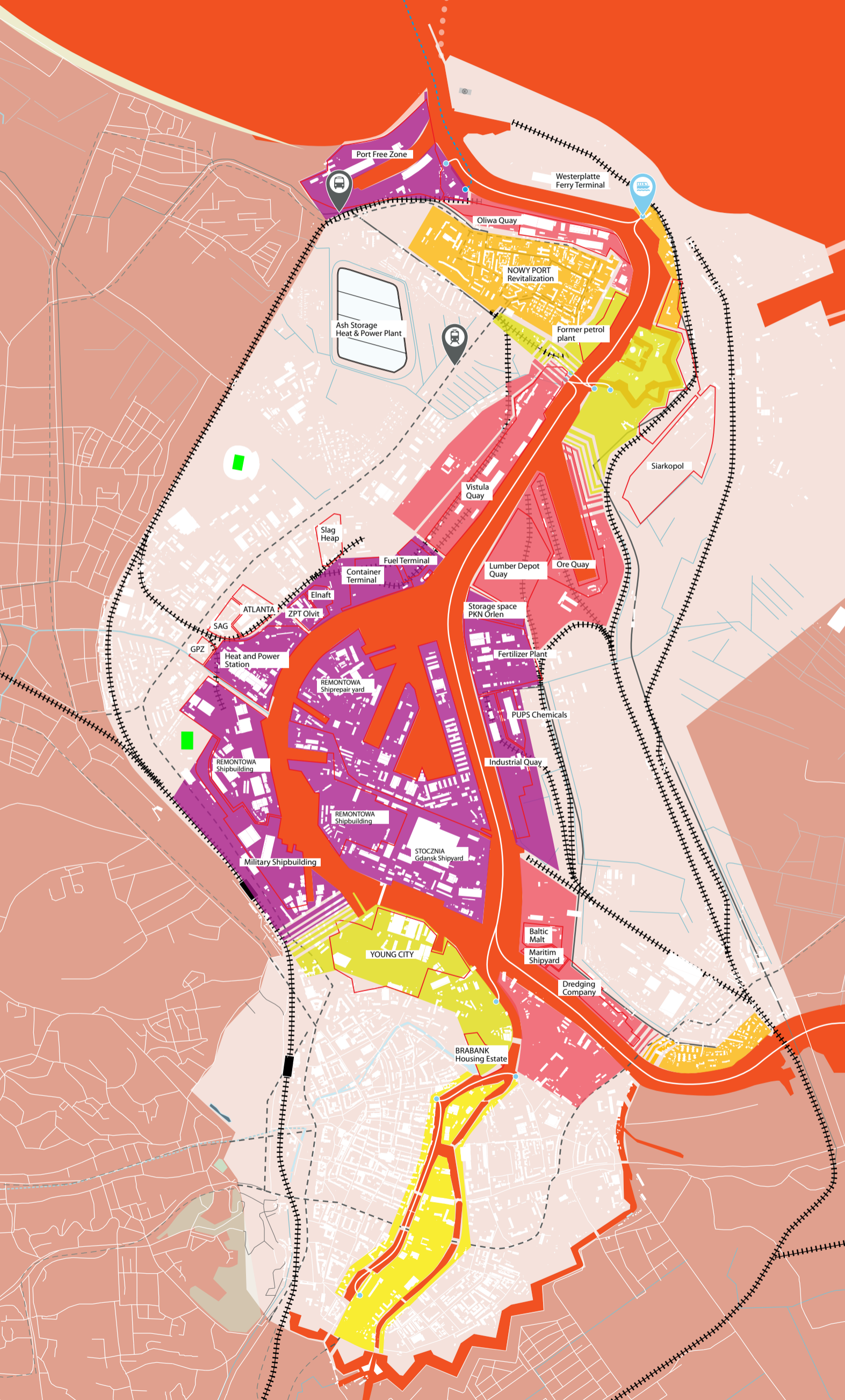
## 26. - 28. JANUARY, 2015

HOSTED BY THE MUNICIPALITY OF GDANSK

The final workshop presented the preliminary results of the Urban Water Strategy for Gdansk. Proposals for implementation of the strategy in the identified Priority Area were discussed with the participants from a large variety of organisations and institutions related to urban development and water management. The discussions resulted in valuable suggestions which are incorporated in the final strategy.



# DEEPWATER PORT EXPANSION



## Participants





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# *recommendations for priority area*

## 8.1. INTRODUCTION

In the earlier chapters of this report the Priority Area has been identified as that which has the highest urgency and potential for integrated and water related development and flood interventions. For this Priority Area (city centre and port areas) a programmatic approach has been selected as most appropriate.

Based on the programmatic approach, and the specific characteristics of the Priority Area, four main recommendations have been identified. These recommendations aim to:

- a) *Make the Priority Area Climate Resilient and Flood Proof;*
- b) *Increase the Urban Quality of Gdansk, and the Priority Area in specific;*
- c) *Increase the Socio-Economic Strength of Gdansk, and the Priority Area in specific.*

The four recommendations for Priority Area are:

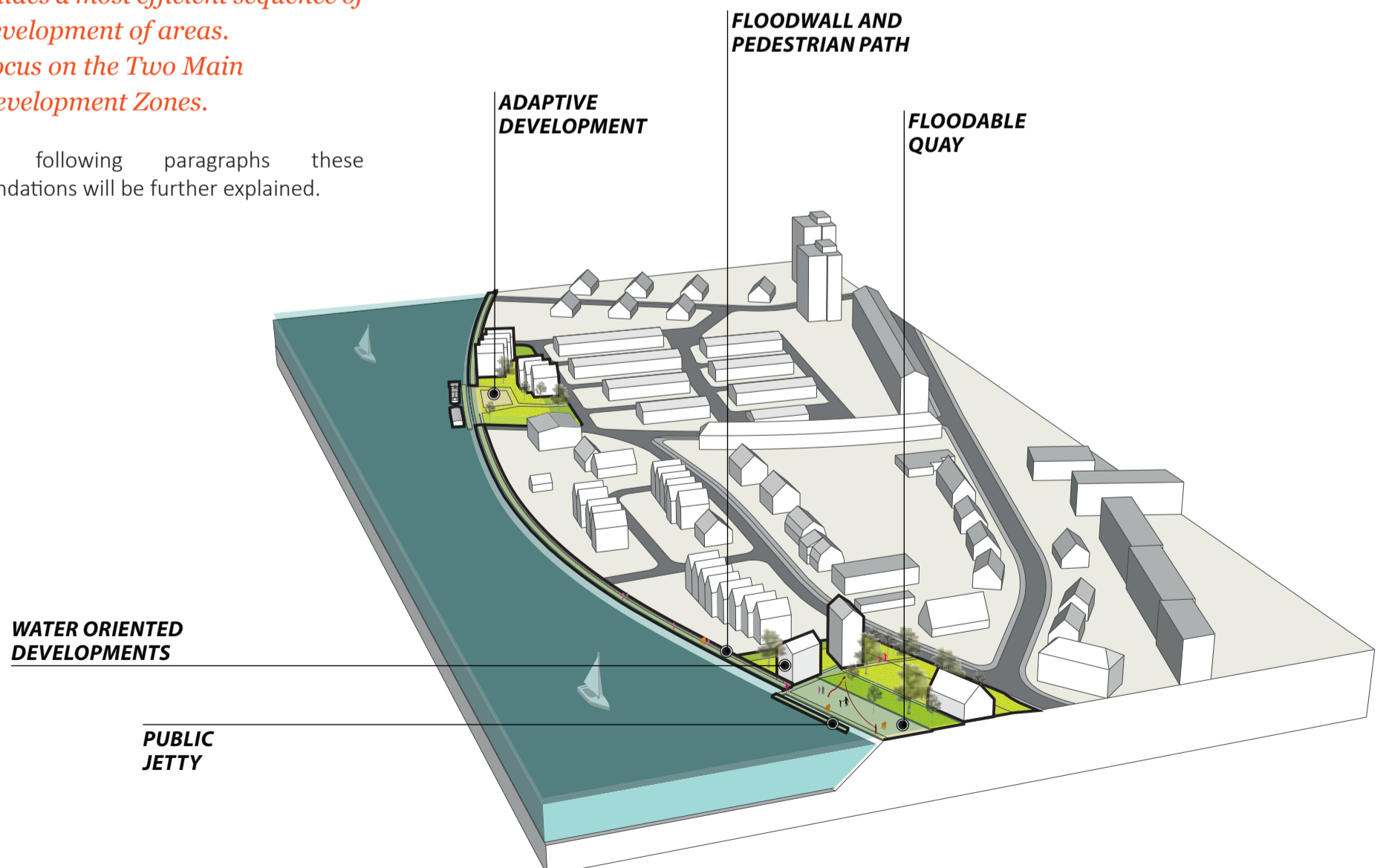
1. *Adopt a programmatic approach to establish water safety and to use water as the basis for an attractive and strong urban development for the whole area;*
2. *Compose a Task Force that manages the overall process and secures the public and private interests for the entire Priority Area;*
3. *Create a zoning that defines and guides a most efficient sequence of development of areas.*
4. *Focus on the Two Main Development Zones.*

In the following paragraphs these recommendations will be further explained.

## 8.2. ADOPT PROGRAMMATIC APPROACH *Recommendation #1*

It is recommended to implement the integrated Urban Water Strategy for the Priority Area based on a programmatic approach. This approach first defines the objectives of the Priority Area as a whole, subsequently defines the guidelines for the overall development, and then describes location specific projects to realise the overall objectives.

For the Priority Area it is recommended to start with the first step of preparing an overall vision to make this area flood safe and resilient for a sustainable long term integrated development. In the overall vision a set of guidelines for the future of the Priority Area can be determined.



Study location for a programmatic approach: Przeróbka

# DEEPWATER PORT EXPANSION

WESTERPLATTE

NOWY PORT CULTURE CENTER

HISTORIC MUSEUM

RECREATIONAL  
ROUTES



PARK LANDSCAPES

PGE ARENA

OLD POSTOFFICE

LIVEABLE DIKE  
DEVELOPMENT



ROAD TO FREEDOM

PRZERÓBKA

DOLNE MIASTO

## 8.3. COMPOSE GATEWAY TASK FORCE

### *Recommendation #2*

The Priority Area hosts a large variety of public and private stakeholders that each have their own (commercial or other) interests. To achieve an overall vision on the Priority Area that is supported by a large majority of all stakeholders, it is important to consult and discuss this topic with them at an early stage of thinking about the future.

Therefore it is advised to compose a Task Force that initiates the process of thinking about the future of the Priority Area, and that creates awareness among everyone involved.

Because the interests in the Priority Area are commercial as well as public, it is proposed to create a Task Force based on public-private partnership. Within this framework, the City of Gdansk would have the final responsibility of the Task Force to secure the public interest of the citizens of Gdansk.



The *Gdansk Gateway Task Force* is an alliance formed between public, private and citizen stakeholders who share the interest of reactivating water related areas.

# DEEPWATER PORT EXPANSION

PORT GDAŃSK  
PORT AUTHORITY

INLAND WATER AUTHORITY

NOWY PORT

HISTORIC MUSEUM GDAŃSK

LETNICA

SIARKOPOL  
SIARKOPOL  
Gdańsk SA

HEAT AND  
POWERPLANT

GDAŃSK  
PORT

SHIPYARD REMONTOWA

STOCZNIA

YOUNG CITY

BRABANK HOUSING ESTATE  
INVEST  
KOMFORT

PRZERÓBKA

MIASTO GDAŃSK

DOLNE MIASTO

## 8.4. TWO MAIN DEVELOPMENT ZONES

### *Recommendation #3*

Based on the identified best zoning sequence, it can be concluded that there are two zones within the Priority Area that have highest potential and urgency for first development. These zones have highest potential and need for urban development, require improved flood protection, and provide in catalysts for an integrated urban development. These zones are:

- *City Center area, and;*
- *Nowy Port area.*

Based on the earlier described compact city approach, it is recommended to promote and focus new developments in these two zones. By concentrating urban development on these locations a strong City Centre and strong Nowy Port development can take place, leaving existing industrial sites develop at their own paste.

#### **CITY CENTER AREA**

A strong and vibrant City Center is important to every city. It should be avoided that new functions that could be used to strengthen the city centre, be located at locations (at a distance) where they do not support the creation of a strong and lively city centre for Gdansk.

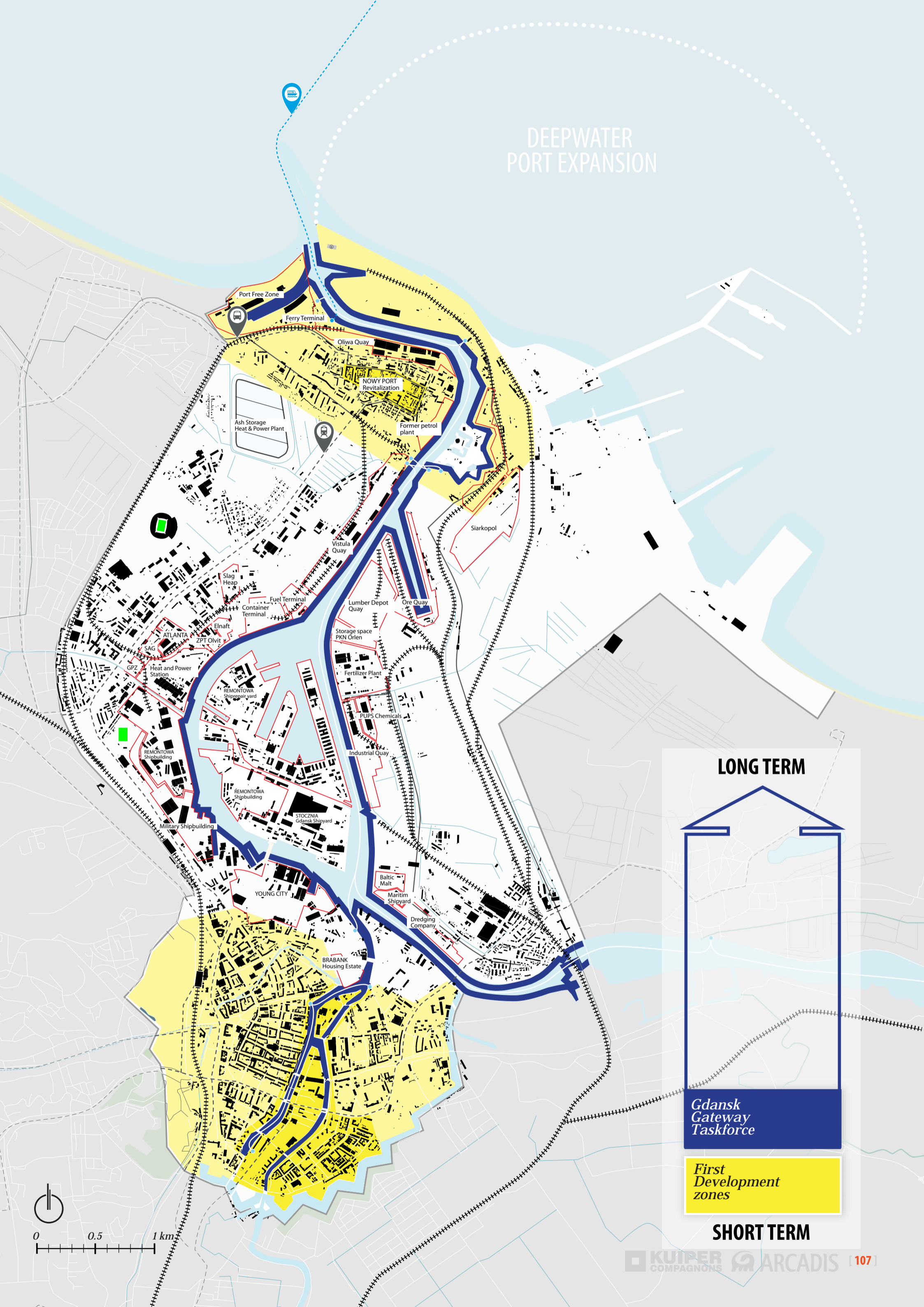
This recommendation is based on the presumption that avoiding an empty city centre is of highest importance to the city. A vibrant centre attracts cultural facilities, businesses, tourists and generates economic growth. It strengthens the identity and image of Gdansk, and promotes the center as a meeting place for people and businesses, for which Gdansk is famous.

#### **NOWY PORT AREA**

Besides the City Center also the Nowy Port area hosts many potentials for an integrated socio-economic and spatial development. The revitalization of residential Nowy Port, future plans for the historical fort, future port activities, and waterfront potential are some of them.

The Nowy Port area is less pressurized on its development and offers therefore large potential for new integrated development. It is therefore advised to first start with the creation of an overall plan for the Nowy Port area that integrates all developments that are currently taking place or potentially take place in the future. This integrated overall plan can be the fundament for a long term sustainable development of this area.

# DEEPWATER PORT EXPANSION



**LONG TERM**



*Gdansk Gateway Taskforce*

*First Development zones*

**SHORT TERM**



## 8.5. DEVELOPMENT SEQUENCE

### *Recommendation #4*

#### **TRENDS**

In port cities all over the world, it can be observed that inner city industrial activities slowly relocate to outer city port areas. Reasons are that an attractive inner city environment and industrial activities are often in conflict with each other. Effects of industry that hamper high quality urban development for example include disturbances by noise, dust, air, and aspects like safety hazards, heavy traffic congestion and so on. Environmental regulations increasingly make it difficult to have industrial and commercial / residential land uses in immediate proximity.

#### **OBSERVATION IN GDANSK**

In Gdansk it can also be observed that new port related activities are increasingly located in the outer port areas. The new container terminal is a good example. At the same time several existing industrial activities in the port are flourishing and do not have plans or urgency to relocate.

#### **EXPECTATIONS FOR THE FUTURE**

It is expected that also in Gdansk, like in all major port cities, the (heavy) port industries will slowly move from inner city areas to locations outside the city. These locations have large benefits such as for example less restriction from noise, air and hazards regulations. These locations also have enough space for possible future expansion and are often very well connected to road and rail. However the speed of this process varies greatly per area. Some areas have flourishing industrial activities and are not expected to change location for many decades to come whilst other areas have more potential to transform at a more rapid pace from previous water related industry towards other functions that are more suitable for modern times inner city urban development.

#### **OVERALL APPROACH FOR THE ENTIRE AREA**

If one knows that this process is going to take place, one can better anticipate this in order to prevent unorganised and uncontrolled transformation developments in the Priority Area. An uncontrolled and 'un guided' transformation development will most likely result in "lock in" of the development opportunities for areas that would otherwise be most suitable and desirable for development. Furthermore, in order to establish flood safety from storm surge, an overall approach to the entire Priority Area is required that will prevent 'gaps' in the flood protection.

#### **TRANSFORMATION HEAT MAP**

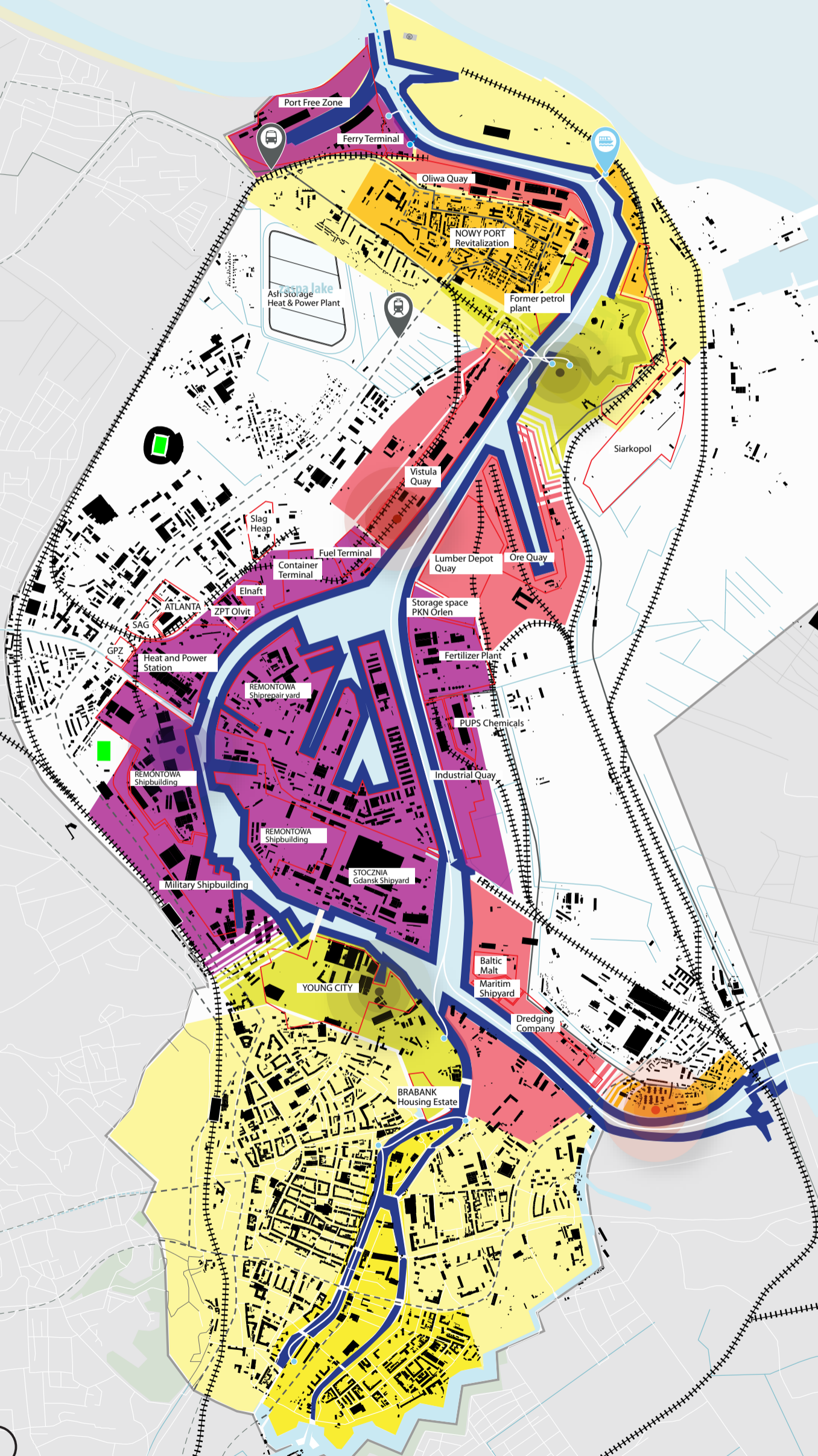
The Transformation Heat Map identifies which areas could best transform and in what sequence, based on their potential for development and their existing functions (the suggested years are indicative only) This Heat Map can be used to prioritize focus and investment for transformation (revitalization) within the Priority Area.

By adopting the sequence of the Heat Map, the long term transformation process of the Priority Area would happen in the most logical and efficient way. At what moment in time the transformation of the areas takes place, is dependent on when this is desired by involved stakeholders and when market opportunities are suitable for such a process.

#### **WHY SOME AREAS HAVE HIGHER TRANSFORMATION POTENTIAL THAN OTHERS**

Some areas have more potential than other areas for transformation from former water related industrial area, to a high quality urban waterfront area. This difference in potential can be caused by proximity of the specific area to other urban areas; by restrictions for urban development arising from neighbouring heavy industries; by costs of cleaning soil contamination; connectivity & accessibility of the area, and many more factors.

# DEEPWATER PORT EXPANSION



## LONG TERM

Long term industrial activity

Potential for transformation

Revitalization of existing functions

Introduction of new functions

Gdansk Gateway Taskforce

First Development Zones

## SHORT TERM

# LIST OF MATERIALS

## **POMERANIAN WOJWODSHIP**

01. Pomorze 2030 – Megatrendy i wstępne scenariusze rozwoju Pomorza, Instytutu Badań nad Gospodarką Rynkową – Gdańsk, 2010

## **GDANSK**

01. Feasibility Study, Protection of Gdansk Bay waters – the construction and modernization of rainwater drainage in Gdańsk – Gdańsk, 2010

02. Miejskie Obszary Funkcjonalne w Wojewodztwie Pomorskim, Urząd Marszałkowski Województwa Pomorskiego – Gdańsk, 2013

03. Plan zagospodarowania przestrzennego województwa Pomorskiego, Pomorskie Studia Regionalne, Urząd Marszałkowski Województwa Pomorskiego – Gdańsk, 2010

04. Plan zrównoważonego rozwoju publicznego transportu zbiorowego dla Miasta Gdańska na lata 2014-2030 - Gdańsk, 2014

05. Poglądowe materiały kartograficzne dla obszaru Natura2000, Instytut Morski w Gdańsku - Gdańsk, 2012

06. Rozwój Międzynarodowej Turystyki Morskiej oraz Rozwój Portu i Miasta Gdańska na Wschód, Gmina Miasta Gdańsk – Gdańsk, 2011

07. Standaryzacja Zapisu Studium Uwarunkowań i Kierunków Zagospodarowania Przestrzennego Gmin Położonych w Gdańskim Obszarze Metropolitalnym, Biuro Rozwoju Gdańska – Gdańsk, 2013

08. Studium – Uwarunkowań i Kierunków Zagospodarowania Przestrzennego Miasta Gdańska, Organ sporządzający Studium Przewodniczący Miasta Gdańska Paweł Adamowicz – Gdańsk, 2008

09. Wyznaczenie terenów objętych stałymi i czasowymi ograniczeniami w działalności inwestycyjnej polegającymi na ograniczeniu natężenia odpływu odprowadzanych wód opadowych, Biuro Rozwoju Gdanska – Gdańsk, 2009

## **PRESENTATIONS**

01. Strategia rozwoju rejonu Motławy w Gdańsku, Urząd Miejski w Gdańsku Wydział Programów Rozwojowych – Gdańsk, 12|02|2014

02. Podsumowanie strategii rozwoju rejonu Motławy w Gdańsku, Urząd Miejski w Gdańsku Wydział Programów Rozwojowych – Gdańsk, 12|05|2014

03. Program Ożywienia Dróg Wodnych w Gdańsku, Urząd Miejski w Gdańsku Wydział Programów Rozwojowych – **Gdańsk**, 2014

04. Modernizacja wejścia do portu wewnętrznego (w Gdańsku). Etap II – przebudowa szlaku wodnego na Motławie, Urząd Miejski w Gdańsku Wydział Programów Rozwojowych – Gdańsk, 08|02|2014

05. Klimat zmienia się również w Gdańsku Czy jesteśmy przygotowani?, Seminarium Skutki zmian klimatu i ich znaczenie dla Rozwoju Gdańska i okolic Gdańsk, 18|12|2007

06. Zagrożenia dla Gdańska związane ze zmianami klimatu, Biuro Rozwoju Gdanska - Gdańsk, 18|12|2007

07. Program Rewitalizacji Obszarów Zdegradowanych w Gdańsku, Lokalny Program Rewitalizacji – Gdańsk, 03|2009

08. Projekty Rewitalizacji na przykładzie Gdańska, Przykłady projektów planowanych do realizacji w latach 2007 - 2013, Aspekty prawne i finansowe - Gdańsk, 21|05|2014



