RE-BORN FROM DUST

A Transformation Proposal for ILVA Industrial Area in Taranto, Italy

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A Transformation Proposal for ILVA Industrial Area in Taranto, Italy
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Me during a study visit at Zollverein, Essen, Germany

PREFACE

After graduating in Architecture at the University of Rome "La Sapienza" I decided it was time for me to travel, meet new cultures and learn more about sustainability.

Since I started the Master Programme Design for Sustainable Development at Chalmers I have been thinking how to apply this new knowledge to the city I come from, Taranto.
Working on this thesis allowed me to learn more about my city and explore the opportunities and threats for its sustainable development.

I would like to thank the Ufficio Urbanistica in Paolo VI, Taranto for providing me with the plans of the site, and PeaceLink for fighting for the environment and people in Taranto.

I would also like to thank my tutor Atli Seelow for all the patience and advises which helped me to finalize this thesis, my examiner Lisa Brunnström for the guidance and practical suggestions, Maja Kovacs for the support and great organization and CHOCS Chalmers for the help with the text.

Thank you to all my fellow students at Chalmers, Cecilia, Francesca, Erica, Camilla, Beatrice, Giada, Ti, Annina, Liz, Angelina, Hanna and Luis for constructive discussions and coffee breaks and to Eva, Galini and Philipp for their help and support.

Last but not least, I want to thank my beautiful mother and family for being there, and Peter for calming down my 'italian temperamento'.

ABSTRACT

ILVA is the largest European steel factory, which is located in Taranto in southern Italy. In 2012 Taranto´s regional Preliminary Hearing Judge has accused ILVA of creating an environmental disaster and sequestered part of the industry.

The purpose of this thesis is to transform part of the industrial area into a landscape park and provide the area with new activities and facilities to attract tourism and local inhabitants. The challenge is to recover the industrial area with the objective of returning substantial parts of it to the local community by creating new connections between the site and Taranto.

This thesis is divided into five main parts: Background and theory, Site analysis, Design strategies, Transformation master plan and finally In-depth design as a showcase project. The data for the analysis of the area were collected by site visits and mapping. The results of the analysis led to the formulation of goals and design strategies, which provide the base for the design. The in-depth design part explains the urban and architectural proposal for the chosen site through a master plan, plans, sections and elevations.

The final results are a transformation master plan and an in-depth design. The transformation master plan is divided into three phases and shows which activities are appropriate for the development of the industrial area. The in-depth design proposal transforms the actual mineral park deposits and the coking plant into an industrial landscape park throughout the use of gentle remediation techniques and urban and landscape sustainable principles. The landscape park includes a circular promenade, elevated walkways, viewing platforms and a new museum-sustainability center.

Keywords: Transformation process, sustainable transformation, ILVA Taranto, steel factory, pollution, gentle remediation options, industrial landscape park.

TABLE OF CONTENT

What?
Transformation proposal for ILVA industrial area.
Why?
Come up with a proposal for a different use of the industrial site that could be of benefit for the city of Taranto and could be an efficient and more sustainable alternative to the industry.
How?
Through a transformation master plan and an in-depth design. The transformation master plan will guide a gradual conversion of the site while strengthening synergies and connections with the city and the surrounding areas. The focus of the in-depth design is the part of ILVA closest to the city.

Location

The chosen site is located in the southern part of Italy. ILVA lies in Taranto in the Italian region of Puglia.

ILVA, with its surface of about 15 km^2, is the biggest steel production plant in Europe.

The surface of ILVA compared to Gothenburg, Sweden.

Problems identified

- High pollution of the site and surroundings
- Health issues related to the environmental issues generated by the industry
- Location of the industry being too close to the city
- High unemployment rate in Taranto
- Lack of accessibility and connections between the city and the site

These problems are further explained in the next chapters.

Aim

The aim of this master thesis on a larger scale is to provide a guide for the transformation of the entire ILVA industrial area in Taranto. On a smaller scale the aim is to propose a design to transform part of the site into a landscape park. The intention is to improve Taranto´s overall sustainability and life quality while preserving the main industrial features and history of the area. The challenge is to recover the industrial site with the objective of returning substantial areas to the local community as well as to create new connections between the site and Taranto.

Mar Piccolo Sea.

Mar Piccolo Sea and district Tamburi with ILVA in the background.

Research question

How can ILVA be transformed in order to reinvent the city that hosts it and create new sustainable opportunities for Taranto´s inhabitants?

Follow up questions

Which are the new functions that can both meet Taranto´s needs and be hosted by the disused site?

How can the land that hosts ILVA be recovered in a sustainable way?

How can a disused industrial site be re-connected to the surrounding landscape and city?

Methodology

This thesis is design based and it is divided into eight chapters. After a short introduction, the second chapter presents the background, theories and case studies, based on literature studies and study visits. The third chapter consists of the site analysis which examines the industry and its surrounding areas and it is carried out on two scales: medium and large. In the fourth chapter new goals for the area and design strategies are formulated. The goals are the result from the analysis and the base for the design. In the fifth chapter the transformation master plan for the entire area is presented and divided into three phases. The sixth part is the architectural proposal for the chosen site.

Metal dust released by ILVA´s conveyor belts.

Taranto´s touristic port and ILVA in the background.

Delimitations

This is a thirty-credit master thesis in architecture. Although the issues concerning ILVA industry are related to several themes, this thesis investigates the most relevant ones that serve the aim of transforming the site on an urban and landscape scale. The transformation of the existing buildings in the site is not designed in this thesis. The transformation master plan is formulated on a conceptual scale. The new structures shown in the in-depth proposal, are not studied at level of structural details.
The pollutants analysis and gentle remediation proposal are engaged on a basic level. Therefore, the chemical and biological aspects are not explored in detail. Costs of demolition, reclamation and construction are not discussed.

Final results

The results of this thesis are a transformation master plan and an in-depth design.
The transformation master plan shows which activities are appropriate for the development of the whole industrial area ILVA and in which parts the new activities can take place.
The in-depth design is a proposal that transforms the actual mineral park deposits and coke ovens into an industrial landscape park with elevated walkways and viewpoints, an Industrial museum and a fun area. This is achieved through the use of gentle remediation techniques and urban and landscape sustainable principles.

Background and Theory

- History
- Sustainable urban transformation
- Conservation
- Remediation techniques
- Case studies and study visit

Site analysis

- Large scale: land use, infrastructure, morphologies
- Medium scale: buildings, production, infrastructure, pollution

Design strategies

- Remediation
- New connections
- Job and research
- Industrial heritage
- Resource efficiency and awareness

Transformation master plan

- Transformation process in three phases
- The program

In-depth design

- Coke ovens promenade
- Tamburi hill viewpoint
- Conveyor belt promenade
- Industrial museum and Sustainability center
- Industrial fun area

Borgo district, the oldest part of Taranto commonly called *Taranto vecchia.*

Taranto is characterised by a long history and traditions.
In fact the city was founded in 706 B.C (Treccani.it , 2011).
The steel production started in 1961 and it had from that point on, many influences on the landscape and the land of Taranto.

Since the history of Taranto is very long and the issues connected to ILVA are very broad, major events are shown in the following historical time-lines to give a brief overview of a more vast reality.

2.1 History of Taranto. Time-line

706 B.C
Founded by Spartans
(Magna Graecia period)

9th century
Defeated alternately by
the Byzantine Empire and
Saracen

1806-1815
Become a French
naval base

1861
Italian unification

272 B.C
Joined the Roman alliance
(Roman period)

1063
Became center of a
fief (Norman period)

14th-16th century
Become a principality (House
of Anjou period)

1900s
District Tamburi created

WW1
Become a naval base for the Italian, French and English navy in the Mediterranean sea

1937
Had 147 668 inhabitants with a surface area of 310 000 square meters

1951
Grew to 169 941 inhabitants.
Main activities in the area were: agriculture, fishing, hunting, industry, transports and various commercial activities

1959
District Paolo VI was founded

1970s
Public transportation systems and infrastructure were improved.
The highway and the bridge Ponte Punta Penna were built

1971
Population rose to 227 342 inhabitants

1981
244 101 inhabitants

Source: Treccani.it , 2011

2.2 History of ILVA. Time-line

1961-1973
Expansion period. Around 20 000 workers were employed. Surface area about 15 million square meters, double the size of Taranto

1988
Privatisation of Italsider which became ILVA S.p.a.

1961
Italsider (Italian national steel company) was built in Taranto. Around 6 000 workers were employed. Surface area about 6 million square meters

1973
Oil crisis, rise in production costs and decrease in the demand for steel

1990
Taranto, Statte, Massafra, Montemesola and Crispiano were declared areas of high environmental risk

1995
The steel factory was sold to the Riva Group

2000-2004
Cancer mortality rate in Taranto and surrounding cities was 10% and 13% higher for men and women, respectively, than in the rest of the region Puglia

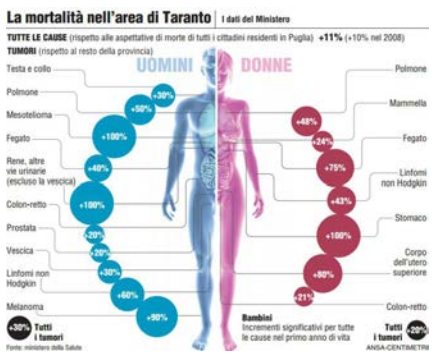
2005
The steel factory released in the atmosphere a quantity of dioxin accounting for 8.8% of the European total amount and it produced 90.3% of the total national emissions

2007
The application for permits in accordance with IPPC European directive(Integrated Pollution Prevention and Control) started

2011-2012
IPPC permit is granted to Ilva and technical prescriptions are provided by law for confiscated areas of the industry

2012
The judiciary orders the seizure of the hot steel production area and mineral storage parks and arrests the owners of RIVA group because of causing an environmental disaster

2012
SENTIERI report from ISS was published with an analysis of mortality rates in Taranto and Statte between 1995 and 2009



Conclusions

- Taranto has a long history
- Since 1961 ILVA and Taranto coexist
- During the first decade the steel factory was an economic resource for the city of Taranto
- In the last decades ILVA became a threat for Taranto´s sustainable development

Sources: Caforio, 2012 ; Corriere del Mezzogiorno, 2012; Marescotti, D. 2005

2.3 ILVA: some facts

ILVA the first years of production

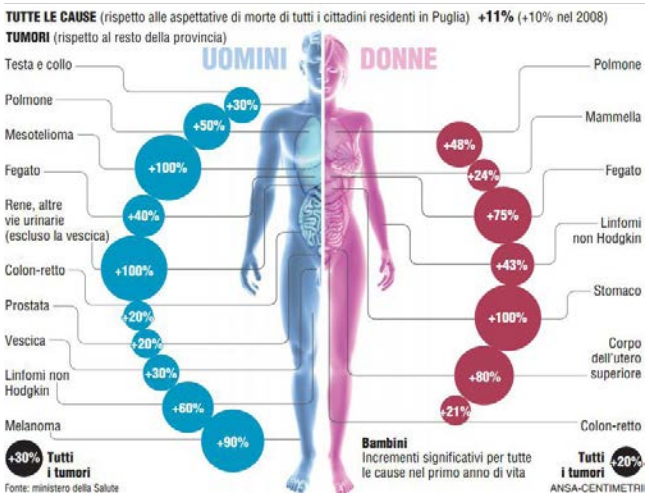
ILVA steel production plant is the biggest in Europe with its surface of about fifteen million square meters (Il Sole 24ore, 2012). ILVA was previously a State-owned company. In the early 1990´s it was acquired by the Riva Group. About 11 500 workers are currently employed in the factory (Mania, 2014). ILVA produces 8 million tons of steel annually and it distributes a value of 865 million euro into the region of Taranto; this represented about 75% of Taranto's Gross Domestic Product (Tonelli et al., 2013). During the last twenty years, health and environmental issues related to ILVA´s production have come up and the industry has been in the Italian public eye. In 2012 the Taranto´s regional PHJ (Preliminary Hearing Judge) Patrizia Todisco seized ILVA and wanted the shutdown of the blast furnaces and ordered to enclose uncovered mineral stockpiles. Moreover, eight people among the company managers and owners were placed under house arrest after being accused of creating an environmental disaster (Corriere del Mezzogiorno, 2012; De Luca, 2012).

2.4 The problems

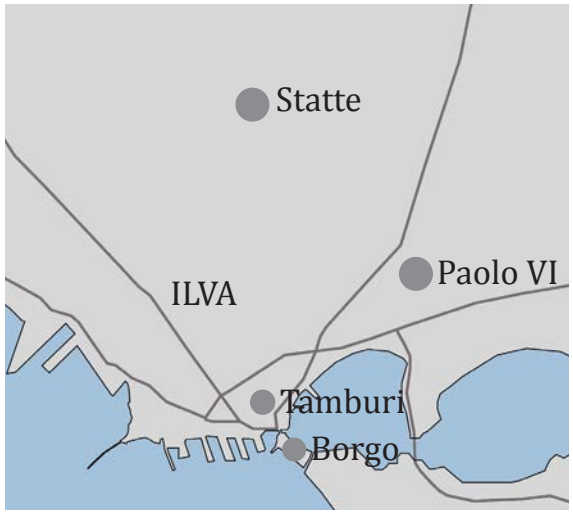
District Tamburi and ILVA in the background

Pollution

Since 1990 the area of Taranto has been classified by national regulation as SIN, Site of National Interest. This is due to the high pollution levels in the area which represents one of the main European environmental emergencies (DHI Italia, 2011; Martinelli, 2009).
The SIN area in Taranto has an extent of about 125 km^2 of which 73 km^2 are part of the Mar Piccolo sea. The pollution in Taranto is a consequence of the ILVA industrial area and the concurrence of other risks areas, such as ENI oil refinery, Cementir (concrete manufacture company), a military shipyard, the Italian Navy headquarters and some landfills. Several pollutants are released by those sites, such as Dioxin, Heavy metals, Benzo(a)pirene, PAHS and many others (Caforio, 2014). A more detail pollution map is presented in chapter 3.2.



Mortality in the area of Taranto



Municipalities and districts mostly affected by pollution

Residential buildings in the district Tamburi and ILVA mineral park deposits lie 130 meters away from each other.

Health Issues

A recent study, SENTIERI, published in 2012 by the ISS, Italian Institute of Health, has shown that the mortality rate is higher among people living in the area of Taranto compared to the rest of Puglia region. Especially people living in the districts of Tamburi, Borgo, Paolo VI and the municipality of Statte are affected by illnesses and one possible cause may be the environmental conditions of the area. The most common illnesses are heart, respiratory diseases and cancer.

Specifically, the study shows that the cancer incidence for women resident in Taranto and Statte is 20% higher than in the rest of the region. While the cancer incidence for men is 30% higher than in the rest of the region (Comba et Al, 2012).

Unemployment

Although ILVA is one of the main employer in the area, the unemployment rate in Taranto is still very high. In fact in 2013, 15.5 % of the population in Taranto was unemployed (ISTAT, 2014).

Location and lack of connection

ILVA is located about 130 meters away from the district of Taranto, Tamburi. Considering the environmental and health issues related to the steel production (Banini, T. and Palagiano, C. 2014), the proximity of the industry to the city represents a threat for the sustainable development of Taranto. ILVA is an operating privately owned factory. It is surrounded by a steel enclosure and only a few entrances are provided to allow the employees to reach their work places. The industry is otherwise not accessible to local inhabitants.

2.5 Sustainable urban and landscape development

"The overall aim of sustainable urban development is to achieve a healthy and high quality of life for all people in this and subsequent generations, with equitable and geographically balanced and socially cohesive economic development, which reduces the impact on the global and local environments" (Lebensministerium.at, 2004).

In order to achieve a sustainable urban transformation it is important to consider the existing building stock as a resource. Existing buildings are both an economic and social resource for our cities, because of their embodied energy and their history. In fact, old residential, production and trading buildings constitute part of modern cities identity and their architecture shows their original usage and meaning (Baum, Christiaanse, 2012). Transformation can be seen as the way of making abandoned places and spaces relevant again to everyday life. On an urban level this is achieved by a planning approach that reinterprets and implements the existing shapes in the city with new meanings for the society. Therefore, the social value of a transformation intervention can be measured by the quality of everyday urban life which it generates. In order to establish a new everyday life situation, a detailed analysis of the specific location`s architectural, social and spatial past and present is needed (Baum, Christiaanse, 2012).

Architecture, on a landscape level, has the opportunity to promote designs that repair, regenerate and enhance conditions affecting the ecological health of our urban communities (Yocom, Rottle, 2010).
Nowadays, one of the challenges for the design of existing cities is to find out ways which minimize environmental impact while increasing social equality. Since most of landscape and sites have had the impact of human actions, design teams should act to rehabilitate and restore the site´s ecological functions. Additionally, integrating art or design elements which can drive the attentions on the restoration process, provides a tool to create awareness about today´s sustainability issues (Yocom, Rottle, 2010).

2.6 Conservation and regeneration of the industrial heritage

"Conservation is the process of understanding, safeguarding and, as necessary, maintaining, repairing, restoring and adapting historic property to preserve its cultural significance" (Orbasli, 2008).
Conservation does not only encompass architectural consideration, but also economic and social issues. The process of conservation needs to consider three main aspects related to the site: its history, the needs and resources available and the future sustainability (Orbasli, 2008).
A contemporary concept of conservation cannot anymore deal only with artworks as they have been defined by Cesare Brandi in *Teoria del restauro* (1977). In fact, since the twentieth century, objects of conservation have been described with the broader term of "cultural heritage" (Munoz Vinas, 2005). The term "cultural heritage" refers to a broad category of objects and includes tangible as well as intangible and natural heritage. UNESCO defines "cultural heritage" as monuments or groups of buildings and sites which are of outstanding universal value from the point of view of history, art or science and sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view (1972).
By the 1980s urban regeneration projects where undertaken in larger industrial cities. Since then, waterfronts, harbors and disused industrial sites have been restored in the course of urban transformation projects. However, the redevelopment of industrial heritage involves challenges as well. First of all most of the industrial structure may not be considered attractive and pleasant as historic buildings. Secondly, industrial sites present a larger scale that makes the task of finding a new use for all the buildings more difficult. This is due to the large dimensions and high costs of maintenance and interventions that these sites involve. Thirdly the land in industrial zones can be polluted (Orbasli, 2008).

One form of heritage conservation in architecture is adaptive reuse. Adaptive reuse is about converting abandoned buildings and infrastructure, by considering what new functions can suite their structures and be relevant for the city in order to regenerate an area in a sustainable way (Bullen, Love, 2011).

After World War Two, the major challenge has been to find the right balance between preservation and transformation. Therefore, the process of regeneration should combine the conservation of buildings with actions to improve living conditions (Stratton, 2000).

Regeneration aims not only to preserve buildings unchanged, but also to bring back into use their embodied energy trying to make the best use of resources reaching a balance between development and conservation. Therefore, a sustainable industrial regeneration should take into consideration the surrounding economy and communities.
During the regeneration process, it is important to understand the building´s history and role for the community. After a careful analysis of the features and conditions of the building a new vision should be identify for it. It is central to include mix uses in the project and include activities that can attract people during the different times of the day and keep the building busy. By doing so the building will more likely generate money for its own maintenance (Stratton, 2000).

Conclusions

- Abandoned buildings and areas have to be seen as a resource.
- One way to preserve a building is to find new appropriate activities for it.
- The design should promote a mix of uses for the area
- Sustainable urban regeneration takes into account the local community, economy and culture.
- The ecological health of the environment has to be enhanced by the design.
- The design has to use available resources efficiently.
- A detailed analysis of the history, economy, culture and need of the site has to be carried out to define the best way of intervention.

2.7 Remediation techniques

"Remediation is generally defined as the corrective action to clean up an environmentally contaminated site to eliminate contamination or reduce it to an acceptable level" (Carlon, Hope et Al, 2009).
Remediation processes include techniques to reduce the level of hazardous substances in the soil, subsoil and groundwater of a site. The remediation techniques can be ex situ or in situ. Ex situ technologies are applied to excavated soil or extracted groundwater while in situ technologies work on unexcavated sites. One of the first steps for a correct remediation process is to identify the nature and extent of pollutant substances in the soil, subsoil and groundwater of the site. Then the most appropriate remediation technology can be selected depending on the type of pollutant and future activities that will be assigned to the selected site.

Remediation techniques can be divided into four main categories:

- Excavation and containment techniques, such as removal to land-fill or engineered land-raising and land forming.
- Engineered systems, which include designing physical in situ containment structures to limit the migration of pollutant substances.
- Site rehabilitation measures, which allow bringing back some utility to sites that cannot be treated for instance using growing grass.
- Treatment based techniques, which are used to remove or destroy the contaminants in the polluted site by using chemical, biological, physical or thermal processes (Carlon, Hope et Al, 2009).

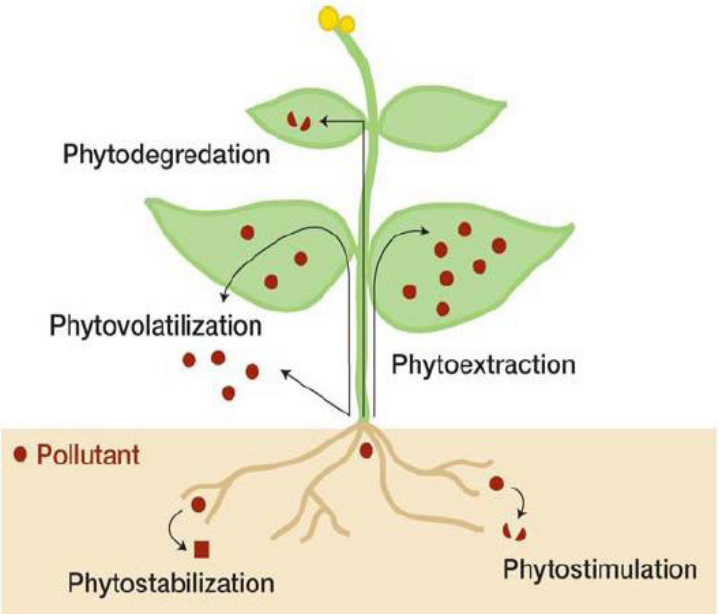
Advantages

- Shorter time frame needed for the remediation of a site

Disadvantages

- High costs
- Need of spaces for landfill of excavated soil
- Risk of reducing the biological functionality of the site

2.8 Gentle remediation techniques



The pollutant can be stabilized or degraded in the rhizosphere, sequestered or degraded inside the plant tissue, or volatilized in the air.

Recently the concept of Gentle Remediation Options (GROs) has arisen. GROs are "risk management strategies and techniques that result in no gross reduction in soil functionality as well as risk management " (Cundy et Al. , 2013). They focus on approaches to remediate contaminated soils at low cost and without significant negative effects for the environment (Hombre project, 2012).
GROs encompass a number of technologies which include the use of plant (phytoremediation) or microbiologically-based methods, for reducing contaminant by in situ stabilisation or extraction of contaminants such as phytovolatilisation, phytodegradation, phytoextraction, rhizofiltration, phytostabilisation (Cundy et Al. , 2013).

Another remediation option is the simple form of phytoremediation, the natural attenuation. Natural attenuation means that vegetated polluted sites have the tendency to clean up without human intervention since the processes involved in phytoremediation happen naturally (Pilon-Smits, 2005).
The choice for the most appropriate remediation techniques depends on risk management needs, whether the intended use of land is for a "hard" end use such as a built development, or a "soft" end use, where the soil remains unsealed, such as parks (Cundy et Al. , 2013).
Additionally, an ecological risk assessment and soil function assessment are needed to determine the pollutants proprieties and the soil´s characteristics (Volchko, 2014).
Finally, when choosing plant species for a certain site, it is advisable to include species that grow locally. These species are competitive under the local conditions and, if they are growing on the site, they can tolerate the pollutants (Pilon-Smits, 2005).

Advantages

- Relatively low cost
- Aesthetic nature of planted sites
- CO_2 sequestration
- Provide a range of ecosystem services
- In-situ technique may reduce exposure of the polluted substrate to humans

Disadvantages

- The plants that mediate the clean-up have to be where the pollutant is and have to be able to act on it
- Effectiveness limited by root depth because the plants have to be able to reach the pollutant
- Depending on the biological processes involved, phytoremediation may be slower than the more established remediation methods
- Phytoremediation efficiency is still limited by a lack of knowledge of many basic plant processes and plant-microbe interactions

2.9 Case study IBA Emscher Park, Germany

Industrialization in the Ruhr area had an impact on the society and landscape

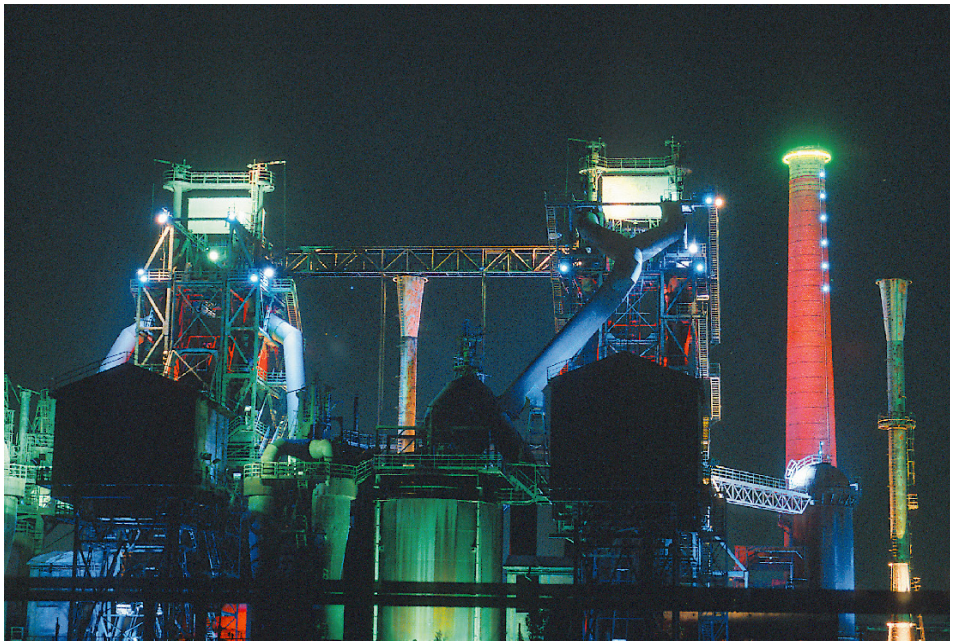

Nordsternpark Gewerbe, Gelsenkirche

From 1989 to 1999 the International Building Exhibition Emsher Park (IBA) was held in the Rhur area in Germany. The focus of the Exhibition was the decline in mining and steel industries which for almost 150 years of industrial activities have shaped and exploited the land between the River Ruhr and the River Lippe.
WHY is it important- In 1989 public appeal was launched by IBA Emscher Park for the implementation of projects in the following themes:

- The Emscher Landscape Park
- The Ecological reconstruction of the Emscher river system
- Working in the park
- New residential and urban development
- Conservation of industrial monuments and culture
- New facilities for social, cultural and sporting activities.

Towards these categories, the approach to the redevelopment of the area was comprehensive and holistic.
The challenge of the exhibition was to develop a design model oriented towards the value of sustainability, recycling, economy, structural and spatial quality. For the first time, the urban and ecological renewal of an industrial region became the focus of a program for structural change.
The 40% of the IBA projects were financed by private investors while the rest by the German Federal government and the European Union. By 1999 more than 100 projects have been planned and executed by 19 cities, municipalities and companies in the Ruhr area (Uttke, 2008).

Railwalk in the park and dialogue between old and new.



Jonathan Park´s lighting concept for the Blast furnaces in Dusiburg-Nord park.

Duisburg-Nord landscape Park is a leading example of post-industrial parks. The focus of the park is the disused Meiderich steelwork located in Duisburg, Germany. The construction of the first shaft took place in 1899. The operations stopped in 1985 and in 1994 the park opened as part of the IBA Emsher Park (Uttke, 2008).
After the shutdown of the steelwork, 230 hectares of polluted landscape were left behind. The main features of Duisburg landscape park is the construction of gardens, sports facilities and playgrounds throughout the old industrial structures.
The former blast furnace, the existing infrastructures and buildings were all maintained and remodeled within Peter Latz and partners´s landscape project. The site is charachterised by a mix of designed and wild areas (Uttke, 2008).
Latz and partners did not aim to draw an overall plan for Duisburg-Nord but rather try to link independent structural layers in a process-driven approach. The landscape design attempted to deal with the pollution of the site through green spaces and plants. Another strategy for the development of the park was the use of the smallest possible intervention. The result of the project is a new cultural landscape which attracts visitors with a wide and various range of activities during the day and night (Weilacher, 2008).

Study visit Zollverein

The Zollverein´s twin-strut frame gear is the symbol of the site.

The coking plant.

Zollverein is an ex-pit and coking plant located in the north of Essen and it is part of the industrial monuments in the Ruhr area, Germany.
The history of Zollverein pit started in 1847. In 1987 the last coal was mined and in 1993 the coking plant closed down. In 2000 the Zollverein whole complex was listed and it became part of the UNESCO Cultural Heritage Sites' list. Since then, the site has been developed into a business location. New emphasis has been put on art and culture and Zollverein attracts every year tourists from all over the World (Borgelt, Jost, 2009). From 1989 to 1999 the initial rehabilitation and development phase took place. During this period most of the buildings in the area were refurbished for new uses.

In 2002 a Master plan for Zollverein´s urban development was developed and presented by Rem Koolhaas and his office OMA (Carapinha, Diedrich, 2009). The master plan had the aim to combine the preservation of the historical cultural heritage and the conversion into a business location with a mixture of culture, education, tourism and art. The master plan stated the preservation of the existing buildings and it planned an outer zone for the new development. Today the site hosts the Ruhr Museum, a School of Design and an industrial landscape park with a Ferris wheel and swimming pool. Moreover a network of paths and a circular promenade for pedestrians and cyclists connect the site to the new entrances (Borgelt, Jost, 2009). The motto of Zollverein is "preservation through alternative use" (Stiftung Zollverein, 2014).

Conclusions from the case studies

Dusiburg-Nord landscape park.

- The transformation of the sites is carried out as a process
- The master plan plays a central role to guide the transformation process
- Conservation through reuse
- New activities planned include business, education, landscape park, culture and art
- Remediation of land and water thorough the use of plants
- Preserve the history of the place
- The existing buildings become the main feature of the new development

3.1 SITE ANALYSIS, LARGE SCALE

ILVA viewed from the close city Statte

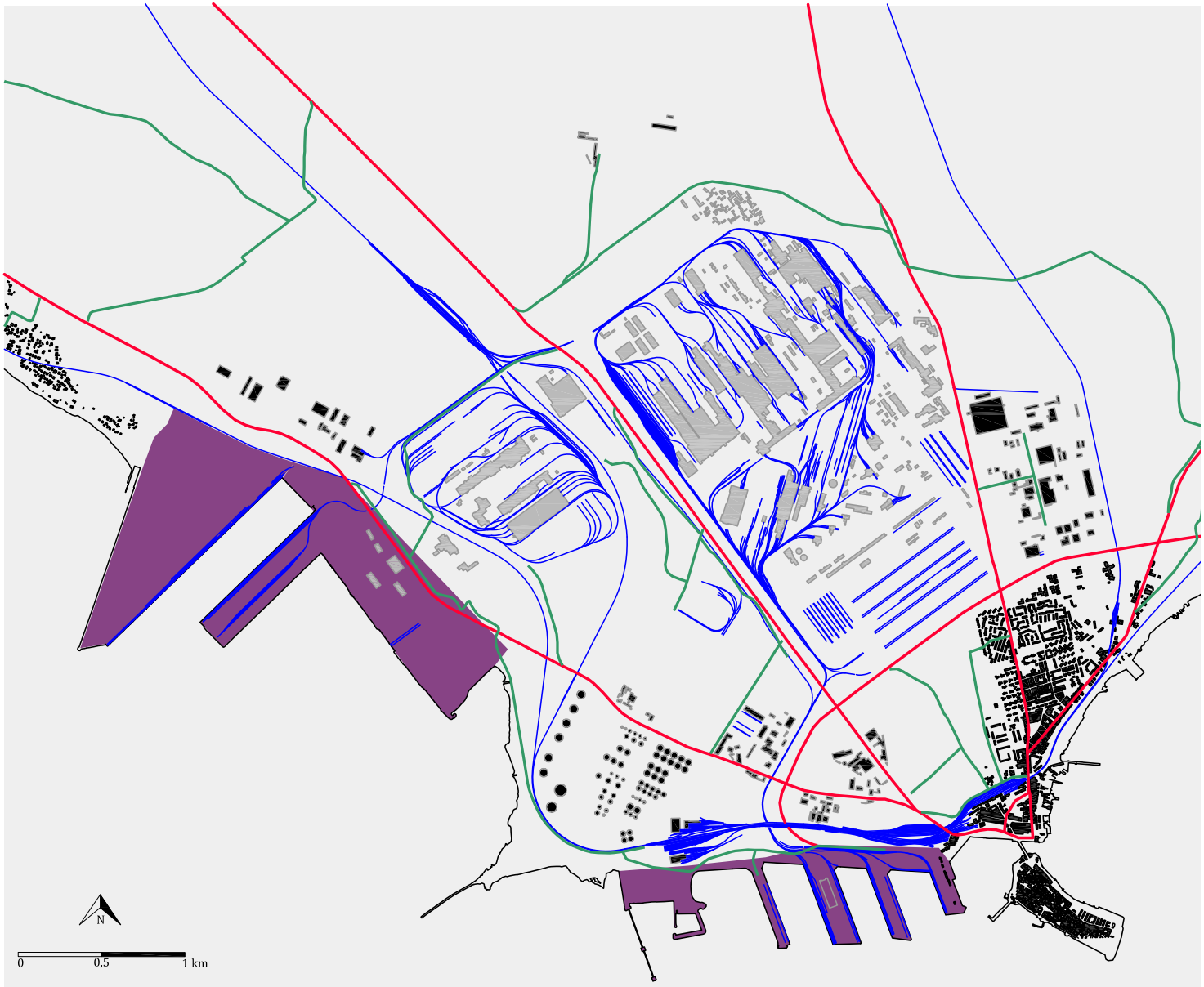
ILVA and the surrounding areas are the focus of the large scale analysis.

3.1.1 Land use

Harbor
Industrial
Residential
Commercial/Mixed use
Green used
Green unused/
Left-over land
Mine/landfill
Cemetery
Manor farm
Water

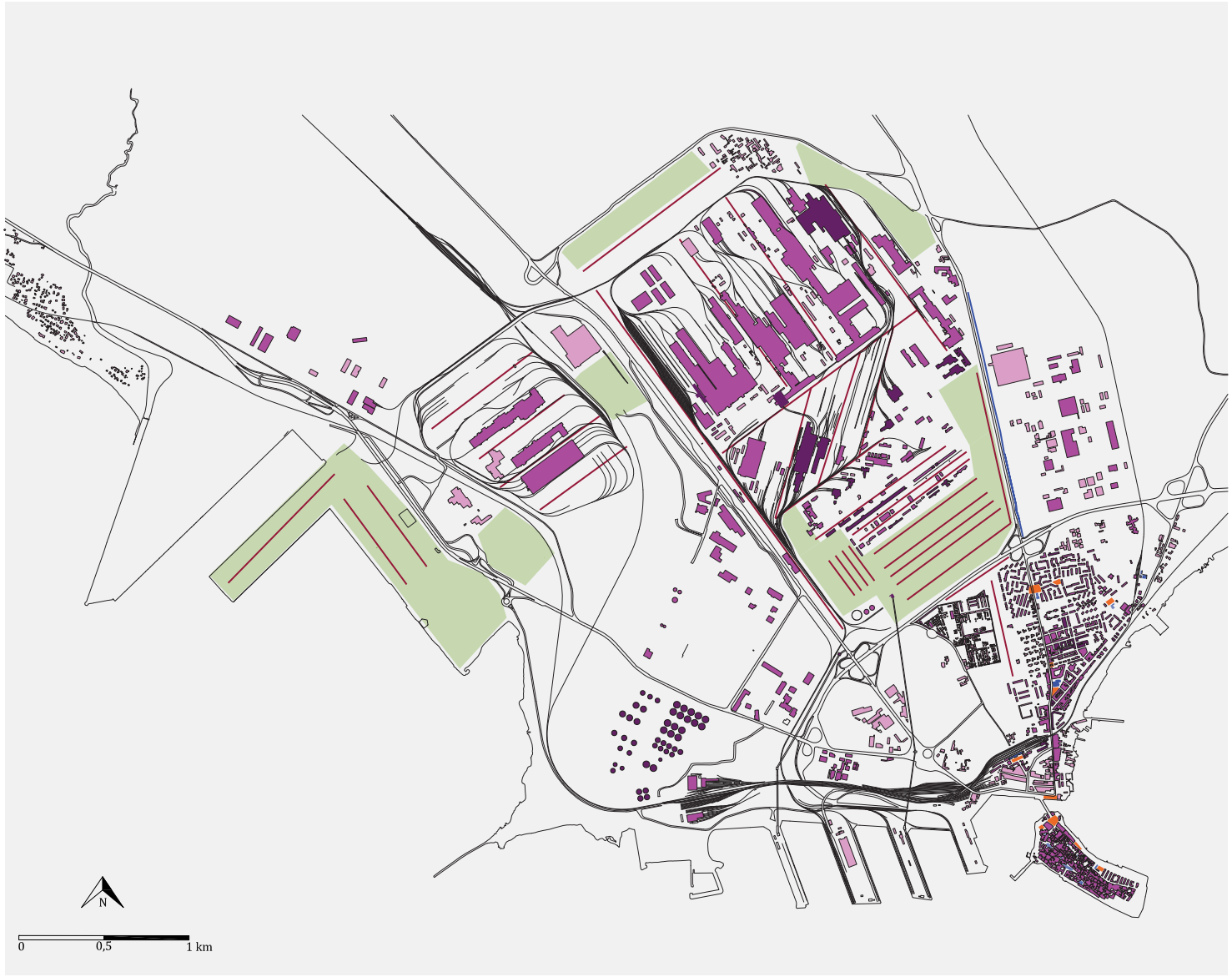
ILVA is part of a larger industrial district in Taranto. It is surrounded by several green areas such as agricultural fields and wild nature areas. The districts Tamburi, Borgo and Lido Azzuro are the closest to the industry and are, therefore, most severely affected by it.

Harbor
Main motorways
Secondary roads
Railway system



The infrastructure plays a central role in industrial areas. In fact ILVA depends on two harbors to load and unload materials and a broad railway system which connect the harbor to the main industrial facilities. Additionally, three main motorways connect ILVA to nearest cities, while a fourth separate it from Taranto causing ILVA somehow to be isolated.

3.1.3 Morphological analysis



Identified axes
Low density areas
Important squares
Relevant buildings
Low rising buildings (1-7m)
Medium rising building (8-20m)
High rising buildings (>20m)

The shapes of the buildings in ILVA are rational and reflect the steel production process and flows. Within ILVA the areas close to the boundary have a lower construction density. Most of the residential buildings in Tamburi are between 3 and 5 stories high. Interesting ancient structures can be found in the area surrounding ILVA, such as the aqueduct *Del Triglio*. Unfortunately, most of them are abandoned and in state of decline (Balena, 2013).

Main roads
Secondary roads
Railway system

3.1.5 The surrounding areas, approaching the site

Tamburi cemetery

Hot steel area

Abandoned manor farm La Riccia

Ancient aqueduct Del Triglio

District Tamburi

Taranto´s train station

Residential buildings and football field

Via Orsini, one of the main district´s road

Tamburi cemetery

District Borgo

Castello Aragonese and harbor

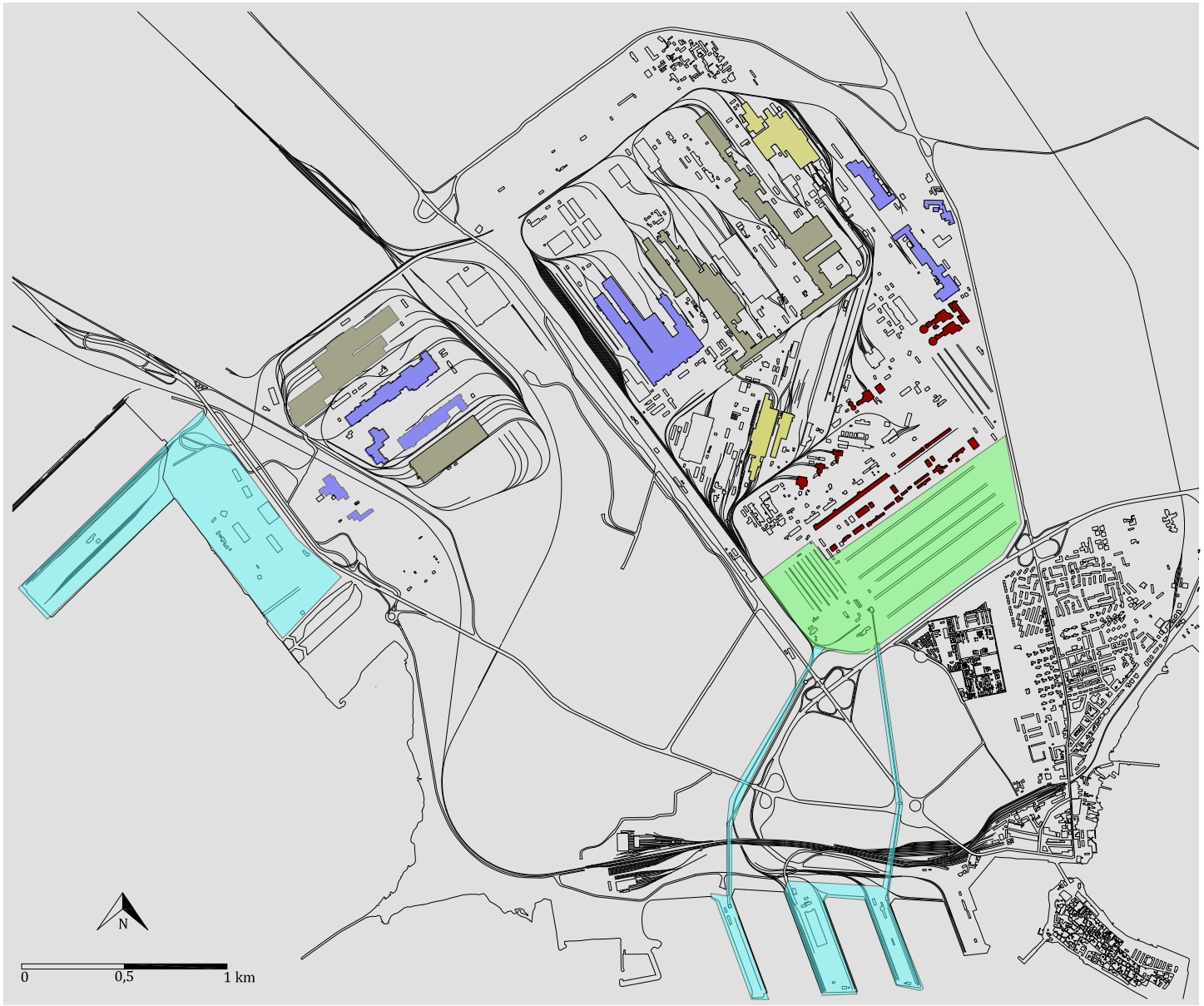
Touristic harbor and ILVA

Bridge Ponte di Porta Napoli

Fishing harbor

Today ILVA is part of the landscape in Taranto. In fact, as it is shown in the pictures, the industry is visible from every direction in the surrounding areas.

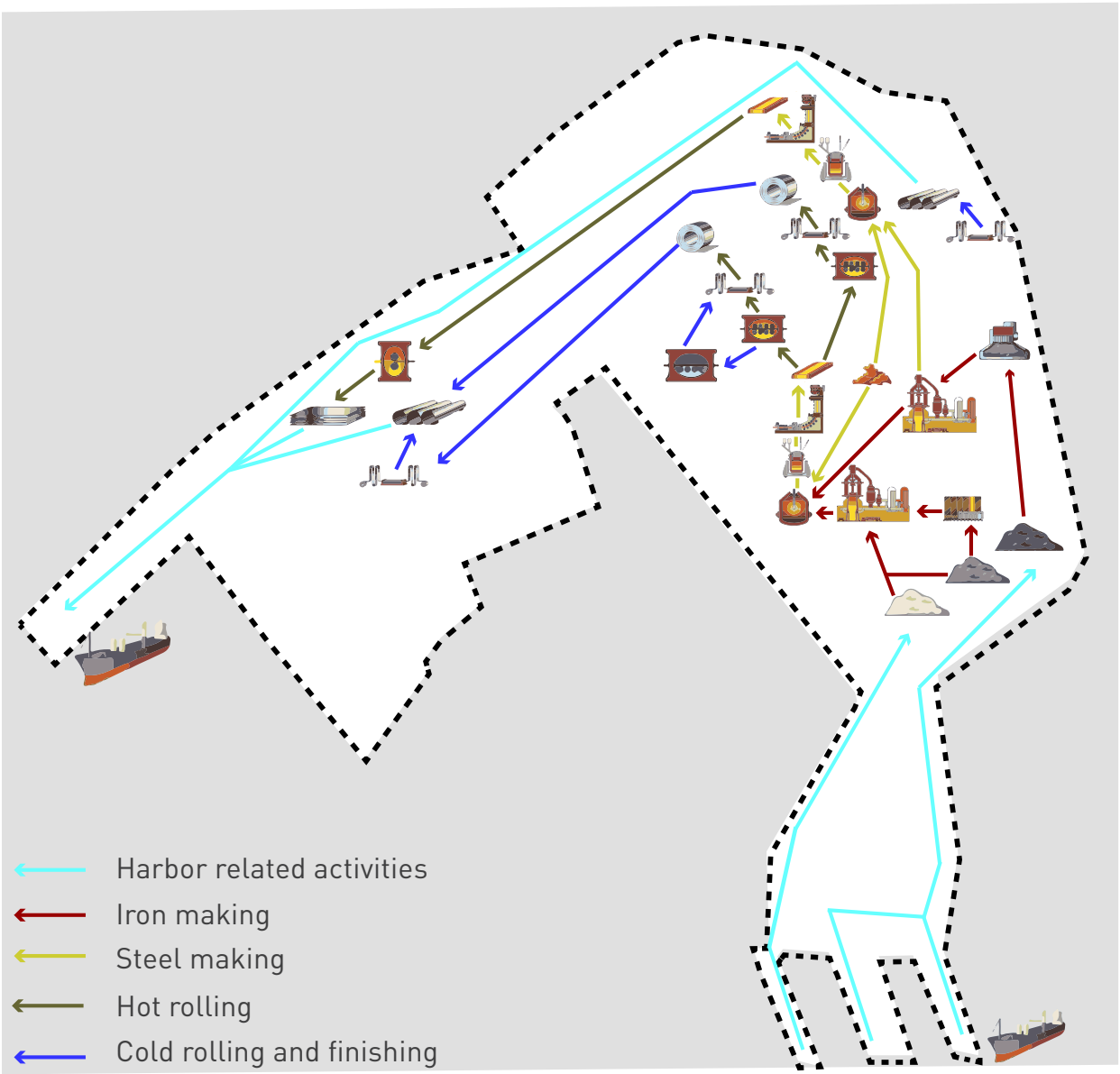
3.2.1 Prominent buildings



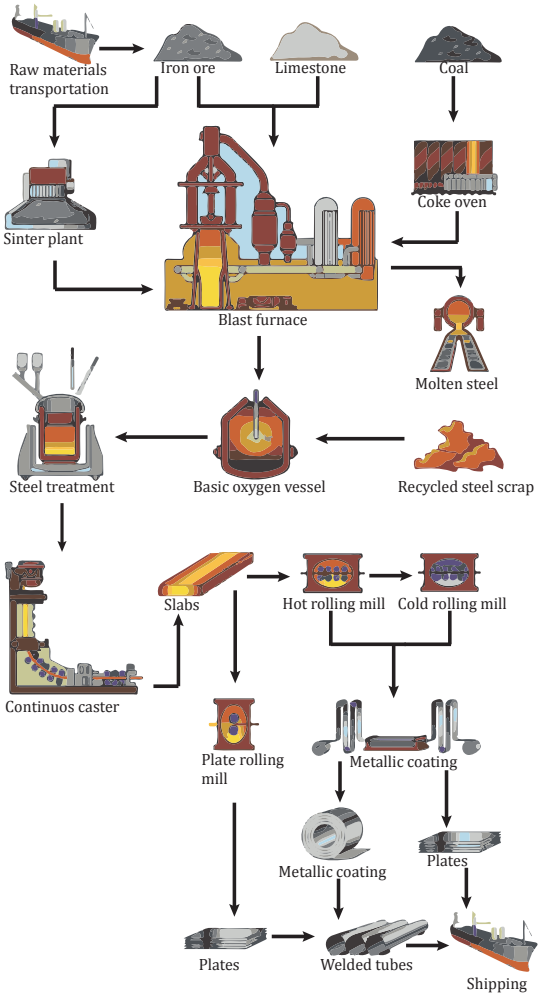
Harbor
Minerals park deposits
Blast furnaces
Coke ovens
Sinter plant
Steel making plants
Steel strip production
Plates production
Tubes production
Metallic coating
Tubes production
Cold rolling production

ILVA and the steel production are the focus of the medium scale analysis.

3.2.2 Steel production flows

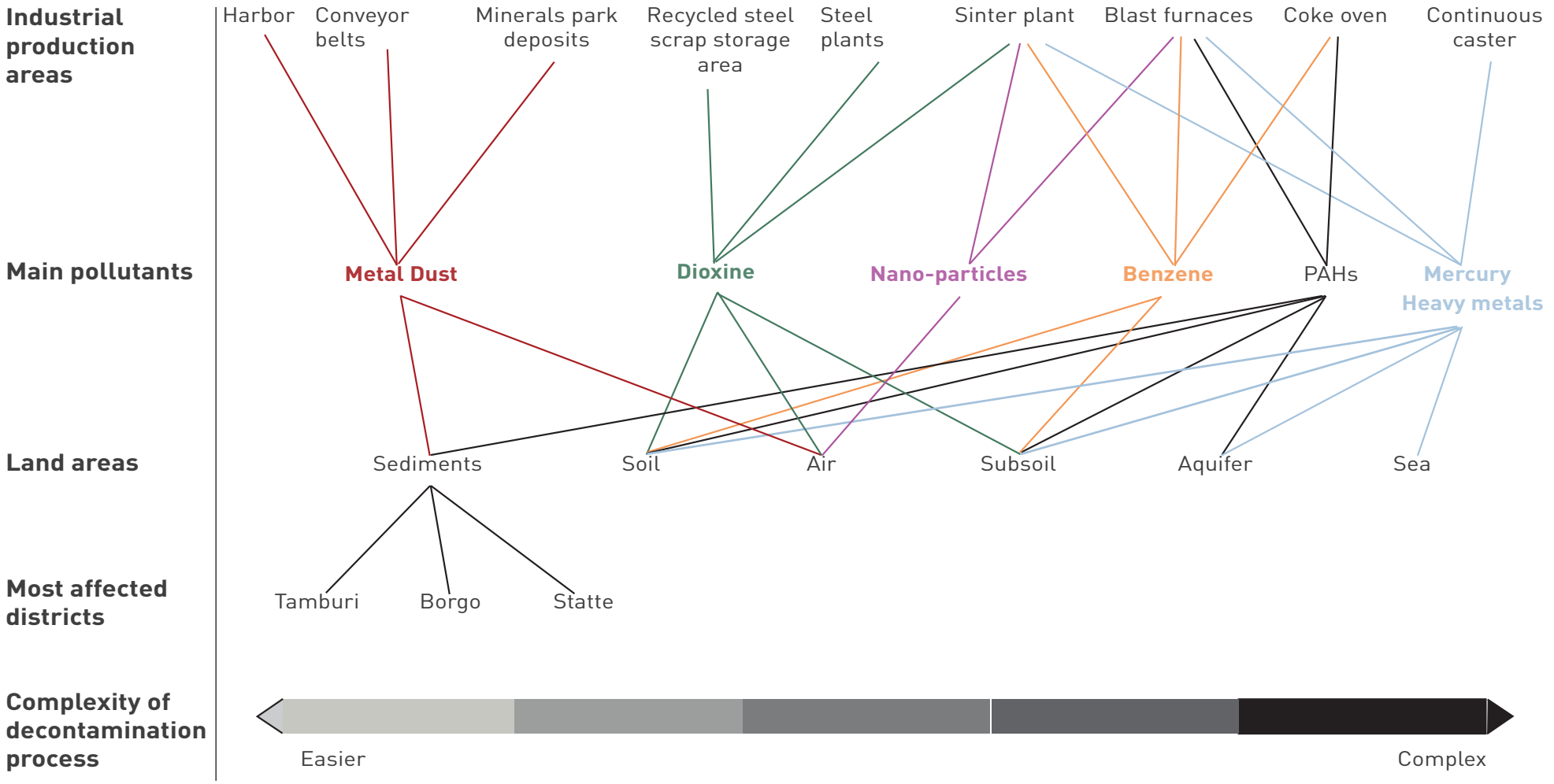


ILVA´s steel production process

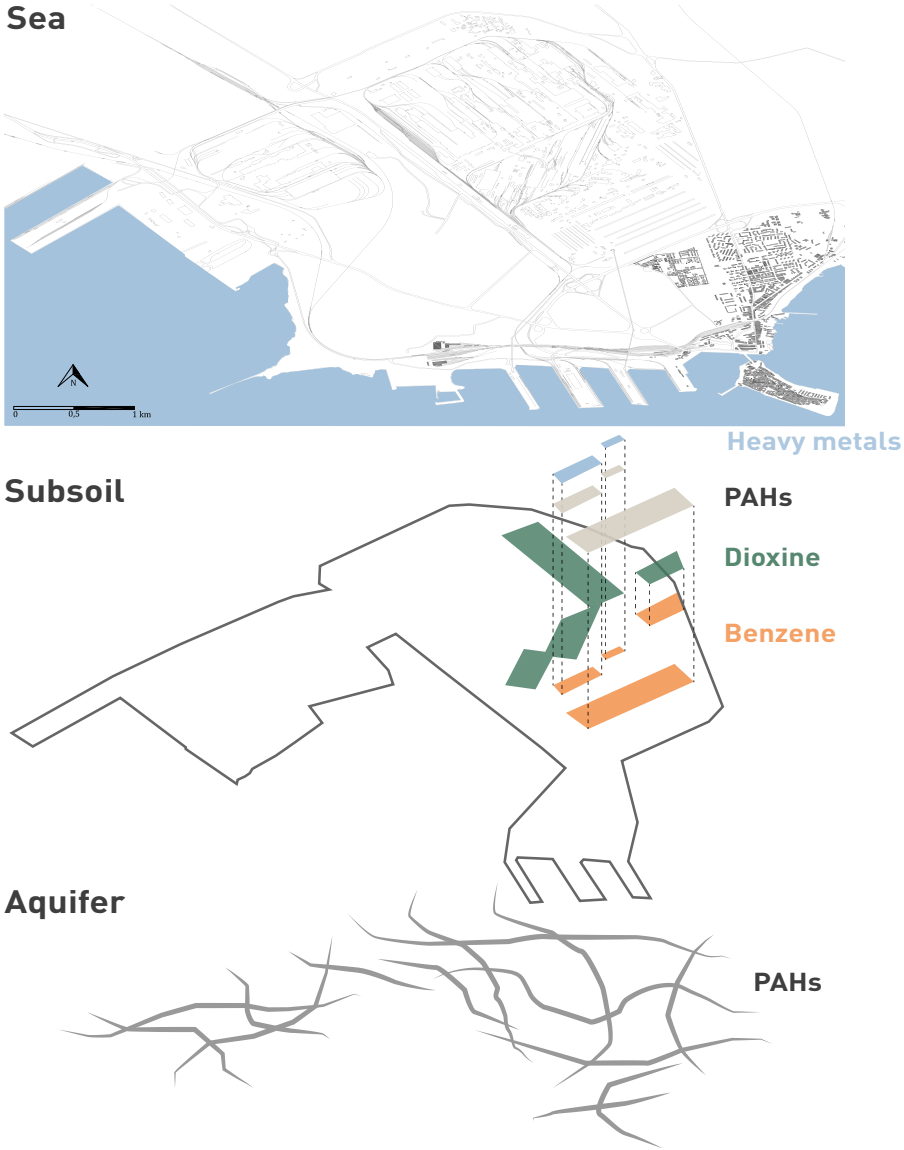


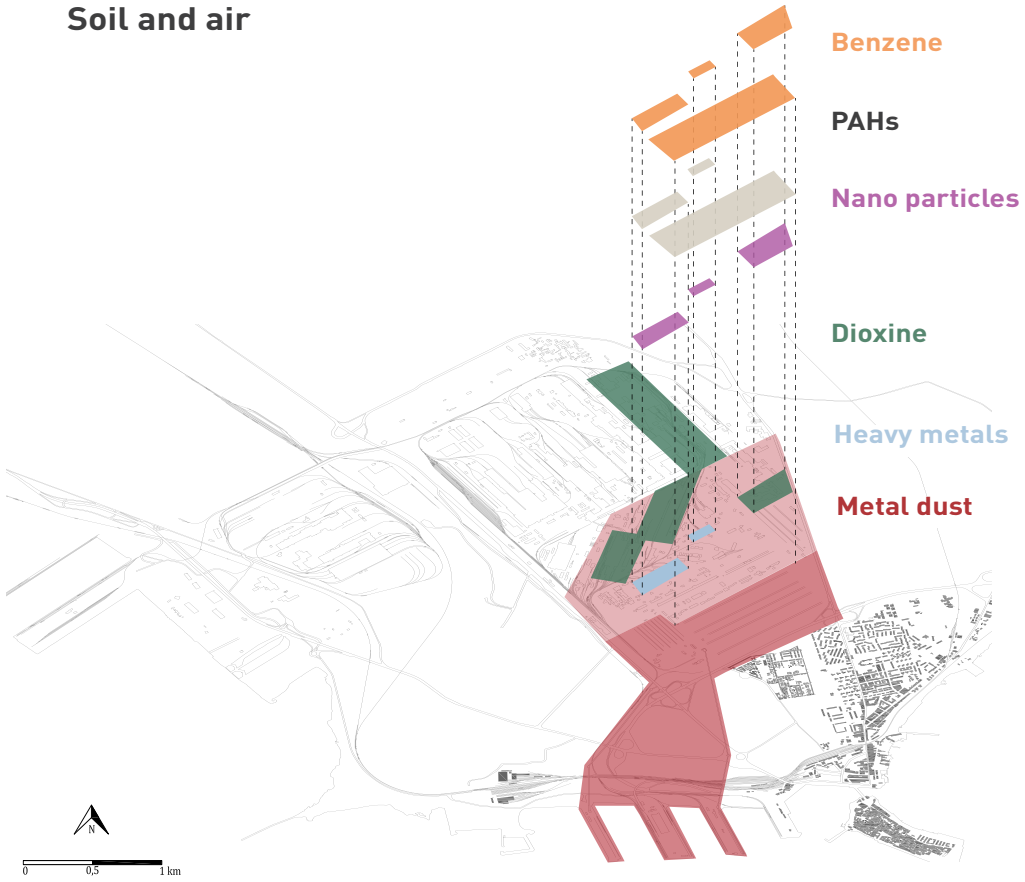
The steel production process that takes place in ILVA is the integrated process. All the production steps from the iron ore to the final coating and shaping of the steel products are carried out here (Gruppo ILVA; EEF Organisation ,2014).

3.2.3 Polluting agents diagram



Sources: Marescotti, A. 2010 ; Annicchiarico et Al. , 2011





Several pollutants are released by the steel production in the sea, air, soil, subsoil and aquifer.
These maps and diagrams are just an attempt to show in a more graphic and conceptual way where some of the main pollutants come from and which layer of the land they affect most (Morelli, 2013).

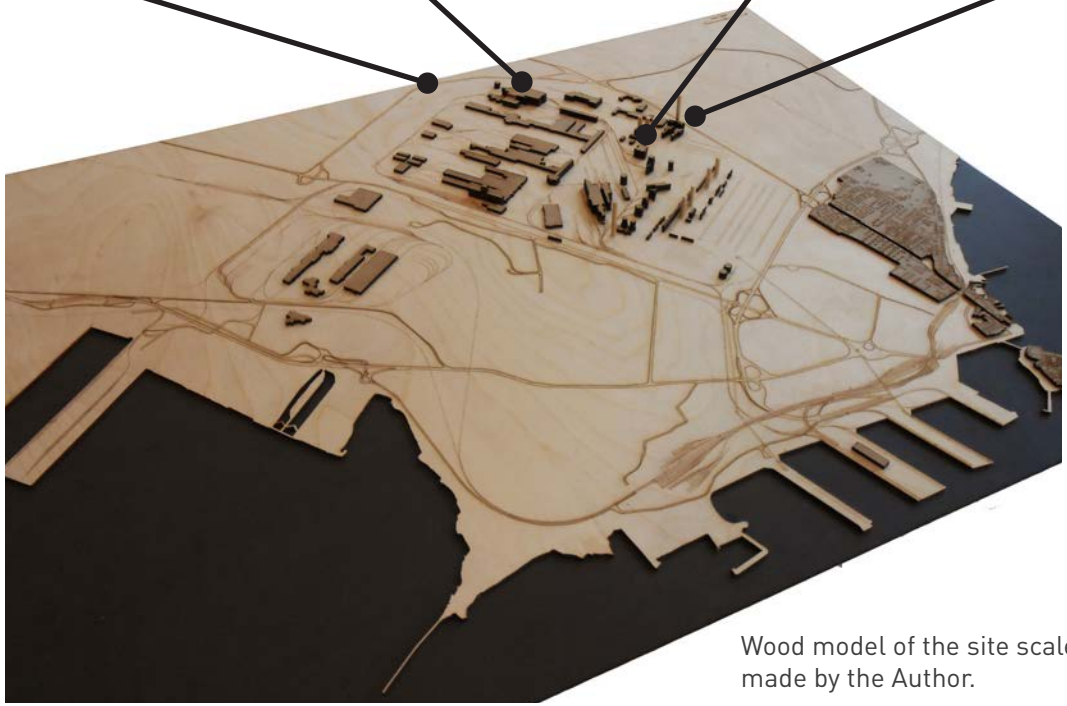
3.2.5 The site today

Limestone production

Steel production plant

Blast furnace

Smokestack sinter plant area



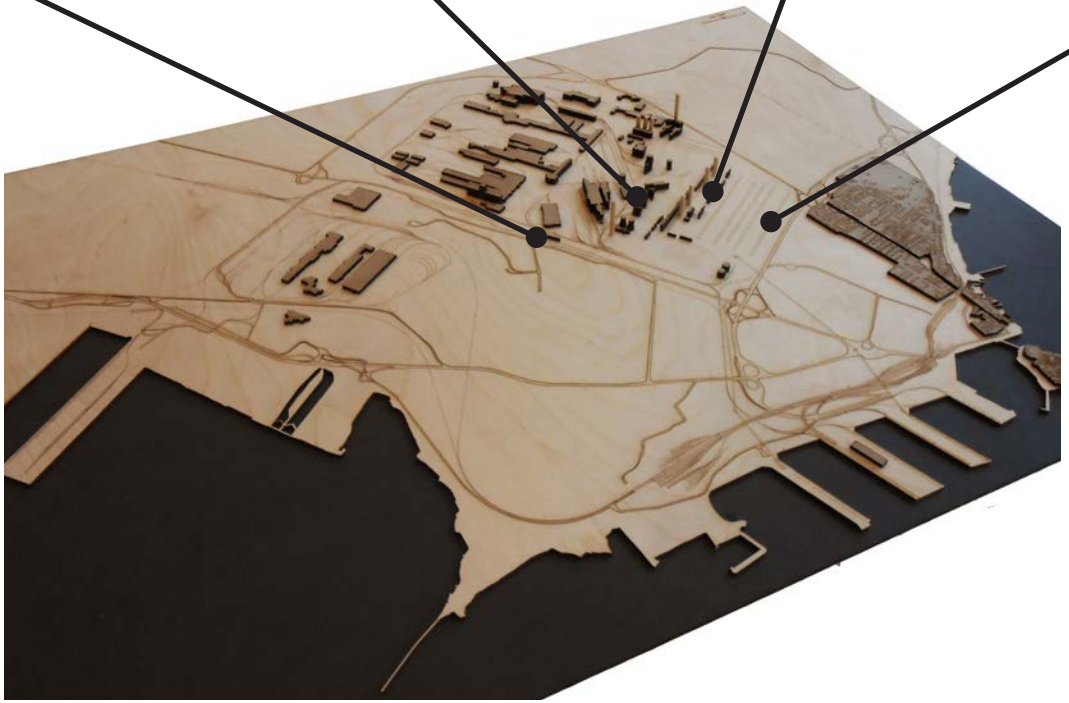
Wood model of the site scale 1:10 000
made by the Author.

Offices building

Iron production area

Coke ovens area

Minerals park deposits

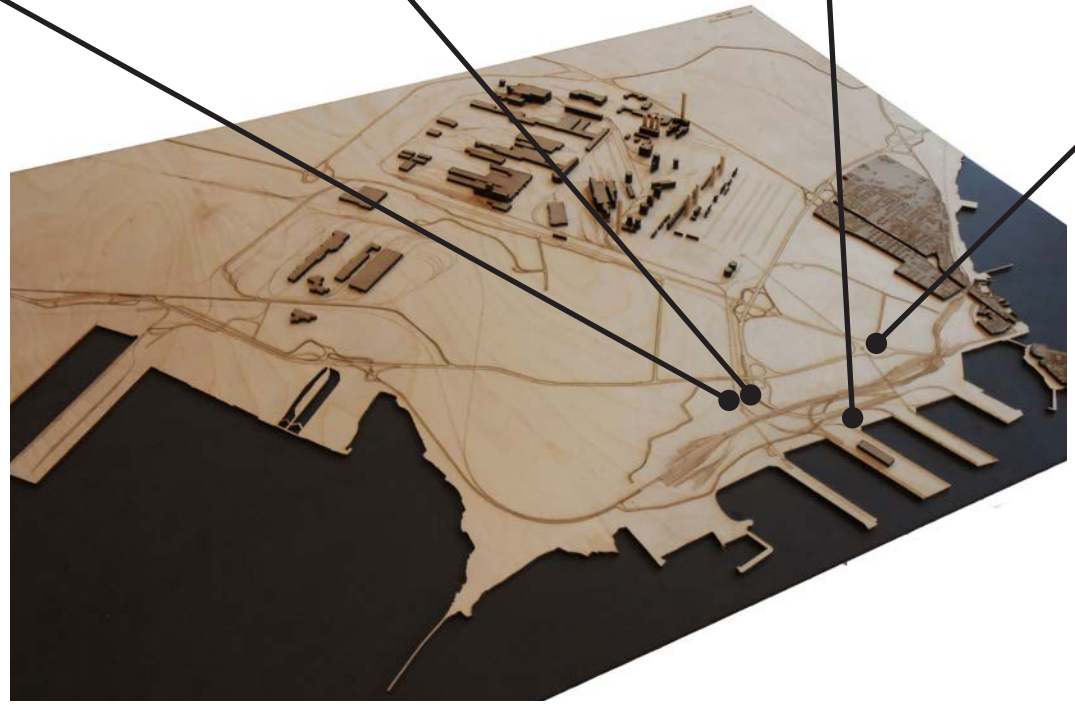


Minerals' conveyor belt

Metal dust

Harbor

Minerals' conveyor belt

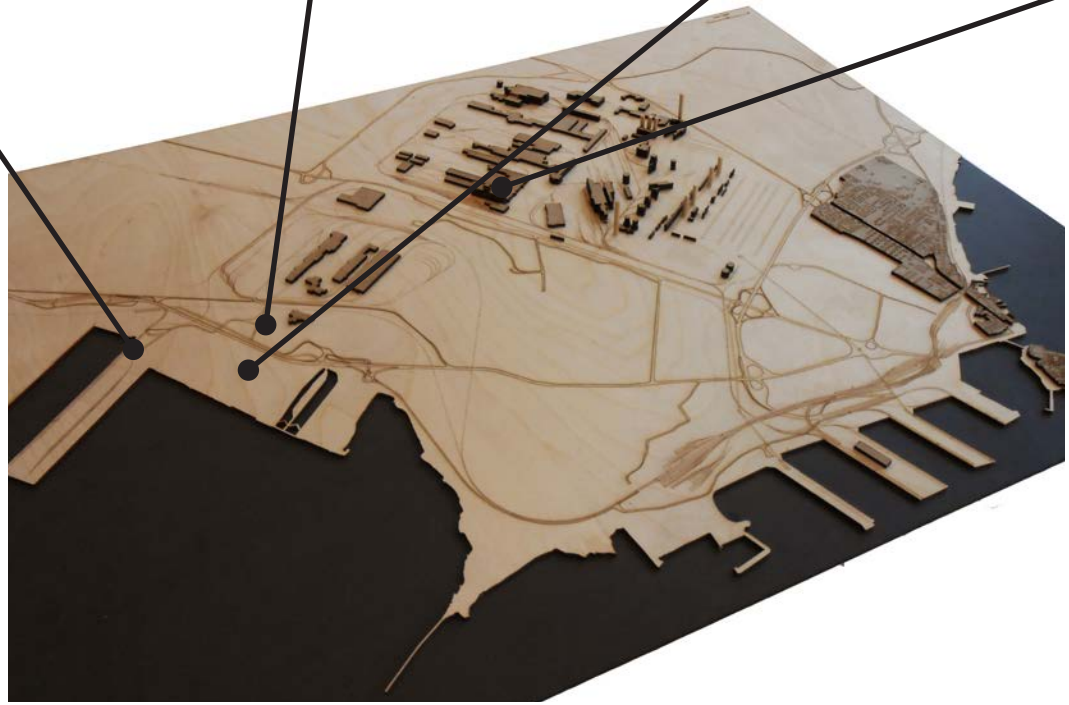


Harbor and storage area

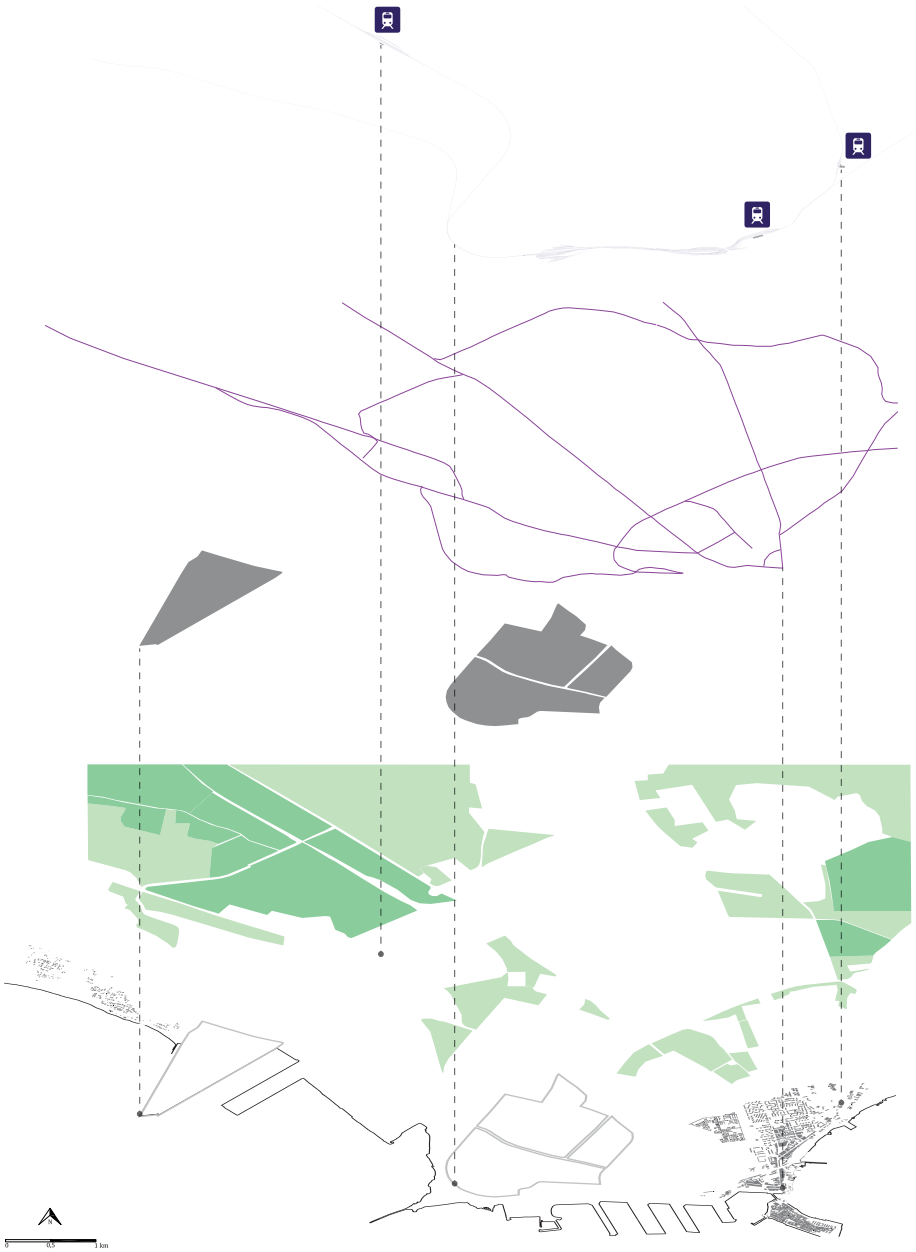
Cold steel production area

Harbor and storage area

Cold rolling and finishing area



Conclusions site analysis



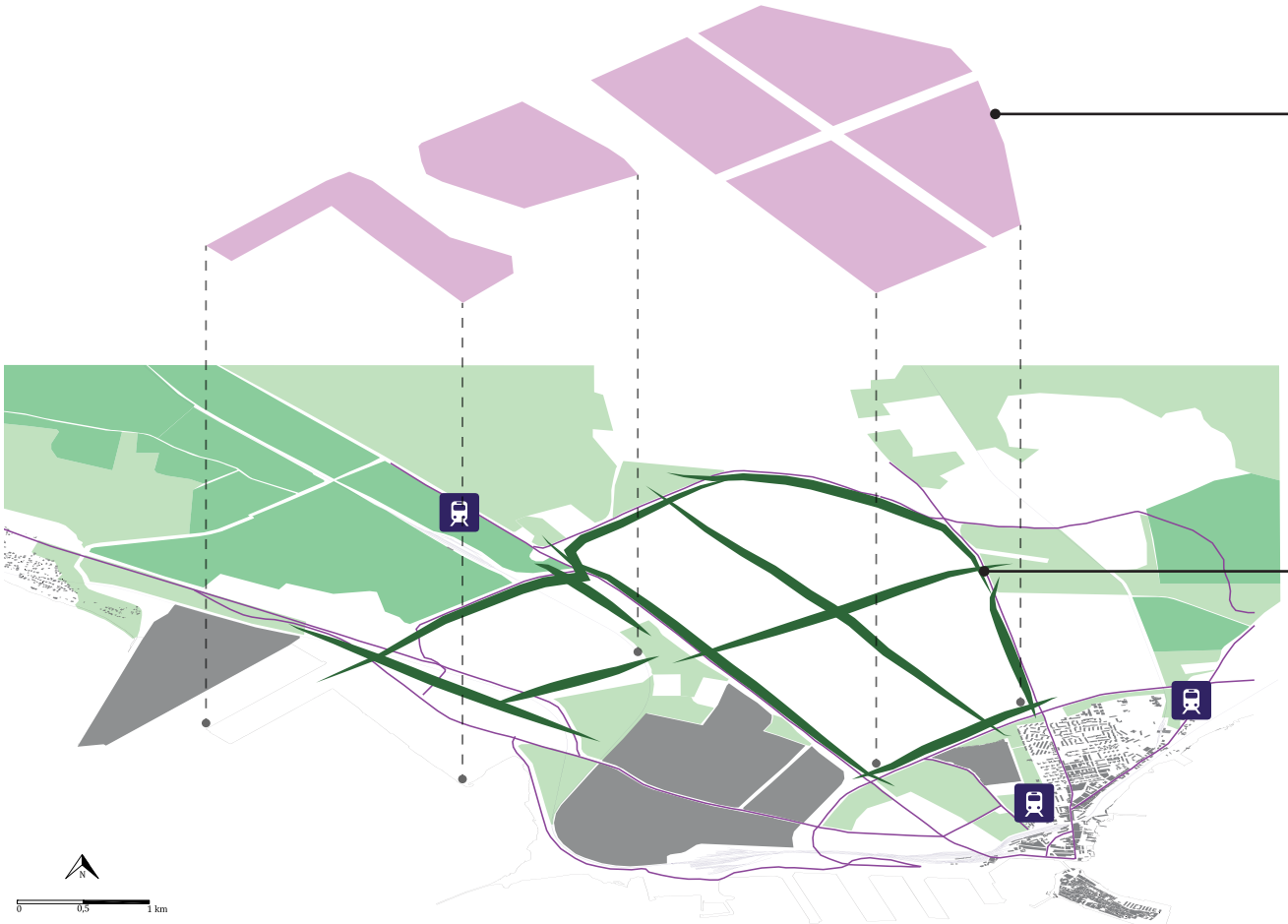
Railway and existing train stations
The development of the new area will take into consideration the existing train stations.

Main external roads
Three main motorways connect ILVA to nearest cities, while a fourth separate ILVA from the district Tamburi.

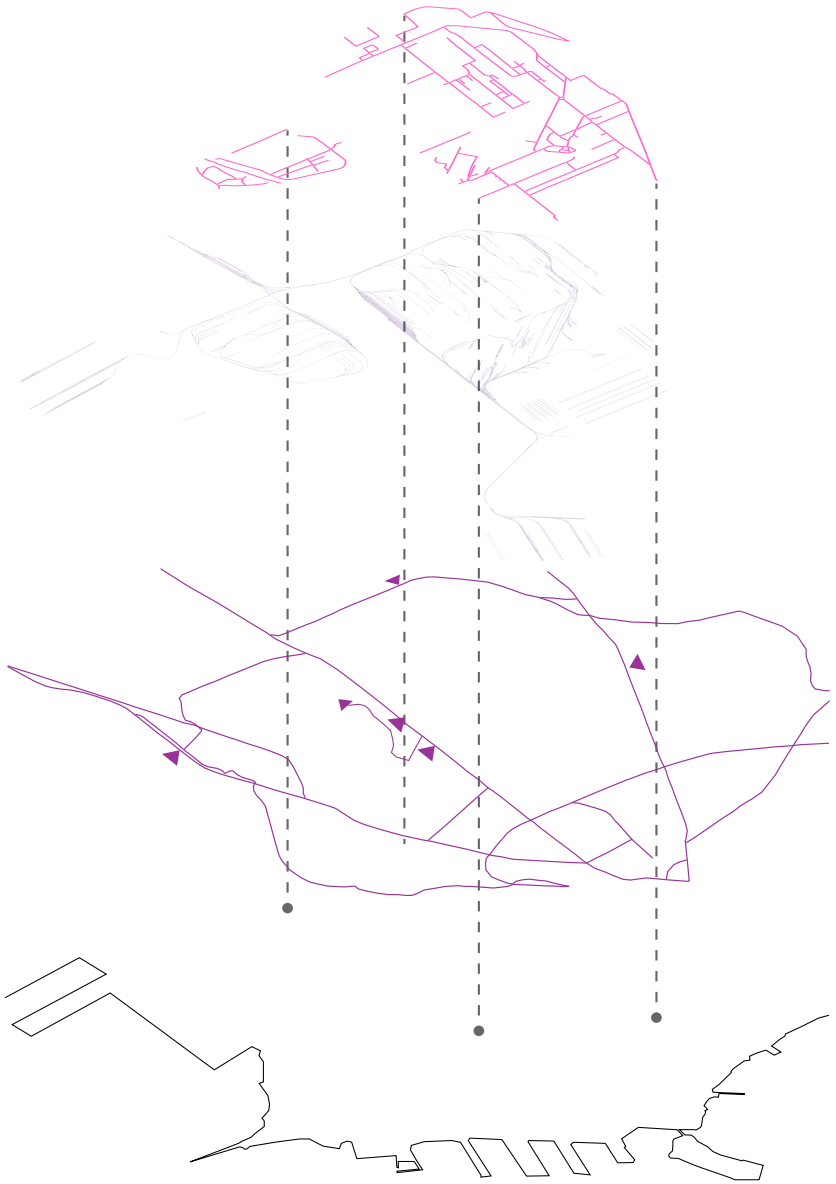
Barriers
Other exiting industrial sites create barriers to the development of the areas on the south and south-west sides.

Existing green and left-over green areas suggest how to reconnect the landscape through the site.

City
The presence of the city will influence the choice of the functions and location of the activities in the transformation area.



In order to reclaim the site and restore the landscape it is important to consider green corridors and parks to re-connect the existing vegetation around the industry (Beatley ,2000). Therefore, the new development areas will take into consideration the existing greenery.



Internal roads

The existing streets define specific paths within the site.

Railway

The railway system is widespread inside the area and part of it can be reused for the new transportation system which will serve the area.

Main external roads

The site is surrounded by important highways and streets but the connections between the city and the site need to be established.
Bicycle lanes and pedestrian paths are totally missing from the entire area and main streets. Therefore, there is no safe way for pedestrians and cyclists to reach the site.

Buildings
The buildings differ from each other in shape and function. Some of them will be preserved because of their relevance for the steel production.

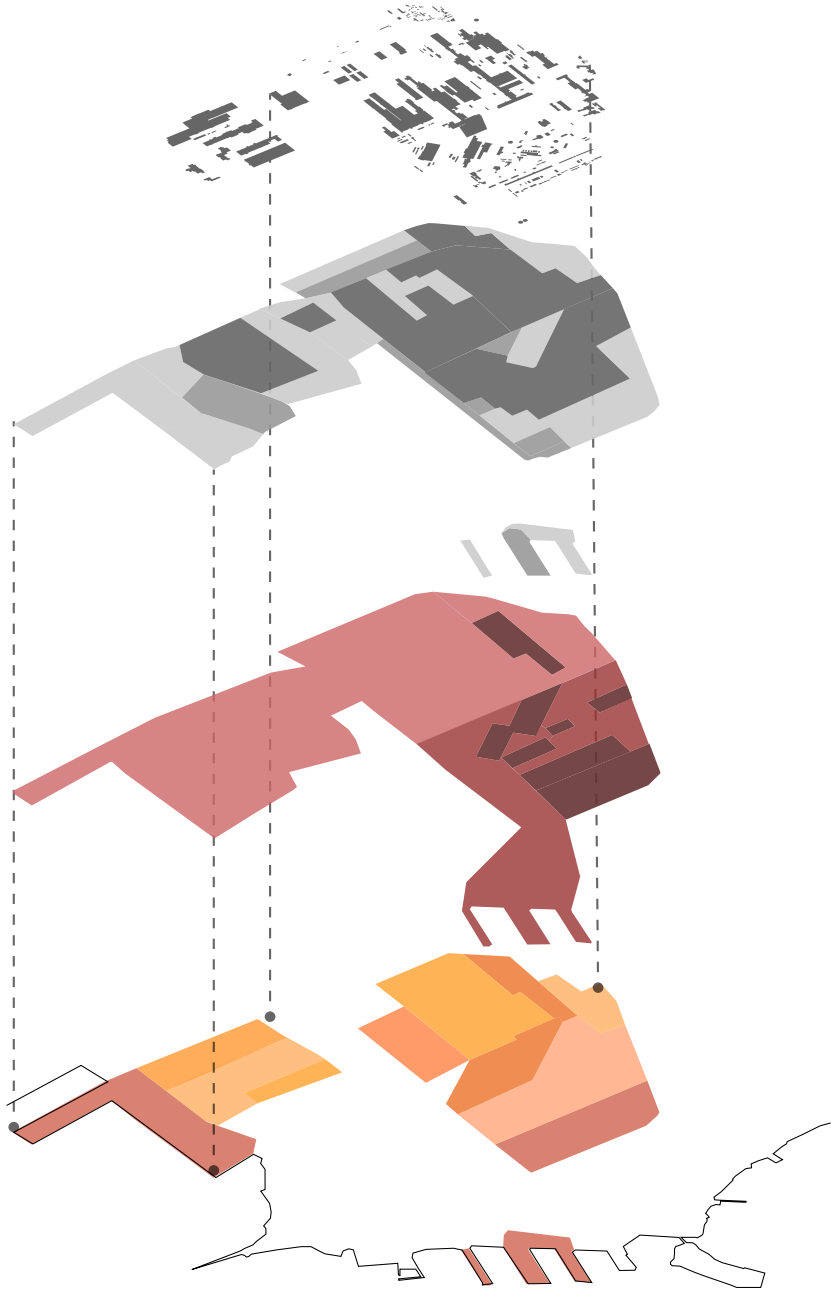
Density
Since the greenery is almost totally missing from the site, the less dense areas can host new green spaces.

Higher density

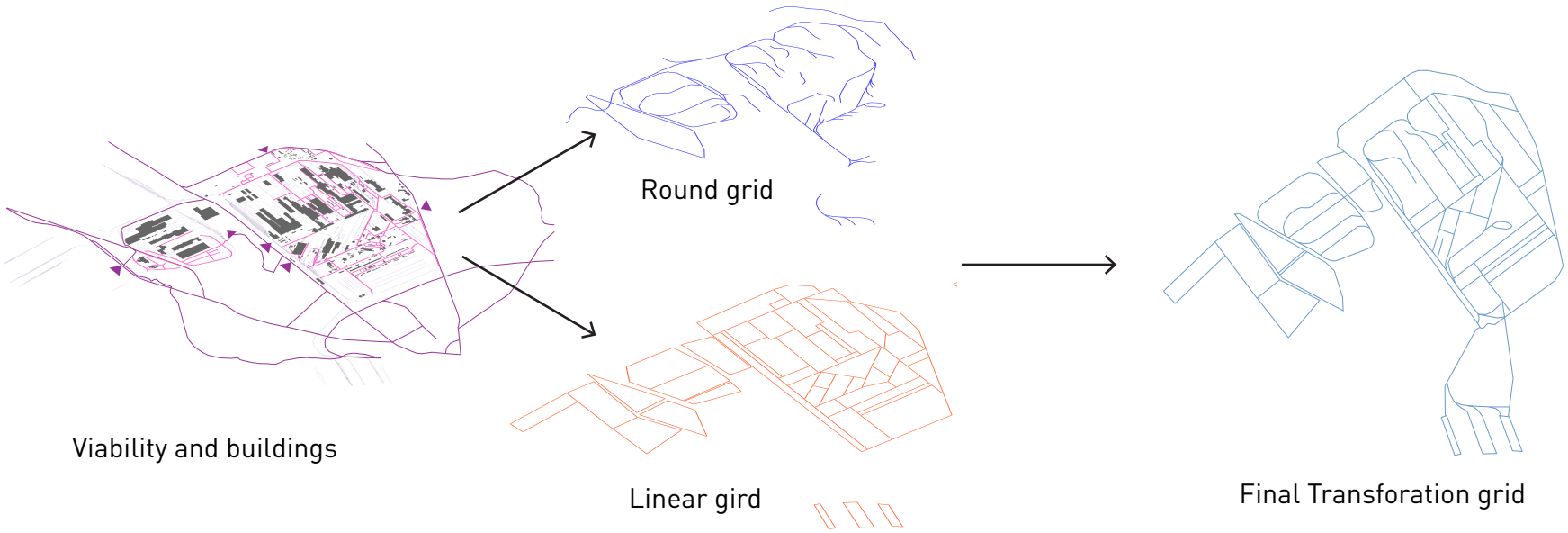
Pollution
The site is heavily polluted by different hazardous substances and it will require time to reclaim the entire area. Therefore, the most polluted areas will be mostly turned into green areas and the less polluted will be developed with different activities.

Higher pollution

Production areas
The transformation process will follow the structure of the actual production areas to allow the production to continue when the first transformation steps take place.



Transformation grid development



The morphological analysis highlighted the rational architectural character of the industry. ILVA´s architecture can be seen as functional, regular, additive, and anonymous. In fact, in the last century, the awareness that a well-planned factory is a prerequisite for an efficient production, has been developed and this influenced the contemporary industrial buildings (Brunnström, 1990). The architecture of ILVA allows to read in the plan the different stages of the steel production.
Therefore, this rational characteristic of the site will be reflected in the design.

Final Transformation grid

The observation of the existing features in the site has led to the creation of a “Transformation grid”. The grid will be used as a tool for the transformation master plan development. In fact, the existing features will define how and when to transform each part of the industry.

SWOT analysis

Strengths

- The site is located close to the city center and the central station
- The site is surrounded by green areas
- The site is still in use so most of the buildings are in good conditions
- The site is characterized by a harbor area and is close to the sea

Weaknesses

- Other relevant industrial sites and landfills surround the area
- Long time and financial resources are needed for a complete remediation of the area
- Lack of public transport to connect the site and the neighboring cities
- Lack of proper infrastructure for bicycles and pedestrians

Opportunities

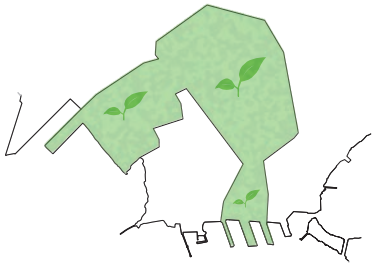
- Many lands between the site and the city are not used today and could be developed
- The university, archaeological museum and many local organizations could be involved in the project
- Ancient aqueduct Del Triglio close to the site
- The railway system is widespread in the entire area

Threats

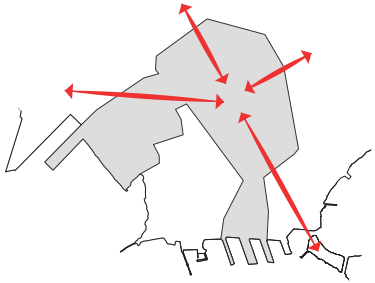
- Soil, subsoil and air are strongly polluted from different kinds of pollutants
- Around 11 500 people are currently employed in the industry

4. DESIGN STRATEGIES

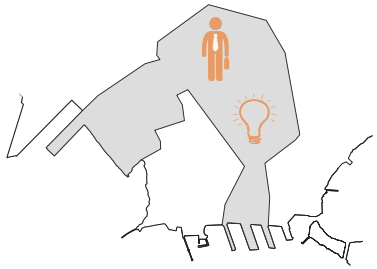
Goals for the sustainable transformation of the area



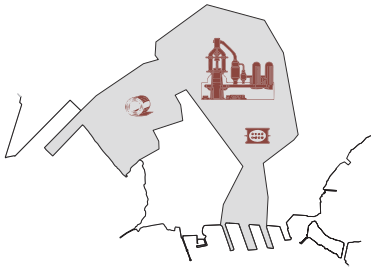
Remediation



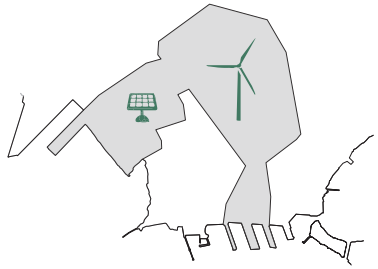
New Connections



Job and research



Industrial heritage



Resource efficiency and awareness

Strategies

- Create parks and green corridors
- Use local vegetation and Gentle Remediation Options
- Transform the most polluting areas of the industry first

- Implement infrastructure
- Give priority to cycling and walking paths
- Plan new activities that can attract local inhabitants and tourists to the site
- Create new entrances
- Make the site accessible by bike and on foot

- Implement education and research programs
- Provide spaces for new businesses
- Promote tourism
- Create mixed use areas

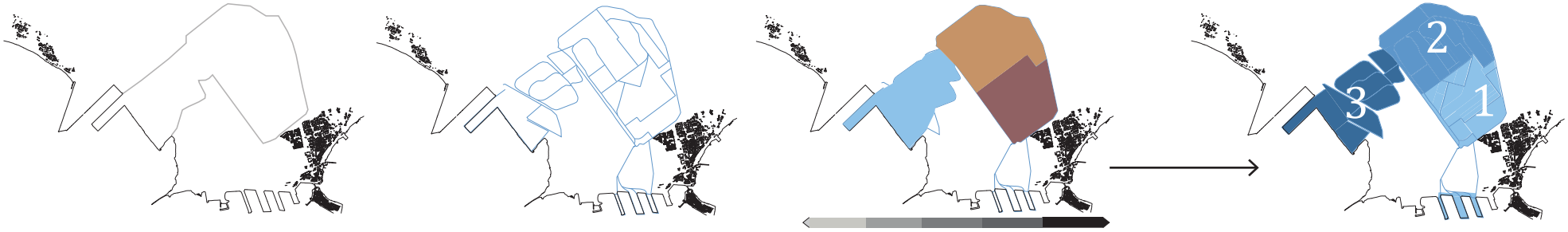
- Preserve the industrial history and character of the site
- Create a museum for the history of the site and steel production in Italy
- Preserve the current density and existing features
- Reuse part of the existing railway

- Use renewable energies and make them visible to increase awareness
- Provide space for education and conferences
- Create a Sustainability center
- Use resources efficiently

The main goal of this master thesis is to transform ILVA in a sustainable way. In order to address the five main problems identified in the introduction, goals have been set to reach the sustainable transformation of the area.

The goals and strategies are based on the conclusions of the analyses. They led to the formulation of the transformation master plan and the in-depth design presented in the next chapters.

5.1 Master plan development



City | Transformation grid | Production areas an pollution intensity | Transformation phases

Determining factors

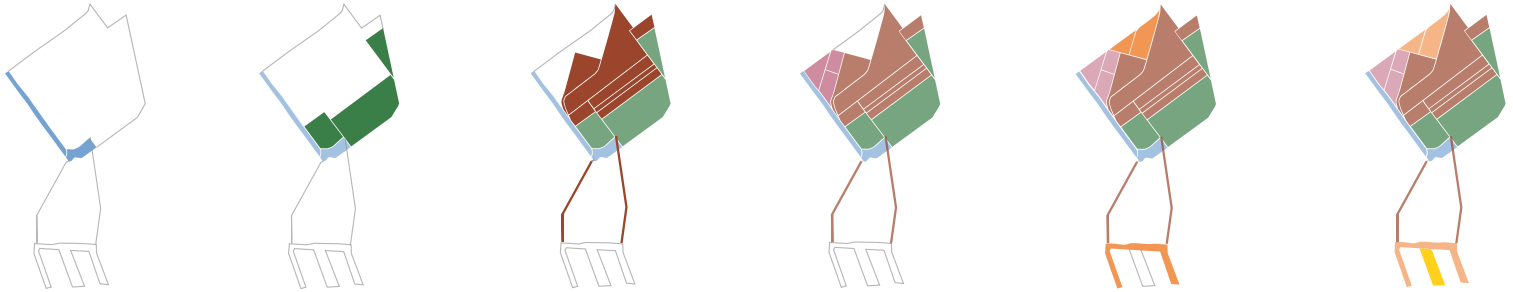
The conclusions of the medium and large scale analyses establish the starting point for the transformation process. In order to preserve the character of the site, the new development will preserve part of the existing buildings as well as streets, entrances and infrastructure at the site.
The transformation process of the entire area will be divided in three main phases and it will follow the transformation grid.
The decision of using this time frame and process has been influenced by three ideas:

- The first phase will transform the most polluting and polluted parts of the industry
- When the first part of the industry closes, the other parts can still be able to continue the production
- The transformation process will start from the part of the industry which is closest to the city.

The overall aim of the transformation master plan is to guide the transformation process of the industry from the current function to a more environmentally and socially sustainable one.
In the transformation master plan a new activities program is suggested for ILVA area. The aim of the activities is to promote a development based on culture, education and new jobs opportunities and address on a conceptual scale the main problems identified (see chapter 2).

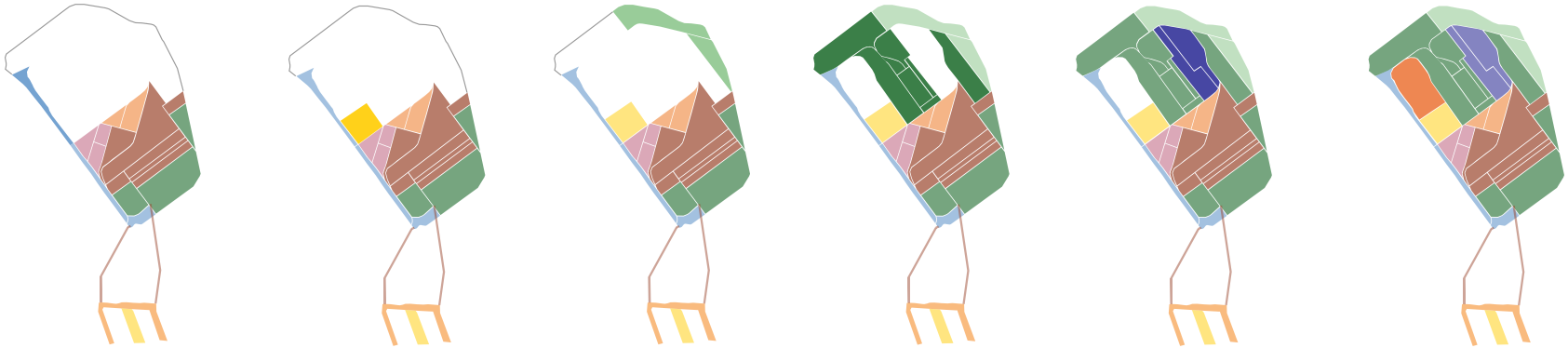
5.2 Transformation master plan

First phase
Now ⟶ 10 years



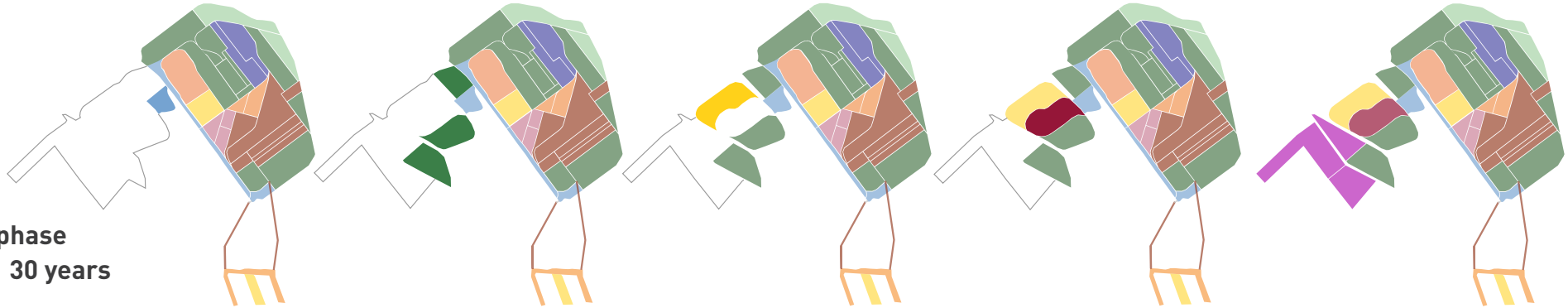
Connection and entrance | City park | Industrial park | Health research center | Public space | Education

Second phase
10 ⟶ 20 years



Connection | Education | Renewable energies | Green | Green businesses | Sport

Third phase
20 ⟶ 30 years



Connection | Green | Education/Urban agriculture | Residential/Mixed use | Leisure

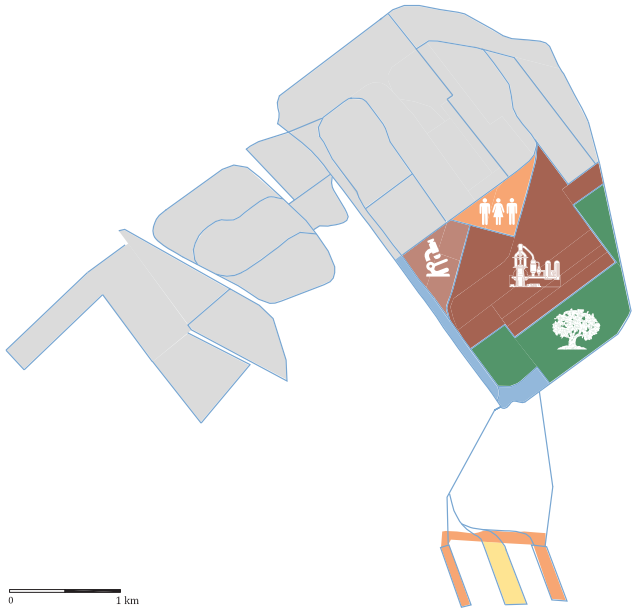
The first stage of every phase is the soil remediation.
In order to deal with the high pollution levels in ILVA´s territory, large green areas are included in the master plan. As explained in chapter 2 and in the following chapter, plants have both the function of extracting the soil´s contamination levels, reducing the exposure of the polluted substrate to humans and environment, and stabilize pollutants in the soil (Pilon-Smith, 2005).
The choice of the activities results from the estimated level of pollution in each area of the industry. For instance, the new residential development will be activated in the third phase in the current cold steel production area of the industry, which is one of the less polluting ones.

The new activities planned in the area intend to help the inhabitants of Taranto and surrounding cities to progressively transform their economy and culture.
Furthermore education and research play a central role in each transformation phase.
Another important aspect to be addressed during the conversion process is the need for new infrastructure to bridge the target site and the city of Taranto.
Since most of the case studies analysed (see chapter 2) have been developed in about 10 years, it has been assumed that every transformation phase will occur in at least a range of ten years.

LEGEND pag. 60

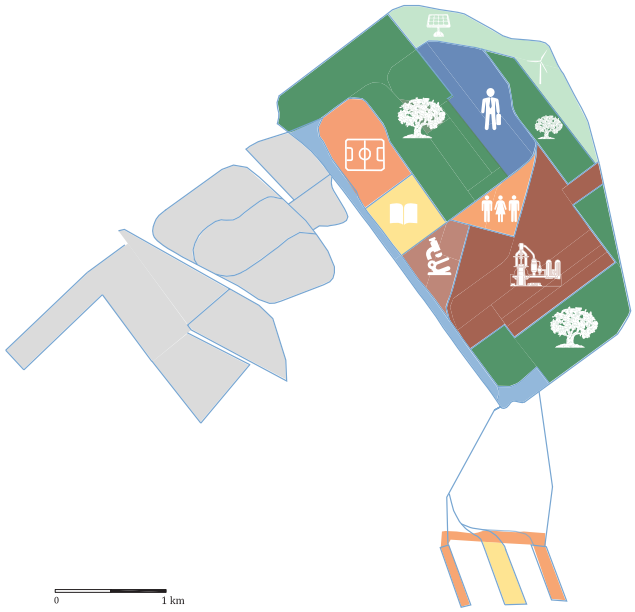
- Connection and entrance
- City park and new green areas
- Industrial park
- Public space and squares
- Health research center
- Green businesses
- Education
- Renewable energies
- Sport
- Education and Urban agriculture
- Residential/Mixed use area
- Leisure

5.3 Activities program



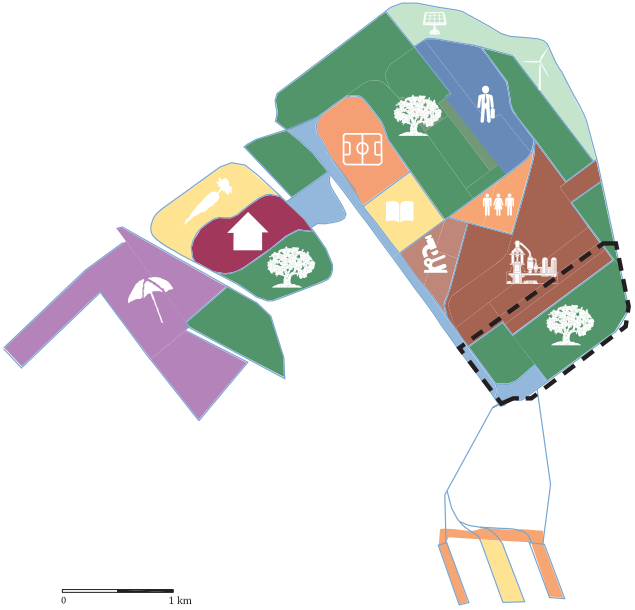
First phase

The aim of the first phase is to transform the hot steel area which hosts the more polluting activities of the industry and is the closest area to the city. Since the steel production is divided into hot and cold production areas, the former can be closed in the first phase without compromising the use of the latter. In the first phase the industrial park, the new main entrance and the research center are activated.



Second phase

In the second transformation phase the green areas are expanded. A part of the site provides the location for the development of new businesses as well as renewable energies and education. The renewable energies area is located close to the boundary of the site in order to enhance their visibility. The education zone is placed close to the research center.

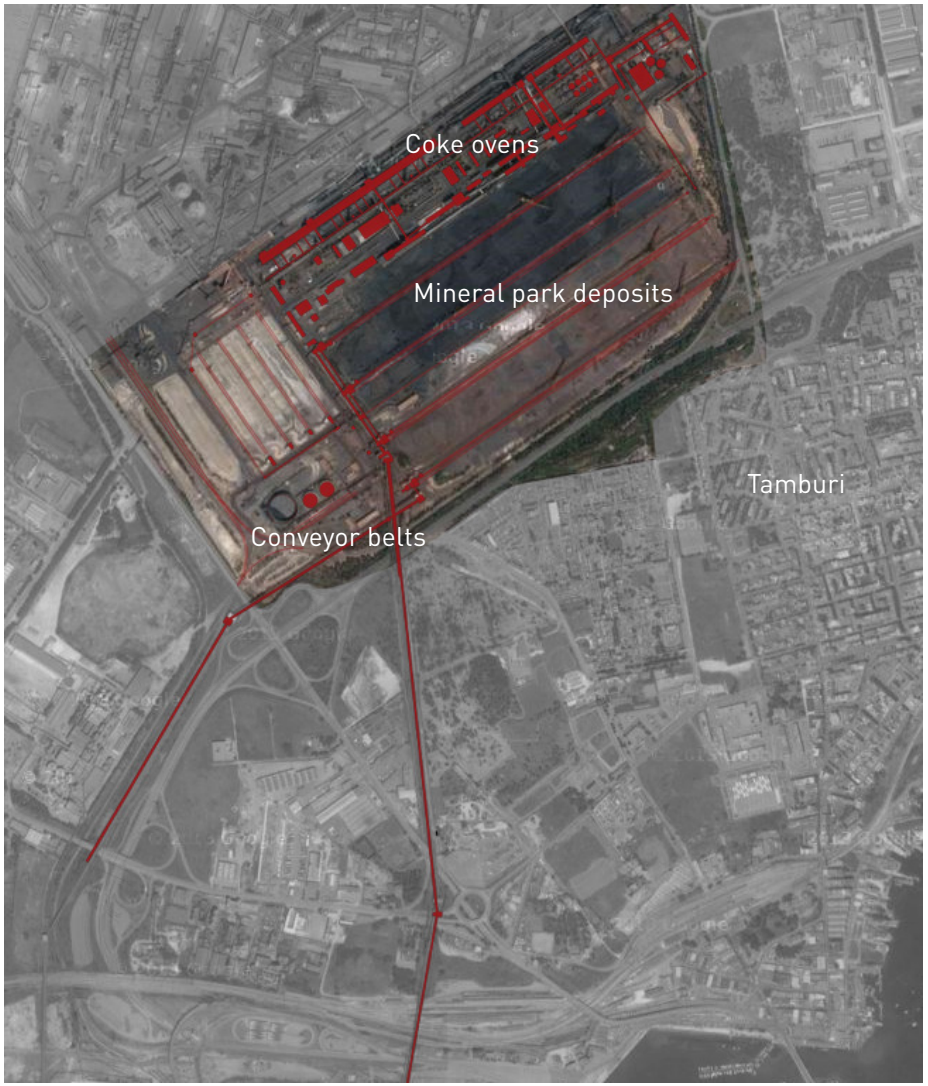


Third phase

The final phase involves the part of ILVA which has been identified as the less polluting one (see chapter 3). This phase includes the development of a new residential-mixed area and the transformation of one of the actual harbor into an area for leisure activities.

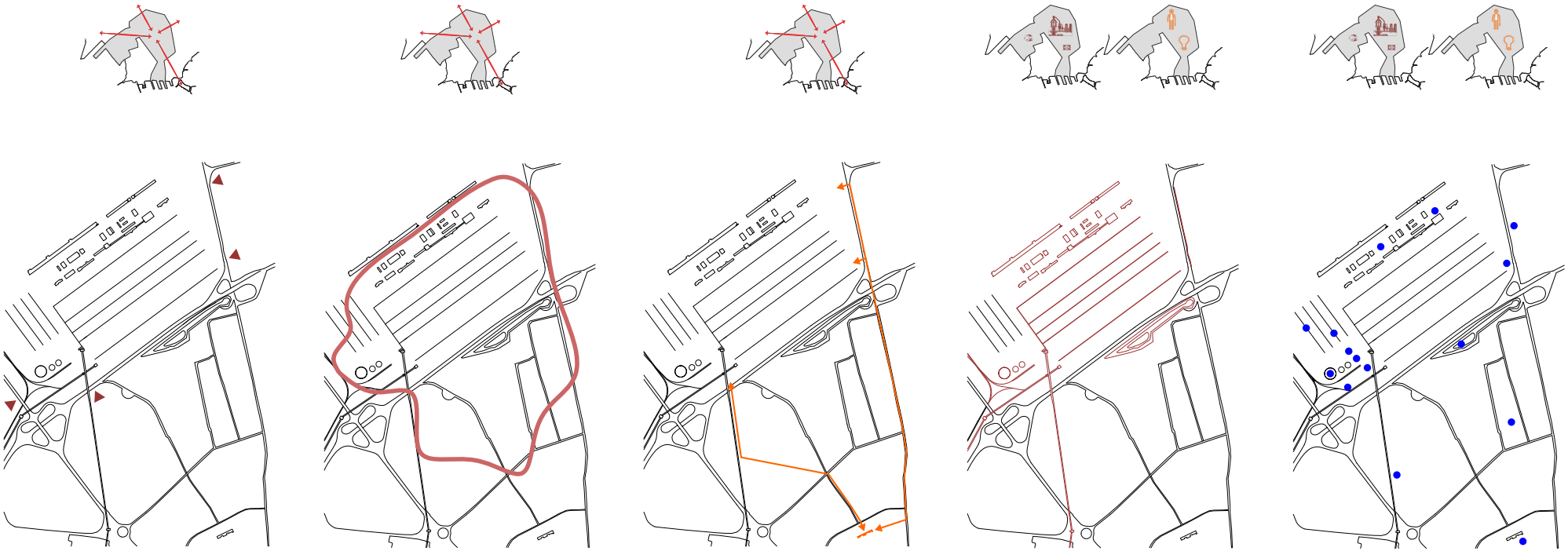
6.1 Current site state

Selected structures slated for conservation



The in-depth design focuses on the transformation of the current mineral park deposits and coke ovens areas. This site has been chosen since corresponds to the first steps of the transformation master plan. Furthermore, these areas are the closest to the district Tamburi.
Since one of the goal of the intervention is to preserve the industrial character of the area, the most prominent buildings will be preserved because of their relevance for the steel production (see chapter 3.2).

6.2 The concept: design storyline



1. New entrances

Create four new entrances which are strategically located in order to easily enter the site from the city.

2. Circular promenade

Create a circular walking and cycling promenade which goes from the city to the site.

3. Access to the train station

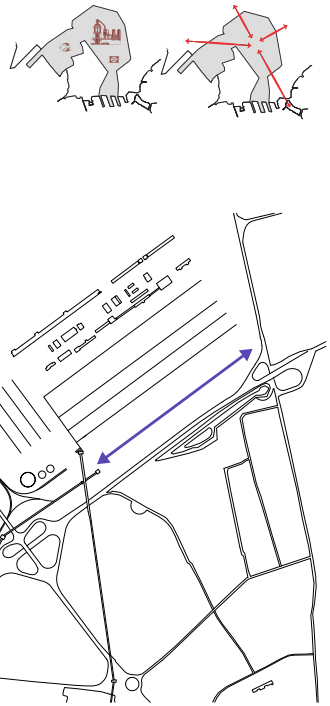
Connect the new entrances to the existing train station through the circular promenade.

4. Exploit existing features

Preserve the existing industrial features and emphasize them in the design.

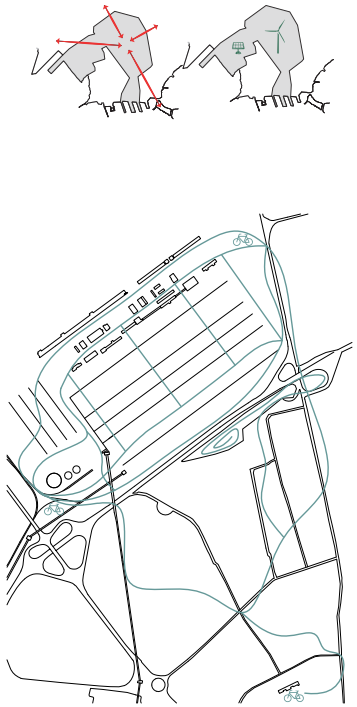
5. New activities

Include new activities to make the site more attractive to local inhabitants and tourists.



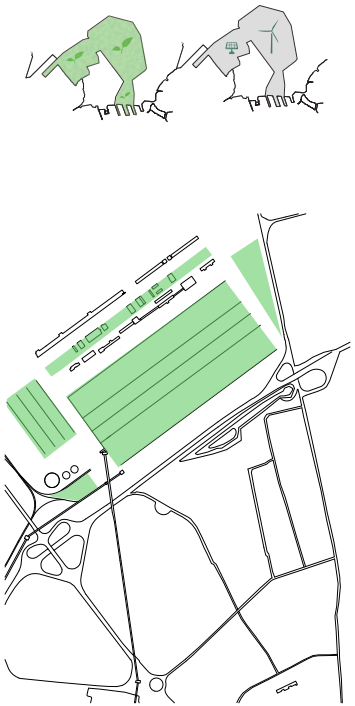
6. Connect main square and aqueduct

Make the old aqueduct accessible and easy to reach from the main new square.



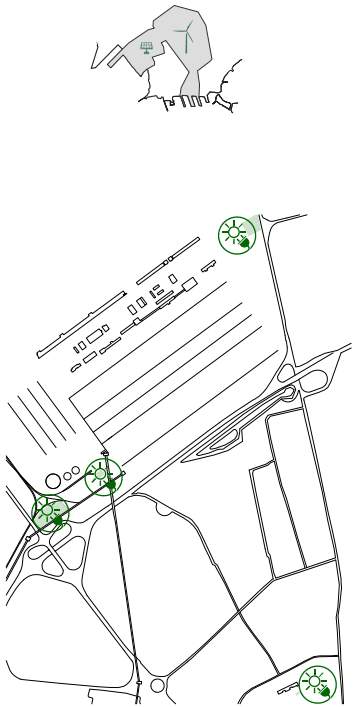
7. Pedestrian and cycling paths

Give priority to walking and cycling paths.



8. Phytoremediation and local vegetation

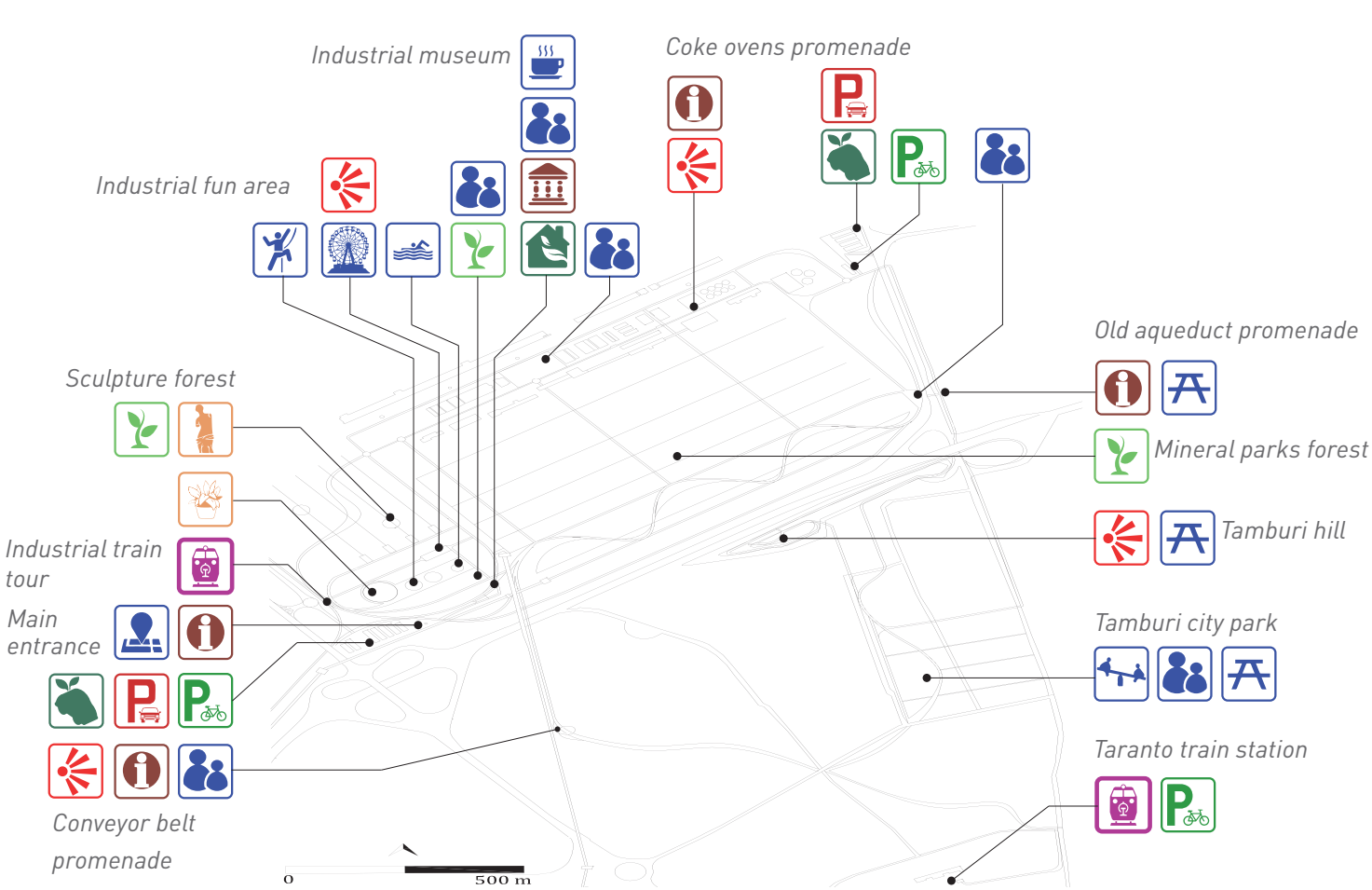
Include in the green areas plants for phytoremediation and local vegetation.



9. Solar energy

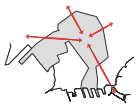
Use solar energy to power the new building and structures and make them visible.

6.3 Activities program



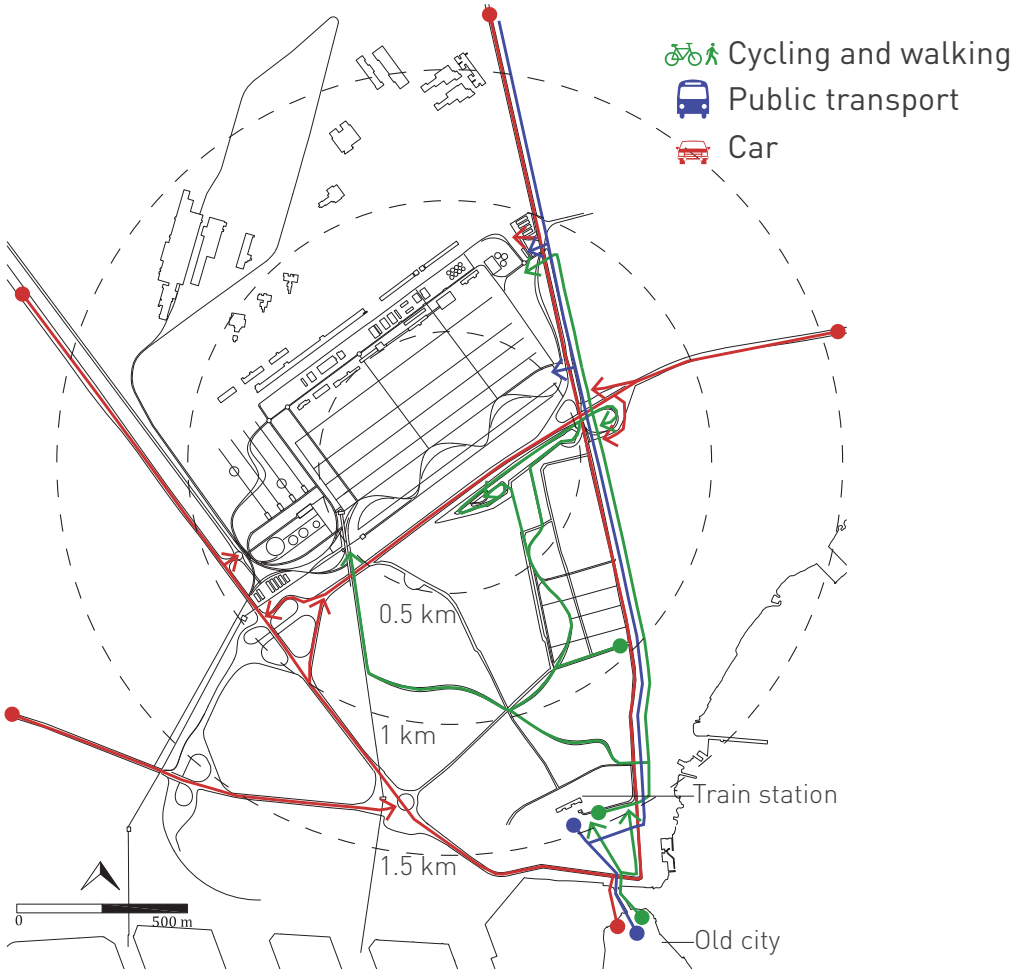
Phytoremediation
Interesting view
Steel production train tour
Industrial museum
Info center
Sculpture exhibition
Botanical garden
Sustainability center
Electric cars
Site model and map
Meeting place
Cafe
Picnic area
Climbing site
Ferris wheel
Swimming pool
Playground

The new activities planned in the site aim to promote education and culture, create new meeting places and viewpoints which create visual connections between the city and the site.



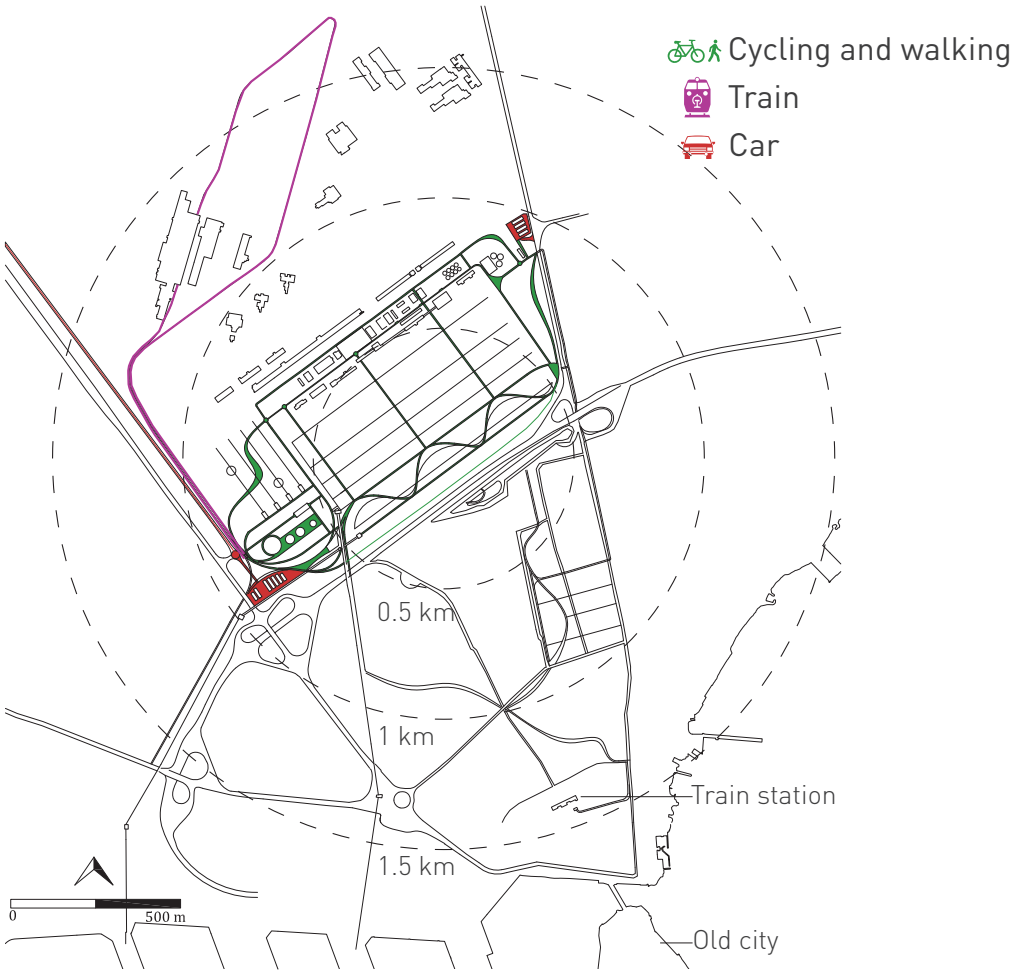
6.4 Circulation diagram

How to reach the site



The site is reachable both from the city and the train station by bicycle, on foot and by car. Every new activity is within a twenty-minute walk from the train station.

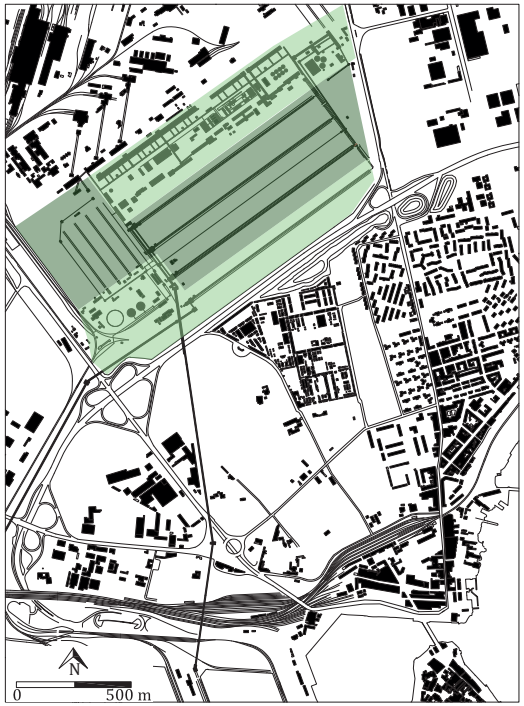
Internal circulation



At two entrances, parking space for cars and bicycles are provided. Within the site it is allowed to commute only on foot and by bicycle. The industrial train tour re-uses the existing railway system and guides the visitors throughout the different steel production areas.

6.5 Remediation proposal

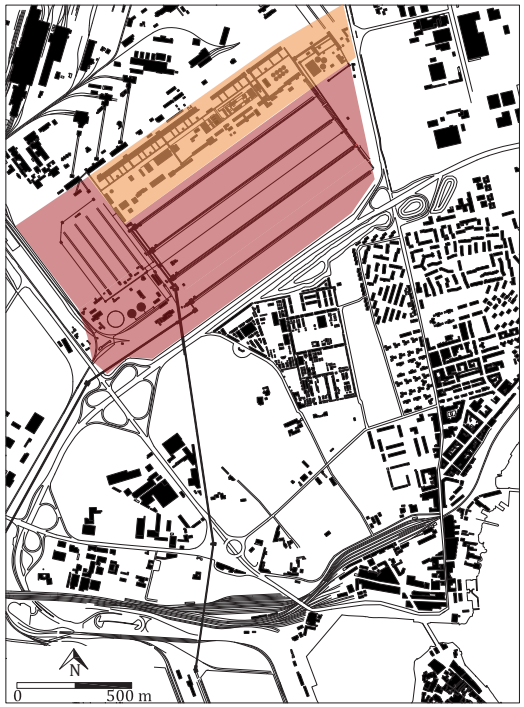
Future use planned for the area



Mixed use: museum, industrial park, fun park, train station, parking

Forest

Suggested remediation techniques



Phytostimolation and phytostabilization

Combination of excavation, phytoextraction and phytostabilization

Because the chosen site is heavily polluted, the new use of the area will be mostly “soft” end use.
As shown in the pollutants maps (Chapter 3.2), the chosen site is mostly affected by heavy metals, PAHs and benzene. Among gentle remediation options, phytoextraction is mainly used for metals and toxic inorganics (Pilon-Smits, 2005).

Phytostimulation is used for hydrophobic organics such as PAHs and PCBs that cannot be absorbed by plants but can be degraded by microbes. Since the concentration of pollutants in ILVA’s soil is heterogeneous, the most efficient and cost-effective remediation solution may be a combination of different technologies, such as excavation of the most contaminated spots followed by the use of plants (Pilon-Smits, 2005).

Phytoremediation

Festuca arundinacea ⟶ **PAHs**

Dracena fragrans Hedera helix ⟶ **Benzene**

Quercus ilex ⟶ **Heavy metals**

Ficus robusta ⟶ **Benzene**

Mediterranean forest

Pistacia lentiscus

Myrtus communis

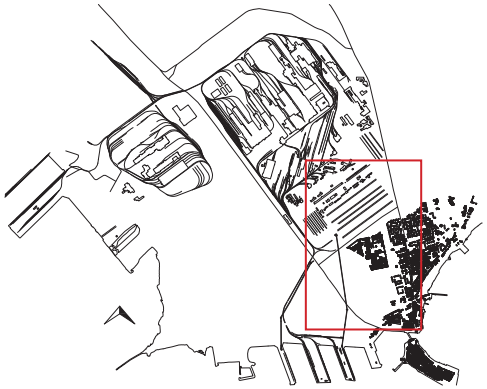
Acanthus mollis

Mediterranean grass, Festuca robusta et al.

The choice of plants depends on local climate and environmental conditions (Caneti, 1993). According to the Köppen-Geiger climate classification, Taranto has a climate type Csa, temperate with hot and dry summers (Mediterranean climate) (Peel, et Al. 2007).

The selected species are part of the Mediterranean forest and some of them are commonly used for phytoextraction, phytostimulation and phytostabilisation (Prasad, Freitas, 2000; Pilon-Smits, 2005; McIntyre 2003). None of the chosen plants will be fruit plants or crops.

ILVA Industrial landscape park master plan



LEGEND

- Circular promenade ground-level
- New structures
- Existing buildings
- New grass areas
- Trees for phytoremediation
- Existing green
- New squares
- Mediterranean garden
- Zoom-in 1:500

1. Coke ovens promenade
2. Bikes parking
3. Cars parking
4. Old aqueduct promenade
5. Tamburi viewpoint
6. District Tamburi
7. Tamburi city park
8. Cemetery
9. Green square
10. Taranto train station
11. Conveyor belt viewpoint
12. Conveyor belt promenade
13. Pedestrian/Cycling bridge
14. Ferris wheel
15. Swimming pool
16. Museum/Sustainability center
17. Botanical garden
18. Info point
19. Train tour station
20. Sculpture forest
21. Mineral deposits park
22. Mineral park promenade
23. New roads


1
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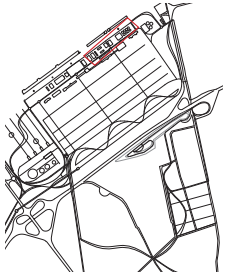
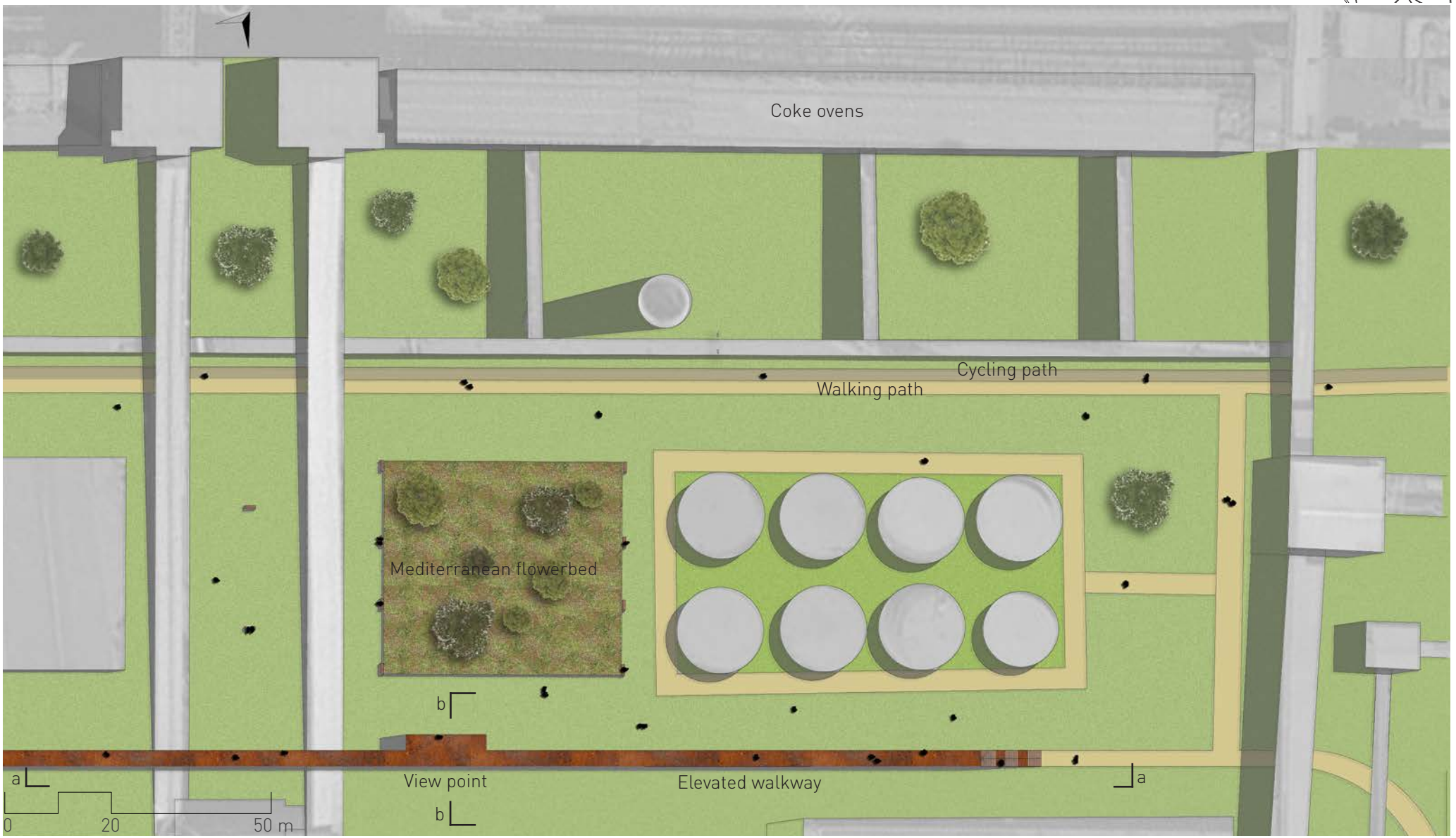
0
150
300 m

ILVA Industrial landscape park Master plan

The circular promenade provides new walking and cycling paths that connect the site to the district Tamburi and Taranto's central station. The promenade has an extension of about 1.5 km radius. The intersections created by the promenade where the paths meet or encounter existing streets, provide larger spaces for resting and new meeting places.
The new entrances to the site are 1.5 km away from the central station and about 500 meters away from the nearest part of the city.
Within the site, the circular promenade allows the visitors to move through the buildings and structures of the coke ovens and conveyor belts.
The main new entrance to the site is located on the south-west boundary of ILVA. This place has been selected as new entrance and main new square for two reasons. Firstly, it is strategically located close to the city. Secondly, at this place the visitors can start the site tour as this was the starting point of the steel production. In fact, from the harbor, the raw materials were transported to the park deposits through the conveyor belts. The entrance is where most of the activities take place.
In the Industrial museum and Sustainability center, the visitors can learn about the history of ILVA and the steel production as well as about the transformation process and remediation techniques used to reclaim the site.
The minerals park deposits are transformed into a landscape city park.
The mineral deposits promenade crosses the landscape park and connects the Industrial museum to Del Triglio aqueduct . The promenade creates flowerbeds and includes small bridges to overpass the existing structures from the minerals park deposits.
The old aqueduct promenade follows the route of the aqueduct Del Triglio. This gives the visitors the opportunity to take a closer look to the aqueduct and learn about its history.
At the central train station bikes for rent are provided to start the circular promenade-tour and reach the industrial landscape park.
Several **new viewpoints** are created along the promenade and within the site. They provide the visitors with the possibility to experience ILVA from a different perspective. In this way, both the physical and visual connections are strengthen.

Coke ovens promenade, number 1 master plan
Site plan 1: 1000





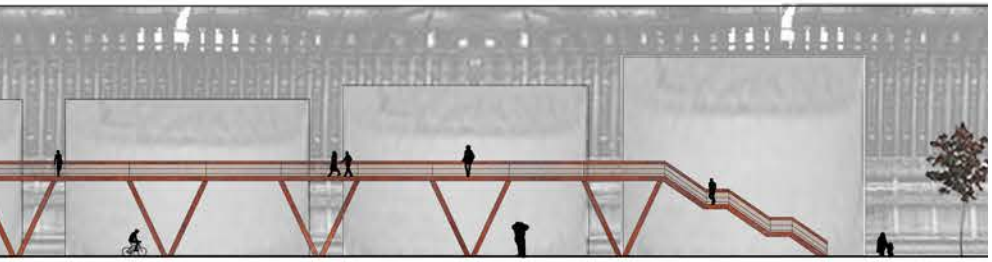
1. Coke ovens promenade
Elevation a-a 1:500

Elevated walkway

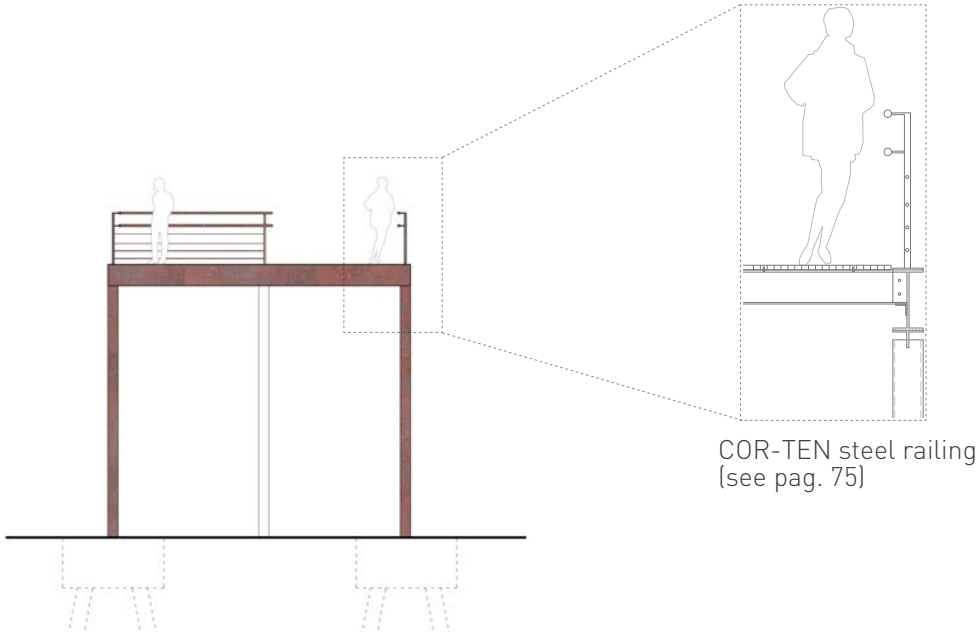
The walking and cycling promenade passes through the coke ovens area and branches out in two paths. The yellow path visible in the plan is on the ground level and it is accessible for pedestrians and bicycles.

The promenade in this part of the site is characterized by a straight route which reflects the long shape of the buildings where the coke production used to take place.
The second path, in reddish in the plan, is the elevated walkway. It allows the visitors to experience the coke ovens area from a

Elevated Walkway
Section b-b 1:150 and 1:50



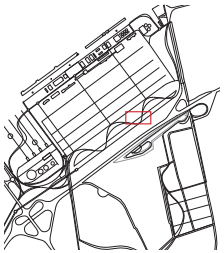
Staircase to the walkway



COR-TEN steel railing
(see pag. 75)

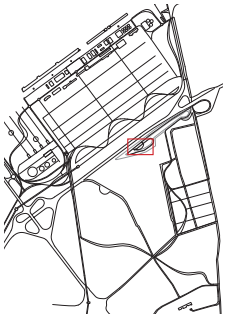
higher perspective. The elevated walkway is 5.5 meters high and 300 meters long. Every 100 meters the walkway broadens into wider platforms where is possible to pause and enjoy the view. Benches are provided to sit down and rest.
The material of the platform is COR-TEN steel.

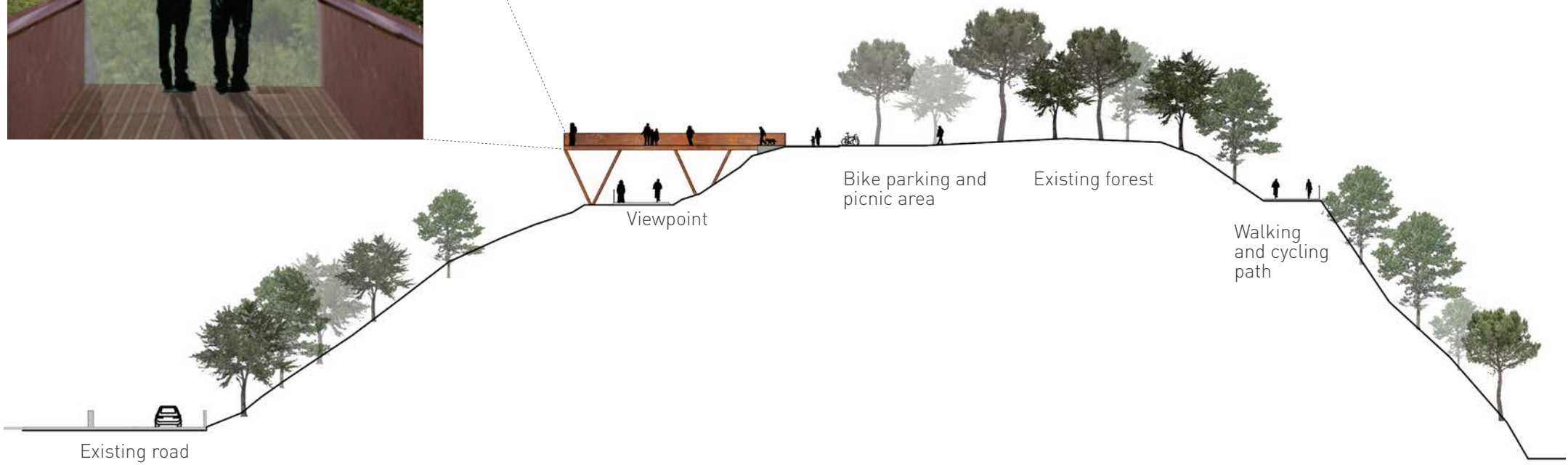
The system of oblique COR-TEN steel pillars visually differs from the coke ovens' vertical pillars. This makes the new additions clearly distinguishable from the old industrial structures.
The railing of the elevated walkway is designed to allow the visitors to view both sides of the path. Therefore, the selected structure is made of steel cables and is very open.



Tamburi viewpoint, number 5 master plan
Site plan 1: 1000

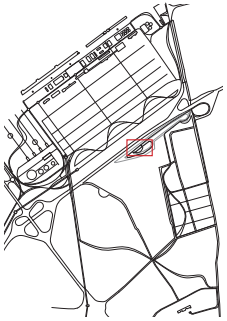
5. Tamburi viewpoint
Section c-c 1:500



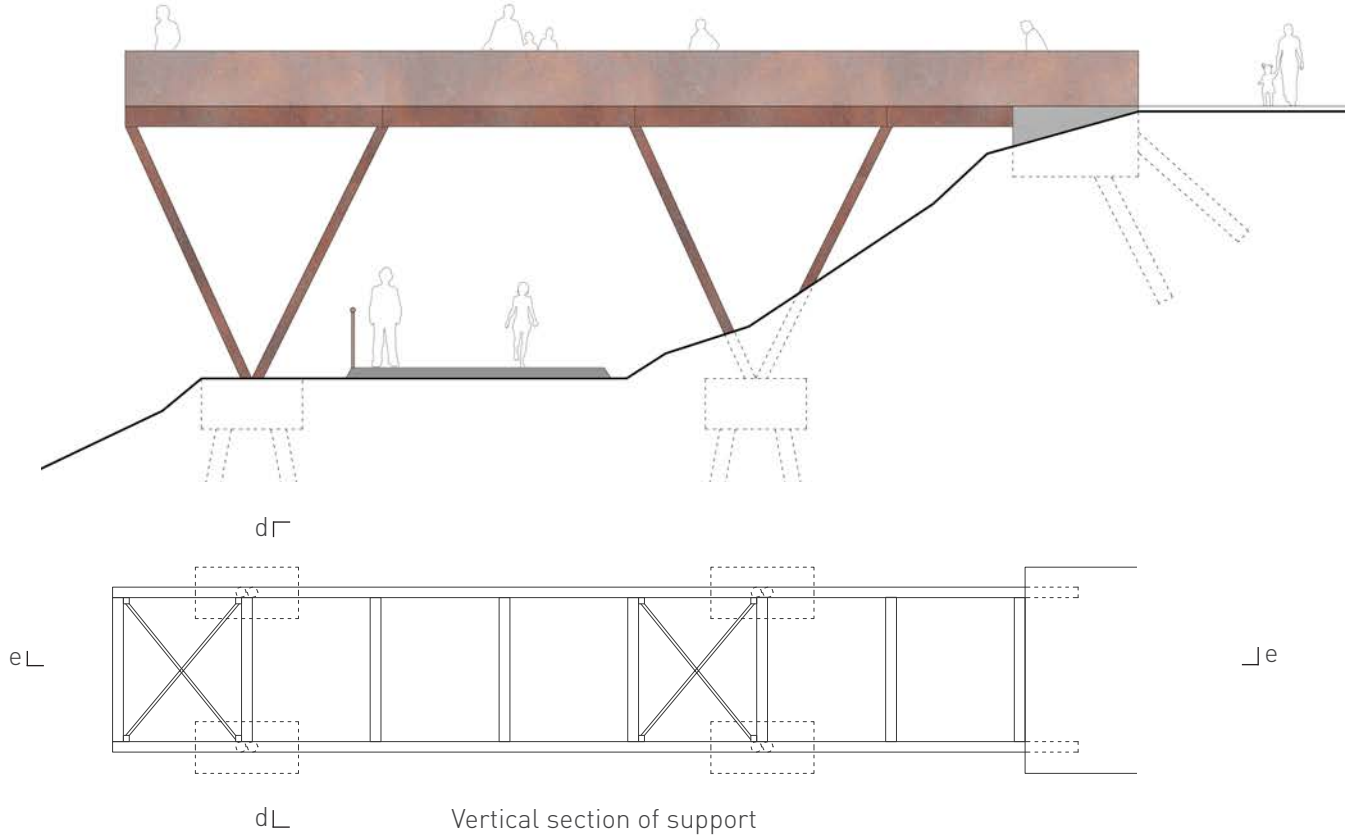


The circular promenade leads to the Tamburi hill.
Here two viewing platforms allow the visitors to have an overall view over ILVA's industrial landscape park.

Between the two platforms, space for picnic, resting and bike parking are provided.
Most railings in the industrial landscape park belong to one of the two kinds: the viewpoint railing and the elevated path railing.



5. Tamburi viewpoint
Section c-c 1:150



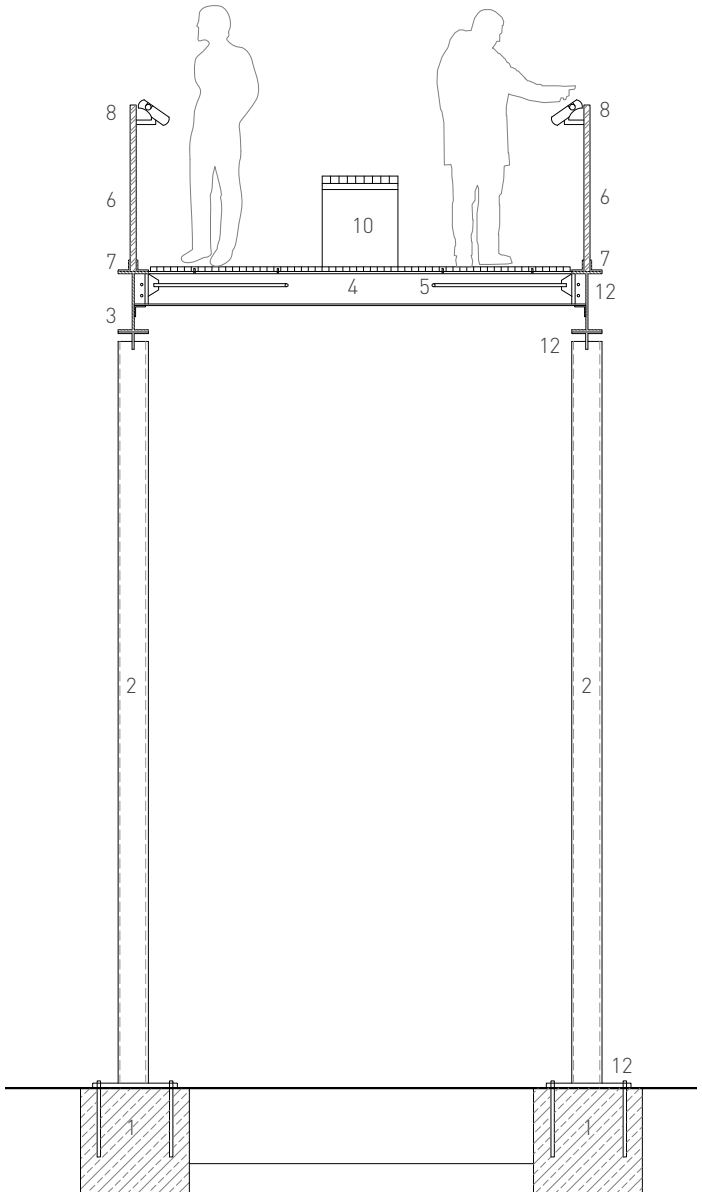
Vertical section of support

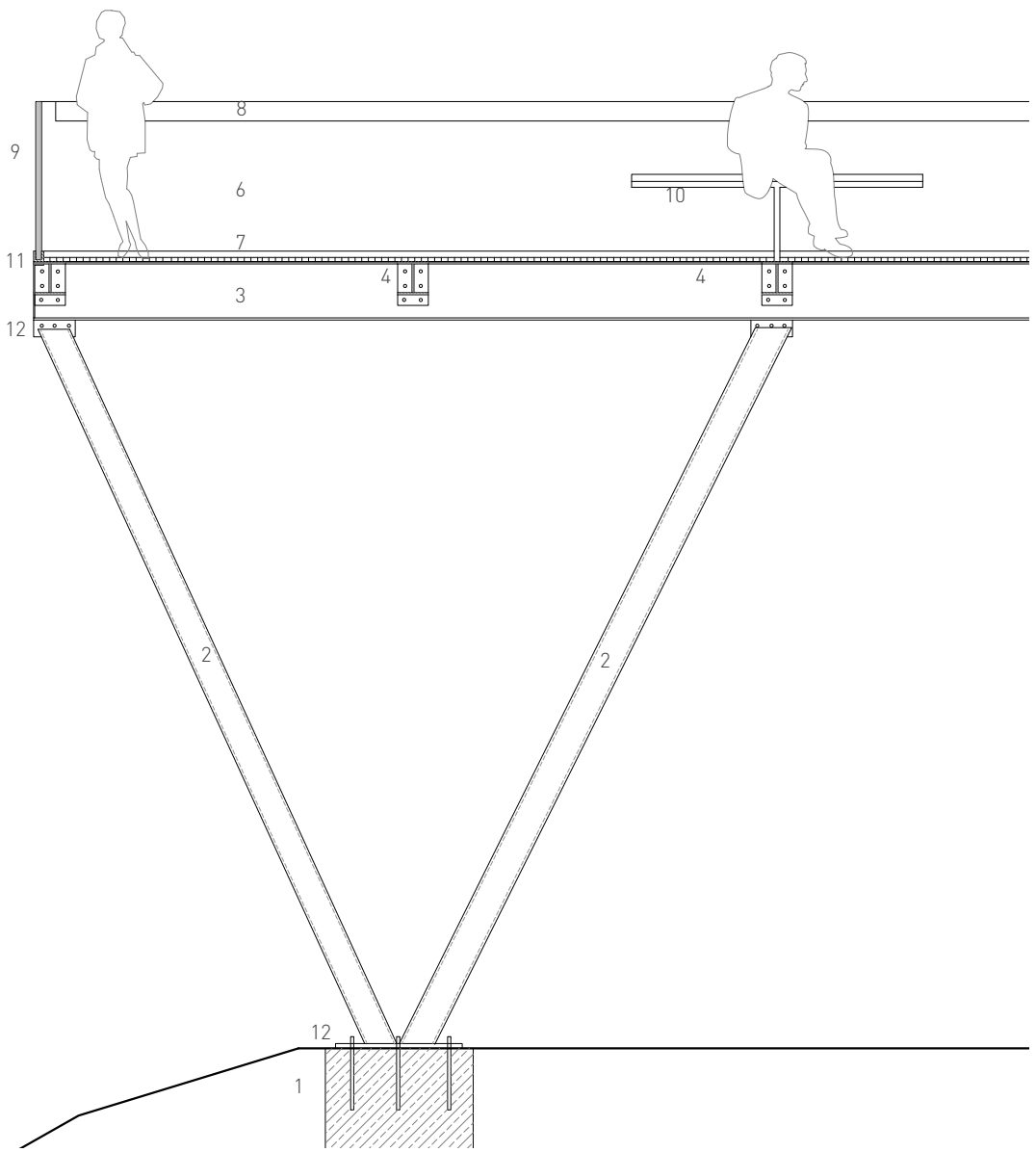
1. Concrete foundation
2. Column COR-TEN steel 200 tube
3. Girder I section COR-TEN steel 400
4. Girder HEA COR-TEN steel
5. Horizontal bracing tube
6. Railing, COR-TEN steel panels
7. COR-TEN steel angle
8. Handrail, extruded aluminium with integrated LED light
9. Unbreakable glass panel
10. COR-TEN steel and wood bench
11. Support for glass, steel U section
12. Steel plate

The concept for the viewpoint railing is to be "close off" at the beginning of the platform and "open up" at the end to direct all the attention to the framed views.
This is achieved by using plain COR-TEN steel panels on the sides of the viewing platform and unbreakable glass at the end.

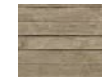
Although most of the new constructions designed are characterised by an oblique "V" structure, the construction systems between the elements presented below are different. Therefore, the following detail is presented as a showcase.

5. Tamburi viewpoint
Sections d-d and e-e 1:50






Extruded aluminium


Wood

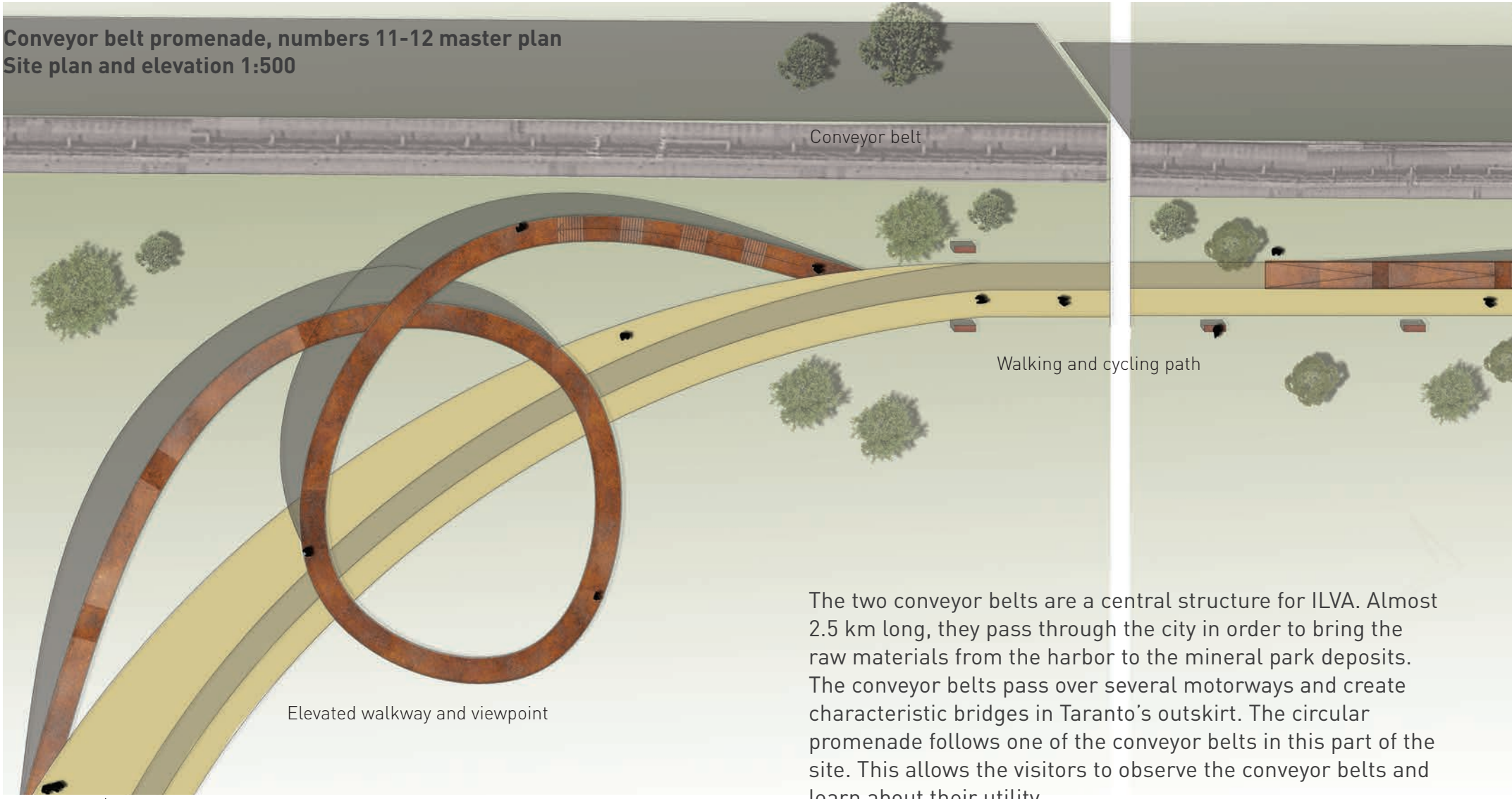

Unbreakable glass


COR-TEN steel


Stainless steel


Concrete

Conveyor belt promenade, numbers 11-12 master plan
Site plan and elevation 1:500



The two conveyor belts are a central structure for ILVA. Almost 2.5 km long, they pass through the city in order to bring the raw materials from the harbor to the mineral park deposits. The conveyor belts pass over several motorways and create characteristic bridges in Taranto's outskirt. The circular promenade follows one of the conveyor belts in this part of the site. This allows the visitors to observe the conveyor belts and learn about their utility.

Pedestrian and cycling bridge, number 13 master plan
Site plan and elevation 1:500

Conveyor belt

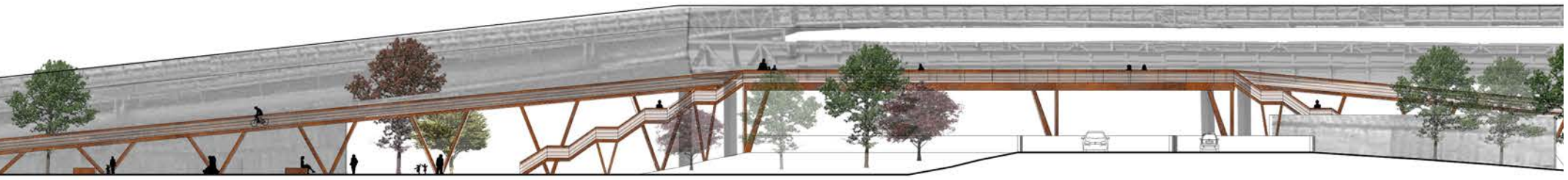
Ramp

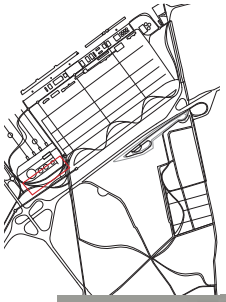
Pedestrian and cycling bridge

Pedestrian entrance to the museum and fun area

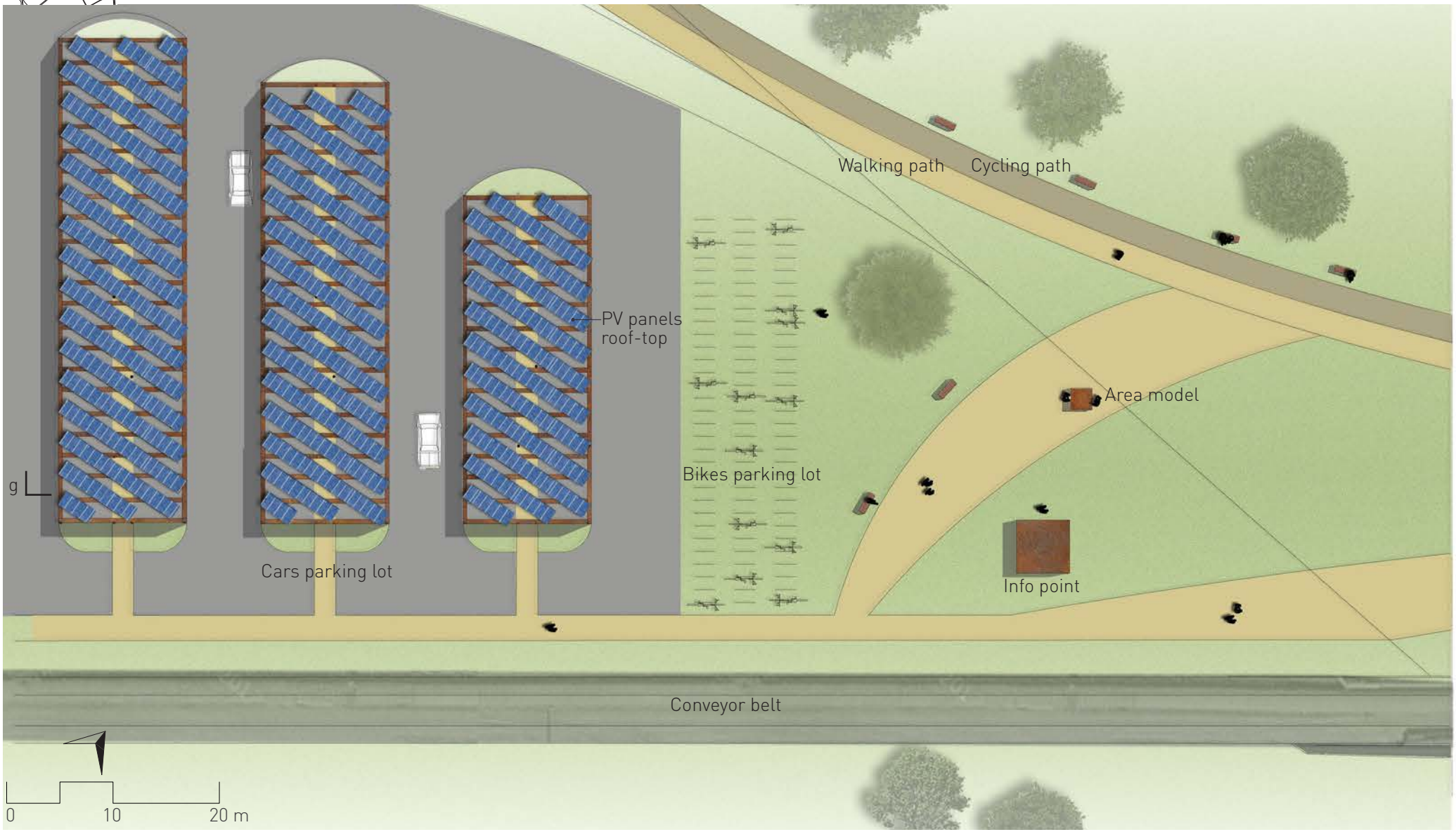
Existing road

The elevated circular viewing platform provides a bird's-eye view over the conveyor belt and the city. Just like the conveyor belts, the bridge and the ramp cross over the motorway creating a new entrance to the site. The ramp has a slope of 5% and makes the site accessible for everyone.
The parapets of the bridge are designed to be safe but allow the users to look in all directions through the use of steel railing.

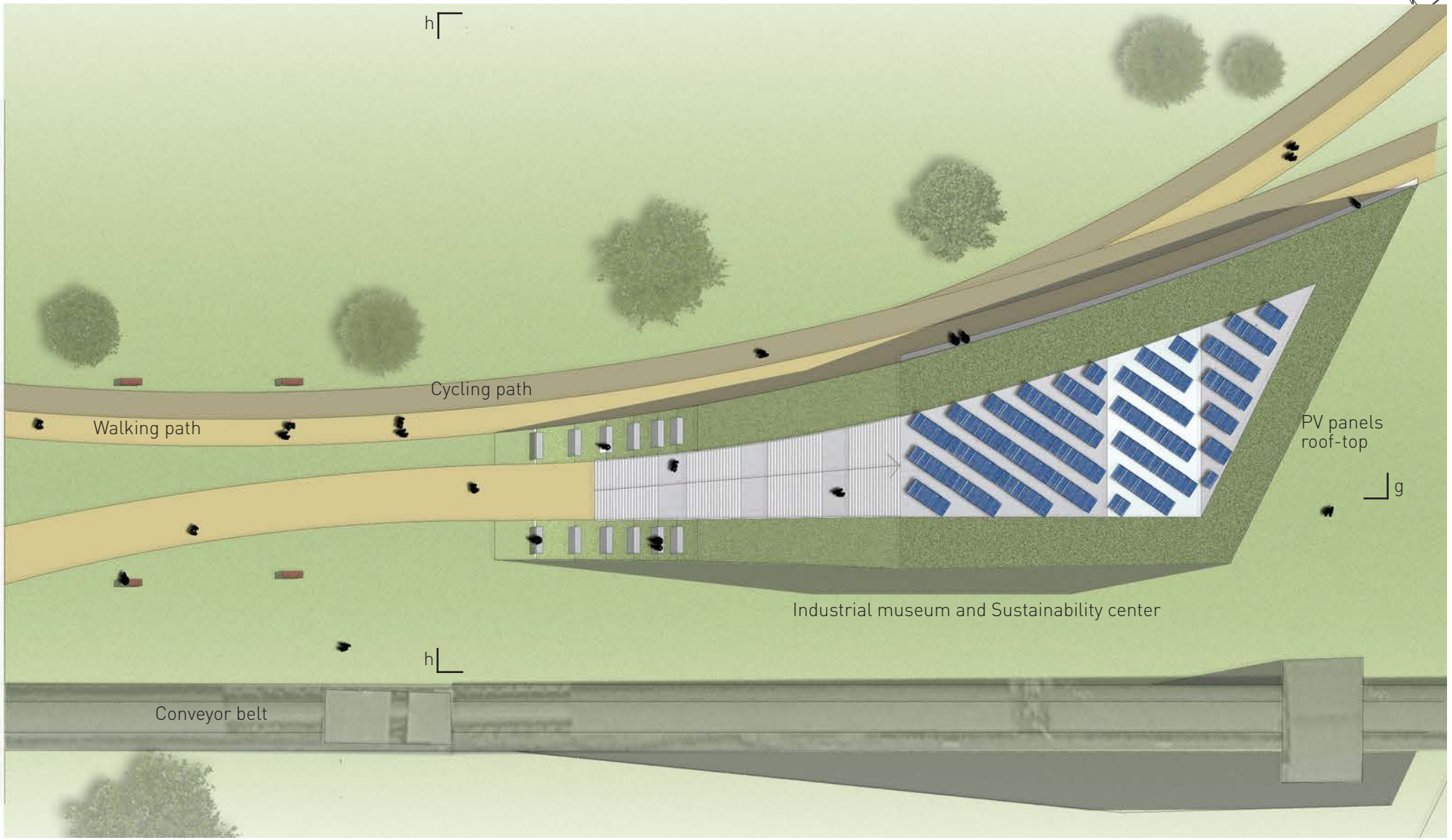


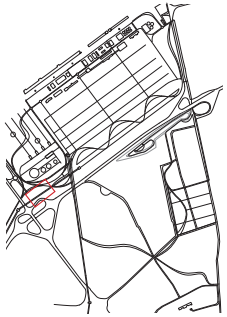


Main entrance - Museum square, number 2 - 3 - 18 master plan
Roof top plan 1: 500

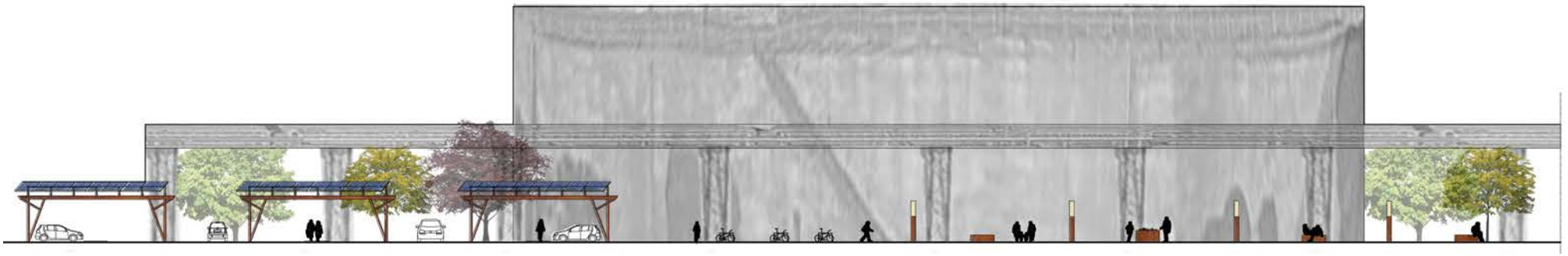


The Industrial museum and Sustainability center, number 16 master plan
Roof top plan 1:500





2-3-18. Main entrance - Museum square
Section g-g 1:500



Cars parking lot with PV panels roof-top

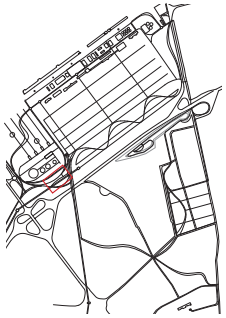
Bikes parking lot

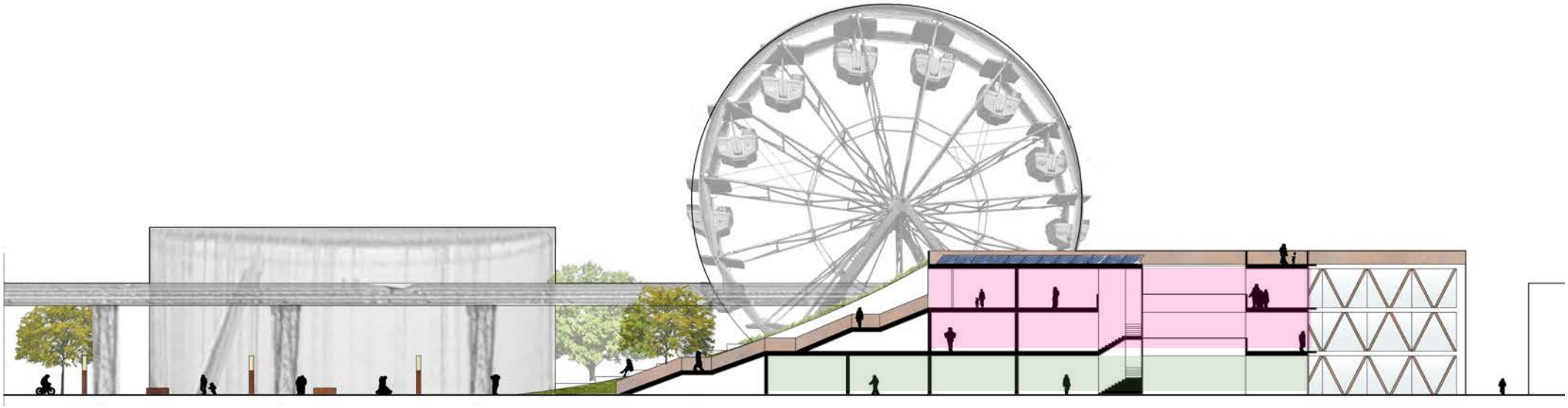
Info model

The new entrances provide cars and bikes parking lots. The car parking lots are covered with PV panels. In this way the panels can both shade from the sun and be visible to create awareness about the use of resources.

The energy produced can be used to power electric city cars that can be rented on the site.
The entrance provides an info point and info model. Here the visitors can find out the activities in progress, depending on the time of the year.

16. The Industrial museum and Sustainability center
Section g-g 1:500





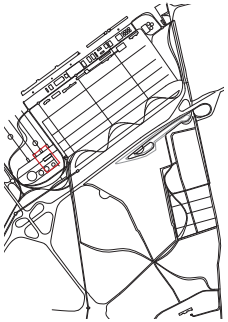
Walking and Cycling path

Industrial museum

Sustainability center

The new building is three story-high. The first floor hosts the Sustainability-center and the last two floors are used for the Industrial museum. Here permanent and temporary exhibitions inform the visitors about the history of steel production in Italy and the history of ILVA.

Workshops and information about the future developments are provided here as well. The roof top of the building is accessible and PV panels are placed on top of it as on the parking lots. The long staircase, which leads the visitors to the third floor of the museum, recalls the conveyor belts long structures that are prominent in this part of the site.



14 - 15. Industrial fun area
Elevation h-h 1:500

Ferris wheel

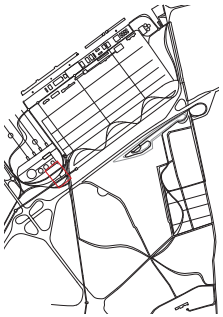
Conveyor belts structures in the background

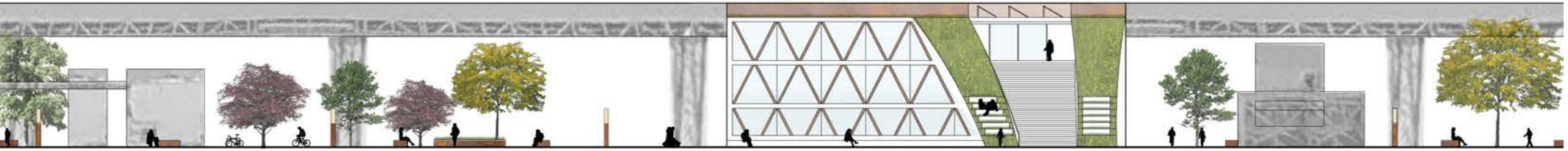
Swimming pool

As in Zollverein (see chapter 2), the fun area aims to attract visitors of all ages during the different times of the year.

The Ferris wheel provides an interesting view point over the site as well.

16. The Industrial museum and Sustainability center
Elevation h-h 1:500





Walking and cycling path

Industrial museum and Sustainability center main entrance facade

The main Industrial museum's entrance merges with the landscape and provides with the possibility to sit down.
The building has a secondary entrance on the ground floor on the opposite side.

One elevator inside the building makes it accessible to everyone.
The choice of designing a new museum in the first transformation phase is due to the idea of making the site lively and interesting.

Elevated walkway and coke ovens promenade, number 1 in the master plan.

Industrial museum / Sustainability center and the fun area, numbers 14-15-16 in the master plan.

7. CONCLUSION

In conclusion, the presence of the steel factory ILVA in Taranto limits the sustainable development of the city and life of Taranto´s inhabitants. Therefore, solutions to address the major issues of pollution and health diseases must be found.
This thesis suggests the closure of ILVA in three phases in order to allow the production to end gradually.
The transformation of ILVA industrial area has to be carried out using sustainable development principles and it has to regenerate the site as well as its image and meaning for the local inhabitants and employees.

The proposal for ILVA presented in this thesis does not only look at architectural qualities and details of the design, but it also focuses on the planning phase. I believe that, dealing with a complex reality as ILVA, it is important to consider the site as a whole and explore the context in order to come up with a promising proposal. This is why this master thesis analyses and work on the site on different scales, from the larger conceptual, urban and landscape scale to the smaller architectural and building scale.

The goals set for the area are an attempt to answer the main problems identified such as pollution, health issues, high unemployment rates and lack of physical and visual connections between the site and Taranto. In fact, the aim of the design proposal is to reclaim the land, create sustainable job opportunities, preserve the industrial heritage and promote culture and research while taking care of the existing resources.

Above all, in order to achieve a sustainable transformation, the design of the site needs to include large green areas as well as facilities and activities to make it interesting. This in order to attract tourists and local inhabitants to visit and interact with the site in a totally different way as before. Additionally, the design aims to maintain the most prominent existing buildings in order to preserve the history of the place and production that have shaped the city and landscape of Taranto in the last decades. Although the features of the area are preserved, its current image needs to be transformed from industrial to recreational, cultural and environmental friendly. As shown by the case studies, this process requires time and a careful analysis of the site´s characteristics, opportunities and needs.

Approaches such as gentle remediation and efficient use of resources as well as the everyday life of Taranto´s inhabitants are crucial for the sustainable transformation of ILVA Industry.

However, further and more in depth studies and analyses should be carried out on all the different topics concerning ILVA industrial area. Some of the most important are environmental impact assessments, chemical and soil analysis and cost benefits analysis. Since the case of ILVA in Taranto is complex and the area is large, the transformation process should be planned by an interdisciplinary team of professionals and guided by the local municipality, the region, the Italian State and the European Union.

8. EVALUATION AND REFLECTIONS

Topic and process

Working with a site like ILVA was a big challenge for me.
Since I started this Master in Design for Sustainable Development I have been thinking at my home country and especially at the city I come from, Taranto.
In my opinion, Taranto is a city with a lot of issues and in a great need for sustainable development. This is why I have decided to work with the topic of industrial transformation trying to apply what I have learn to the site ILVA.
Although the site is very complex and finding the right information to develop an architectural proposal has been very problematic, working with this area allowed me to learn more about my city and its current situation. This master thesis is my attempt to propose a solution, although very small, to the complex and very discussed ILVA industrial area.

Industrial transformation

During the research phase, I have learned more about industrial transformation by looking at great examples such as the IBA Emscher park in Germany, the Tate modern in London, Norrköping in Sweden, Sulzerareal in Switzerland, Westergasfabriek in The Netherlands, or other ex-industrial cities such as Pittsburg which have been able to redevelop their economy by investing on education and culture without erasing their industrial past (Baum, Christiaanse, 2012; Baccaro, Ferrari, 2012; Alzén, 1996).
One of the main differences between these case studies and ILVA is that the steel production in Taranto has not been stopped yet despite it has dramatic consequences for the environment and Taranto´s inhabitants.

Within the Italian context of industrial transformation, an interesting case is the ex-ILVA in Bagnoli, Napoli. This site was very remarkable for my master thesis research since Bagnoli hosted another steelwork from the same company. Unfortunately, although the steel production in Bagnoli closed in 1993, the decontamination and transformation process has not been completed yet (Chetta 2014).
A successful transformation project carried out in Italy is Parco Dora in Torino by Latz and partner. This project unifies the intervention by using four common layers (Fernández, Mozas, 2012).
Another interesting ongoing transformation project is the Luma Arles new contemporary art center by Selldorf Architects, Frank Gehry and Bas Smets (Hoffmann, 2014).
While researching for the theoretical background for this thesis I realized that many interesting projects and examples can be found to learn from, but the lack of time and space in the report, made me take the decision to concentrate on some of the most famous and widely studied ones.

The current situation in Taranto

I believe that one of the biggest challenges for Taranto is the reclamation phase. Since the area that needs to be decontaminated is large, and it would be very expensive to reclaim it by using only traditional remediation technologies, I believe that GROs (Gentle Remediation Options) can be a valid alternative (see http://www.greenland-project.eu/).
Nowadays the awareness regarding GROs effectiveness is still limited. In this topic demonstrator sites can make a significant contribution to stakeholder engagement by providing evidence

on the effectiveness of GROs under varying site contexts and conditions (Cundy, 2013). I think that another opportunity for the site ILVA could be to be used as case study to develop research about GROs effectiveness.
In the last years, several organizations and people in Taranto are fighting against ILVA and suggest its closure. One of the most famous environmental associations connected to ILVA´s case was founded in 1991: PeaceLink. Since then, PeaceLink plays a central role in the collection of documentation and denounce of the risks for the environment and the population in Taranto. Additionally, they contribute to the continuous monitoring of the environmental state in Taranto (see www.peacelink.it). Since 2013, this association is engaging master students to write thesis about ILVA and come up with proposals and sustainable solutions for the site. The aim of this initiative is to increase Taranto inhabitants´awareness.
One important example for me is Alice Martemucci´s master thesis *Ilva Verde* that has been published on-line on PeaceLink website in 2013. The topic of this thesis is the architectural transformation of the hot steel production area in a sport and leisure park. Although this topic is very similar to my thesis, the structure and results of this thesis is different.

My proposal and further development

Although I am aware that a project for a complex reality as ILVA needs an interdisciplinary team and approach in order to be complete and successful, I am happy with my final result.

Since I started working on this master thesis I have realized that it was important to work on different scales. As a consequence, I have tried to deal with the identified problems in every step of my proposal. One of the major challenges related to ILVA was the large scale of the area. In fact it is complex to fill completely such a site with activities.
I believe that a sustainable transformation process cannot be complete unless it reuses the existing disused buildings as well. However, in the specific case of this master thesis, the lack of time and technical material, such as drawings or the possibility to measure the buildings, made me take the decision to focus more on the landscape and urban scale of the project.
It could have been very interesting for me to work on this thesis in a group with a landscape architect and a structural engineer. This would have made the result even clearer and better defined in all the three scales of intervention. On the other hand, working alone gave me the chance to take all the decisions I felt right. This helped me to improve my skills. It also made me understand the challenge and importance of working on every phase of a project from the analysis and understanding phase to the final design.

To conclude, I believe that ILVA should be seen not only as a threat for the development of Taranto, but also as an opportunity. However, the seriousness of the situation requires prompt action in order to allow the city of Taranto to be re-born from dust.

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