RegioneEmilia-Romagna

SOS4LIFE
SAVE OUR SOIL FOR LIFE

2

FREEING THE SOIL

20 CASE STUDIES FOR URBAN RESILIENCE
Adaptation projects and processes in regeneration interventions

RegioneEmilia-Romagna

DEPARTMENT OF TRANSPORT, MATERIAL AND INTANGIBLE INFRASTRUCTURE NETWORKS, TERRITORIAL PLANNING AND DIGITAL AGENDA

GENERAL DIRECTORATE CARE OF THE TERRITORY AND ENVIRONMENT

DEPARTMENT OF TERRITORIAL AND URBAN PLANNING, OF TRANSPORTS AND LANDSCAPE

www.sos4life.it
info@sos4life.it
saveoursoilforlife
SOS4Life
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PROJECT SOS4LIFE
SAVE OF SOIL FOR LIFE

promoted by
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URBAN REGENERATION
GUIDE LINES

action by
REGIONE EMILIA-ROMAGNA

Department of Transport, Material and Intangible Infrastructure Networks, Territorial Planning and Digital Agenda
Raffaele Donini
councellor

D.G. Cura del territorio e dell'ambiente
Paolo Ferrecchi
director

Servizio Pianificazione territoriale e urbanistica, dei trasporti e del paesaggio
Roberto Gabrielli
head of deparment

Luisa Ravanello
project manager

Anna Muratori
administration

action development
Luisa Ravanello
Regione Emilia-Romagna
methodology ideation
technical coordination
of the working group

group of experts

Raffaella Lombardi
Studio Associato
di Ingegneria Lombardi
Spazzoli Paglionico

Elena Farnè
architetto

Mauro Mugnai
Studio Geodesign
Associati

FREEING THE SOIL ❶

guide lines
coordination
Luisa Ravanello
Elena Farnè

guidelines by
Elena Farnè
Raffaella Lombardi
Francesco Pinosa
Francesca Poli
Luisa Ravanello
Maria Teresa Salomoni

WORK GROUPS
STUDY VISITS

Luisa Ravanello
coordination

Elena Farnè
Raffaella Lombardi
Francesca Poli
Luisa Ravanello
Maria Teresa Salomoni
Valeria Zorzin
meeting organization

Fernanda Canino
Oronzo Filomena
Cosetta Giovannini
Elena Pagliarini
Anna Maria Tudisco
Comune di San Lazzaro di Savena (BO)

Carla Ferrari
architect, freelance
Comune di San Lazzaro di Savena (BO)

Claudio Maltoni
Giovanni Milanesi
Carmelo Pellerone
Mario Ricci
Pasquale Ricciato
Comune di Forlì (FC)

Francesca Ferrari
ANCE ER

Lidia Castagnoli
Lorenzo Frattini
Legambiente ER

Venturi Ilaria
Comune di Ravenna

Flavia Mazzoni
Comune di Cervia

Nicola Bastianelli
Comune di Rimini

Rachele Bria
Comune di Medicina

Francesca Terzi
Comune di Montechiarugolo

Enrico Terzo Alessandra
Bonifica Renana

Teodoro Georgiadis
CNR Istituto
per la bioeconomia

Francesco Malucelli
ARPAE Emilia-Romagna

FREEING THE SOIL ❷

reseaerch by
Luisa Ravanello
technical coordination
urban and urban analysis

Elena Farnè
urban and landscape analysis

Raffaella Lombardi
hydraulic analysis and environmental regulations

Maria Teresa Salomoni
agronomic analysis and legislation

Valeria Zorzin
agronomic analysis

Francesca Poli
Riccardo Tagliaferri
schemes and drawings

BEST BRACTICES
SELECTION

Luisa Ravanello
Elena Farnè
Raffaella Lombardi
Mauro Mugnai

GRAPHICS
Brenso
Architettura e Design
EF design

SCHEMES, DRAWINGS AND PROJECT PHOTOS
authors and/or design studies indicated in the images

ICONS
the Noun project

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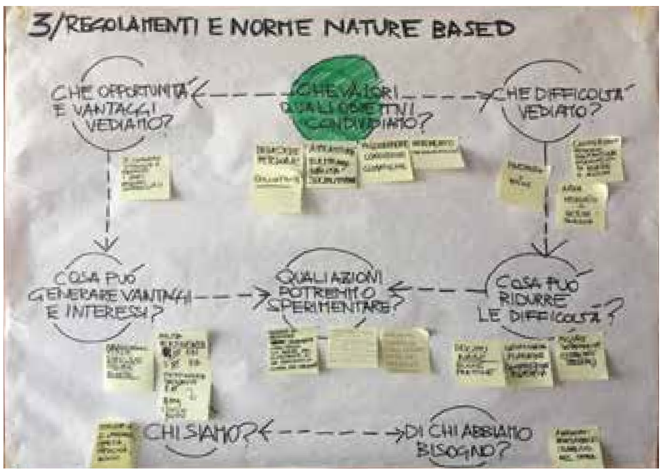
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INTRODUCTION

Cover: flowery lawn inside the Rotonda 1st May in Milano Marittima on the Riviera Romagnola. (Photo by Francesca Poli)

Left: the summary of the work of the 2° meeting for the definition of the guidelines of the SOS4Life Project where the participants worked on the aspects of replicability of good practices with particular reference to design and regulatory issues.

The FREEING THE SOIL guidelines are a steering document for urban regeneration processes, with specific emphasis on resilience to climate change.

The guidelines are made up of two volumes:
FREEING THE SOIL 1
Guidelines for resilience in urban regeneration
FREEING THE SOIL 2
Urban resilience case studies: adaptation projects and processes for urban regeneration

Volume 1 addresses the topic of resilience on the scale of cities and regulations and on the scale of individual projects, , with a specific focus on nature-based solutions that can be implemented in the built environment in order to free land and carry out adaption measures through green and blue infrastructures and the use of vegetation in hostile settings.
This volume is organized into 5 chapters:

0- INTRODUCTION TO THE GUIDELINES
1 - URBAN AREAS TO REGENERATE AND CLIMATE
2- CRITERIA FOR URBAN, ECOLOGICAL AND ENVIRONMENTAL QUALITY
3- NATURE-BASED PROJECTS AND SOLUTIONS
4- VEGETATION AND TREES IN HOSTILE URBAN SETTINGS
5 - GLOSSARY AND BIBLIOGRAPHY

The fact sheets show various solutions using images, technical drawings and texts, and include information on the actions, maintenance and cost. The volume ends with a reference glossary on the topics of climate, heat, vegetation, and water.

Volume 2 shows various case studies of adaptation projects and processes that were carried out on various scales in redevelopment and regeneration contexts in Italy and abroad.
The case studies are classified into six categories:

A - LARGE DISMISSED AREAS FOR TRANSFORMATION AND ECO-DISTRICTS
B - LARGE DISMISSED AREAS FOR TRANSFORMATION AND URBAN PARKS
C - URBAN SQUARES, PUBLIC SPACES, PUBLIC GARDENS, AND PARKING LOTS
D - TEMPORARY GARDENS
E – BOTTOM-UP ADAPTATION EXPERIENCES
F - URBAN-PLANNING TOOLS AND DETAILED PLANS

The project fact sheets show the case studies in a general text - with a focus on green and blue infrastructures and reference standards - and a series of images and drawings to show elements that are innovative and can be replicated elsewhere

WHY ANALYSING GOOD PRACTICES AND CASE STUDIES IS USEFUL

In order to draft the guidelines, we chose to start from concrete national and international cases, identifying strongly sealed and run-down spaces, areas and districts that have been transformed and given back to the community, through processes and projects with a deep environmental matrix.
The case studies identified and classified by type have been used for three different progressive activities:

- analysis and cataloguing of the urban, landscaping, hydraulic and agronomic aspects of the redevelopment and/or regeneration interventions performed on public spaces and soil;
- analysis of the repeatability of projects, from an Italian regulatory and standard standpoint, concerning the sustainable management of urban water, the management of public green

areas, the management of urban soil desealing operation waste;

- integration and revision of the contents, to compare them with the SOS4Life project partners.

From these activities, we were able to infer the key topics and the recurring or most frequent solutions applied in the different contexts, due to regulatory, economic, project and process reasons, and therefore the content of the Guidelines.

CASE STUDIES ANALYSIS AND CATALOGUING

We started by identifying national or international case studies currently in progress or planned for the future. They are public space urban redevelopment and/or regeneration projects, characterized by interventions where impermeable desealing works and restoring of permeable soil with Nature-Based Solutions (NbS) and Sustainable Urban Drainage Systems - SUDS) have been planned and/or achieved.

Through a first analysis, we classified the case studies into 6 categories.

A - TRANSFORMATION OF LARGE DISMISSED AREAS AND ECO-DISTRICTS
B - TRANSFORMATION OF LARGE DISMISSED AREAS AND URBAN PARKS
C - URBAN SQUARES, PUBLIC SPACES, PUBLIC GARDENS
D - TEMPORARY GARDENS
E - BOTTOM-UP INITIATIVES
F - URBAN TOOLS AND DETAILED PLANS

A) Transformation of large dismissed areas and eco-districts

These projects are promoted by local administrations and/or private investors on run-down (production, railway, tertiary and residential) areas, to transform them into eco-district and/or eco-industrial parks (between 2 and 75 hectares).

B) Transformation of large dismissed areas and urban parks

These projects are promoted by local administrations and/or private investors on run-down (production, railway, tertiary and residential) areas, to transform them into urban parks and/or uncover culverted urban sections of water courses (between 2 and 75 hectares).

C) Urban squares, public spaces, public gardens

These small and medium transformation areas are promoted by local administrations and/or private investors concerning: 1) urban run-down areas and impermeable soil, to transform them into highly-permeable public squares, gardens and parking lots, or road networks and canals with sustainable urban drainage systems; 2) interventions on roads and appurtenant parking lots (between 2 hectares and 500 sq.m).

D) Temporary gardens

These small and medium transformation areas are promoted by local administrations and/or private investors concerning appurtenant interventions on public and private spaces (between 200 and 500 sq.m)

E) Bottom-up initiatives

Transformation of small areas promoted by organizations, committees, associations and groups of residents (between 50 and 200 sq.m).

F) Urban tools and detailed plans

Transformation projects and plans not yet implemented or currently in progress, concerning urban interventions aimed at transforming the existing fabric, according to sustainable-environmental criteria (between 2 and 100 hectares).

Comparison between the different case studies led to the final selection of 20 cases.
For each study, the whole trans-disciplinary group identified has first read the material available together, in order to share the essential principles of the case being analysed and guide the subsequent sector-specific analysis. Afterwards, each team member focused on specific hydraulic, landscaping, soil permeability and process topics, searching for additional materials and detailed insights, and drafting their part of the sheet (project description, masterplan type, transformation process and dynamics, green infrastructure, blue infrastructure). The following reiterated comparisons have been reconnected and integrated in the different contributions, drafting the final description, photo and graphical sheet for this book, FREEING THE SOIL 2.

The following criteria were used for the comparison:

- process innovation and transformation dynamics;
- integration of the soil, green infrastructure, blue infrastructure and grey infrastructure topics;
- reclamation and waste management practices innovation, also in a logic of circular economy;
- ability to intervene over time and by gradual implementation phases;
- examples of special theme aspects, also for the purpose of repeating them in a regional context (phytoremediation, bioremediation, construction aspects, cost containment, etc.);
- positive effects on the local context, from a strategic, environmental, economic and social standpoint;
- key objects and aspects to be further analysed, in order to extrapolate the good practice and repeatability elements.

Each case study is presented by a short general description which highlights its peculiarity in relation to the scale of intervention. Then, the transformation process behind the intervention being studied is briefly described, if relevant. Subsequently, the aspects of green and blue infrastructures, nature-based solutions and sustainable management of urban rainwater are studied further, and, in particular, the blue infrastructure construction aspects and the green infrastructure plant species and planting distance; furthermore, the phytoremediation and phytopurification - soil and bioremediation and the general maintenance aspects are included, where relevant.

REPEATABILITY OF THE PROJECTS FROM A REGULATORY STANDPOINT

Each of the 20 case studies selected has been described by focusing on 8 aspects:

- transformation process and involvement of the local communities;
- green infrastructure project and reference regulations on green areas and soil management;
- blue infrastructure project and reference regulations on a sustainable management of urban rainwater and depaving-related waste;
- soil, green infrastructure and blue infrastructure eco-systemic services, with reference to the CICES classification;
- technical sheet;
- graphical summary of the masterplan or of the project layout, and single green and blue infrastructure components;
- implementation stages timeline;
- photo documents.

All the cases identified have been categorised in a simplified manner, and classified by size, type and players involved.

A - TRANSFORMATION OF LARGE DISMISSED AREAS AND ECO-DISTRICTS

1 - LE ALBERE, Trento (IT)
2 - GOSBENAREALET, Aalbrog (DK)
3 - CASERME DE BONNE, Grenoble (FR)
4 - CASERME DES JARDINES, Angers (FR)
5 - LA CONFLUENCE, Lyon (FR)
6 - PARC TRAPEZE | Boulogne-Buillancourt (FR)
7 - ARKADIEN, Winnenden (DE)
8 - CLICY-BATIGNOLLES, Paris (FR)
9 - GWL TERREIN, Amsterdam (NL)
10 - PENISOLA DI GREENWICH, London (UK)

B - TRANSFORMATION OF LARGE DISMISSED AREAS AND URBAN PARKS

11 - PROMENADE DU PAILLON, Nice (FR)
12 - RIEMER PARK - BUGA, München (DE)
13 - ADLERSHOF PARK, Berlin (DE)
14 - FLUGPLATZ, Frankfurt am Main (DE)
15 - GLEISDREIECK PARK, Berlin (DE)
16 - ZOLLVEREINPARK, Essen (DE)
17 - EMSCHER PARK , Duisburg (DE)
18 - KILLESBERG PARK, Stuttgart (DE)
19 - PARCO MATISSE, Lille (FR)
20 - PARQUE DE CIDADE, Porto-Matosinhos (PT)

C - URBAN SQUARES, PUBLIC SPACES, PUBLIC GARDENS

21 - ROSA LUXEMBURG, Paris (FR)
22 - JARDINES DES AMARANTE, Lyon (FR)
23 - TANNER SPRINGS PARK, Portland (USA)
24 - PIAZZA E GIARDINO DELLA STAZIONE , Templeuve (FR)
25 - ZOLLHALLEN PLAZA, Freiburg (DE)
26 - GIARDINO DELLE FONDERIE, Nantes (FR)
39 – VIALE MATTEOTI, Milano Marittima (IT)

D - SMALL GARDENS AND PARKING LOTS

27 - GIARDINO INDUSTRY CITY, New York (USA)
28 - GIARDINO, Courtrai (BE)
29 - QUEDALLE, Dunkerque (FR)
30 - JARDIN JOYEUX, Aubervilliers (FR)
31 - JARDIN SECRET GARDENS, Courtrai (BE)
32 - TEXTURE PARKING, Courtrai (BE)
33 - JARDIN DESCARTES | Champs-sur-Marne (FR)
44 – PARCHEGGIO DRENANTE TIBERIO, Rimini (IT)

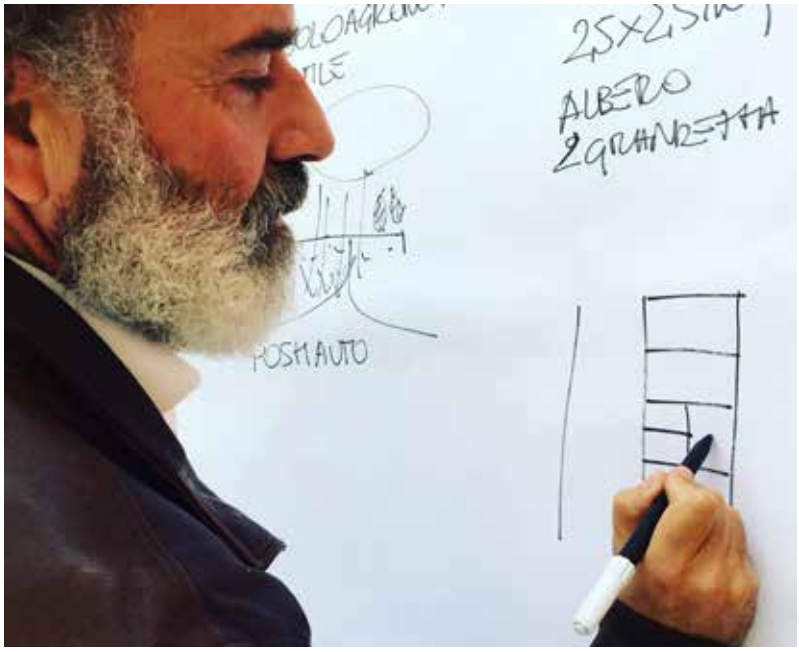
E - BOTTOM-UP PROCEDURES INITIATIVES

34 - DEPAVE / DEPAVE PARADISE, Rue de Trotteil (USA-CDN)
35 - GUERRILLA GARDENING C/O ORTEO, LÀBAS Bologna (IT)

F - URBAN TOOLS AND DETAILED PLANS

36 - BRYGGENS BASTION, Copenhagen (DK)
37 - THE 1° CLIMATE DISTRICT, Copenhagen (DK)
38 - TREKVLIET, Den Haag (NL)
40 – PROGRAMMA DI RIQUALIFICAIZONE URBANA E PARCO NOVELLO, Cesena (IT)
41 – RIQUALICAZIONE AMBIENTALE, URBANA E SOCIALE LUNGO IL CANALE DI MEDICINA, Medicina (IT)
42 – PIANO DI ADATTAMENTO AL CLIMA DEL COMPARTO INDUSTRIALE DI BOMPORTO , Bomporto (IT)
43 – PIANO D'AZIONE PERFECT L'INFRASTRUTTURA VERDE URBANA DI SETTE QUARTIERI DI FERRARA DI FERRARA, Ferrara (IT)

The 3° workshop in Bologna.
(Photo by E.Farnè)



The study visit in Milano Marittima and Rimini. (Photo byE.Farnè)

With regard to the criteria of replicability with respect to the Italian context, national and regional Italian legislation and some instruments of local interest have been taken as a reference. The regulatory references are explained in the Italian version of the document.

A) Planning at national level:

- D.Lgs 152/2006 'Norme in materia ambientale' / 'Environmental standards': a national community enactment standard which guides both in terms of the quality of the water discharged and in terms of the quality of the waste and its possible use;
- Legge sul verde urbano L. 113/92 / Urban Green Act;
- Legge sugli spazi verdi urbani L. 10/13 / Urban Green Spaces Act.

B) Planning at regional level:

- DGR 286/2005 'Direttiva concernente indirizzi per la gestione delle acque di prima pioggia e di lavaggio da aree esterne' / Directive on guidelines for the management of rainwater and washing water from outdoor areas and DGR 1860/2006 'Linee guida di indirizzo per gestione acque meteoriche di dilavamento e acque di prima pioggia in attuazione della deliberazione GR n. 286' / Guidelines for the management of run-down rainwater and early rainwater: regional directive and guideline that define and norman the quality aspects of rainwater after contact with the surface, regardless of what they come into contact with;
- DGR 1083/2010 'Linee Guida per la redazione dei piani di indirizzo in riferimento all'applicazione del punto 3.6 della DGR 286/2005' / Guidelines for the drafting of address plans: the policy plan is the instrument for implementing all the measures relating to the regulation of rainwater and rainwater and has as its main objective the reduction of the pollutant load caused by them to the draining lattice;
- Piano di Tutela delle Acque (PTA) della Regione Emilia-Romagna / Water Protection Plan (PTA) of the Emilia-Romagn Region: the PTA is the regional instrument to achieve environmental quality objectives in inland and coastal waters and to ensure a sustainable water supply in the long term;
- subsequent coordination between the PGRA Flood Risk Management Plan and the Removal Plan for Hydrogeological Risk - PAI Hydrogeological Planning Plan - and Directives concerning hydraulic checks and technical measures to be adopted to achieve the hydraulic safety objectives defined by the Hydrogeological Risk Removal Plan where drafted;
- LR 24/2017 'Disciplina regionale sulla tutela e l'uso del territorio' / Regional regulation on land protection and use: the new Regional Urban Planning Law that brings significant innovations in terms of containing land consumption through policies of urban regeneration on the one hand and reuse and circular economy on the other.

C) Other regulations promoted by non-local administrations:

- criteria and methods for compliance with the principle of hydraulic and hydrological invariance (regolamento regionale Lombardia n. 7/2017 e n. 8/2019) ;
- local regulations of the green (Rimini, Medicina-BO, Cervia-RA, Bologna, Forlì, San Lazzaro di Savena-BO).

A - ECO-DISTRICTS

2 GOSBENAREALET, Aalborg (DK)
5 LA CONFLUENCE, Lyon (FR)
6 PARC DU TRAPEZ, Boulogne-Billancourt (FR)
8 CLICHY-BATIGNOLLES, Paris (FR)

B - URBAN PARKS

11 PROMENADE DU PAILLON, Nice (FR)
14 ALTER FLUGPLATZ, FRANKFURT AM MAIN (DE)
15 GLEISDREIECK PARK, Berlin (DE)
18 KILLESBERG PARK, Stuttgart (DE)

34

C - URBAN SQUARES, PUBLIC SPACES, PUBLIC GARDENS

21 ROSA LUXEMBURG, Paris (FR)
22 JARDINES DES AMARANTES, Lyon (FR)
25 ZOLLHALLEN PLAZA, Freiburg (DE)
39 VIALE MATTEOTI, Milano Marittina, Ravenna (IT)

D - TEMPORARY GARDENS

30 JARDIN JOYEUX, Aubervilliers (FR)
32 TEXTURE PARKING, Courtrai (BE)

E - BOTTOM-UP INITIATIVES

34 DEPAVE AND DEPAVE PARADISE (UK, USA e Canada)

F - URBAN TOOLS AND DETAILED PLANS

37 ØSTERBRO , Copenhagen (DK)
38 TREKVVLIET, The Hague (NL)
40 PARCO NOVELLO, Cesena (IT)
41 CANALE DI MEDICINA, Bologna (IT)
42 BOMPORTO INDUSTRIAL SITE , Modena (IT)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A

eco-districts

A2 GODSBANEAREALET / AALBORG - DK
from former railway station
to resilient district
for climate change adaptation

A5 LA CONFLUENCE / LYON - FR
from former port-industrial area
to ecodistrict for climate change

A6 PARC DU TRAPEZE, ILE SEGUIN, PONT DE SÈVRES / BOULOGNE-BILLANCOURT - FR
from disused industrial area
to eco-neighborhood
for climate change adaptation

A8 CLICHY-BATIGNOLLES AND MARTIN LUTHER KING PARK / PARIS- FR
from former railway station
to resilient district
for climate change adaptation

A2

GODSBANEAREALET / AALBORG - DK

from former railway station to resilient district for climate change adaptation

The former Godsbanearealet railway station, in Aalborg, Denmark, has been transformed into an ecodistrict, through initial climate change adaptation measures.
The station redevelopment affected a 30 hectare area.
After the intervention, the permeable areas increased from 7 to almost 15 hectares, including 12 hectares of urban park. The City of Aalborg decided to adopt this strategy during the district planning phase, in parallel with the intense rainstorm of 2011, which caused great damage to the city and led to a debate about the on-site management of rainwater.
The new project was developed with a transdisciplinary team, with urban planning, architectural, landscaping, botanical and hydraulic skills.

Top right. Permeable square with sports equipment and with meteoric water storage basin below.
The disused tracks were kept on site in memory of the railway station and transformed into rainwater drains.
(Photo by Wichmann +Bendtsen)

Lower right. Lawn sports area, permeable, depressed and unreundable.
(Photo by Wichmann +Bendtsen)

MASTERPLAN AND CLIMATE ADAPTATION MEASURES

The masterplan defined the urban shape of the new district and the environmental performance of the public spaces and newly-built areas, thanks to a high permeability of (private and public) soil, and to the capacity of controlling rainwater in an integrated and gradual way.
The project included the realization of a large Y-shaped public park, integrated and permeating the built-up area along two axes slightly below the pedestrian paths and the building foundations, which gradually channel the district rainwater. The park is equipped with green playgrounds and meadows, which, in the event of intense rain, are transformed into a floodable basin, capable of retaining the water for 24/36 hours, the time required to tackle the climate emergency.
Rainwater management is integrated into the urban elements: the buildings feature green roofs to delay water runoff; sports facilities, parks and public gardens are designed with slight depressions which, in the event of an emergency, become temporary basins: the central courtyards of lots are equipped with small rain gardens and open channels that collect and delay the water flow toward the sewage system; parking lots are designed with semi-permeable surfaces, rain gardens and trees. This set of interconnected solutions makes the district resilient to intense rain, ensuring people's safety and reducing building damage.


Campuspladsen
regnbed
boldbane
parkering
JERNBANEPARKEN
have
plæne
bassin
Å-PARKEN
regnbed
regnbed
regnbed
Østerå
trædæk
regnbed
boldbane

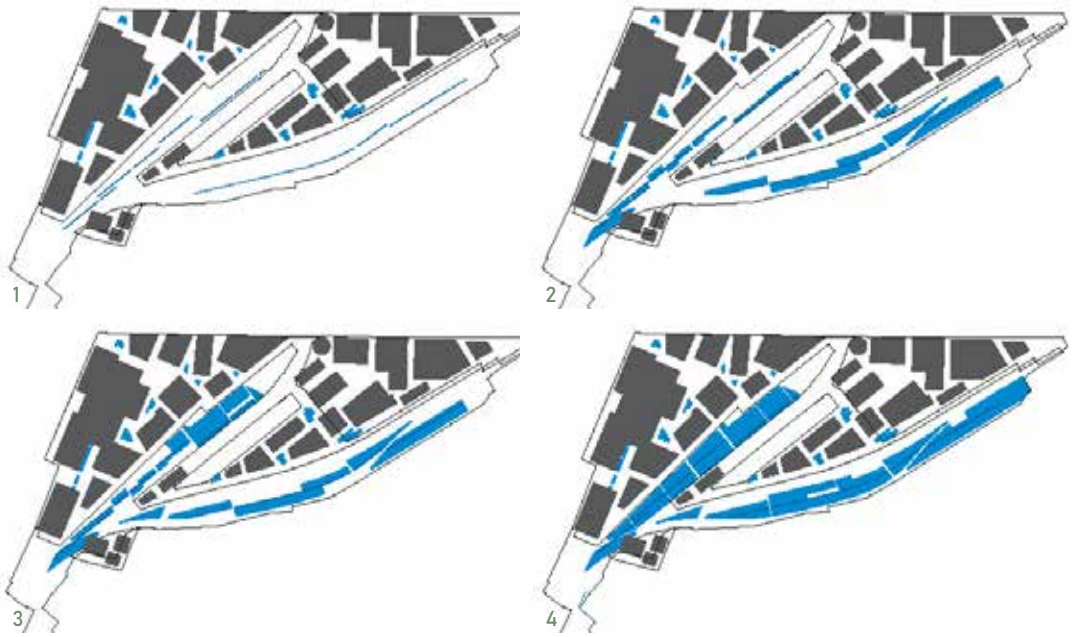
Top left. The project masterplan.
The transformation process created an important park in the heart of the Danish city (9 ha of park out of 30 transformed ha, i.e. 30%), capable of solving the internal and external flooding issues, through sustainable principles and without affecting the previous use (creating little waste and scraps).
(Drawings by Polyform Arkitekter)

Bottom left. Project strategy: permeable and built-up soil are of the same size. Open spaces and built-in spaces integrate and permeate each other. Paths, park and public spaces are the masterplan's connective, accessible and ecological tissue.
(Drawings by Polyform Arkitekter)

GUIDELINES FOR THE TRANSFORMATION OF THE NEIGHBOURHOOD AND CITIZEN PARTICIPATION

The area redevelopment project was devised after the extreme storm that hit the city of Aalborg, in 2011. The city already had a railway station transformation project under way; however, the heavy damage suffered by the city and the impact on the population prompted the local Administration to start over, with a completely different approach based on climate change adaptation.
The project was devised starting from a participative process, from which the urban quality guidelines to transform the area were established. The public debate revolved around ecological, environmental, landscaping, botanical, community service and function, transportation, architectural and energy saving topics.
The set of adaptation solutions, extremely integrated between green and blue infrastructures (overflow basins, rain gardens, floodable equipped green areas and green roofs) is very effective, as well as the analysis of the progressively floodable heights and reservoirs, because it has an efficient response in terms of flooding resilience.

Right. Water collection and management spaces.
The district has a great hydraulic capacity to manage different rainfall events (with increasing intensity) to solve the former flooding issues.
(1) Every time it rains, when the green roofs are full, some of the rain gardens fill with water.
(2) Subsequently, the park basins fill up. This happens 2-3 times a year
(3) In the event of intense rain, water fills all the park depressions. This can occur 2-3 times in 5 years.
(4) In extreme situations, the entire park becomes a floodable basin. This can occur 1-2 times in 10 years.
(Drawings by Polyform Arkitekter)



1959

Godsbanegården railway station is inaugurated along Jyllandsgade.

2004

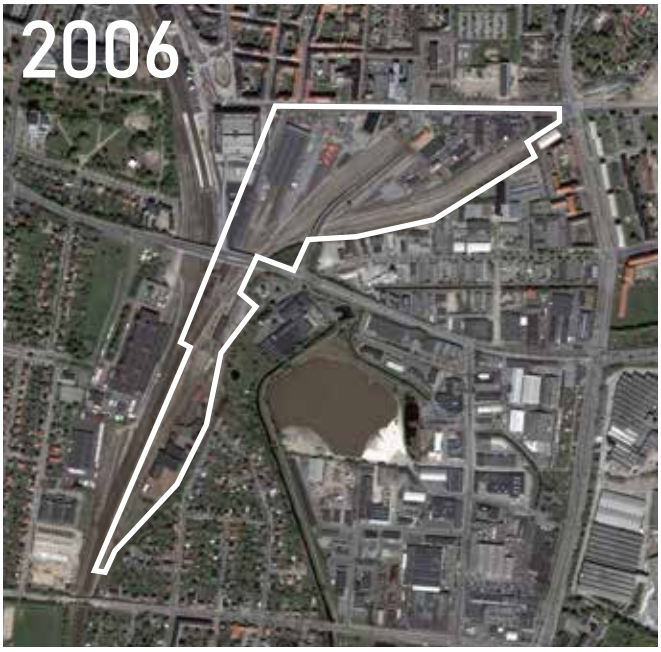
The freight terminal is gradually losing importance, following the construction of the Kennedy Arkaden, a commercial and management centre connected to the bus terminal.

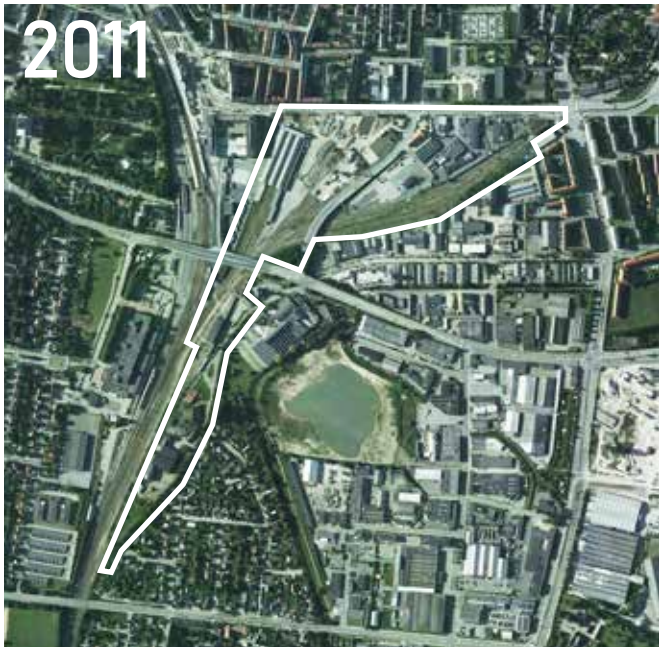
2009

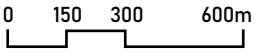
The path of public participation on the transformation of the railway station begins.

2010

Approval of the Urban Quality Guidelines for the transformation of the area (ecological-environmental, landscape and botanical, services and transport, architectural and energy saving).







Aerial photos and district transformation schedule.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN WATER MANAGEMENT

Blue infrastructure / Near the district, apart from natural watercourses, there are medium-large pools of water created in support of man-made extraction activities. The Ostera Canal laps the southern area, penetrates into the city network and then flows into the Limfjord River -just north of the area - which flows into the sea, 30 km later.
Before the interventions, the area was filled with infrastructures and sealed, and it had significant flooding issues. The project implemented different components in a balanced and resilient way, confirming the Ostera Canal as the south-east overflow line to receive and collect excess rainwater in its expertly widened bed.
The project expertly pursued both hydraulic (discharged flow) and hydrological (discharged volume) invariance objectives.
Green spaces can be accessed in dry weather and flooded in case of rainfall; the former railway tracks are used as channels, and the semi-paved squares house underground reservoirs and part water treatment units, using both concrete artefacts and suitable gravel infills.

Blue infrastructure construction aspects / In order to solve the hydraulic issues of the district and of the surrounding areas, multiple intervention levels have been employed, beyond the traditional inflow-outflow approach.
The built-up area foundations are raised with respect to the walkway (to ensure safety and accessibility to the buildings), while public spaces are sunk to different progressively floodable depths. Green roofs collect water in a capillary way and limit runoff.
According to the study behind the gradual floodable area, the first portions to be flooded are the sections underneath the buildings (channels, wells, ducts), followed by the former railway station areas (channels and park), and then gradually the others, based on the criticality of the rainfall event. Similar to the filling mechanism, the hydraulic project defined the flooded circuit emptying dynamics, up to the final receptor water bodies.

2011

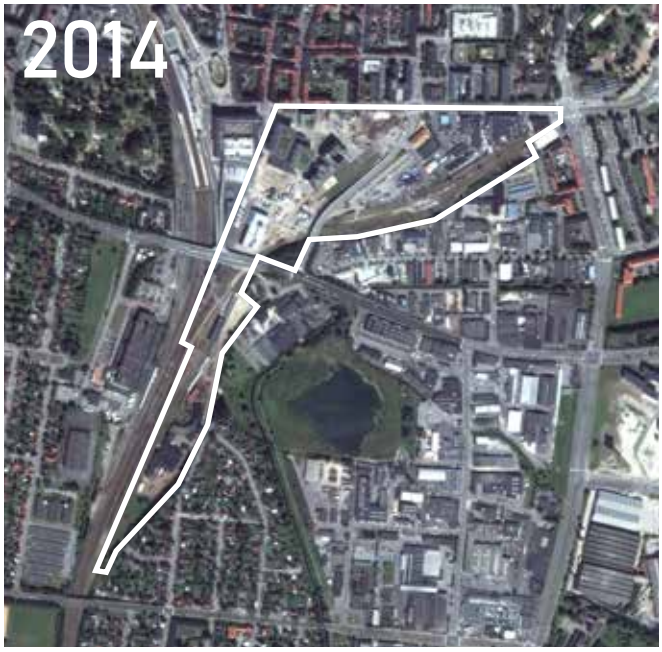
A severe storm hits the city of Aalborg, causing extensive and widespread damage and influencing the design for the new eco-neighborhood.

2011

Work begins: the green and blue infrastructures are built before the building interventions, as founding elements for the development and operation of the new eco-district.

2012-2019

Progress of work.



Green infrastructure and public spaces / The green project entails water collection systems and rain gardens connected to a Y-shaped large park with overflow basin function, developed in the same direction as the railway tracks.
Following desealing interventions, large areas were allocated to becoming green spaces (lawn and sports fields) or devised as floodable (in case of emergency) semi-permeable squares and courtyards. The buildings feature green roofs - the first rainwater intercepting and collection systems. The green infrastructural elements serve a dual purpose, based on the hydraulic system balance.

Plant species and planting distance / The botanical selection is simple, almost poor, and targeted at obtaining effective results in a short time. Tree-lined avenues feature poplars; the watercourse features spontaneous riparian plants, such as willows, poplars and thickets; the large permeable surfaces obtained from dismantling the railway network - symbolically preserved in some portions, with small track segments - are covered with lawns; the surface of some squares and of the internal courtyards of several lots has been cut to create rain gardens filled with perennial herbaceous plants. All species have a rapid growth, some do not last long - such as poplars - while some others have a natural rejuvenation, such as riparian plants.
The green project is linear and well-defined, characterised by single regular rows of poplars and transplanted grass plants with a geometric layout.

Water runoff management with SUDS and NbS / The approach and the set of interventions that led to the desealed area (floodable basins and swales, rain gardens, green roofs and small overflow basins in private lots) are NbS integration examples on a urban scale. The project solutions are an effective response to the flood emergency, with spaces that can be flooded when needed, and 'emptied' at the end of the event via channels (including concrete ones).

Phytoremediation and phytopurification / The plants on green roofs and rain gardens first treat the surface water collected by the building covers and the pedestrian areas.

Soil and bioremediation / The desealing action was focused on limiting the production of waste materials and scrap (the railroad bed is a suitable drainage substrate, so it was mainly left on site).
The works were completed by planting trees and herbaceous plants. Apart from their aesthetic function, plant species help re-mineralize and improve the soil physical and chemical characteristics.

Maintenance / Maintenance is not too demanding, based on the different green elements: an extensive maintenance with regular mowing is performed on lawns; while more accurate and detailed interventions are performed on rain gardens and green roofs. In some flowerbeds and in the rain garden, mulching with pebbles is performed to reduce the growth of weeds and keep the areas clean and neat.
Management costs are limited, because the green selection is simple and not too complex; regularly mowing the lawn can be time-consuming.

GODSBANEAREALET TRANSFORMATION SITE AND MASTERPLAN A-B-C-D-E

BUILT-IN FABRIC

DESIGNED WITH GREEN ROOFS AND PERMEABLE AREAS FOR SOLAR RADIATIONS, WIND CURRENTS AND WITH LARGE PUBLIC AREAS

BUILDINS

GREEN INFRASTRUCTURE

CONNECTION OF PUBLIC GREEN AND SEMI-PRIVATE AREAS, TREE-LINED AVENUES WITH CONTINUOUS AND CONTIGUOUS CANOPIES AND PERMEABLE LAWN SOIL

SINGLE CONTINUOUS ROW

SMALL GREEN MASSES

PERMEABLE YARDS WITH RAIN GARDENS

VEGETATE AND PERMEABLE, DEPRESSED AND FLOODABLE AREAS WITH DIFFERENT LEVEL DIMENSIONS

GREEN ROOFS

BLUE INFRASTRUCTURE

INTEGRATED WATER COLLECTION SYSTEMS, HI-TECH SOLUTIONS INTEGRATED WITH NATURE-BASED SOLUTIONS

ØSTERÅ CANAL

ØSTERÅ CANAL BED

LINEAR RAIN GARDENS

RAIN COURTYARDS

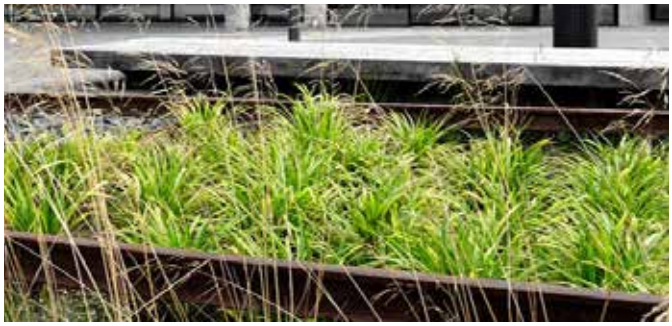
CHANNELS FOR THE PROGRESSIVE DISPOSAL OF RAINWATER FROM THE ROOFS OF BUILDINGS

BASIN

Left. The central green area with flooded sports fields. (Photo by Wichmann +Bendtsen)

Bottom. Rain garden in the middle of a built-in courtyard with perennial herbaceous plants, such as grass species, stipa (*Stipa tenacissima L.*) and Miscanthus (*Miscanthus sinensis*).

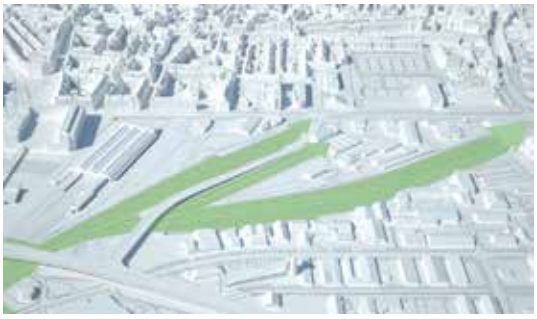
The Miscanthus is included in some blacklists of plants to be eradicated in Italian territories, (regional Regulations and LD 230 of 15 December 2017, to adapt the regulation to the provisions of EU Regulation no. 1143/2014 of the European Parliament and of the Council of 22 October 2014).
(Foto di Wichmann +Bendtsen and www.stateofgreen.com)



Project definition and implementation, in the different planning steps.
A. The area before the works.
B. Identification of the area to be transformed.
C-D. Public spaces and built-up areas penetrate each other: the former railroad bed is green and permeable.
E-F. The built-up area foundations are 'raised' to secure them (above sea level).
G. The built-up areas are permeated with semi-private public spaces and internal courtyards to create cross-paths.
H. Masterplan diagram: filled/empty spaces ratio and penetration between green areas and built-in tissue.
I. The first floodable collection areas are 'lowered'.
J. Green roofs for capillary water collection are included.
K. Ground drainage networks are structured.
L. Green and blue infrastructures are integrated into a unique project with a great effectiveness in terms of flooding resilience.
(Drawings by Polyform Arkitekter)


A


B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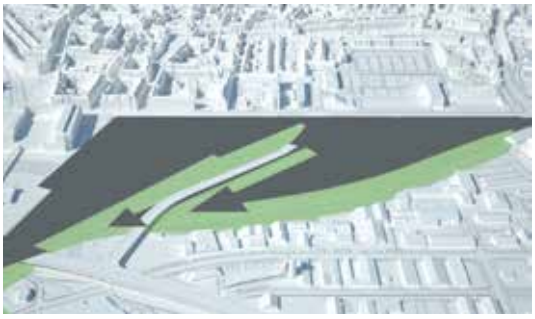
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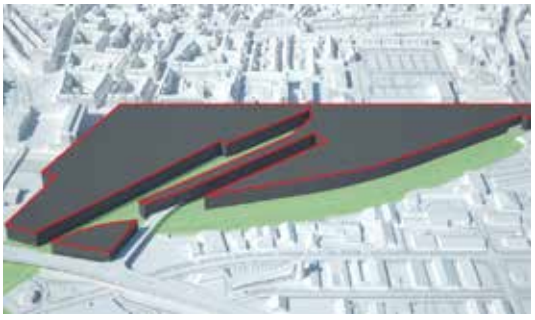
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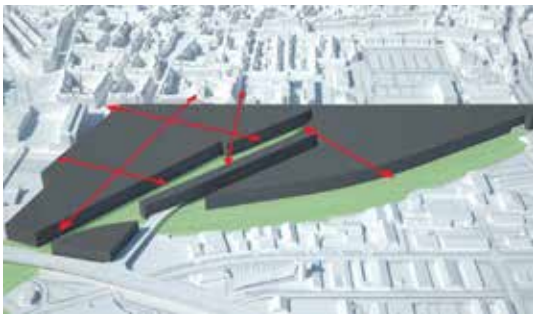
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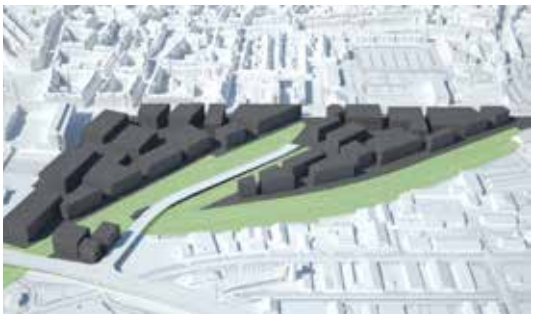
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I


J


K


L

Top. The central water flow channel.
(Photo by Wichmann+Bendtsen)

Bottom. Rain gardens obtained between the existing railroad tracks. The choice to leave part of the tracks and the permeable rail-bed as bearing frame of the floodable basin - the large park - significantly reduced demolition and disposal costs in the former railroad station.
(Photo by Wichmann+Bendtsen)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS

AIR QUALITY AND POLLUTANS REGULATION

NOISE REDUCTION

RUNOFF REDUCTION AND FLOOD

POLLINATION AND BIODIVERSITY

URBAN COMFORT AND MICROCLIMATE

PUBLIC SPACE ACCESSIBILITY AND RECREATION

IDENTITY SENSE PLACE HISTORY

BEAUTY OF NATURE

CLIENT
DSB Ejendomsudvikling

TYPE OF PROJECT
Eco-quartiere

EX ANTE SITUATION
Railway station decommissioned following the construction of the Kennedy Arkaden in 2004.

EX POST SITUATION
Complex urban regeneration area: residential district with buildings with green roofs and numerous public spaces: squares and indoor courtyards with rain gardens, sports facilities and flooding lawns.

WORKS
Conversion of the area of the former Godsbanearealet railway station with mixed functions such as housing, tertiary services, commercial and student services, urban park.

SUDS
The central urban park has been conceived as an un flooded space for the collection and natural purification of rainwater. There are rain gardens among the built-up areas and in the parking lots. Rainwater regination channels penetrate the built-up areas and give to gardens and urban park. All buildings are equipped with green roofs.

PARTICIPATION
A participatory process has been established for the sharing of guidelines for urban quality, preparatory to the elaboration of the masterplan.

URBAN PLANNING AND DESIGN TOOLS
Design guidelines for urban quality.
Masterplan; Urban and Architectural Project; Landscape project and Hydraulic Project.

DESIGNERS
Polyform Arkitekter (Architect WERK Arkitekter - Thomas Kock | Sangberg Architects - Jonas Sangberg): urban and landscape project.
Niras: hydraulic design and sustainable urban drainage systems.
Cenergia: masterplan.

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VIDEO
https://www.youtube.com/watch?v=GDZiFbNrL8Y&feature=youtu.be https://vimeo.com/33347983

WEBSITES
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http://sangberg.com/project/godsbanearealet

http://www.landezine.com/index.php/2016/02/godsbanearealet-a-pioneer-climate-adaption-project/

SITE
Aalborg, Denmark

POPULATION
200 k inhabitants

DIMENSIONS
30 hectares

PERMEABLE AREAS
7 he before
15 he after

INVESTMENTS
14.9M € 1^ phase
30.8M € 2^ phase

A5

LA CONFLUENCE / LYON - FR

from former port-industrial area to ecodistrict for climate adaptation

The La Confluence district is located in Lyon, on the historical city outskirts, on the artificial peninsula between the Rhone and Saône rivers. The area was first urbanized during the industrial revolution, with factories and port/railroad infrastructures. With the crisis of the manufacturing industry, at the end of the 1970s, the effects of de-industrialization manifested themselves for almost 20 years, insomuch that the local Administration decided to start a widespread urban redevelopment program. The City held several calls to redesign the public spaces, involving urban planners, landscape gardeners and environmentalists, to enhance suburban, river-front and historical centre districts.
The redevelopment focused on a 76-hectare area, with approx. 17 hectares of permeable surface.

Right top. Green areas and pedestrian connection spaces along the dock. (Photo by L.Ravanello)

Right bottom. The basin penetrating into the district. (Photo by L.Ravanello)

LA CONFLUENCE'S MASTERPLAN - BETWEEN URBAN PLANNING AND LANDSCAPE

The project for the development of La Confluence includes a dynamic urban and landscaping system, where the optimisation and redevelopment of industrial infrastructures is integrated with an evolving garden system, the *jardins provisoire*, based on the *preverdissement* technique. This preventive planting system comprises permanent and temporary green areas, to both implement public spaces before the buildings (houses and offices) are completed, according to an incremental logic, and to promote local appropriation by the first residents settled there.
From a public space standpoint, the masterplan wants to restore the rivers' pre-industrial configuration, with a solution more attentive to walled docks and quays, typical of Lyon's industrial and commercial history. In addition, the building structure and density, the height and the curtain walls adopted in the adjacent Saint-Blandine working-class district are taken as urban guidelines to reiterate in the newly-built areas, to obtain an even layout with the existing parts of the City.
From a mobility standpoint, rest areas are introduced along the pedestrian paths and new squares for special groups.
However, the urban green areas are the greatest innovation on public space introduced by the masterplan. Concerning the contest's request to create a single 30- ha park, the designers suggested an alternative system of parks and diffused gardens, to occupy the soil available right from the start, even in a temporary way (hence, jardins provisoire), to prevent neglect, pending further construction processes. In La Confluence, a 'two-speed' landscape was thus developed, with certain elements - such as lawns and some plant strips - that valorized the site right from the start. While perennial elements, such as tree rows, embankments and infrastructures, were gradually built, to give a final green layout and structure to the entire district. This way, the diffused park acquired a fragmented layout, with green spaces differentiated by function, based on the residents' needs, which penetrate the urban fabric, within a context comprising also lush private green areas, with pedestrian and cycling paths and roads.
In addition, the environmental redeveloping project entailed the enhancement of the Saône banks, through landscaping and marine structures.

Left. Detail of the project masterplan.
(Drawings by Michel Desvigne and François Gréther)

Top right. Evolving layouts of the plant systems with the temporary gardens. Among the pioneer species, there are birches, willows and poplars, along with groundcovering herbaceous plants, such as ivy, used to cover nourishment-poor surfaces.
(Drawings by Michel Desvigne and François Gréther)

PROCESS

At the end of the 1990s, the Mayor, Raymond Barre, organizes an international contest to draft a masterplan for the La Confluence peninsula, to be used as outline to be implemented over time with independent interventions.

To develop the area, the Gran Lyon and the City of Lyon found the public-private SEM Lyon Confluence company (since 2008, Société publique locale d'aménagement), responsible for the district's redevelopment, soil remediation and sales concessions.

The winning project for drafting La Confluence's masterplan is submitted by landscape architect Michel Desvigne and urban planner François Gréther, which use green spaces and water to rebuild the relationship between the City and the two rivers. The masterplan is followed by a series of ZAC - Zone d'aménagement concerté - to divide it into gradual transformation areas, also fostered by several private architectural contests. Among the others, the following players took part in La Confluence project

Apart from public spaces and private homes, the area houses control centres, businesses, services and attraction centres, such as the Regional Council, the Bank of France, the Musée des Confluences, the Catholic University and Euronews TV. Today, the district is home to about 10,000 residents (and 16,000 are expected by 2025), 860 companies, 10,000 sqm of services and 7,000 sqm of businesses that employ approx. 15,000 people.

La Confluence is much appreciated for its high quality of life: functional green spaces, sustainability criteria adopted for the built-up area with low energy consumption, and services that make the area comfortable for people of any age and social provenance.

late '700

An important adjustment and regulation of the Rhone has been performed, by moving the confluence point a few km downstream, to obtain a strip of land of about 150 ha, for industrial warehouses and activities.

'900

The railway and the highway separate the area from the rest of the City. Here, there are industries, warehouses, two prisons, a wholesale market and a working-class district.

1996

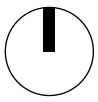
With the progressive decline of heavy industry, a reconversion of the area is beginning to be envisaged. Mayor Raymond Barre has an international competition for the drafting of a masterplan.

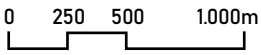
1998

Design group Grether-Desvigne starts reviewing the project that won the contest, opting for a general outline to be implemented over time with independent interventions.

1999

Gran Lyon and the Municipality founded the public-private company SEM Lyon Confluence (since 2008 Société publique locale d'aménagement), responsible for the regeneration of the site.





Aerial photos and district transformation schedule.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN WATER MANAGEMENT

Blue infrastructure / / Public spaces have been designed to collect and store the rainwater used to irrigate the green areas. The sewage system is separated: wastewater is channelled toward the Pierre-Bénite treatment plant, south of Lyon, which has been significantly extended, according to landscaping mitigation values and the La Confluence's inputs. Excess rainwater flows into the surface network, the Saône, after travelling into the collection and drainage ditches, which trap or reuse part of it. The district features sunken floodable green areas.

Blue infrastructure construction aspects / Thanks to the creation of a capillary green network, the rainwater can be progressively managed from the start, by suitably storing it in the large water pools obtained in the park areas, and then using it for irrigation purposes.

Green infrastructure and public spaces / The green project caused a significant transformation of the left bank of the Saône river; the new ecodistrict is inserted in a dynamic context, affected by the geomorphological processes of the two rivers. Wet areas, lawns and forest areas ensure continuity to the green infrastructure, penetrating the district with tree-lined avenues, rain gardens and green squares. In particular, the two wet areas at the entrance to the new Canal flowing toward the peninsula inland, have a significant environmental value and are filled with plant and animal biodiversity, thanks to the presence of marsh species, birds, insects and water animals.

Plant species and planting distance / The temporary gardens house pioneer species, such as willows, birches, poplars and ground-covering herbaceous plants, and final species, such as oaks. Pioneer species have a light and thin canopy, which facilitates the spreading of further tree species; they are frugal, rapid-growth species, with a precocious seed production in significant annual quantities. Small birch groves have been planted near the largest green areas, to obtain even shade. The evolution of the temporary gardens entailed the implementation of green areas, with flowerbeds of grass species, small oaks,

2003
Work begins for ZAC1: 41 ha with 1,900 apartments for about 4,00 inhabitants, 150,000 sqm intended for offices, 77,000 sqm of commercial activity and 31,500 sqm of equipped public spaces.

2009
The market and prisons move to Corbas (south-east of Lyon). The first buildings are delivered and the public spaces of place Nautique, port Rambaud and a stretch of the promenade de Saône are completed.

2010
Work begins for ZAC2: 35 ha with 138,500 sqm of residential, 229,000 sqm intended for offices, 19,000 sqm of commercial activities and 35,600 sqm of public equipped spaces. Work ends in 2012.

from 2012
Management centres, businesses, services and attractions begin to move to Confluence (e.g. Conseil régional, Banque de France, Musée des Confluences, Université Catholique, Euronews, ...)

2019
To date, the district is home to about 10,000 inhabitants (16,000 expected in 2025), 860 businesses, 10,000 sqm of services and 7,000 sqm of commercial activities that employ about 15,000 people.

playgrounds and urban vegetable gardens in crates. The wet areas feature marsh species, such as the common reed, Typha, and rush, which made up large thicket portions. The interventions are distinguished into temporary and final. The tree planting distance has been defined based on the intervention's characteristics and purpose. In temporary gardens, the instant effect has been obtained with reduced planting distances.

Water runoff management with SUDS and NbS / The project entails floodable basins and rain gardens, to manage the rainwater, while wastewater is channelled toward the centralized Pierre-Benite treatment plant, nearby. All the interventions made on public spaces (tree-lined avenues, forest areas, green squares and rain gardens) have an NbS approach and allow a more resilient management of water resources and an improved urban comfort.

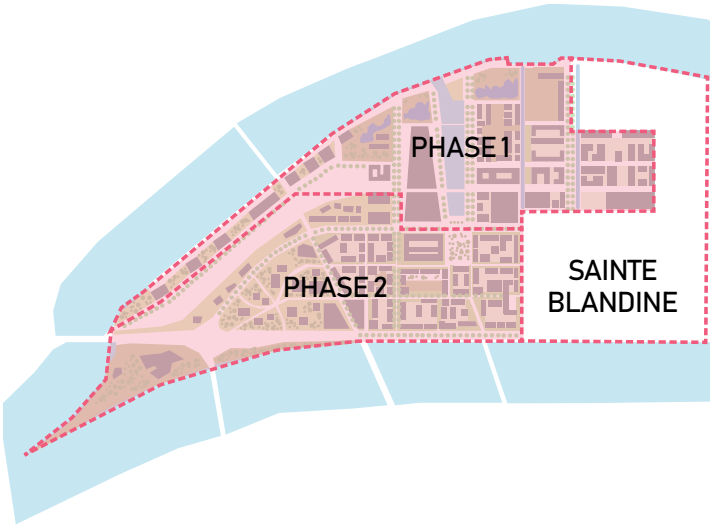
Phytoremediation and phytopurification / Rain gardens are employed for a first treatment of the rainwater collected by roofs, buildings and pedestrian paths. Once the water is collected and stored, it is used to irrigate the green surfaces; excess water is channelled into the Saôna surface network.

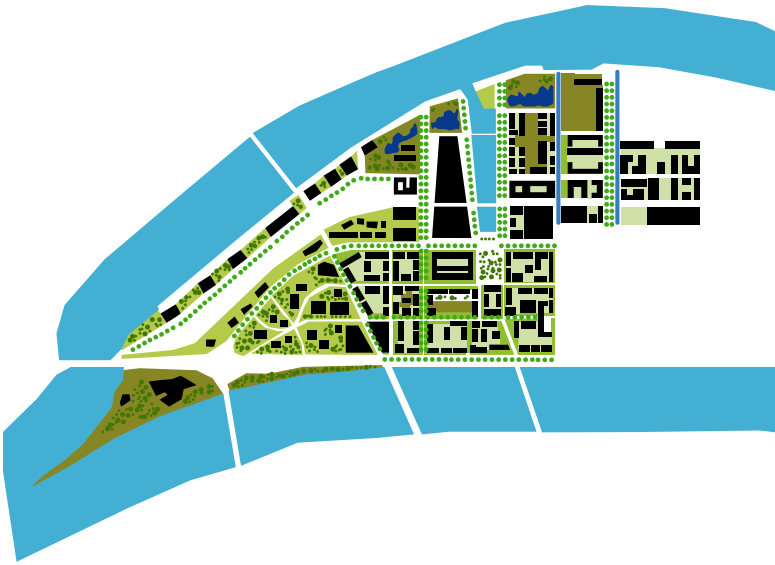
Soil and bioremediation / The peninsula redevelopment from industrial area to ecodistrict entailed the desealing of large sealed surface; however, the preventive hydrocarbon reclamation interventions - required to restore threshold values compatible with the limits set by the law for the project's intended use - cannot be quantified. The implementation of a 'two-speed' green system helped activate the remineralization processes required to increase soil nourishment and plant development.

Maintenance / It can be assumed that the blue infrastructure maintenance is significant, given the articulation and differentiation of solutions. On the other hand, the green project does not entail any special intervention, since the rustic species planted have limited water and maintenance requirements. Surely, it includes mowing the lawns and pruning of the trees, especially on the road network. The vegetable gardens in containers are managed by residents.

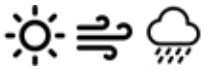
Details of green spaces.
(Photo by L.Ravanello)

TRANSFORMATION AREAS AND MASTERPLAN CONFLUENCE FASE 1-2

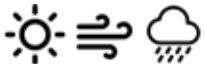




BUILT-UP FABRIC
DESIGNED WITH GREEN ROOFS AND PERMEABLE AREAS FOR SOLAR RADIATIONS, WIND CURRENTS AND WITH LARGE PUBLIC AREAS



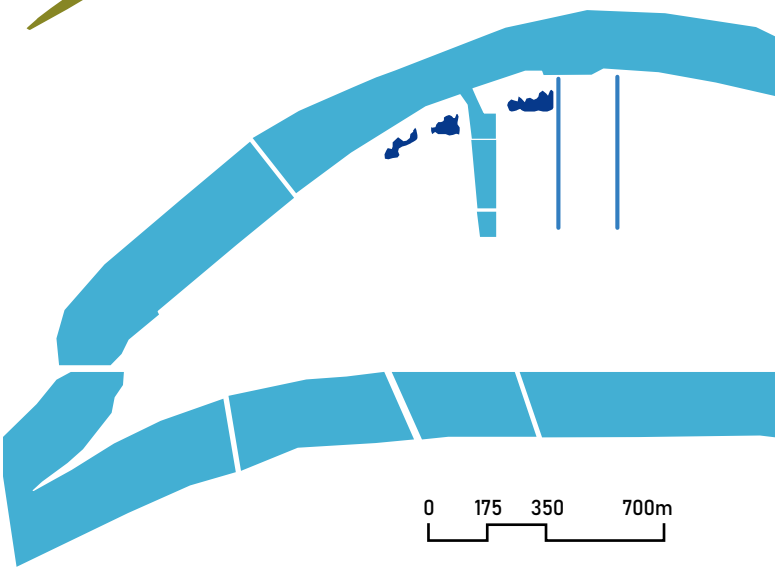
GREEN INFRASTRUCTURE
CONNECTION OF THE PUBLIC GREEN AND SEMI-PRIVATE, TREE-LINED ROWS WITH CONTINUOUS AND CONTIGUOUS FOLIAGE, PERMEABLE LAND AND RAIN GARDENS



- SINGLE OR DOUBLE CONTINUOUS ROW
- SINGLE TREES AND/OR SMALL GREEN MASSES
- TREE-LINED STREETS
- PRIVATE GREEN COURTYARDS
- PARK / EQUIPPED GREEN AREAS
- GREEN AREAS / LAWN

BLUE INFRASTRUCTURE
INTEGRATED WATER COLLECTION SYSTEMS, HI-TECH SOLUTIONS INTEGRATED WITH NATURE-BASED SOLUTIONS

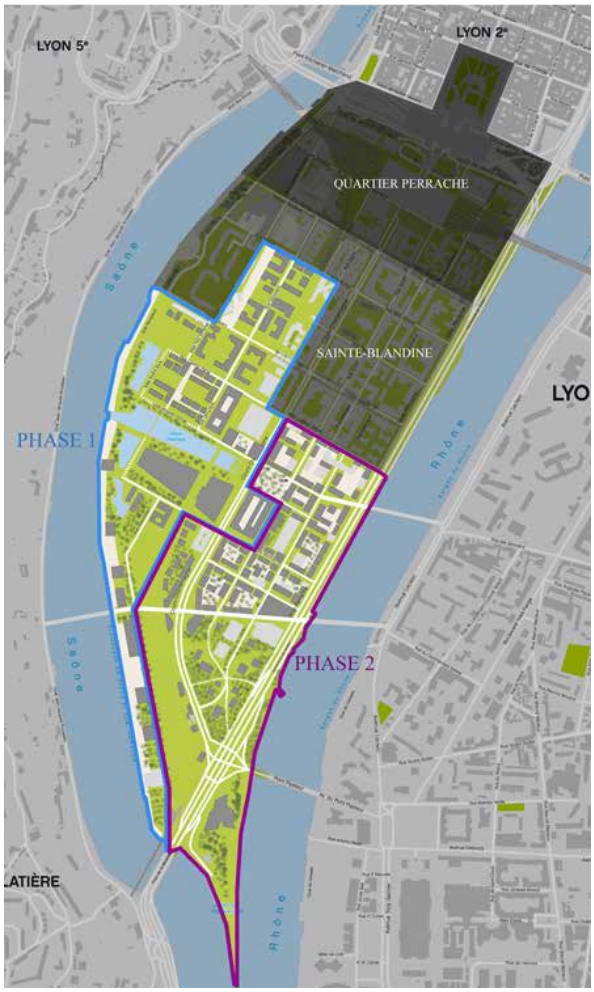
- SAÔNE AND RHÔNE RIVERS
- LINEAR RAIN GARDENS ON THE SIDE OF THE ROAD
- WETLAND



Top. Public spaces and large green courtyards used by the inhabitants of the quarteire in their free time.
(Photo by L.Ravanello)

Bottom. Tree-lined avenue with pedestrian walkway and rain gardens along the street.
At several points of the district, there are raised and safe pedestrian footbridges, to cross depressed and floodable areas, such as the rain gardens along the road.
(Photo by L.Ravanello)

Right. The area of La Confluence for phases of intervention.
(Drawings by Michel Desvigne and François Gréther)


LYON 5e
LYON 2e
QUARTIER PERRACHE
SAINTE-BLANDINE
PHASE 1
PHASE 2
Saône
Rhône

Top left. Green private courtyards, with spaces equipped for leisure and/or shared vegetable gardens.
(Photo by L.Ravanello)

Top right. Green on the side of the road along the driveways.
(Photo by L.Ravanello)

Bottom. Basin with water purification system.
(Photo by L.Ravanello)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
Grand Lyon

PROJECT TYPE
Eco-district

EX ANTE SITUATION
Production area of the 18th century, disused since the 1990s. Historically previously occupied by factories, port installations and infrastructure (railway and highway).

EX POST SITUATION
Complex urban regeneration area, with functional and social mixité. Urban regeneration has been preceded by massive reclamation activities and significant infrastructure interventions (in particular for mobility).

WORKS
Conversion of industrial infrastructure and integration immediately (instead of a single large park) of a green system consisting of permanent and temporary gardens able to create public spaces before the completion of building interventions.
program:
44% luxury homes
23% social housing
23% public funding
33% tertiary, services and business activities.
1 museum - Musée de Confluences (Museum of Confluences).
Universities and educational centers: Catholic University of Lyon, ESDES School of Business and Management, Confluence Institute for Innovation and Creative Strategies in Architecture, SUPDEMOD Fashion Design & Business School and Digital Campus Lyon.

SUDS
Collection of rainwater for drinking purposes. Return of excess rainwater to the river. Collection of grey water and its purification for drinking water purposes.
The system of green areas (more than 30 hectares of parks and gardens) is designed
also in hydraulic function for collection, infiltration, storage and slow return to the river.

OTHER ASPECTS OF ENVIRONMENTAL SUSTAINABILITY
High energy efficiency buildings; mix of renewable energy sources; recycling waste 70%; sustainable mobility/high accessibility to TPL in its own right; 50% reduction in water consumption, collection in networks
separate, local treatment and reuse; recovery of rainwater.

PARTICIPATION
Durante la prima fase di
During the first phase of public consultation, more than 24,000 Lyons visit the exhibition of the winning project of the competition and send 1,000 written observations to the municipality. Following consultation, the first masterplan is reviewed

URBAN PLANNING AND DESIGN TOOLS
ZAC Lyon Confluence
Masterplan ZAC1
Masterplan ZAC2
Urban project
Landscape project
Hydraulic project

DESIGNERS ZAC 1
François Grether: masterplan.
Michel Desvigne: landscape project and public spaces.

DESIGNERS ZAC 2
Herzog & de Meuron architecture: masterplan.
Michel Desvigne: landscape project and public spaces.

BIBLIOGRAPHICAL SOURCES
Grand Lyon, *LA CONFLUENCE® LYON, Dossier de presse, A3, premier îlot opérationnel de la deuxième phase* (Janvier 2014).

Grand Lyon, *LA CONFLUENCE® LYON, Dossier de presse* (Octobre 2012).

WEBSITES
www.lyon-confluence.fr

www.eddyburg.it

www.domusweb.it/it/architettura/2015/02/16/il_nuovo_centro_di_lione.html

SITE
Lyon, France

POPULATION
485 k inhabitants

DIMENSIONS
150 hectares
ZAC 1 - 41 he
ZAC 2 - 35 he

PERMEABLE AREAS
14 he before
27 he after

INVESTMENTS ZAC1
680M € private funds
475M € public funds

A6

PARC DU TRAPEZE, ILE SEGUIN, PONT DE SÈVRES / BOULOGNE-BILLANCOURT - FR

from former industrial area to ecodistrict for climate adaptation

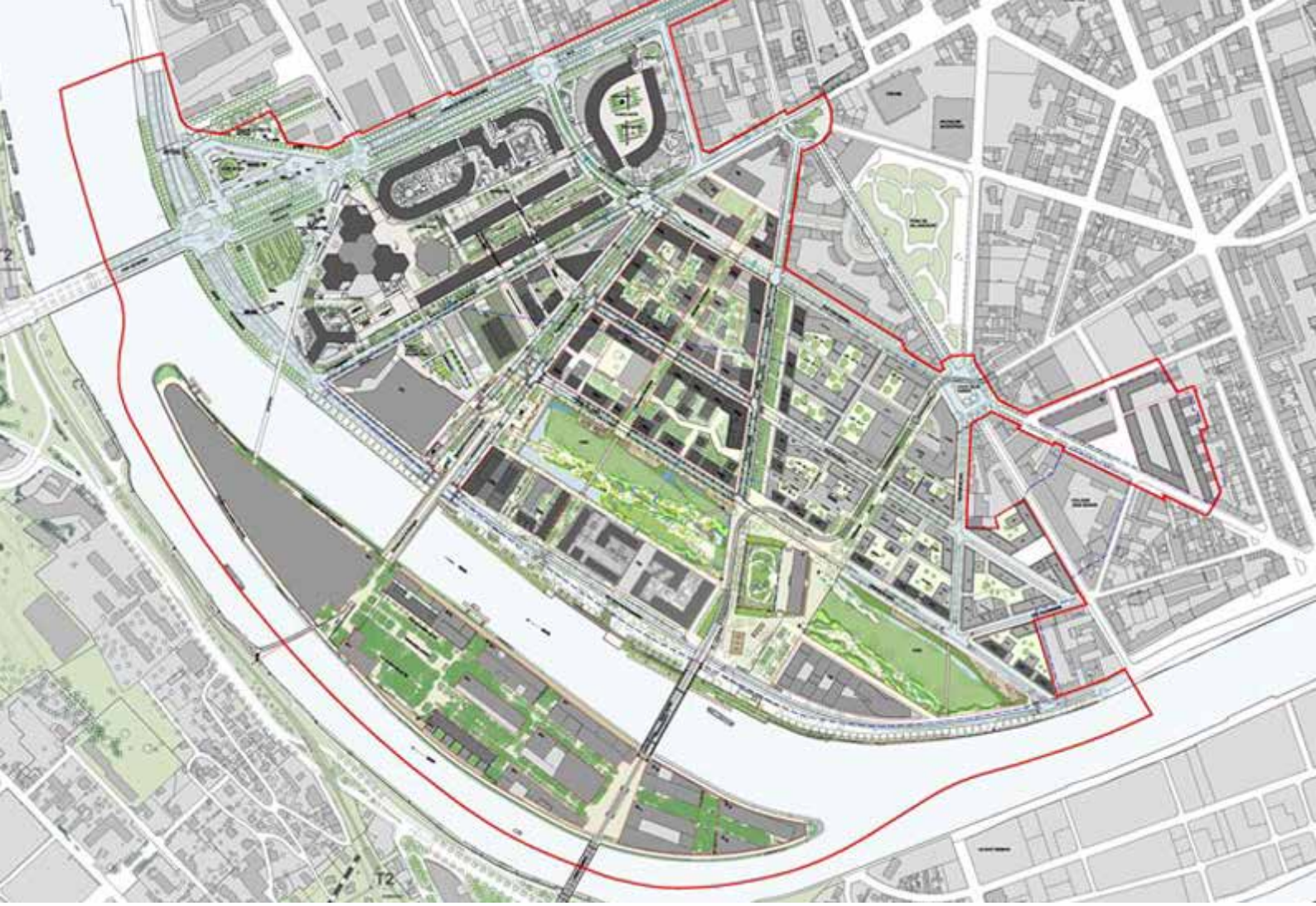
The Boulogne-Billancourt park and ecodistrict is located in the heart of the Île-de-France, in the former Renault decommissioned industrial area, along the Seine.
Renault took over this area in 1898, on a 74-hectare site, and remained active for almost a century, until 31 March 1992. Mostcars produced by the French company - including the iconic R4 - were produced here, in Boulogne-Billancourt. The development of the automotive production determined a rapid expansion of the industrial sector, and it went from half a hectare in 1900 to 37 hectares in 1919 and almost 100 hectares at the end of the 1930s. From the 1980s onward, given the greater competition of global markets, the Boulogne-Billancourt site was no longer able to adapt to the new production processes, and the automotive factory was abandoned in 1992. The redevelopment focused on a 76-hectare area, with approx. 22 hectares of permeable surface.

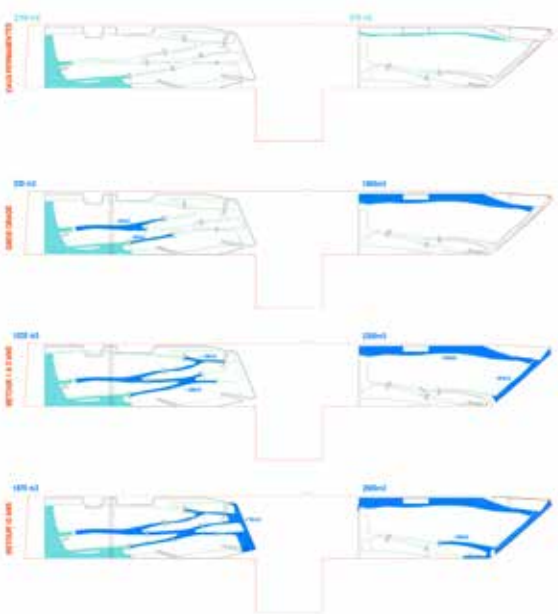
Right up. The western portion of the park with the retention basin.
(Photo taken from www.designpictures.fr)

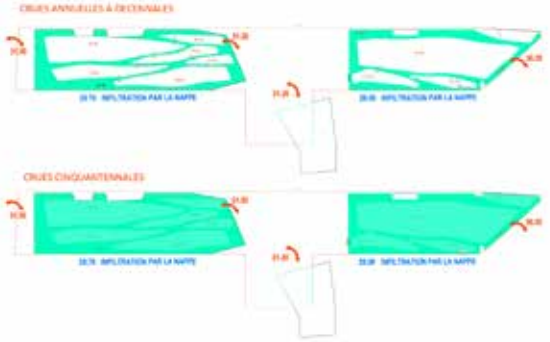
Right down. Pedestrian paths and permanent basin at the edges of the built fabric.
(Photo by E.Farnè)

NATURE-BASED SOLUTIONS FOR THE BOULOGNE-BILLANCOURT ECODISTRICT

The Parc du Trapeze plan development and implementation projects were aimed at giving this exceptionally big and strategic site along the Seine back to the community.
The redevelopment and transformation plan was structured in three compartments: geography, urban-function and landscape. The basic idea was building a sustainable, energy-efficient and contemporary district, divided into courtyard parcels, with mixed functions and capable of adapting to climate change, through tree-lined and permeable public spaces and a large floodable park.
At its heart, the district houses the 7-hectare park, a large green area with facilities, connected to the new residential area through a system of sloped gradients and progressive heights, where the entire district's rainwater flows. The entire park landscape is shaped by water. It includes wet spaces, rustic lawns and swales, small groves and large lawns. Under normal climate conditions, the park offers an accessible green area with a playground and different facilities, which, in case of intense rainfall, is transformed into a progressive accumulation reservoir. Raised paths ensure that people can safely enter and exit the site.
The entire open space system along the road looks like an extension of the park: alongside roads and pedestrian areas, there are always rain gardens and slight depressions with plants and trees that can naturally collect and filter water. The same goes for public and semi-private courtyards in the residential lots, which house services, such as schools, youth clubs and clinics, as well as gardens and permeable areas that progressively collect water and channel it toward the rain gardens along the road.







Left at the top. Redevelopment masterplan for the former Renault production site. (Drawing of AAUPC)

Left in the middle. Floodable park overflow spaces and flood return times. (Drawings by Agence TER)

Left down. Parc du Trapeze landscaping project: an example of effective water resource autonomy and management. (Drawings by Agence TER)

Right. Aerial view of the current construction site and the park. (Photo taken from www.ileseguin-rivesdeseine.fr)

THE PROCESS OF DECOMMISSIONING AND THE CONVERSION OF THE SITE FOR PHASES OF INTERVENTION

After Renault automotive production stopped, given the site dimensions, its identity and the strategic location in the Île-de-France, the French Government decided to launch a national real-estate operation to recoup the area, following the principles of environmental sustainability, sustainable mobility and high residential quality.

Five years after the factory closed down, in 1997, a planning debate was opened, to define the urban plan and the management of all the real-estate transformation operations on the area. In 2002, SAEM - the public-private urban transformation company - was founded, to manage all operations. In 2003, a detailed site transformation plan (ZAC Zone d'aménagement concerté) wa implemented on the 74-hectare area, including the Parc du Trapeze and the Pont de Sèvres interchange district. In 2003, the design contests were launched, and the works started in 2005.

The three transformation areas took over different functions and spaces in the plan:

- the Parc du Trapeze area (37.5 ha), was redeveloped with mixed uses (residential units, public structures, offices, stores, park), in two phases: the first in 2005 and the second still under way (expected for the end of 2016). It also houses an experimental science and biodiversity school;
- the Ile Seguin-Rives de Seine (11.5 ha), designed to become an international centre for cultural innovation; opened in 2010. It houses cultural structure, and the City of Music is currently being built;
- the Pont de Sèvres residential district (25 ha), built in the 1970s, is undergoing an urban redevelopment plan, aimed at renovating all open public spaces, with new functions and services for the district.

The general urban and landscaping project has been entrusted to AAUPC Chavannes & Associés architecture urbanisme et paysage, while the single blocks have been entrusted to several architecture and landscaping studios, and the Park to Agence Ter.

1929

With the introduction of the assembly lines, Renault needs to expand and builds the new factory in Île Seguin.

1945

General De Gaulle nationalizes the company, and the automotive brand becomes a showcase for 'advanced' social relationship, with higher wages and better working

1960

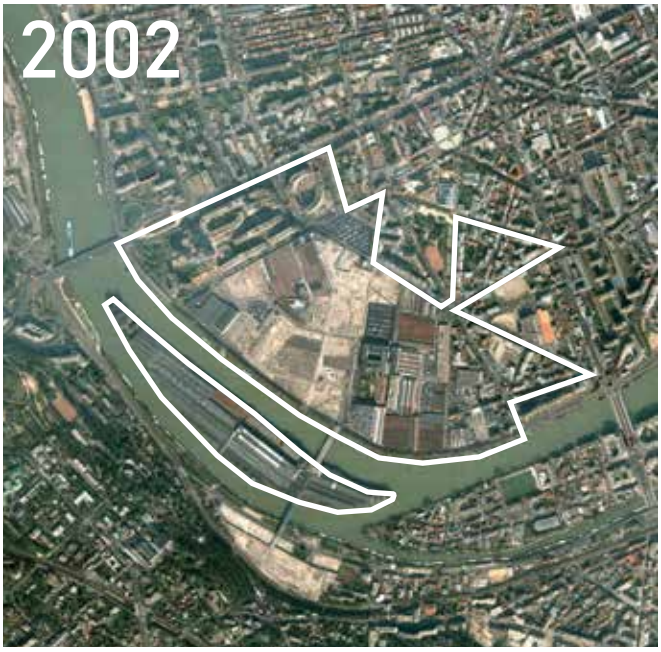
conditions. Thanks to the production of popular working-class cars, such as the 4Cv, Dauphine or the R4, Renault becomes the leading European automotive company.

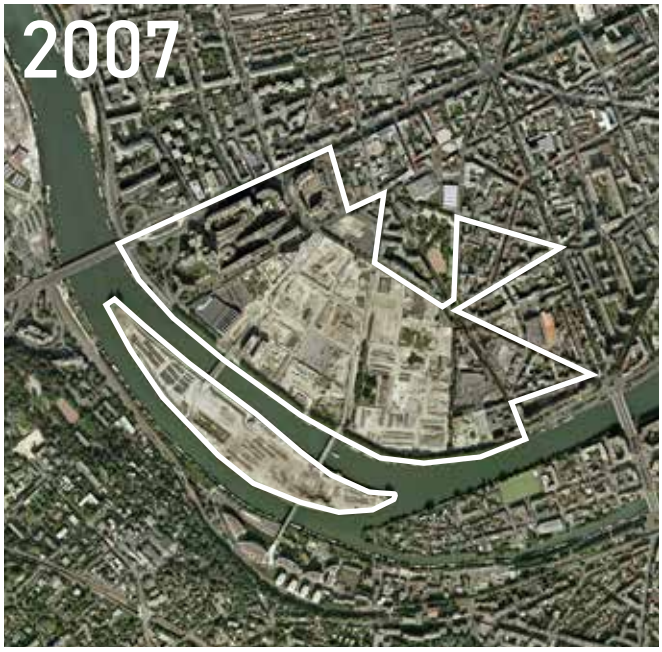
1970

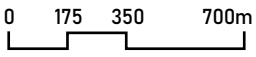
In the 1970s, the Company's decline begins, and suburb factories supplant Billancourt, whose rigid structure prevents any adaptation to the new production techniques.

1989

The Billancourt facility shutdown is announced; the last model produced here will be the R5, in 1992.







Aerial photos and time schedule of the transformation of the neighborhood. It can be seen that the park was completed before the completion of the buildings due to the rain-regination function it performs for the hydraulic safety of the entire neighborhood.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / The area is located on the right bank of the Seine, subject to potential flooding. The Parc du Trapeze is the central element of the project: it acts as a floodable park and solves the flooding issues inside and outside the district, through sustainable principles and water reuse (by creating water-collection reservoirs to irrigate the park). The hydraulic system layout converges to the two east-west ends of the park - connected to one another in the middle - from where all paths and connections (including hydraulic connections) radiate.

Despite its proximity to the Seine, the district is separated from the River, save for the western section that houses the emergency branch. The project's purpose was to be independent and manage water resources internally: water gradually collects on the surfaces, depending on the intensity of the weather event;it is then infiltrated and/or recycled - after being treated - to irrigate the park and the green areas.

In dry weather, the park green areas are completely accessible, while in wet weather, they become floodable spaces, proper depressed 'valleys channels' crossed by raised and safe pedestrian paths. The park - thanks to a structured system of capillary accumulation, channels, conduits, paths, natural depressions and the gradual contribution of underground infiltration - can contain rainwater with a return time of 50 years.

Blue infrastructure construction aspects / The park's gradual flooding has been studied from the lateral sections inward: from the western section - with a permanent water pool - the district's rainwater collection progressively floods - depending on return times - increasingly larger portions in a western-eastern direction. The built-up part features green roofs for capillary water collection to limit run-off. The pedestrian paths/accesses are raised with respect to the natural, permeable and floodable soil underneath; they act as small reservoirs at the source, and help create hydraulic invariance volumes right from the start. The semi-private internal courtyards are made with permeable paving, in line with the principles that inspired the project.

2001

Renault signs a deal to sell the areas to the DBS Consortium (Développement Boulogne Séguin), grouping of Hines France, Icade, Nexity e Vinci.

2003

Following the establishment of the 'Zone d'Aménagement Concerté', the local Urban Plan is approved, along with the ZAC implementation report, and the public area transformation agreement is signed.

2004-2005

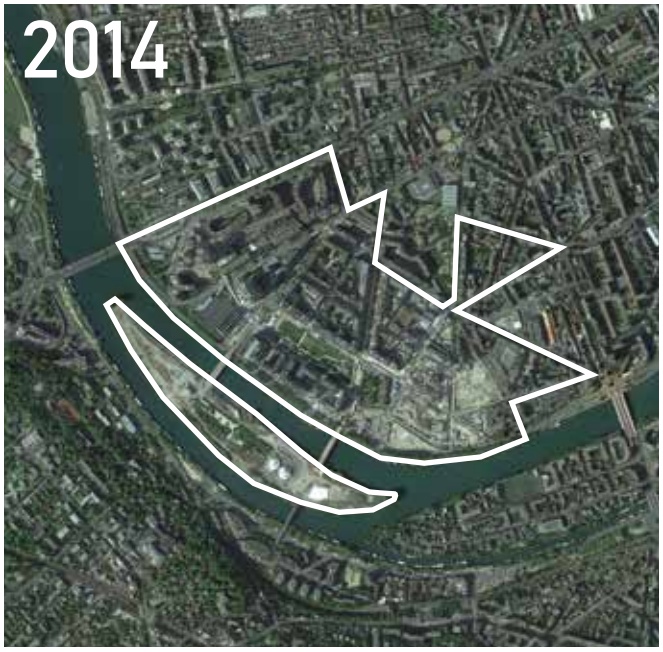
Between 29 March 2014 and 8 March 2015, all the buildings are demolished; at the same time,. The first design contests are launched.

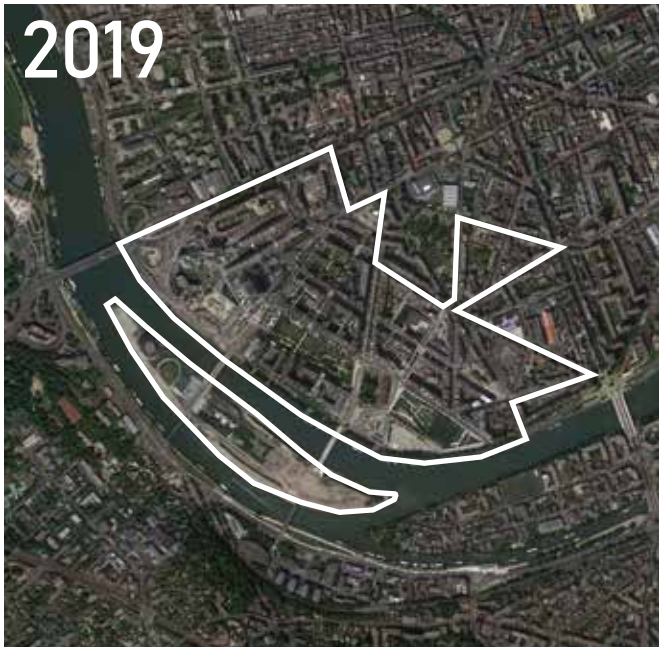
2006

The ZAC Parc du Trapèze redevelopment works start, with the construction of the first residential building and the creation of the park.

2018

The works for the ZAC Parc du Trapèze end: 15,000 residents, 5,000 housing units (including 1/3 social housing), 242.000 sqm of office space, 34,100 sqm of public spaces and 33,600 sqm of commercial activities.





Green infrastructure and public spaces / Along with the blue infrastructure, the green one is spread all over the intervention area, in a very complex and diversified manner. It use a rich variety of environments with exceptional plant and animal biodiversity. In the central park's western section, a permanent water pool - a new wet area inhabited by many aquatic species - has been created. In dry weather, the park green areas are used as public spaces, while in wet weather, they become floodable areas. Compared to the western area and the central natural environments, the park's eastern area is much more enjoyable: it houses a playground and several lawnsfor leisure and relaxation activities. The beaten-earth paths unwind through plant groups and biodiversity oases, enclosed by removable lightweight wooden fences. From the park, the green system develops along the roads and the pedestrian/cycling paths with tree-lined rows, rain gardens and slight depressions containing plants and trees, forming continuous adjoining foliage on the permeable soil. The public and semi-private courtyards of the residential areas are also lined with gardens and permeable surfaces that collect water and progressively transfer it to the rain gardens along the road. Therefore, the green infrastructure is actually connected, and looks like a dense network of green lines and dots that help improve the district's quality and comfort.

Plant species and planting distance / Plant species vary greatly: the recreated natural spaces change their shape, volumes and colours during the seasons. Fast-growing and low-maintenance groundcover plants were used for the bottom layers of planting beds and slopes and in the flowerbeds of the internal courtyards. Green areas comprise perennial weeds, shrubs and deciduous or evergreen trees with different pruning requirements. The biodiversity gardens created throughout the park are environmentally relevant. Thanks to their many species - and flower species in particular – they encourage butterflies, bees, birds and insects back into the city. The green infrastructure is well designed and connected to the districts nearby. The integration of the different green systems determines their functionality in several respects: biodiversity, improved water cycle management, increased urban comfort. The interventions were diversified on road segments, public spaces, interstitial spaces and private courtyards. The urban landform allowed for different tree-planting solutions: they were arranged in single, double and triple continuous rows, in rain gardens, in a large tree-lined square and in the private green courtyards.

At its heart, the district houses the 7-hectare park, a large green area with facilities, connected to the new residential area by a system of sloped gradients and progressive heights, where the entire district's rainwater flows.
Under normal climate conditions, the park offers an accessible green area with a playground and different facilities. In the event of intense rainfall, it is transformed into a progressive accumulation reservoir. Raised paths ensure that people can safely enter and exit the site.
(Photo by E.Farnè)

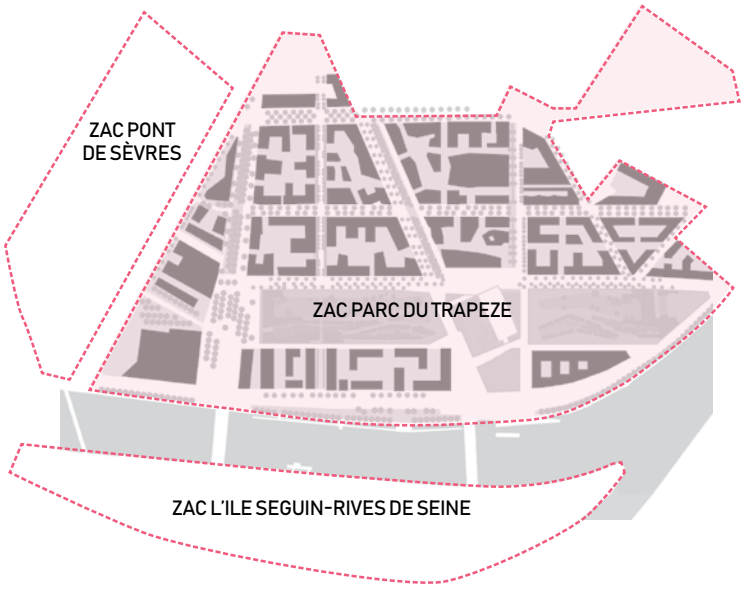
Rainwater management with SUDS and NbS / The large floodable basin - Parc du Trapeze - is flanked by green roofs and small reservoirs in private units, which gradually collect water before it accesses the floodable paths network, based on rainfall event intensity. Furthermore, it includes technical wastewater de-oiling and sedimentation systems; after being treated, water is channelled toward the park sealed basin eastern section.

Phytoremediation and phytopurification / The rain gardens house herbal species that help treat the water coming from roofs, roads and squares.

Soil and bioremediation / Redevelopment of the area has uncovered a large permeable surface, which has promptly been greened. The improving power of certain plant species has helped activate a slow and gradual soil mineralization process.

Maintenance / The park maintenance varies greatly based on the area characteristics and end use. Lawn surfaces are periodically mowed, while plant groups - comprising ground cover plants and herbal plants, shrubs and trees - require minimal maintenance: their free growth lends a naturalistic appearance to the park. In the internal courtyards, the green spaces and roofs are maintained by their owners. It can be assumed that maintenance of the blue infrastructures requires significant naturalistic, landscaping and system expertise.

TRANSFORMATION AREAS AND MASTERPLAN ZAC PARC DU TRAPEZE



BUILT-IN FABRIC

DESIGNED FOR BLOCKS PERMEABLE
TO SOLAR RADIATIONS, CURRENTS AND WINDS,
WITH LARGE PUBLIC SPACES

GREEN INFRASTRUCTURE

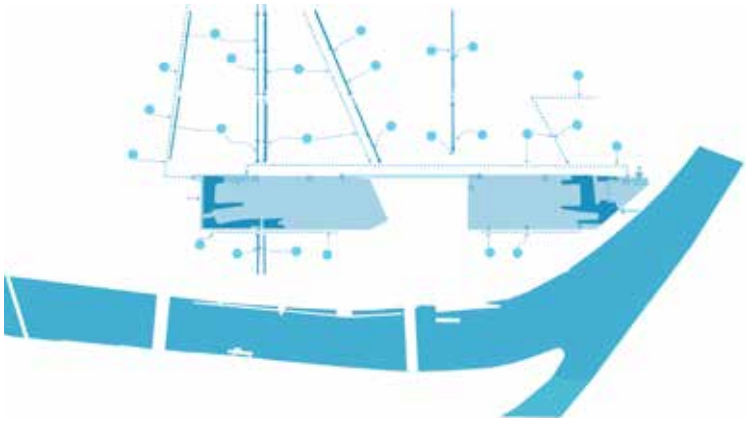
CONNECTION OF THE PUBLIC AND PRIVATE GREEN
PLANT MASSES AND TREE-LINED ROWS
WITH CONTINUOUS AND CONTIGUOUS FOLIAGE
AND VEGETATE PERMEABLE STEMS

- SINGLE CONTINUOUS ROW
- ROW CONTINUOUS DOUBLE
- CONTINUOUS ROWS TRIPLE
- TREE-LINED ROWS ASSOCIATED TO RAIN GARDENS
- PUBLIC PARK
- TREE-LINED SQUARE
- PRIVATE GREEN COURTYARDS

BLUE INFRASTRUCTURE

INTEGRATED WATER COLLECTION SYSTEMS,
HI-TECH SOLUTIONS INTEGRATED WITH NATURE-
BASED SOLUTIONS

- RAINWATER COLLECTION PRIVATE SHORTS
- RAINWATER STORAGE
- WATER DETECTION
- INFILTRATION ZONES
- PERMANENT BASINS
- RAINWATER STORAGE FOR IRRIGATION
- RAINWATER COLLECTION THROUGH FLOODED DITCHES
- RAINWATER COLLECTION THROUGH THE SEWER SYSTEM
- RAINWATER STORAGE AND FILTRATION
- RAINWATER CONNECTION CHANNELLING AMONG THE PUBLIC PARKS



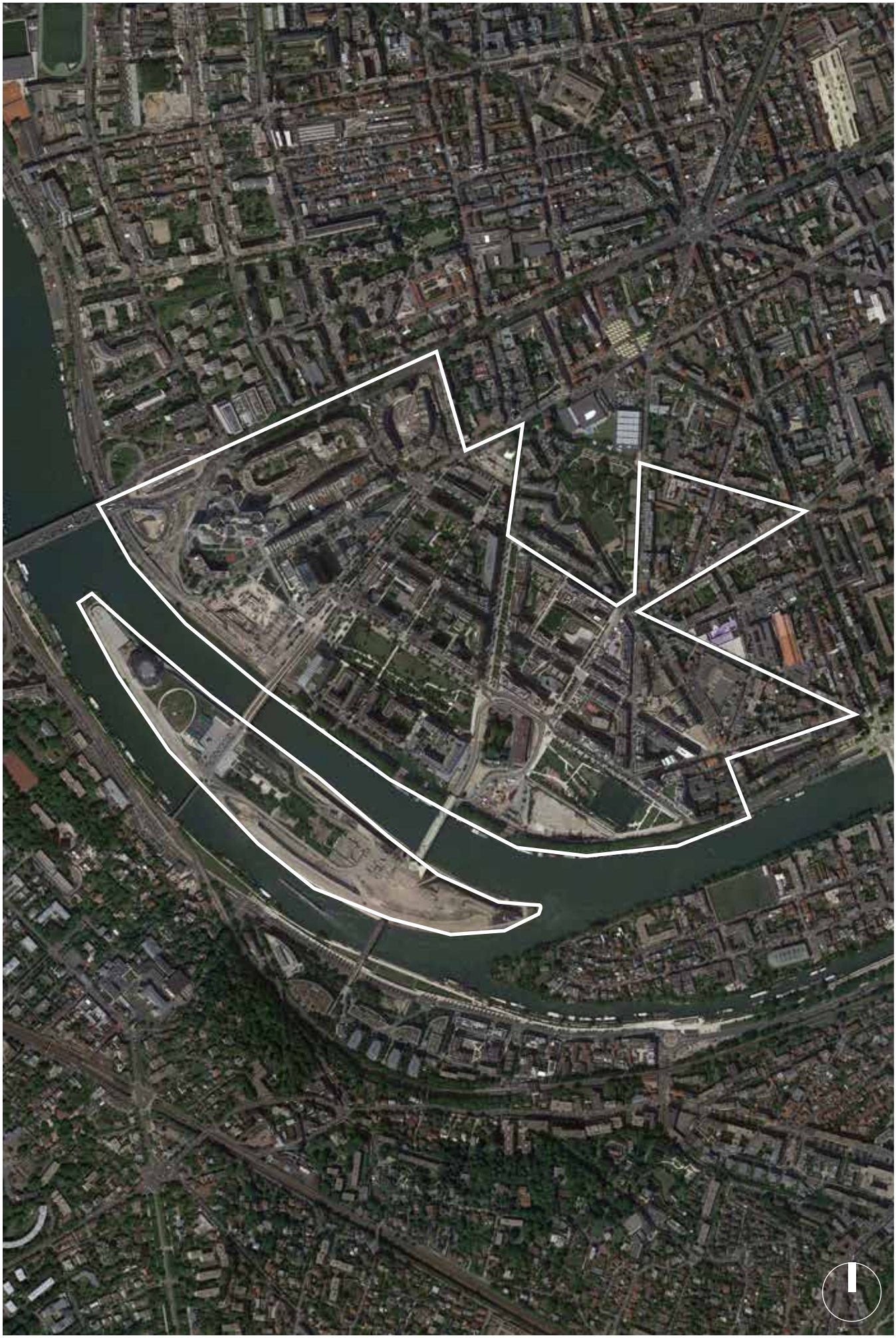
0 100 200 400m

Top. In the rain gardens on the side of the road there are herbaceous species, such as *Schoenoplectus lacustris* (aquatic smooth), *Phragmites australis* (swamp straw), *Iris pseudacorus* (swamp iris), which contribute to the purification treatment of water coming from roofs, cycle and pedestrian roads, parking lots and squares. (Photo by E.Farnè)

Center. Rustic lawns and flowery edges separate the park from the surrounding buildings and provide an oasis for insects, birds and small animals. (Photo by E.Farnè)

Bottom. The blue infrastructure associated with the green infrastructure draws the public spaces of the neighborhood and the landscapes of the park. The whole system of open spaces on the street appears as an extension of the park: alongside streets and pedestrian spaces there are always rain gardens, trees in rows, light vegetated and tree-lined depressions able to naturally pick filter the waters.
The volumes of the vegetate masses are defined by perennial herbaceous, shrubs and trees with different bearings, deciduous or evergreen. Poplars, willows, birches, maples, robinies, black pines, flowering cherries, lagerstroemie are the species present, which combine with each other in the open spaces of the new green infrastructure. (Photo by E.Farnè)

Right. Aerial view.



Top left. Urban greenery on the side of the road. (Photo by E.Farnè)

Bottom. Inside the semi-private public courts of the residential blocks, there are amenities - schools, speakers and clinics - and equipped green areas- gardens and permeable spaces that progressively collect rainwater and gradually yield it to the rain gardens on the side of the road. Light green and tree-lined depressions, at the entrances of the accommodations, are able to naturally pick up filter the waters. The pedestrian entrance paths remain at high altitude to allow access even in case of flooding. (Photo by E.Farnè)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
SAEM Val de Seine (urban transformation society)

PROJECT TYPE
Eco-district

EX ANTE SITUATION
Production area, headquarters of the car industry (RENAULT) founded at the end of the 1800s; divestment since 1992.

EX POST SITUATION
Residential neighborhood with court buildings, functional and social mixité. Homes (1/3 ERS for rent), offices, public facilities, structures dedicated to culture and music, schools, services, commercial activities, park.

WORKS
Conversion of the Parc du Trapeze area (37.5 hectares) with mixed functions such as housing, ERS, public facilities, offices, shops, park, experimental school of science and biodiversity. Conversion of the ile Seguin-Rives de Seine area (11.5 ha) into an international centre for innovation, dedicated to culture; hosts cultural facilities (open to the public since 2010); the construction of the city of music is in the pipeline. Conversion of the residential area of Pont de Sèvres (25 ha), built in the 1970s, has been the subject of urban renewal to redevelop all open public spaces with the provision of new functions and services for the neighborhood. Program: 5,800 dwellings (1/3 ERS housing); 25,000 square meters of commercial activities and 36,400 square meters of public proximity equipment.

SUDS
The neighborhood is designed for adaptation to climate change, through a endowment of tree-lined and permeable public spaces and a large unreliable park. The 7-hectare park - a large equipped green area - is connected to the new town through a system of slope lines and progressive altitudes in which rainwater flows throughout the neighborhood. Water is the element that draws the landscapes of the park: damp spaces, rustic meadows and flooded ditches, small groves, large meadows.
In normal weather conditions the park functions as an accessible green area equipped with games and equipped areas; in case of heavy rains it turns into a progressively filled basin. The routes, at high altitude, guarantee accessibility and mobility in safety. The system of open spaces on the street is designed as an extension of the park: along the streets and pedestrian spaces there are rain gardens; in the public and semi-private courtyards of residential blocks, permeable gardens and spaces collect water and gradually yield them to the rain gardens on the road.
Other aspects of environmental sustainability: high energy efficiency of buildings; water management in a separate triple network; geothermal energy; sustainable mobility; creation of biodiversity zones.

URBAN PLANNING AND DESIGN TOOLS
PLU Municipal Urban Plan; ZAC Zone d'aménagement concertée; It covers an area of 74 hectares which includes the Parc du Trapeze and the Pont de Sèvres interchange district; PLU variant; Design contests.

DESIGNERS
AGENZIA AAUPC - Chavannes & associés architecture urbanisme et paysage: urban and landscape project.
AGENCE TER: project of the park.
Individual buildings designed by different architectural and landscape studios.

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PRESENTATION GENERALE. Ile Seguin Rives de Seine, Boulogne-Billancourt.

INVENTER UNE VILLE DURABLE ET ATTRACTIVE. Le Trapèze / DESIGNING A SUSTAINABLE AND ATTRACTIVE CITY. Le Trapèze. Ile Seguin Rives de Seine, Boulogne-Billancourt

WEBSITES
www.ileseguin-rivesdeseine.fr

www.aaupc.fr

www.agenceter.com

SITE
Boulogne-Billancourt, Île-de-France, France

POPULATION
117,100 inhabitants

DIMENSIONS
75 hectares

PERMEABLE AREAS
0 he before
42 he after

INVESTMENTS
39M € public spaces
13M € park

A8

CLICHY-BATIGNOLLES ANDMARTIN LUTHER KING PARK / PARIS - FR

from former railway station to resilient district for climate change adaptation

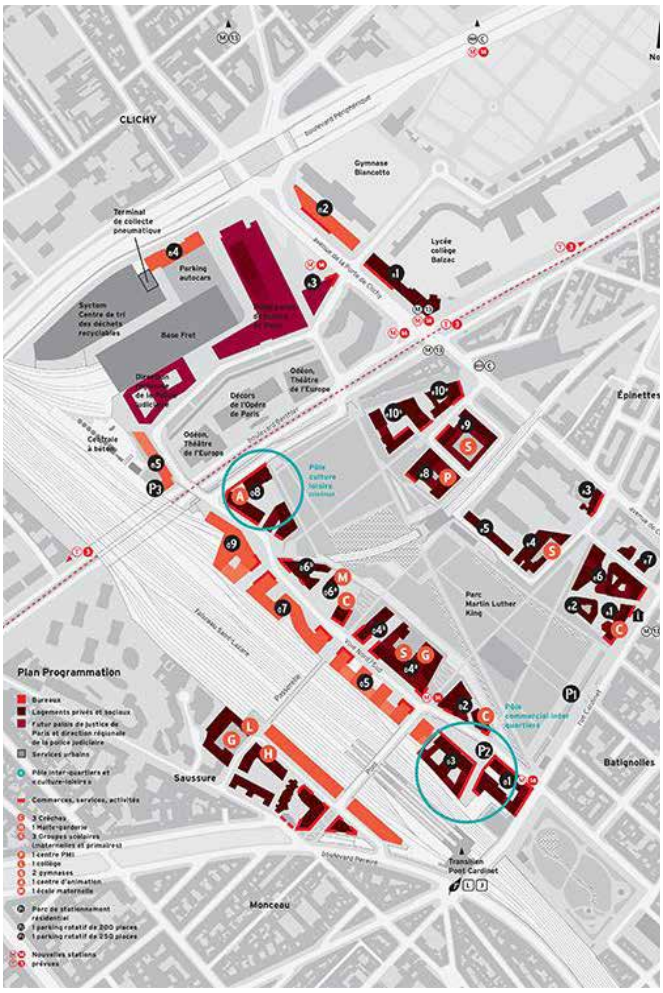
The Clichy-Batignolles area is located north-west of Paris, in the 17th arrondissement, between the Défense district and the Plaine Saint-Denis economic district, and the Plain Monceau Ternes and Batignolles districts.
The redevelopment was carried out on a 50-hectare area, with approx. 12 hectares of new permeable surface. The district is crossed by three railways, a ring road and many avenues and roads. The Saint-Lazare station - the third largest European station in passenger volume - is located along its borders.
Clichy-Batignolles urbanization started in the 19th Century, with the development of the first railway in Paris, and of the Saint-Lazare (passenger trains) and Batignolles (freight and convoy maintenance) stations. After the 1970s, the area underwent a slow and gradual decline, due to the under-utilization of many of its sections. In 2000, former Paris Mayor, Bertrand Delanoë, started an ambitious urban recovery and redevelopment project with mixed functions (residential + third sector), in partnership with the railway transport companies that owned the areas: the SNCF (Société Nationale des Chemins de fer Français) and the RFF (Réseau Ferré de France).

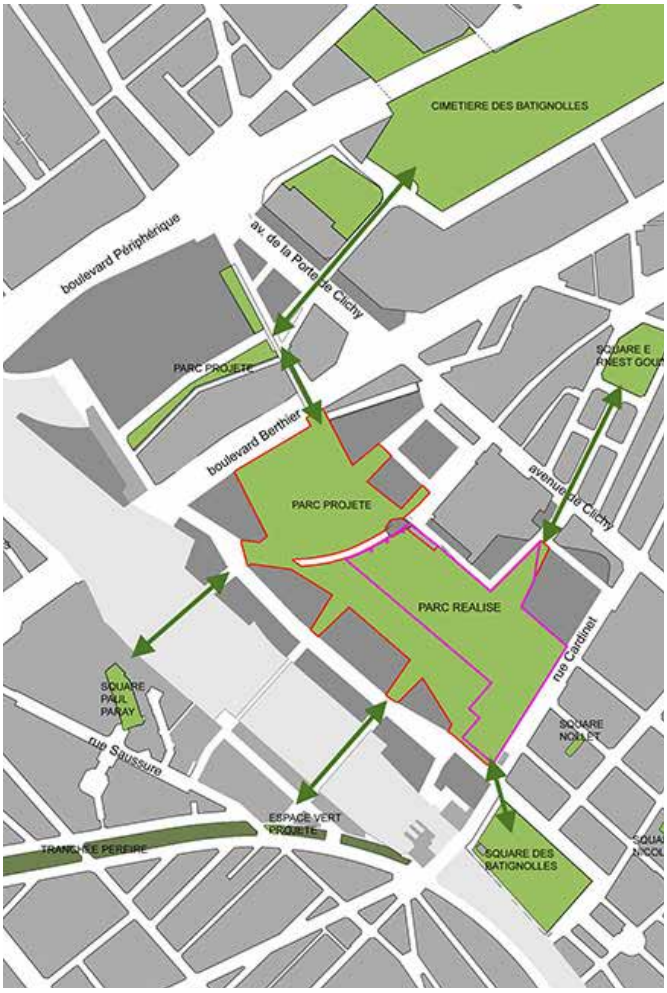
A SUSTAINABLE NEIGHBOURHOOD FOR CLIMATE ADAPTATION

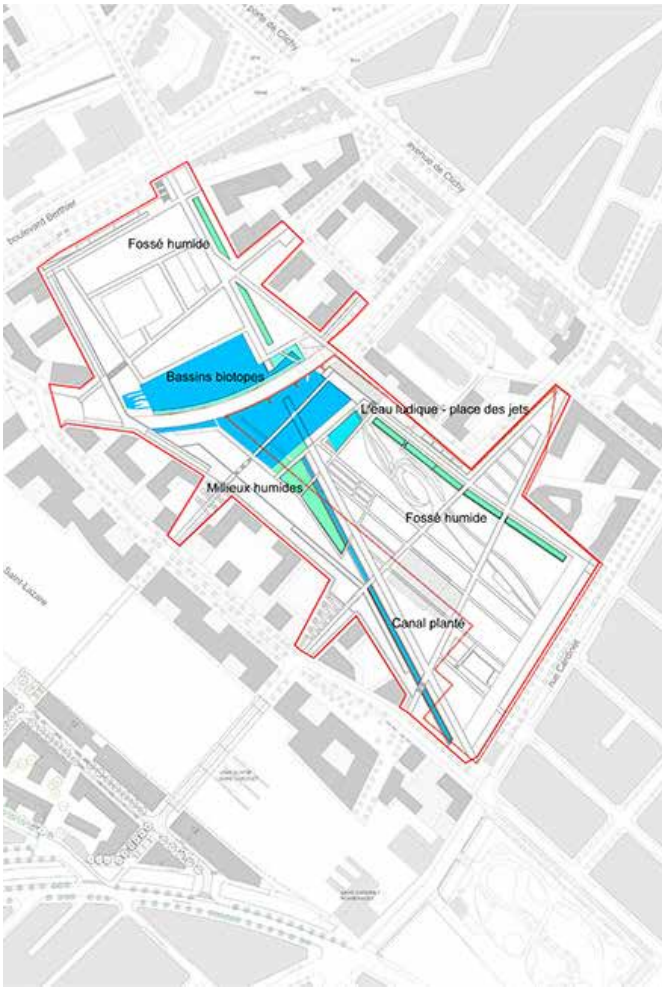
The redevelopment plan is based on sustainable development and climate change contrast principles, with particular attention to biodiversity, energy and water management. The purpose is creating an ecodistrict, an exemplary model of urban redevelopment, by reintroducing a strong natural and biodiverse component, ensured by the presence of trees, water bodies and permeable spaces, to tackle intense climate events, such as heat waves in the summer and intense rainfall.
The energy required to heat the buildings and hot water is mainly obtained from geothermal sources and from photovoltaic systems (solar roofs on the new buildings). For passive buildings, the plan sets forth limiting provisions on the use of non-recyclable materials, in favour of natural and eco-friendly materials.
The core of the Clichy-Batignolles project is the new great Martin Luther King Park, designed by landscape designer Jaqueline Osty. The green area extends for 10 ha, surrounded by the new residential buildings and the new Court of Paris, and is crossed by pedestrian paths and spaces. This area, once secluded by railway stations, has now become one of the largest and most important urban parks in the west of Paris, along with Monceau Park (8 ha) and André Citroën Park (13 ha). New roads have been included only at the edge of the park, and have smaller dimensions (12% of the surface) to reduce vehicle pressure and limit sealed surfaces. Inside the park, there are many longitudinal and diagonal crossing paths, to promote the maximum level of movement in all directions and access to playgrounds and rest areas.

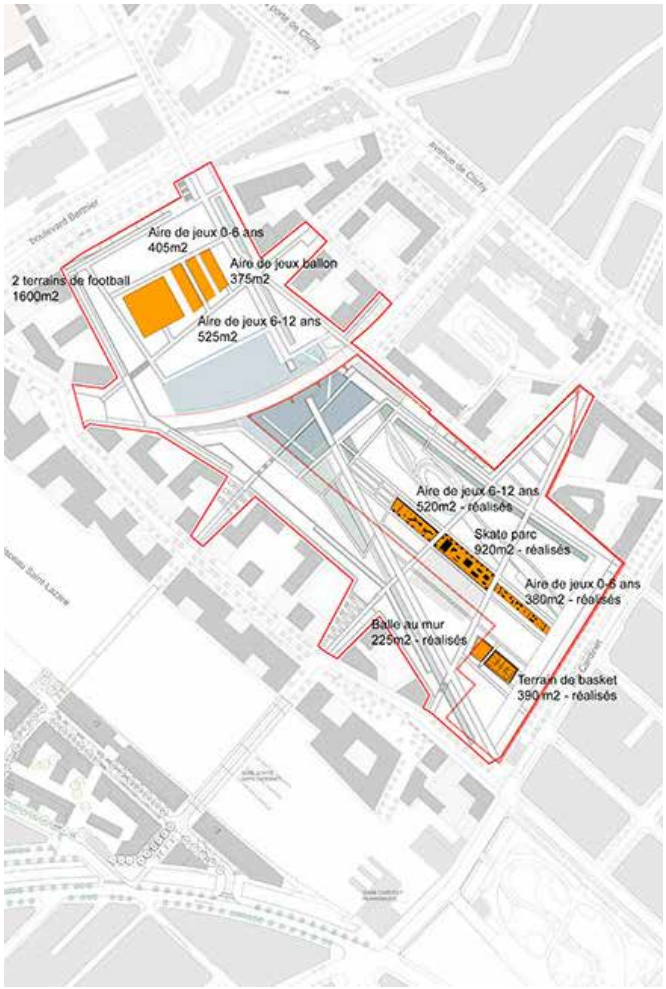
Park vegetation is divided between the different intervention areas, according to the relevant theme, and includes low-maintenance species - especially on the large lawn surfaces maintained by gradual mowing, which alternate big flowery meadows with grass-covered paths.
(Photo by Martin Ar)

Right down. Flooded moat inside the park.
Overall, such resilient rainwater management contributes to the creation of a cooler and more comfortable microclimate, promoting the release of water vapor into the atmosphere.
(Photo by E.Farnè)


CLICHY
Gymnase Biancotto
Lycée collège Balzac
Parking autocars
Base Fret
Décors de l'Opéra de Paris
Odéon, Théâtre de l'Europe
Épinettes
Parc Martin Luther King
Saussure
Batignolles
Monceau
Plan Programmation
Bureaux
Logements privés et sociaux
Futur palais de justice de Paris et direction régionale de la police judiciaire
Services urbains
Pôle inter-quartiers et culture-loisirs
Commerces, services, activités
3 Crèches
1 Halte-garderie
3 Groupes scolaires (maternelles et primaires)
1 centre PMI
1 collège
2 gymnases
1 centre d'animation
1 école maternelle
Parc de stationnement résidentiel
1 parking rotatif de 200 places
1 parking rotatif de 250 places
Nouvelles stations prévues


CIMETIERE DES BATIGNOLLES
boulevard Périphérique
av. de la Porte de Clichy
PARC PROJETE
boulevard Berthier
PARC PROJETE
avenue de Clichy
PARC REALISE
rue Cardinet
SQUARE PAUL PARAY
rue Saussure
ESPACE VERT PROJETE
TRANCHEE PEREIRE
SQUARE DES BATIGNOLLES
SQUARE NOLLET


Fossé humide
Bassins biotopes
L'eau ludique - place des jets
Milieux humides
Fossé humide
Canal planté


Aire de jeux 0-6 ans
405m2
2 terrains de football
1600m2
Aire de jeux ballon
375m2
Aire de jeux 6-12 ans
525m2
Aire de jeux 6-12 ans
520m2 - réalisés
Skate parc
920m2 - réalisés
Aire de jeux 0-6 ans
380m2 - réalisés
Balle au mur
225m2 - réalisés
Terrain de basket
390m2 - réalisés

On the next page, in the upper left. Buildings construction in different phases.

On the next page, in the upper right. The green project: Martin Luther King Park, gardens and tree-lined avenues.

On the next page, lower left. Water regulation diagram. In order to promote correct water management and supply to irrigate the green and Park areas, the soil system is formed with canals and swales to collect rainwater, creating an irrigation reservoir and preventing its discharge into the sewage system. In practice, the water recovered ensures 50% of the water requirements.

On the next page, lower right. Leisure equipment position.

(Drawings by Atelier Jacqueline Osty)

For the City of Paris, the interventions on the Clichy-Batignolles area are also a pilot experimentation of the 'Urban Biodiversity Plan'. Indeed, Martin Luther King Park, lush with fauna and flora, is developed around a swale and a pond (biotope) that collect rainwater, but it is also part of the urban green infrastructure comprising the other parks, squares and green areas around it, the Montmartre and Clichy graveyards and the green roofs of the new buildings. This system of green spaces and connections promotes urban biodiversity.
The park - designed as a place of social gathering - is full of leisure time and urban sports equipment, fountains and water features, included to enhance the well-being of its visitors and mitigate summer heat.

STEP-BY-STEP IMPLEMENTATION PROCESS

The urban redevelopment project for the former railway station has been divided in different phases, over a 15-year period. Half the park (4.3 ha) has been created in the first phase.
Works are still in progress, and they should be completed in 2020.
The study to transform the area starts in 2001, and between 2005 and 2007:

- the project team is selected through an architectural contest;
- an agreement between the Government, the City of Paris, SNCF and RFF is signed, to transfer the properties and reorganize the railway activities.
- the ZAC ((Zone d'Aménagement Concerté) are created;
- the first part of the park is delivered.

The affected area spreads over 54 hectares; its transformation has been conceived in an integrated way by the project team, by substantially implementing it in two ZAC - Cardinet Chalabre and Clichy-Batignolles - plus the Secteur Saussure parcelling plan.
The project has been implemented gradually, including the creation of the green-blue infrastructure, before building the real-estate section, or in parallel with it. From an operational standpoint, the Clichy-Batignolles ecodistrict buildings have been divided in five sectors: the Central sector, with Martin Luther King Park, the sector East of the Park, along Avenue de Clichy; the West sector, along the railway, North of Boulevard Berthier, around the Porte de Clichy, and Ilot Saussure, beyond the railway. A great quantity of buildings will be constructed in these districts, making a total of 6,900 new residential units, public functions (new Court) and public transportation infrastructures.
Construction of Martin Luther King Park - by the City of Paris, owner of the area - entails three stages:

- the first stage, completed in 2007, with 4.3 hectares delivered;
- the second stage, started in September 2012, with the creation and delivery of further 2.5 ha, completed in April 2014;
- the third and last state, in progress.

The real-estate and subway construction will be completed by the end of 2020.

until 1860

Batignolles is an independent village on the outskirts of Paris until 1860, when Emperor Napoleon III annexed it to the capital.

'900

The vibrant social and cultural life of Batignolles and Saint-Lazare station are often portrayed in paintings by Édouard Manet and his group of painter friends, known as the "Batignolles group".

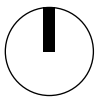
The railway has a major effect on the Victorian city: it is responsible for urban densification, determines the pace and size of growth and influences the housing market.

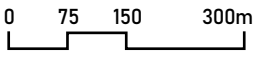
1970s

Batignolles railway station, built in the north-west of the city on the first French railway line, falls into disuse and is gradually abandoned.

2001

Socialist Mayor Bertrand Delanoë envisages the conversion of the 50 ha of railway station to the Olympic village, in anticipation of the city's candidacy for the Olympic Games of the 2012.





Aerial photos and timetable of the district transformation.
It can be noted that the park was completed before the completion of the buildings due to the rain regination function that the park performs for the hydraulic safety of the entire neighborhood.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND URBAN RAINWATER SUSTAINABLE MANAGEMENT

Blue infrastructure / The Martin Luther King Park is the central element of the blue infrastructure: it houses a large 'biotope basin', interconnected with the network of canals and swales developed inside the Park, through an interesting pumping system powered by a wind turbine that gives it a unique appearance.
Thanks to the Park and the many green areas, only 50% of rainwater quantity is discharged into the sewage system. The Park houses floodable areas that solve the district's internal and external flooding issues, according to sustainable and water reuse principles (water stored in reservoirs for irrigation purposes). In dry times, green areas are completely accessible, while in case of rainfall events, they become true *noue paysagère*, e.g. depressed and floodable 'valley channels', crossed by safe and raised footbridges.

Blue infrastructure construction aspects / Approx. 30% of the building covers feature green roofs to collect water and limit its run-off. The other roofs feature photovoltaic systems that help power the district.
The Park was one of the priority interventions to be implemented during the first phase. Right from the start, rainwater has been partially collected in tanks, filtered and stored in an underground 900 cubic meter reservoir. Through a pumping system with wind turbine, the 'biotope' has been fed by channelling water into the permanently wet basin, and thus covering 40% of the park irrigation needs.
In private areas, the water collected is used to irrigate green spaces, wash the floors and in the internal wastewater network; only excess quantities are discharged into the sewage system.

2002

The Municipality commissioned to Atelier Parisien d'Urbanisme a study for the development of the area. The project guidelines are collected in a municipal resolution that sets out the objectives.

2005

The design group formed by urban planner François Grether, landscape designer Jacqueline Osty and engineering firm OGI wins the competition for the transformation of the area.

2007

The first phase of work ends and inaugurates the first portion of martin luther king park (4.3 ha), which quickly establishes itself as a powerful center of public life in neighboring neighborhoods.

2020

The works are scheduled to be completed: the green project includes a park of 10 hectares, in addition to 6,500 square meters of private greenery and 16,000 square meters of green roofs.

Green infrastructure and public spaces / Martin Luther King Park is located in the middle of the Clichy-Batignolles area, and has been designed as a space to connect and link together districts and urban fabrics that were once separated, and which now are integrated and revolving around it. The buildings are only on the edges; fences are transparent or partially covered by small shrubs; the many pedestrian accesses and paths create direct connections to the districts nearby.
A series of linear green areas stem from the central park toward the entire area, integrating into the buildings, between the urban fabric islands. Aside from the Park, there are over 6,500 private green spaces and 16,000 sqm of newly-built green roofs. The Park project was developed along three topics: seasons, water and outdoor activities. A wide range of environments and habitat has been created, promoting the development of a rich animal and plant biodiversity. Wet areas - comprising swales and the biotope bond - perform a dual function: noue paysagere, rainwater reservoirs in the wet period, and refreshing resources in the hot continental summers. Flowery meadows, lawns maintained with progressive cutting, and tree-lined areas become oasis for insects, birds and small animals, picture-worthy scenarios in the spring and in autumn, open spaces for the residents' leisure and relaxing activities.

Plant species and planting distance / The plants were selected based on a careful analysis of plant cover from a regional flower, plant and landscaping standpoint. Pioneer species and coenoses were planted on the new permeable soils, to promote the development and establishment of the following typical species. The backbone of the green project was certain structural trees, such as willows, maples and ashes, lined in rows along the pedestrian paths. Significant is also the use of mid-high plants, such as shrubs, grass and perennial herbaceous plants, which create secluded and protected environments. Open spaces are full of colours, hues and tones, with cherry trees and bulbs. Groundcover plants play a significant role too, covering the lower flowerbed layers. Pedestrian paths include deciduous trees in rows 4 m apart, so as to create continuous shadowed areas; near some uneven areas, colourful tree patches were recreated, with several species of *prunus*. Herbaceous and bulb species are widespread in the Park, because they perform several functions: aesthetic, shielding, colour, phytopurification along the swale and the biotope, and sheltering for animal species.

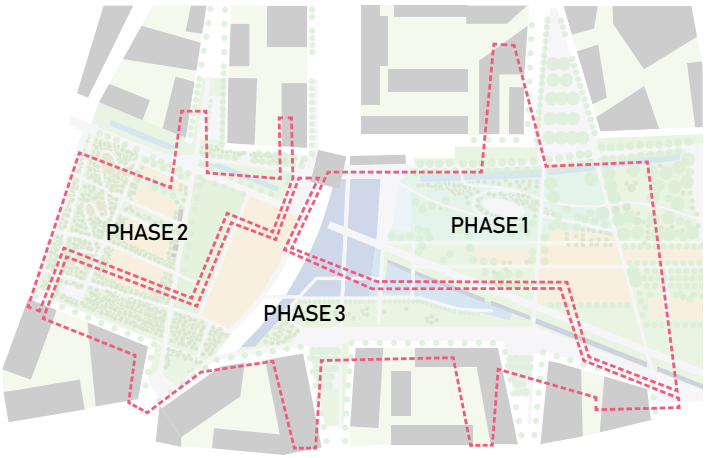
Rainwater management with SUDS and NbS / The project entails several Nature-Based-Solutions; in particular, tree rows and plants to generate a forest effect. Trees with different shapes have been planted to give continuity to the green infrastructure. Swales and floodable basins (blue infrastructure) are connected to the green roofs and small reservoirs in private areas, creating a capillary network of floodable areas, based on rainfall event intensity. Especially for the houses nearby, the Park helps regulate summer heat, like a giant urban 'air conditioning unit', thanks to tree shade, plant evapotranspiration, and the air-cooling wet areas.

Phytoremediation and phytopurification / Phytopurification processes are triggered by special plant species, such as willows, poplars, and reed thickets in the biotope pond and along the swales.

Soil and bioremediation / Depaving interventions helped increase the permeable surface and partial restoration of the soil function as a water filter; however, the presence of gypsum in the subsoil (a lithoid material typical of this area) posed some difficulties to natural water infiltration into the soil.
In new permeable surfaces, different herbaceous, shrub and tree species are key to remineralize the soil and increase organic matter.

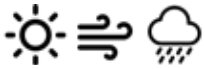
Maintenance / Park maintenance differs, based on the different environments: in large lawn surfaces, gradual mowing is performed, as well as in flowery meadows; shrubs areas are often left to grow freely; plant protection products are not employed, and mechanical maintenance is limited. Maintenance of the blue infrastructures requires both naturalistic/landscaping and system expertise. 50% of irrigation requirements are ensured by the rainwater collected and treated in the ecodistrict complex water system.

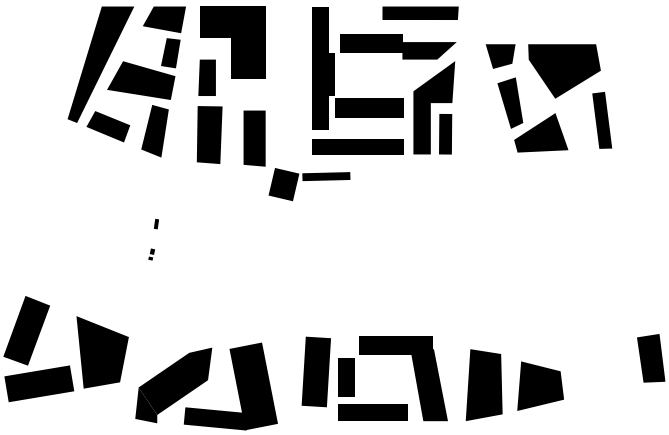
TRANSFORMATION AREAS AND MASTERPLAN CLICHY-BATIGNOLLES



BUILT-UP FABRIC

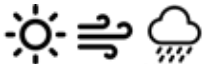
COURTYARDS WITH PRIVATE AREAS PERMEABLE TO SOLAR RADIATION, WINDS CURRENTS AND WITH LARGE SEMI-PUBLIC SPACES





GREEN INFRASTRUCTURE

PUBLIC AND SEMI-PRIVATE GREEN CONNECTION, TREE ROWS WITH CONTINUOUS CANOPIES, PERMEABLE SOIL AND RAIN GARDENS



- TREES
- GREEN MASSES
- PRIVATE COURTYARDS WITH RUSTIC LAWNS
- MOWING MEADOWS
- RUSTIC LAWNS AND FLOWER MEADOWS
- AREAS EQUIPPED FOR LEISURE AND SPORT
- PATHS

BLUE INFRASTRUCTURE

INTEGRATED WATER COLLECTION SYSTEMS, HI-TECH SOLUTIONS INTEGRATED WITH NATURE-BASED SOLUTIONS

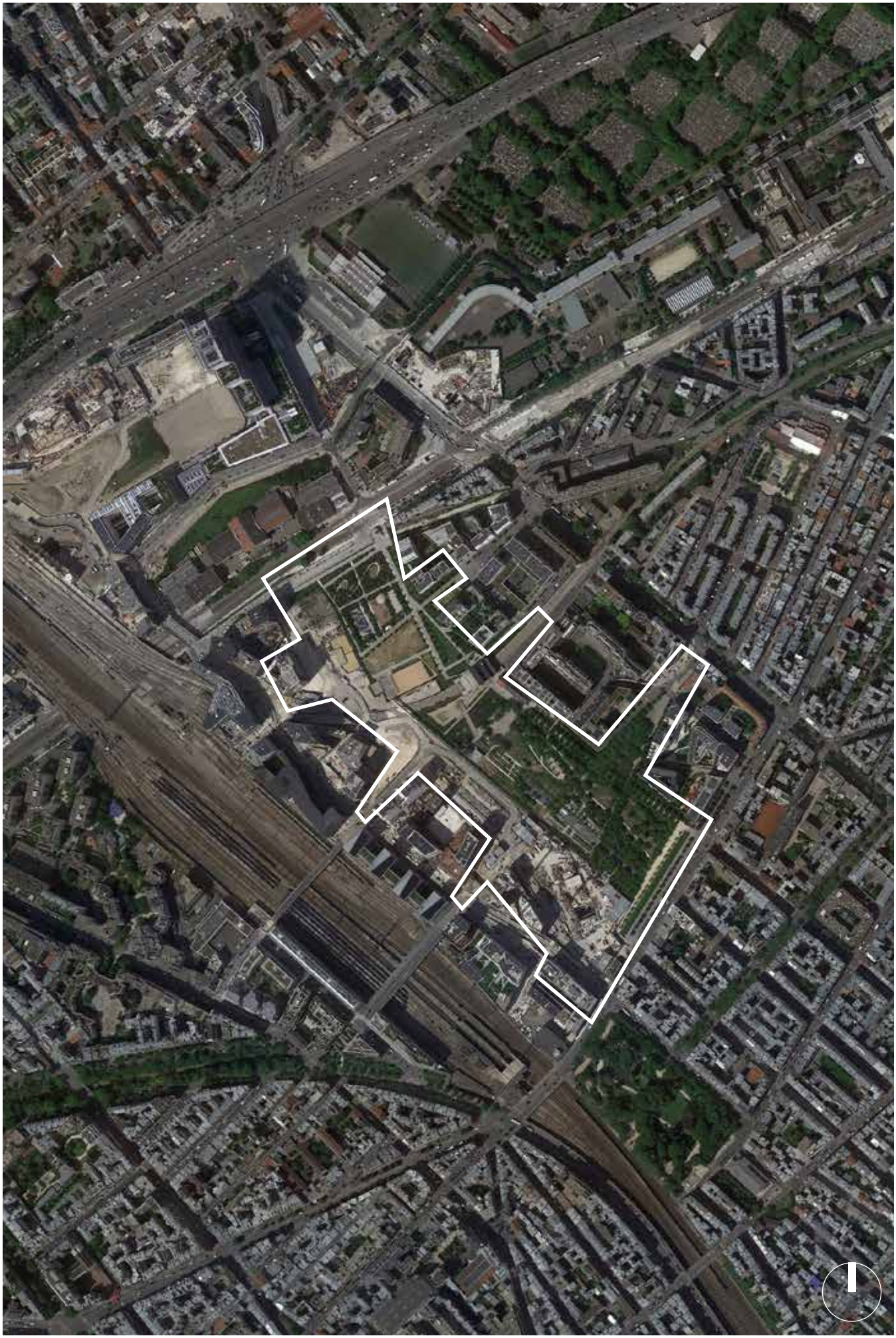
- BIOTOPE BASIN
- SWALES
- CANAL
- SQUARES WITH SPRAYING FOUNTAINS

0 50 100 200m

Top: the park alternates wooded areas with dense vegetation and shaded paths, to spaces equipped for play and leisure, to more natural routes between rustic and flowery meadows. In the 'biotope' rainwater is collected through accumulation basins, stored in an underground tank of 900m, and progressively filtered by a 'biotope' basin of 3,000sqm for the natural treatment of water and the aquatic ecosystem. The basin is permanently humidified by the hydraulic system powered by a wind turbine.
(Photo by E.Farnè)

Bottom. The wind turbine that feeds the 'biotope' basin, pumping the water stored in the subterran accumlo tanks.
(Photo by E.Farnè)

Right. Aerial view.



Flowery meadows gradually mowed which become an oasis for insects, birds and small animals, and offer picture-worthy scenarios during the spring blooming.
The Park areas are developed by interpreting the seasons: the plant palette chosen for the green areas of the first section delivered (south) is inspired by spring, while the central part around the Petite Ceinture and the biotope basin by summer; the species of the new northern areas (about to be opened) are autumn and winter plants.
Mid-high plants, shrubs, grass and perennial herbaceous plants are used to create secluded and protected environments, and to hide the fence.
Even materials have been selected for the paths, arranged hierarchically near residential or functional urban areas; the constant use of stabilized soil in the natural areas, or concrete in playgrounds, helps limit summer heat and facilitates any future maintenance.
(Photos by E.Farnè)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
DEVE (Direction des Espaces Verts et de l'Environnement)

PROJECT TYPE
Eco-district

EX ANTE SITUATION
Scalo ferroviario: area attraversata da tre linee ferroviarie e importanti infrastrutture per la mobilità (tangenziale, strade).

EX POST SITUATION
Complex urban regeneration area

WORKS
Functional mix with residences, tertiary, services, commercial activities and large urban park of 10 hectares.

SUDS
At the heart of urban regeneration is the park, which develops around a wet ditch and a pond (biotope) where rainwater flows.
The stems are modeled through channels and ditches to recover and recycle rainwater (storage tank for irrigation of green areas and the park); collection to the sewer system only in exceptional cases. The recovered water guarantees 50% of water needs.
The park is part of a system - an urban green infrastructure - made up of green, continuous and contiguous spaces and connections, which favors climate mitigation and the maintenance of urban biodiversity.

OTHER ASPECTS OF ENVIRONMENTAL SUSTAINABILITY
There is a large endowment of solar systems on new buildings.
The energy produced by a wind turbine is able to favor the recirculation of water within the network of the park's canals.
Requirements have been laid down for building materials, with the aim of saving exhaustible resources, mainly using recyclable materials and products with renewable sources.
Some materials have been banned (e.g. PVC), while others have required special certifications (e.g. for paints, wall coverings or carpets).

DESIGNERS
François Grether with Concepto and Ogi Ingegneria: urban project.
Atelier Jacqueline Osty Landscape: landscape project.

BIBLIOGRAPHICAL SOURCES
Clichy-Batignolles. L'éco-quartier, une référence de développement urbain durable à paris. Dossier de presse (Octobre 2015).

WEBSITES
www.clichy-batignolles.fr

SITE
Clichy-Batignolles, Paris, France

POPULATION
2,230 k inhabitants

DIMENSIONS
50 hectares

PERMEABLE AREAS
0.5 he before
12 he after

INVESTMENTS
14.9M € phase 1
30.8M € phase 2

B

urban parks

B11 PROMENADE DU PAILLON,
LA COULEE VERT /
NICE - FR
a linear urban park along the sealed
Paillon river

B14 ALTER FLUGPLATZ KALBACH
PERIURBAN PARK,
FRANKFURT AM MAIN - DE
from former military helipor
to evolving ecological park

B15 GLEISDREIECK PARK /
BERLIN – DE
from disused railway area
to equipped urban forest

B18 KILLSBERG PARK /
STUTTGART -DE
from brownfield to urban park

B11

PROMENADE DU PAILLON, LA COULEE VERT / NICE - FR

a linear urban park along the sealed Paillon river

The Promenade du Paillon is located in the historic centre of Nice, between the National Theatre and the sea. The park was created by the decommissioning of the old bus station and a parking area to bring back a large green lung in the heart of the city.
The park project covers a large linear area, almost 1.5 km long and about 100 m wide for an area of more than 12 hectares. The site was created by demolishing some buildings and recovering several spaces, which, between the 1970s and 1990s, had been built on the old riverbed, the Paillon.

The big pond in the middle of the park. The large scenic pond consists of a thin layer of water, just 2 cm deep, animated by 128 nozzles and lights. The complex system of fountains alternates splashes and sprays in a continuous cycle, even in the evening at dark, drawing children, visitors and tourists who walk and play in the park, especially during the summer, to find relief from the heat. All the structures and systems of the fountains recycle water through the creation of storage tanks. To facilitate and limit maintenance, the fountains have been provided with sand filters and a water treatment system with softener, controlled delivery of disinfectant and pH adjustment.
(Foto di Péna Paysages)

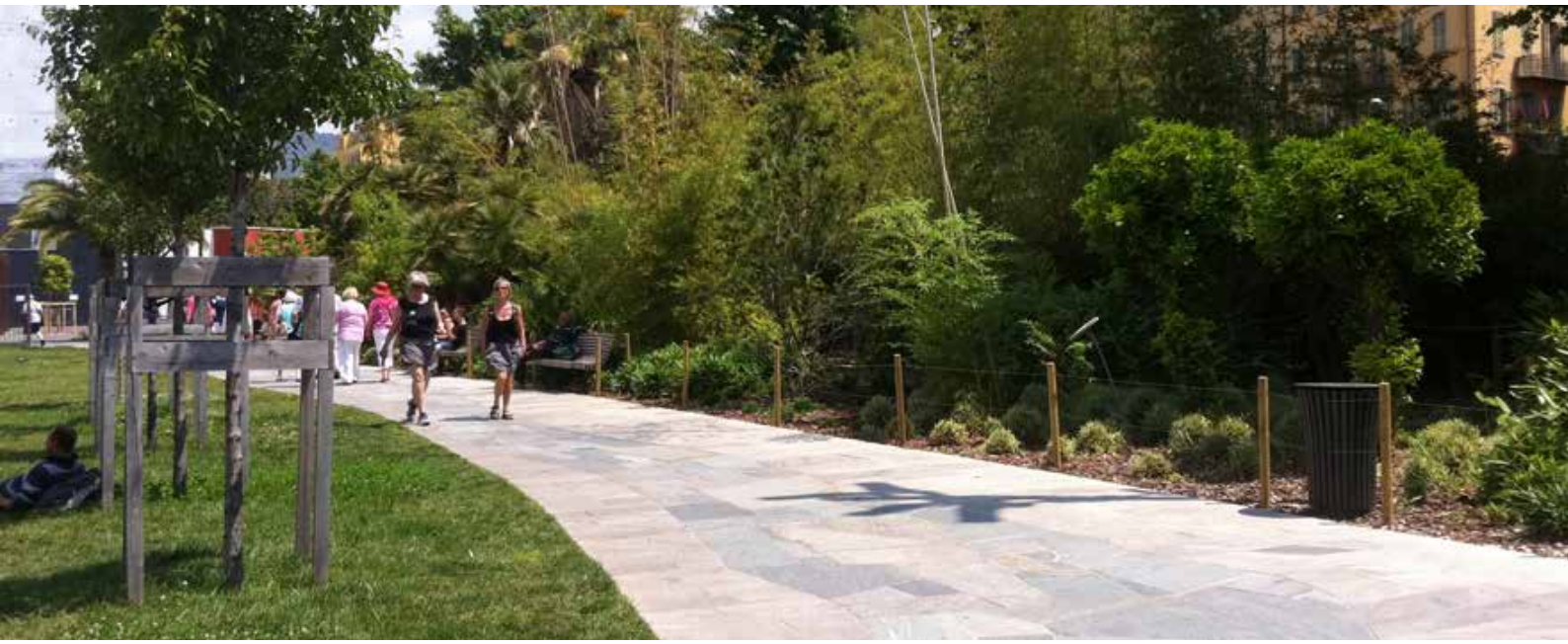
Bottom right. The network of mineral paths that make up the walk outline the edges of the vegetation evoking the flow of the forgotten river. The mineral materials are differentiated by shapes and colours according to the context and functions, guiding those who walk toward the services outside the park.
(Photo by E.Farnè)

PUBLIC SPACE REDEVELOPMENT

The construction of the park required considerable resources for the demolition of the buildings, the disposal of asbestos used in the old structures and a strong political will: the works involved one of the central areas of Nice, located between the famous Promenade des Anglais and the National Theatre, and has had a significant impact on the urban road network during the various construction phases.
The landscape project and the quality of the park have consolidated the city's green vocation and its image has become a tourist attraction capable of drawing about 15 thousand visitors a day.
The idea behind the large urban park project was to bring nature back to the city, restoring and recovering the geography of the river, albeit in a 'tamed' form due to the dense historical context and the great monumental value. The park has thus returned a large green space that was missing to the city, creating a sequence of differentiated public spaces capable of connecting the main historical monuments that are all reachable on foot, for more than a mile's walk.
From a functional point of view, the park is divided into three macro areas: the part towards the sea, between the Promenade des Anglais and Massena Square, features the Mediterranean garden, a large space for events and outdoor concerts; the central part of the park, the one most closely connected to the old city and the monumental buildings, has large mirrors of water; the part towards the museum and the theatre has all the play and recreational spaces for families and children, all made specifically with wood sculptures of Mediterranean marine animals.

PROCESS

contract throughout the river valley. In developing the urban transformation project, there was a broad debate and a complex project was developed to rethink public mobility together and to enhance the city centre for the creation of the large public park and the construction of a tramway.
The park project, commissioned by Métropole Nice Côte d'Azur, was awarded to an interdisciplinary team formed by the Atelier Péna Paysages - for the landscape and agronomic aspects - with the advice of ZEKTON Hydraudesign - for the hydraulic aspect and the systems of the large fountains - and the Atelier Coup d'Eclat for the lighting design



Top. Aerial view of the central part of the park. (Photo by Ville de Nice)

Right. Project masterplan. The park during the construction phase and at the end of the works. (Photos by Péna Paysages)

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / The park is located on the old site of the river Paillon, which was sealed in the middle of the 19th century. The photos of the site show how the excavations freed some areas up to the soil, while others - at the cover - were left waterproof. The draining and infiltrating surfaces - where present - together with the storage tanks for irrigation purposes and fountains, contribute to improving the permeability and hydraulic invariance conditions of the area.

Construction aspects of the blue infrastructure / The large water square in the middle of the park is the project's most distinctive element. Conceived to recollect the riverbed, the square is formed by a thin layer of water of about 2 cm and animated by 128 nozzles that favours recreation and comfort of people in the summer months. All fountains use recycled water, stored in tanks filled with raw water. To facilitate maintenance and limit water consumption, the fountains are provided with sand filters and treatment systems with softeners, disinfection and pH adjustment to eliminate risks to people.
The surface waterbody has gutter openings for filling and emptying, and a channel along the perimeter to recover any excess water, as well as contributions from rainwater.
Atomisation is obtained by the dispersion of non-recycled drinking water.
The hydraulic systems and fountains built in the public spaces of the linear park are closely linked to the lighting design, which blends with the water jets enhancing the usability and attractiveness of the park even in the evening.
Finally, the routes have a slight slope towards the green spaces: this way, there is no return to the sewer system, but to the ground.

Green infrastructure and public spaces / The park has a linear shape and stretches continuously for over 1 km, from the centre to the sea. The park is flanked by a tramway and crossed by several roads, where the speed limit is slowed down to ensure the safety of people and favour the flow of pedestrians along the promenade.
The green infrastructure consists of a central strip, either lawn or equipped, and two strips of trees and vegetation, along the board. These vegetated strips were conceived as a sequence of themed gardens, in which colours, shapes and scents change with the seasons. A few dozen metres away, we pass from a small bamboo forest, which can be crossed, through a rock garden made up mainly of grasses, to an ornamental and colourful garden made up of roses and flowering shrubs. In the central part of the park, the surfaces are more open and more user-friendly: an area characterised by a complex system of fountains and water jets, play areas with entertainment paths for children and meadows.

1867

The river Paillon begins to be progressively drained to protect the city from sudden and mostly uncontrollable flooding. On the surface there are squares and gardens, streets and parking areas.

1973

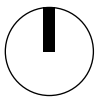
Construction of the Gare Routièr - bus station, with attached parking area for 485 vehicles.
The covering of the Paillon is completed as far as the Palais des Expositions.

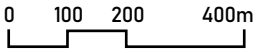
2000

The idea of Coulée Verte was born as a project that aims to create a public space to enhance the attractiveness of the neighbourhood as well as economic and social cohesion.
The bus station will be demolished and replaced by two multimodal hubs in Saint Augustin and Saint Jean d'Angély.

2009

An information phase and public consultation precedes the publication of the competition for the design of public spaces.





Aerial photos and district transformation schedule.

Plant species and planting distance / Thanks to the mild climate of the Riviera, the Promenade du Paillon has been conceived as a botanical walk among more than 170 species from around the world, from North Africa, Europe, South America and Asia. Many species typical of the Mediterranean maquis have been used, such as palms, various citrus fruits and olive trees, as well as aromatic plants, bay trees, strawberry trees, mock privet and exotic species from North Africa, South America and Asia. These typical Mediterranean species are combined in some cases with more rustic species, such as willows and locust trees, and in others with more ornamental species, such as the helichrysum, sedum, gaura, and agave. The arboreal species include many palms, domestic pines, oranges, olive trees, holm oaks, and willows.
The different plant species are associated and constitute a rich heritage of biodiversity for the flora and fauna in the heart of the city.
The park has different tree systems. In the Mediterranean garden, the planting of the trees is regular, creating a uniform vegetated mass and a well-shaded area in summer. The vegetated strips at the edges are compact and designed to protect the interior of the park from dust and noise from the streets running alongside the park.

Soil and bioremediation / The demolition of the buildings, and desealing and recovery of several open spaces has doubled the permeable surface. The use of a rich variety of plants, with different root systems, contributes significantly to increasing organic matter and mineralising the soil.

Maintenance / The structure and diversity of the environments require different types of maintenance: more intense and frequent in the areas equipped for playing and events, minimal and sporadic in the lateral vegetated strips, thanks to the presence of rustic and low-maintenance species. In all the flowerbeds there is a mulch layer made up of bark which is useful to limit the development of weeds and to maintain a certain humidity in the soil during the summer.
As regards the fountains, the choice of materials used was dictated by the need to save water.

2010

The two-step competition for the design of the park is won by the group by Péna Paysages with ZEKTON Hydraudesign and Coup d'Eclat

2011-2013

The construction site for the park begins: 13,000 tons of asphalt and 365 tons of iron are demolished.
The total cost of the works, financed by the city and Métropole Nice Côte d'Azur (with the participation of the General Council of Alpes-Maritimes for 3.5 million euros), amounts to 40 million euros.

2013

On October 26, 2013, outgoing Mayor Christian Estrosi officially inaugurated the Promenade du Paillon in front of thousands of citizens.

2019

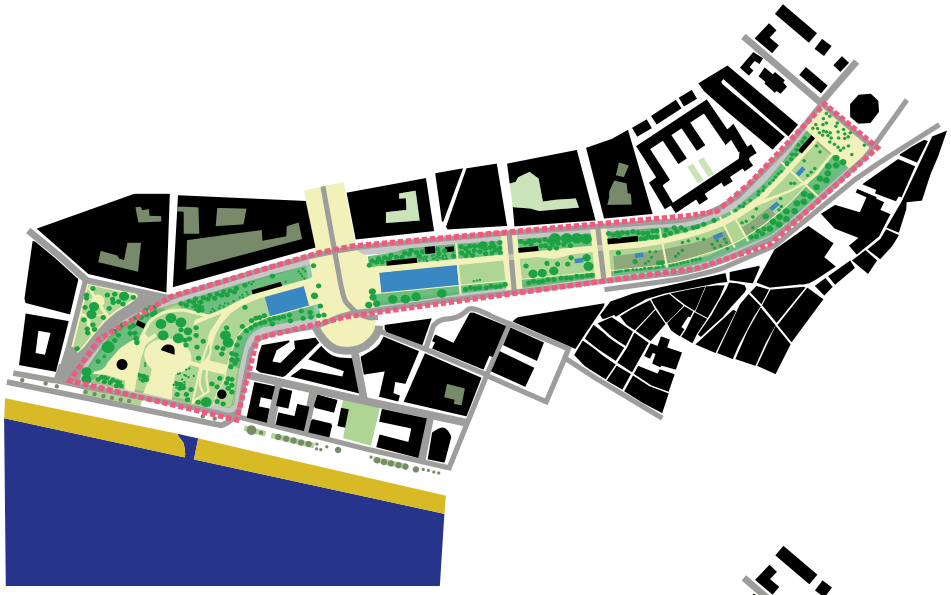
To date, the Promenade du Paillon is frequented daily by 15 thousand visitors, including tourists and inhabitants of Nice.

Top. Materials, details and elements of urban furniture: a series of mobile seats are positioned under a wooden roof that allows you to shade the area overlooking the central wet square. (Photo by E.Farnè)

In the middle. Details of vegetation. (Photo by E.Farnè)

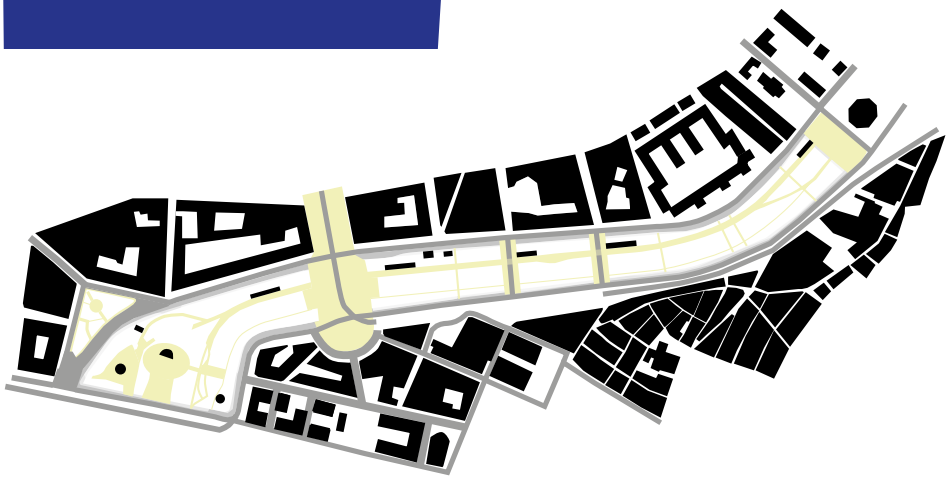
Bottom. The central wet square consists of a complex system of fountains that alternate splashes and continuous sprays, even in the evening in the dark, attracting children, visitors and tourists who walk there and play inside, especially during the summer, to benefit from the heat. (Photo by E.Farnè)

MASTERPLAN PROMENADE DU PAILLON



INTERVENTION AREA

BUILT-UP FABRIC AND PATHWAYS

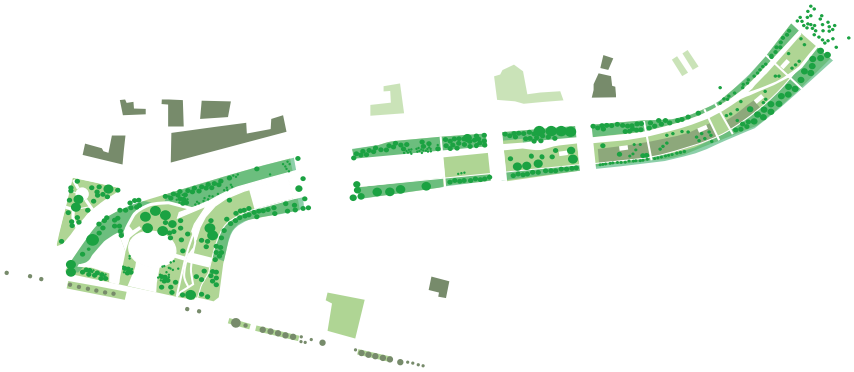


BUILDINGS

DRIVEWAYS

PEDESTRIAN PATHS AND SQUARES

GREEN INFRASTRUCTURE



WATERFRONT TREES

SINGLE TREES
AND/OR SMALL VEGETTATE MASSES

MEADOWS

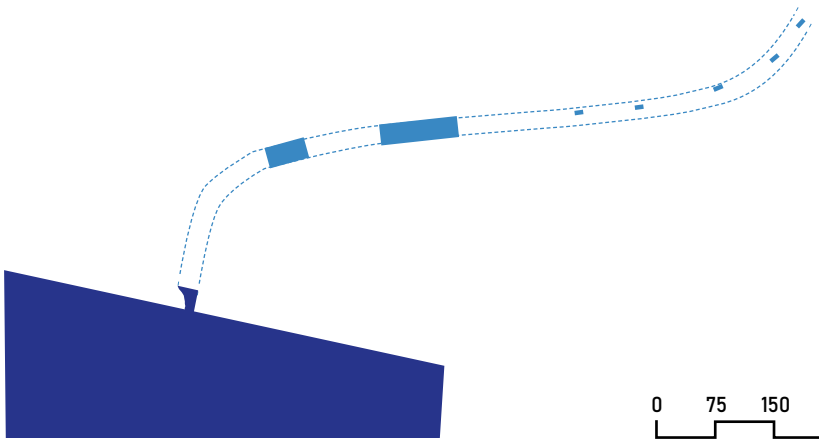
FLOWERING MEADOWS AND EDGES

SYNTHETIC LAWN

GREEN COUTRYARDS

MINERAL COUTRYARDS

BLUE INFRASTRUCTURE



MEDITERRANEAN SEA

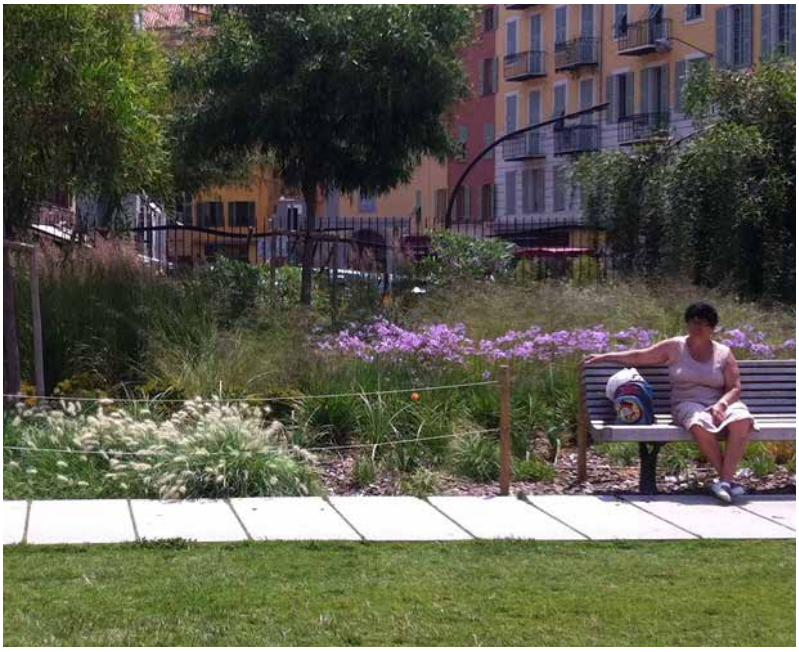
WATERWORKS
AND AQUATIC SQUARES

TOMB PATH OF THE RIVER

0 75 150 300m

Top. From a botanical point of view, the newly planted trees and vegetated bodies are concentrated at the edges of the park, ideally restoring the river's riparian vegetation.
During the planning phase, the utmost was done to keep the existing trees and, between the old and new species, the park has 1,000 trees, 6,000 shrubs and 50,000 plants including perennials and grasses.
The vegetated borders also play an important role against pollution and noise from the two roads that run parallel to the park; the species chosen are capable of retaining fine dust and the road and noise are completely hidden from inside the park.
(Photo by E.Farnè)

Bottom. Equipped play area with wooden sculptures of Mediterranean marine animals like whales, dolphins or octopi.
(Photo by E.Farnè)



ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
Nice Métropole Côte d'Azur

PROJECT TYPE
Urban park with linear development

EX ANTE SITUATION
Between the 1970s and 1990s, they had been built on the old river see: the old bus station, a large former parking lot, Leclerc Square, the Massena area and the Jacques Medecin Forum and the Albert I garden.

EX POST SITUATION
Urban park with rich equipment of areas for parking, play and sport. The park is spread over a large area, almost 1.5 km long and about 100 meters wide.

WORKS
The site was obtained through the demolition of some buildings and the recovery of different spaces.
Radical reorganization of urban mobility.

SUDS
Rainwater management: use of absorbed, filtered and partly stored rainwater for the park's water needs.
Limitation of waterproof areas maximum exploitation of permeable (lawn) surfaces obtained through desealing as a natural filter for meteoric waters.
Slopes of the routes in the park to favor drainage to the vegetted areas and drastically reduce the runoff to the sewerage system.

OTHER ASPECTS OF ENVIRONMENTAL SUSTAINABILITY
The complex system of fountains with continuous spraying and spraying, from which the large blade of water in the center of the park also originates, performs an important climate mitigation action during the summer season.

PARTICIPATION
At the end of 2009, a public information and consultation phase preceded the publication of the competition.

URBAN AND DESIGN TOOLS
Preliminary study;
Landscape project and agronomic;
Hydraulic design;
System design fountains;
Lighting project.

DESIGNERS
Atelier Péna Paysages: landscape project and agronomic.
Zekton Hydraudesign : hydraulic design.
Atelier Coup D'Eclat: lighting project.

BIBLIOGRAPHICAL SOURCES
Métropole Nice Côte d'Azur (a cura di), *Coulée verte: un poumon vert de 12 hectares en plein coeur de ville*.

WEBSITES
www.penapaysages.com

www.wordpress.com

SITE
Nice, France

POPULATION
343,000 inhabitants

DIMENSIONS
8 hectares

PERMEABLE AREAS
2.5 he before
6.7 he after

INVESTMENTS
14.9M € phase 1
30.8M € phase 2

B14

ALTER FLUGPLATZ KALBACH PERIURBAN PARK, FRANKFURT AM MAIN– DE

from former military heliport to evolving ecological park

The project consists in transforming the former Bonames military heliport into a 4.5-hectare park and nature reserve, on the outskirts of Frankfurt, along the right bank of the river Nidda, a tributary of the Main.
The area was a pasture before the United States Army built the Maurice Rose Army Airfield, an airfield for small aircraft, at the end of World War II.
The airfield was adapted in the 1950s for helicopter take-offs and landings and was used in the 1970s as a military training ground.
In 1992 the site was definitively closed and handed over to the Federal Office; the following year the area was placed under landscape protection and in 2002 it was handed over to the City of Frankfurt.

Top right. Vegetation takes over the area. Much of the soil has been de-waterproofed, 50% of the asphalt has been removed, crushed and relocated in different grain sizes creating favourable conditions for the development of habitats. The remaining 1.5 hectares are used as playgrounds and circulation areas. (Photo by Luisa Ravanello)

Bottom right. The main landing strip has been completely preserved and is now touched by pioneer plant species. The concrete slabs of the helicopter landing pad were stacked to create a sort of observation platform. (Photo by Luisa Ravanello)

THE PARK AND THE EVOLUTION OVER TIME OF THE PIONEER VEGETATION

The basic idea of transforming the area was to convert the existing site into a recreational park, transforming the former military heliport through desealing, allowing the pioneer species to grow and colonise the area.
The project provided for the gradual conversion over time, without excessive disruption of the runways, which were partly kept and used as paths.
In order to make the site more permeable, the take-off pads were broken and cracked and the sheets removed selectively. Half of the heliport's mineral soils were demolished, fractioned and partly recomposed in situ in separately selected grain sizes, ranging from 10-sqm concrete slabs to fine gravel. This created a wide range of habitats, favoured by the humid environment and the presence of water. The condition of the site has favoured plant and animal colonisation processes, demonstrating nature's great capacity to restore fertility. Starting from an almost desert situation, the former airfield has shown its great ecological potential, providing equipped areas and new habitats.
The park is designed to be used for all types of outdoor activities, such as roller-skating, cycling or picnics, while the ongoing biological processes are the subject of long-term research studies aimed at documenting the development of different plant combinations.
Much of the demolition material has been reused in the park. For example, the concrete slabs of the helicopter landing pad were piled up to create a rock garden, or used in metal gabions to create retaining walls. The main runway has been completely preserved as a path for sports. The area features several ponds, natural areas and spaces for sunbathing, as well as a space for dogs. New cycle/pedestrian routes have been created along the river Nidda to enjoy the landscape.


Public Buildings
Romagna
Ibimet

DESEALING AND RENATURALIZATION OF THE SITE

The conversion project was carried out through a circular economy project guided by man, but implemented according to the timing of nature. If in a certain sense the replicability of this project may seem modest - as it can be applied to large disused areas - the idea of breaking up anthropic and mineral soil is actually much more feasible than it may seem.

The decision to create a recreational park with a strong ecological vocation has given rise to various problems of an economic nature, given the large areas to be disposed of. Therefore, the renaturation process has driven the idea, not only from a fruition and environmental point of view, but also in terms of economic sustainability. In this case, desealing took place without complete removal or disposal of the mineral soil, accepting the conditioning of use that this has entailed - natural spaces not always accessible on foot, orderly stacking of slabs recalling the previous use - while benefiting from the large amount of by-product that the demolitions have generated - for the construction of gabions, seats, retaining walls, foundations and paths made with recycled material.

Top left. Masterplan and design sketches. The structures of the auxiliary buildings have been preserved and transformed. The former Control Tower is now used as a restaurant "Tower Cafe" while the small hangar hosts concerts and flight demonstrations and is home to the Frankfurt Fire Museum.
The old airfield has become an educational centre for children and teenagers. Events for families, educational groups and schools are regularly organised.
(Photos and drawings by GTL Gnüchtel Triebswetter Landschaftsarchitekten GbR)

Left at bottom and right at the top. Different types of desealing and crushing of the soil.
(Photo by L.Ravanello)

Right down. The park is popular, especially on weekends, and used for long walks, jogging, skating, cycling and much more.
(Photo by L.Ravanello)




1951-52

The Maurice Rose Airport is located on the banks of the river Nidda in Frankfurt and is named after a American war hero who died during World War II.

1970

The facility was modernised to be used as a military training camp.

1992

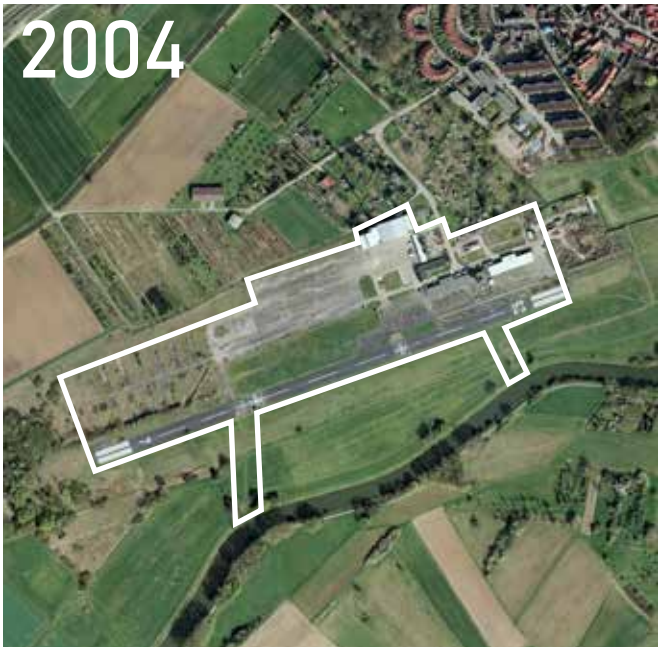
The heliport was closed permanently and handed over to the Federal Office.

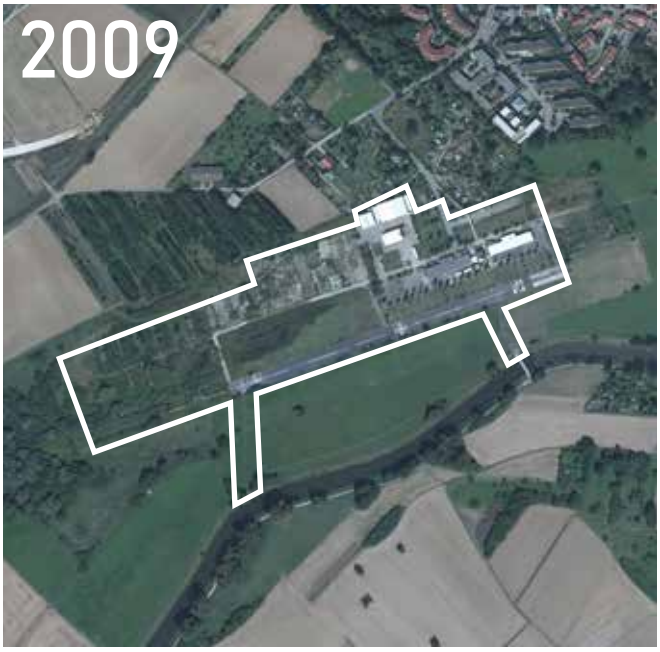
1993

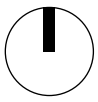
The area was placed under landscape protection. Local inhabitants have rediscovered the area as a place to spend their free time.

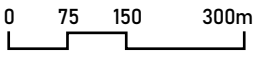
2002

The area was handed over to the City of Frankfurt, which started the conversion process with the aims of renaturalisation and environmental enhancement.









Aerial photos and district transformation schedule. Note from the images the progressive process of colonization of nature that took place as a result of the desalination of soils.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE WATER MANAGEMENT

Blue infrastructure / Thanks to the wide depaving interventions, the redevelopment project introduces large permeable soil portions, where there was once just concrete. Rainwater flows into the park wet areas, creating new habitats, and in the Nidda river, which borders the southern section. These open spaces are intimately connected to the soil agronomic and landscaping projects, and water is controlled through open ditches and drainage networks. This has promoted an increase of rainwater access times into the surface collection network - reducing its quantity - and groundwater infiltration on the entire area.

Construction aspects relating to the blue infrastructure / The paths and bridges from the river to the area are made of steel or draining cements, all about between +50 and +150 cm above the level of the park and surrounding agricultural areas. This always ensures that people and service providers can come and go from the Tower Café and other recreational facilities. The paths in the park are floodable, dry or wet depending on the rainfall regimes.

Green infrastructure and public spaces / The depaved tracks and the presence of water created ideal humidity conditions that promoted the increase of nutrients, helping the environmental remediation of a run-down location and its gradual revitalisation.

The depaving interventions and the selective relocation of inert materials have helped shape macro-environments with wet areas, lawns and rocky areas, then defined and modelled by plant colonization and development. The planners wanted to establish a slow natural ecosystem evolution process toward a climaxing condition, i.e. a natural dynamic balance between flora-flora and flora-fauna, typical of natural vegetative associations.

An interesting example is the wet area, where, through small terrain modelling interventions, rainwater accumulation has been improved in some depressions, and thus the formation of actual water pools. Over the years, nature has conquered the different areas, creating groves and wet areas, full of animal and plant biodiversity.

2003

Following an international competition, GTL was awarded the contract for the construction of the park.

2004

Completion of the works and inauguration of the park.

2005-2007

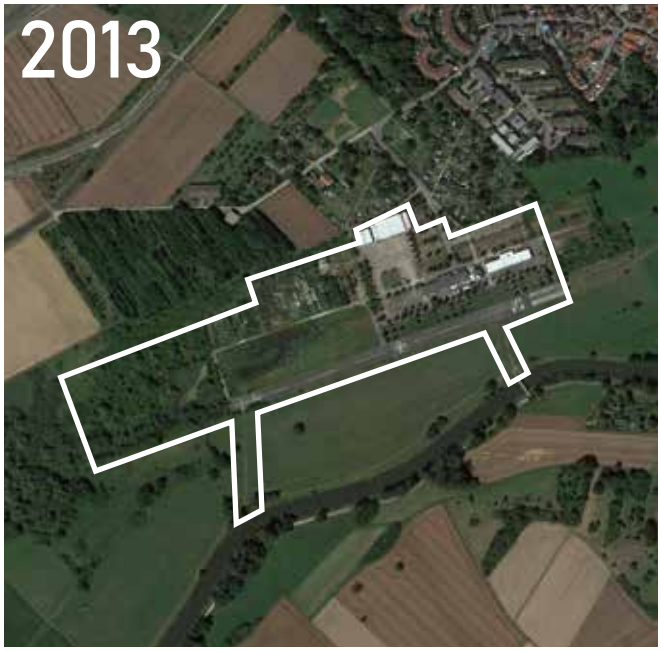
Educational and recreational centres, services and commercial businesses are located inside the former airport buildings.

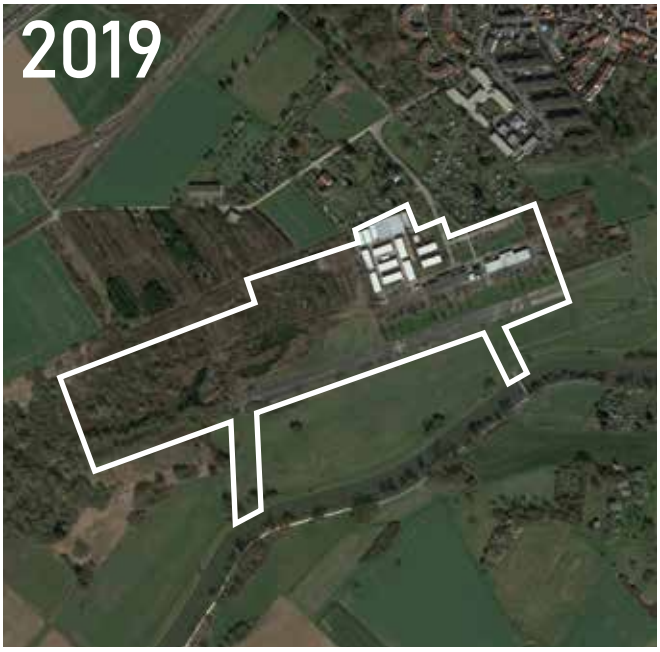
2013

A study of the park's flora and fauna reveals the presence of numerous species of birds, amphibians, and insects such as dragonflies, butterflies, grasshoppers, cockroaches and spiders.

2019

Today the area is very popular for outdoor sports activities and is fully integrated into Frankfurt's green belt.





Species and planting distance / Pioneer plants are key in this project; thanks to the species that take root first on newly formed soil - or in degraded areas subject to natural disasters, such as landslides or fires - and develop on poor soil and in adverse climate conditions. Generally, these plants are very resilient, and can adapt in shallow soil poor of nutrients. These plants modify the soil, making it more ideal for other more demanding species that will take root at a later stage.
Among the main species, we find: poplars, willows, field maples, hawthorns, cornels, dogwoods, rosehip and many herbaceous species. Larger shading trees, such as maples, alders, ashes, willows and Prunus, have been planted only in more accessible areas.
No specific planting distance has been established, except on the equipped area, where the planting distance of mixed species is regular, to create a continuous tree strip.

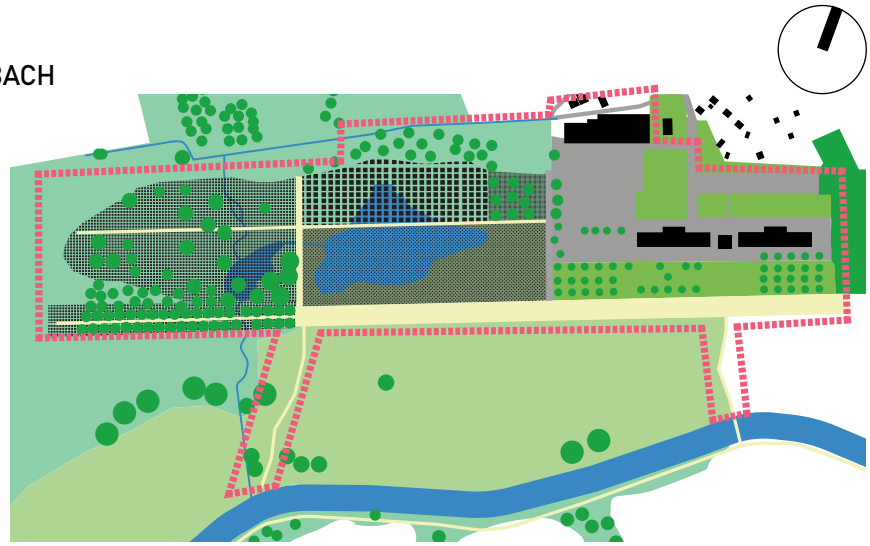
Phytoremediation and phytopurification / As the plants win back this run-down area, their roots carry out phytopurification and improving processes on the soil nutritional and structural components.

Soil and bioremediation / The decision to leave the materials resulting from depaving in place was certainly dictated by economic reasons, but it is an interesting starting point to reflect on the fact that there is no urgent need to proceed, in similar cases, with the immediate removal and disposal of "broken" mineral materials.
From a vegetation point of view, the fractured cement surfaces, the reduction of waste materials, and their relocation on site are operations that fostered all those processes of soil recovery, organic substance supply, water infiltration and runoff into the aquifer. It makes sense to proceed step by step, monitoring the behaviour over time of both a possible release of pollutants and the rooting of greenery.

Maintenance/ The project does not entail specific maintenance save for mowing lawn areas; and nature is free to take back the rest of the park.

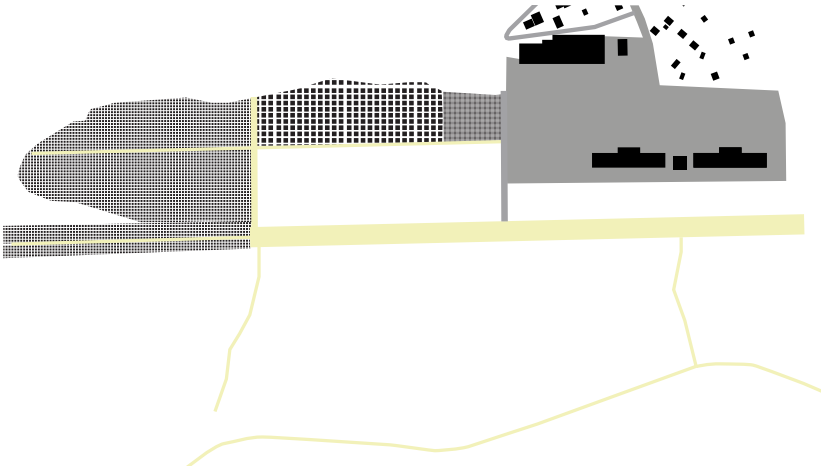
Up. Different evolutionary stages of vegetation pioneer. The central track is the only non-decayed part, partly reused for skating, running and cycling.
The debris of the runway was reused for different purposes: for the creation of gabions or foundations, or left in place, favoring the reconquest by the vegetation and the natural water cycle. Thanks to the presence of some ditches, in fact, part of the heliport has become a biotope for aquatic species. In areas where the debris is crushed into slabs, pioneer species and numerous specimens of birch trees have developed.
(Photo L.Ravanello and E.Farnè)

MASTERPLAN ALTER FLUGPLATZ KALBACH



INTERVENTION AREA

MINERAL SOILS AND BUILDINGS



BUILDINGS

SQUARES AND WATERPROOF AREA

FOOTPATHS

DEPAVIMENTED AREA WITH FINE CRUSHING

DEPAVIMENTED AREA WITH EXTRA-LARGE CRUSHING

DEPAVIMENTED AREA WITH EXTRA-LARGE CRUSHING AND REPOSITIONING IN BLOCKS

GREEN INFRASTRUCTURE

TREES

RUSTIC LAWN

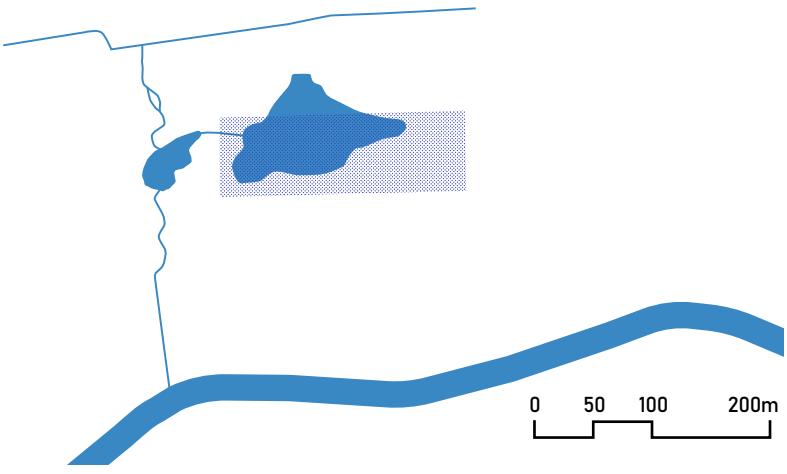
HIGH TRAMPLING LAWN

FOREST OF BIRCHES

WETLAND

GREEN AREA WITH SHRUBBY MASSES

BLUE INFRASTRUCTURE



NIDDA RIVER

DRAINS

WETLAND

The park is usually frequented by frankfurters for long walks or bicycles, for jogging or skating. Ponds and bodies of water, natural areas and sunbathing spaces as well as a dog area enrich the park spaces. Cycle and pedestrian paths go all the way to the bridge over the Nidda River.
(Photo by L.Ravanello)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS

AIR QUALITY AND POLLUTANS REGULATION

NOISE REDUCTION

RUNOFF REDUCTION AND FLOOD

POLLINATION AND BIODIVERSITY

URBAN COMFORT AND MICROCLIMATE

PUBLIC SPACE ACCESSIBILITY AND RECREATION

IDENTITY SENSE PLACE HISTORY

BEAUTY OF NATURE

CLIENT
Grünflächenamt Frankfurt aM

PROJECT TYPE
Urban park with linear development

EX ANTE SITUATION
Helipad, an airfield for American military use.

EX POST SITUATION
Ecological park equipped for sport.

WORKS
The site was the subject of a differentiated desealing action, on 1/3 of the area. The project involves the merger between the military character of the area and the surrounding nature.

SUDS
The area has been de-paved and numerous permeable and floodable surfaces have been introduced.

URBAN PLANNING AND DESIGN TOOLS
Landscape and agronomic project

DESIGNERS
GTL - Gnüchtel Triebswetter Landschaftsarchitekten GbR with Markus Gnuechtel, Roland Nagies and Klaus W. Rose: landscape and agronomic project

AWARDS
2018 - Awardee of the "*Award for commondable building site within the state Hess*"
2012 - Awardee of the "*Green GOOD DESIGN Award*" for Maurice Rose Airfield, Frankfurt Bonames
2005 - German Landscape Award for Maurice Rose Airfield, Frankfurt Bonames, 2005

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Alter Flugplatz Bonames

WEBSITES
www.landezine.com

www.gtl-landschaftsarchitektur.de/projekt/alter-flugplatz-bonames-frankfurt-am-main-bonames

SITE
Flugplatz Kalbach, Frankfurt am Main, Germany

POPULATION
736,000 inhabitants

DIMENSIONS
7.5 hectares

PERMEABLE AREAS
4 he before
7.5 he after

INVESTMENTS
900,000 euro

B15

GLEISDREIECK PARK / BERLIN – DE

from disused railway area to equipped urban forest

The Gleisdreieck Urban Park is located in Berlin and covers about 29 hectares in a large, elongated triangular area between the disused railway lines of the freight yard, between the Potsdamer and Anhalter train stations. The name of the park literally means 'triangle between the tracks'.
The area, enclosed between the tracks, was abandoned in the 1960s because of the high maintenance costs of the freight lines, which are not widely used.
Towards the end of the 1990s, after the fall of the Wall, the city of Berlin entered into an agreement with the company that owned the former railway area, Grün Berlin GmbH, deciding the construction of the park.

Top right. The desealing of the old railway yard led to a gradual creation of a park of wide extension. The mainly permeable surfaces (flowery and grassy meadows) are flanked by the old railway tracks in memory of the past use.
(Photo by Julien Lanoo and Leonard Grosch)

Bottom right. The paths, mostly made of large concrete strips or paths of beaten earth, alongside the disused tracks kept by heart of the railway yard.
(Photo by Julien Lanoo and Leonard Grosch)
Work in progress and desealing interventions for the construction of the park.
(Photo by Lichtschwärmer – Christo Libuda)

THE PARK AND THE WOODS BETWEEN THE TRACKS

The park is located between the districts of Kreuzberg, Schönenberg and Temphelof. In over thirty years of neglect, the vegetation, left free to grow, has quickly colonised the site, so that today the eastern part of the park comprises a dense wooded area.
In 2006, Berlin-based development company Grün Berlin GmbH launched a two-stage competition for park planning and green design, won by Atelier Loidl with Breimann Bruun Simons Landscape Engineering. The choice of the project was to maintain the state of the places, the presence of the tracks and railway buildings and the vegetation that grew while it was disused.
The park, built into three functional parts, is divided into three macro-areas, connected by new routes that flank the length of the railway lines.
The area to the west - Westpark, the last to be built in 2014, covers 10 hectares: it is the most wooded and natural part. It was decided to preserve here the wild appearance of the trees and shrubs that grew spontaneously and are so dear to the local population. The routes that cross it are mainly used for running and cycling.
The central area of the park to the east - Ostpark, the first to be restored in 2011, covers 17 hectares and features sports facilities: there are playgrounds, basketball courts, parkour and freestyle tracks, platforms, five-a-side football fields, and areas for relaxation.
The south part - Flaschenhalspark, converted in 2013, covers 2 hectares and corresponds to a large lawn equipped for relaxing, walking, sunbathing or picnicking.

TRASFORMATION PROCESS

Already in the 1970s, the residents of the area urged the Berlin administration to transform the abandoned area into an urban park, proposing the first ideas of reuse and accessibility based on maintaining the 'wild' nature of the site reclaimed by nature. It took about thirty years to start the process to convert the area, which took off only in the late 1990s with the unification of East and West Berlin. The works were financed by the companies that participated in the reconstruction of the nearby areas of Potsdamer and Leipziger Platz.


Potsdamer Straße
Lützowstraße
Kurfürstenstraße
Nollendorfplatz
U Nollendorfplatz
Pohlstraße
U Bülowstraße
Alvenslebenstraße
Pallasstraße
Goebenstraße
Heinrich-von-Kleist-Park
Potsdamer Straße
Kurmer Straße
Yorckstraße
S Yorckstraße
Großgörschenstraße
Bautzener Straße
Grunewaldstraße
Langenscheidtstraße
Crellestraße
Hohenstaufenstraße
Monumentenstraße
Akazienstraße
Kolonnenstraße
Hauptstraße
Schöneberger Straße
Flottwellstraße
U Gleisdreieck
Deutsches Technikmuseum
Tempelhofer Ufer
Spree
U Möckernbrücke
Obentrautstraße
Möckernstraße
Wartenburgstraße
Großbeerenstraße
Hagelberger Straße
Mehringdamm
Kreuzbergstraße
Viktoriapark
Katzbachstraße
1B
1A
8A
2
7A
8B

The strength of the project lies in the choice to enhance the spontaneous vegetation and ecosystem services that it provides for the benefit of the city: a conversion of this type offers citizens an important open and usable urban space, restoring balance to portions of the land heavily impacted in the past.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE WATER MANAGEMENT

Blue infrastructure / The water is managed in the permeable surfaces that allow infiltration of most of the rainwater gravitating in the area. Due to the large size of the site, consisting mainly of meadows and wooded areas, the area serves the purpose of improving access times to the surface and drainage network.
The depaving actions have also made it possible to reduce runoff and to manage water resources wisely. The wide meadows, which alternate with the spontaneous forest strips, are real safeguards for the containment of runoff and to increase infiltration.

Green infrastructure and public spaces / Natural vegetation has triggered a series of reconversion processes of the area, giving rise to an urban space of considerable ecological and environmental

Top left. Work in progress and desealing interventions for the construction of the park. (Foto di Lichtschwärmer - Christo Libuda)

Bottom left. Project masterplan. (Atelier LOIDL)

Bird's-eye view of the park. (Photo by Urban Mitte www.urbane-mitte.de)

1912

The triangular area of the Gleisdreieck took shape when, after a series of serious accidents, it was decided to design a new interchange.

1961

With the construction of the Berlin Wall, it cost too much to carry out maintenance on railway lines that were used very little or were partly disused, so many railway tracks in the station were closed.

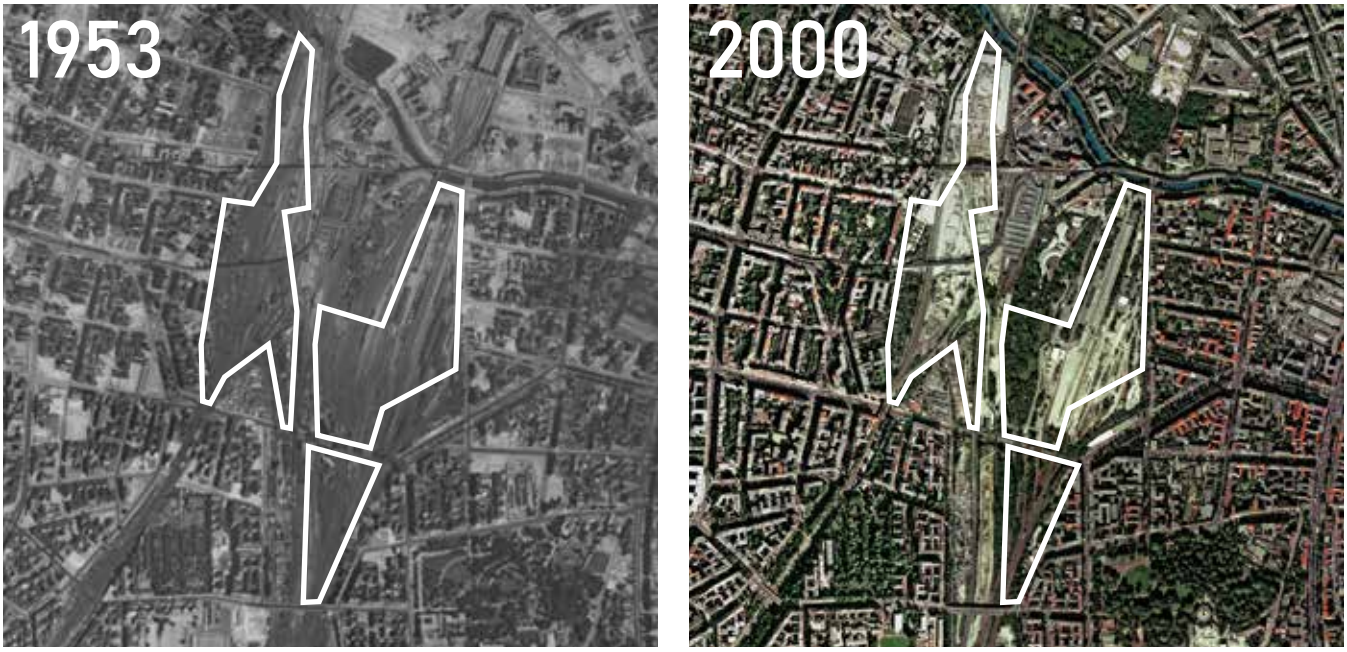
1970

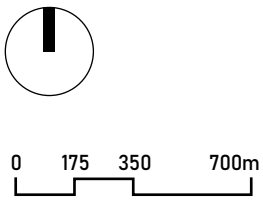
Residents of the neighborhood came up with the first ideas for designing a park in the abandoned area overlooking Möckernstraße, where one of the main entrances is now located.

1997

The city of Berlin reached an agreement and signed an urban development contract with the real estate company VIVICO, which owns the former railway station.

The City Council presented the concept for the conversion of the area and the creation of the park, with ample space for citizen participation.





Aerial photos and neighbourhood conversion time line.
Notice how in the 1950s there was no forest; following the abandonment of the area, the vegetation spontaneously colonized the site, up to the current conformation.

value for the city. In the decades of disuse, the vegetation, initially ruderal, then transient to climax, has conquered the railway surfaces developing real wooded areas.
The designers have chosen to intervene as little as possible on the wooded areas: cycle/pedestrian paths have been created between the arboreal vegetation of locust and birch trees, enhancing the historical traces of the old railway tracks, signalling systems and internal stops, thus creating a sort of open-air railway museum. Together with the enhancement of the existing green areas, new equipped areas have been created for sport, relax and entertainment. The refugee community of Bosnia and Herzegovina has established an intercultural garden in the park, where people of different nationalities grow plants and share moments of celebration and social and cultural exchange. With the pilot project 'Gardens in the Garden', areas of urban gardens have been parcelled out, creating a central market, which is a showcase and interactive place of exchange between the citizens involved and visitors to the park.
For more than 30 years nature has been able to grow freely in the former railway station; today there are dozens and dozens of both plant and animal species. To safeguard this biological diversity, fenced areas have been created to protect nesting birds and other minor species; moving between the different area

Plant species and planting distances / The pioneer species were the first to conquer the small interstitial spaces created between the vast waterproofed surfaces; mosses, lichens, brambles, locust trees, willows, birches, and annual and biennial herbaceous plants played a crucial role in enriching the soil with organic matter. Over the years, the vegetation has evolved into the following ecological stages; the tree component has established itself with the arrival of other increasingly evolved species such as oaks and perennials, such as grasses, have appeared among the herbaceous species.
The project involved the enhancement of wooded areas and the creation of equipped and shaded areas by planting hornbeams, pines, poplars and oaks. In the park there are large grassy areas frequented every day by many children, teenagers, families and elderly people. The project has provided for the planting of a minimum tree component compared to the existing one; the major actions involved the areas equipped to create new shaded areas and

2006

In 2006, the Berlin Department for Urban Development, represented by Grün Berlin GmbH, published a competition in two phases: general planning and green design, both won by Atelier Loidl.

2009-2011

Works began on the first section - Ostpark, inaugurated in September 2011.
Costs of intervention: 9.5 million euros.

2011-2013

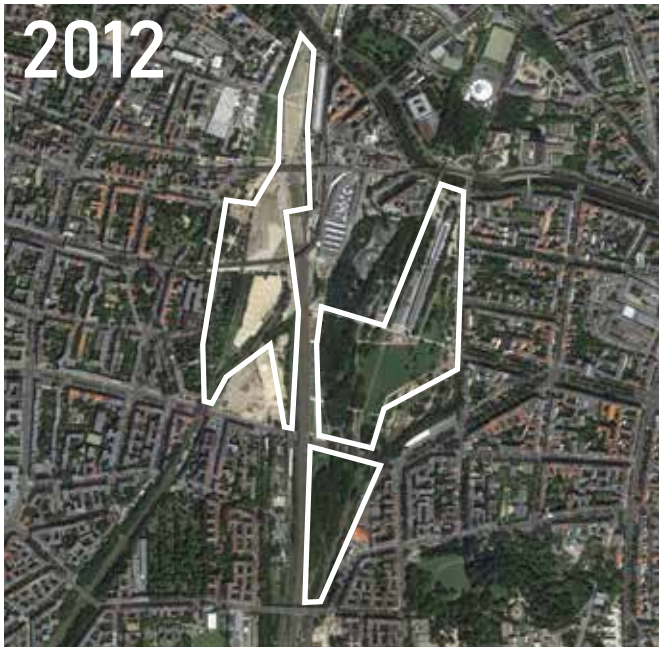
Works began on the second section - Westpark, inaugurated in May 2013.
Costs of intervention: 8.5 million euros.

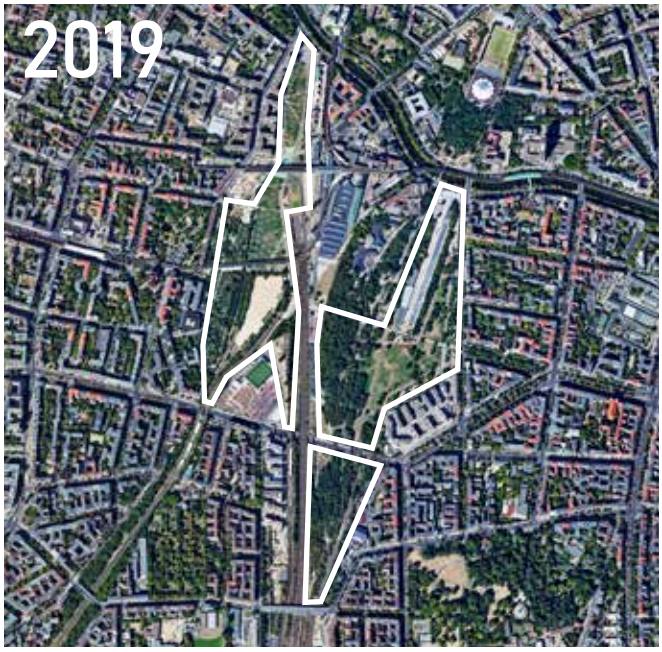
2013-2014

Works began on the second section - Flaschenhalspark, inaugurated in May 2014.
Costs of intervention: 442,000 euros for green areas and 1.5 million euros for paths.

2019

To date, the park is an element of great biodiversity: 366 plant species, 49 fungal species, dozens of mammals and about 112 different species of butterflies have been found.





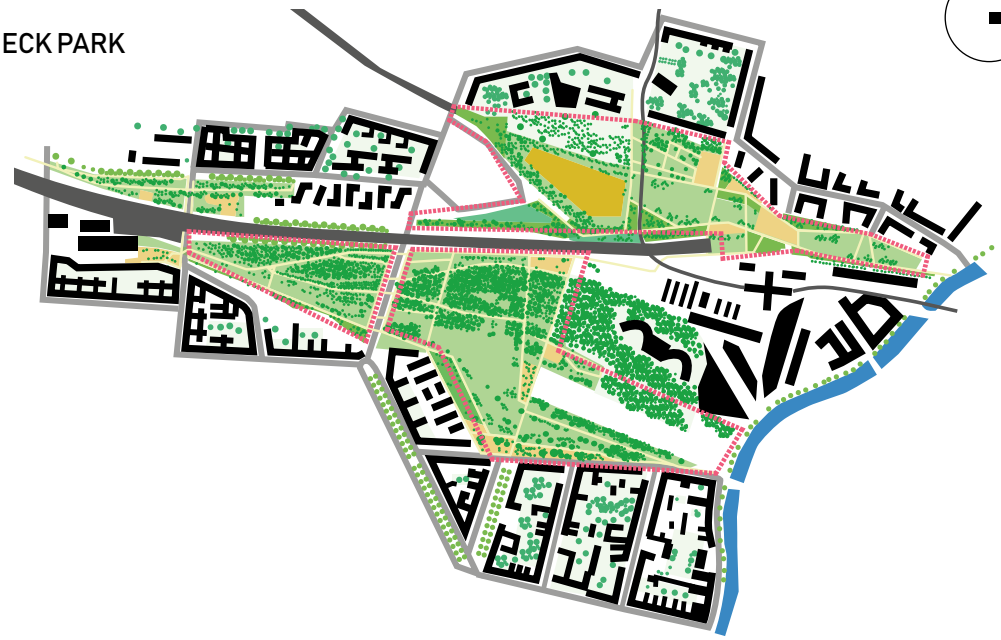
some cycle paths. The large grassy areas have been diversified into flowering meadows and green areas on which differentiated mowing is carried out, in order to allow and guide use, favour biodiversity and flowerings, and reduce maintenance.

Phytoremediation and phytopurification - Soil and bioremediation/ The desealing measures have allowed the recovery of about 29 hectares of permeable surfaces. The colonising action of the spontaneous vegetation over the decades had already started the soil remineralisation and bioremediation process that has been boosted today by man through desealing and the designing of the green infrastructure.

NbS and SUDS maintenance / The maintenance of the forest and the conversion of disused structures at low cost are important forms of economy for such large areas, as well as the use of rustic vegetation and the forest left to grow freely significantly reduces maintenance costs.
The project provides for diversified maintenance according to the use of the areas: for some grassy areas there are stepped mowings, for the equipped areas there are more frequent cuts and for some less used areas there is the maintenance of the flowering meadows. The pedestrian and cycle paths have been made with rustic mineral materials, beaten earth, mineral fragments of various grain sizes and bark that in some cases is also used as mulch.

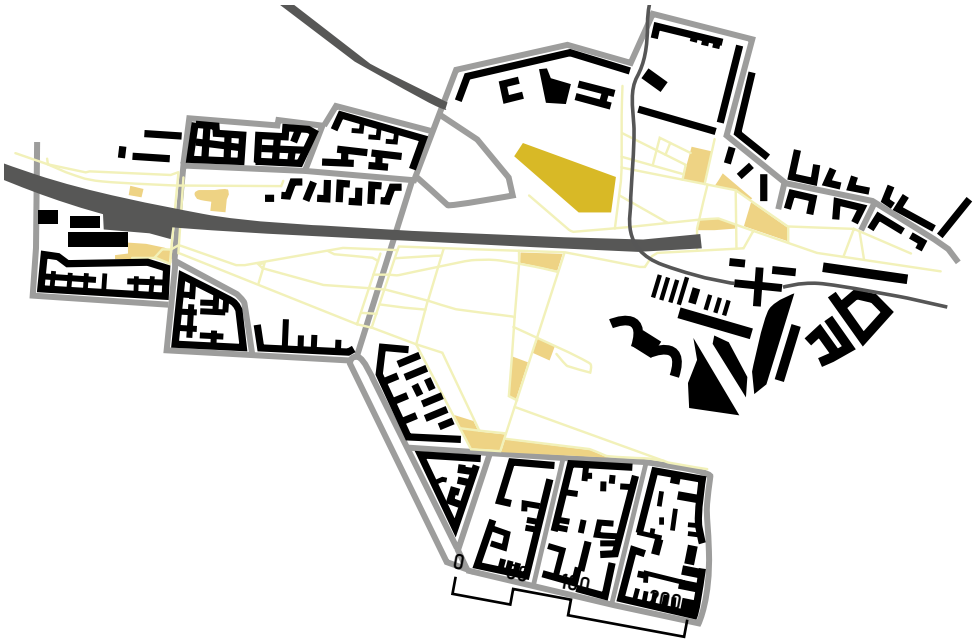
The park alternates more natural areas with rustic meadows, flowery meadows and wooded areas with thick vegetated masses, with spaces equipped for play and leisure, paved with semi-permeable walkable surfaces.
(Photo by Atelier LOIDL)

MASTERPLAN GLEISDREIECK PARK



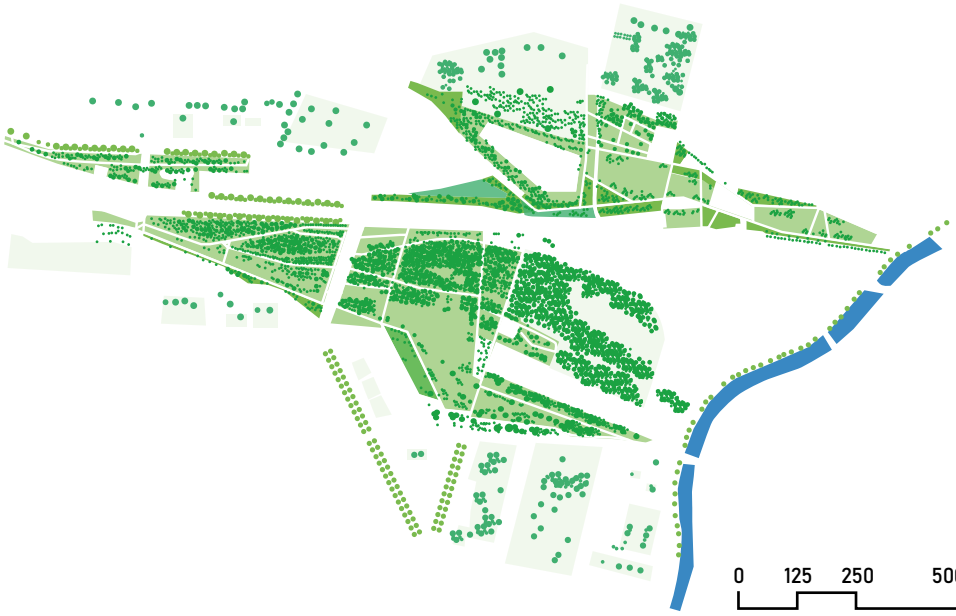
INTERVENTION AREA

BUILT FABRIC AND PATHS



- BUILDINGS
- DRIVEWAYS
- RAILROAD
- PEDESTRIAN ROUTES
- EQUIPPED AREAS
- BEACH

GREEN INFRASTRUCTURE



- CONTINUOUS ROW OF TREES
- TREES AND / OR SMALL VEGETATED MASSES
- HIGH TRAFFIC LAWN
- FLOWERY MEADOW AND RUSTIC MEADOW
- EQUIPPED GREEN AREA
- GREEN COURTYARDS AND PRIVATE GARDENS

BLUE INFRASTRUCTURE

- RIVER SPREE

Up. The vast green spaces are interspersed with areas equipped for play or sport, with slides, swings and entertainment for the little ones but also bowls, basketball or ping pong tables.

The park is assiduously frequented by skaters, skaters and joggers, and yoga, fitness, zumba and cross-fit courses are organized outdoors. (Photo by Julien Lanoo)

Down. Spaces equipped for relaxation and free time. The vegetation and soils of the park evoke a rustic and rural aspect, in which wooded areas and low-maintenance flowery meadows alternate with areas with razor grass, the forest and the nursery, the large terraces, the small woods, the areas for sports and a large central space. (Photo by Urban Mitte www.urbane-mitte.de)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS

AIR QUALITY AND POLLUTANS REGULATION

NOISE REDUCTION

RUNOFF REDUCTION AND FLOOD

POLLINATION AND BIODIVERSITY

URBAN COMFORT AND MICROCLIMATE

PUBLIC SPACE ACCESSIBILITY AND RECREATION

IDENTITY SENSE PLACE HISTORY

BEAUTY OF NATURE

CLIENT
Grün Berlin GmbH

PROJECT TYPE
Urban park

EX ANTE SITUATION
Railway station in the West area of Kreuzberg

EX POST SITUATION
Equipped and semi-natural public green area.

WORKS
Urban park equipped with services and equipment for relaxation, sport and free time.

SUDS
The whole area is an urban park, with the exception of some existing floodable buildings and equipment.

PARTICIPATION
Participatory process from below promoted by the community for the maintenance of naturalistic functions and public green areas.

URBAN PLANNING AND DESIGN TOOLS
Landscape project

DESIGNERS
Atelier Loidl + Breimann
Bruun Simons Landscape Engineering: urban and lascape project

AWARDS
2018 - Berlin Architecture Prize
2015 - German Urban Development Special Prize
2015 - German Landscape Architecture Prize

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DER PARK AM GLEISDREIECK. Idee, Geschichte, Entwicklung und Umsetzung

WEBSITES
www.gruen-berlin.de/park-am-gleisdreieck

www.atelier-loidl.de
www.openstreetmap.org
www.ecoprospettive.com
www.urbane-mitte.de

SITE
Berlin, Germany

POPULATION
3,575 mil
inhabitants

DIMENSIONS
33
hectares

PERMEABLE AREAS
14 he before
29 he after

INVESTMENTS
20M €
Ostpark
Westpark
Flaschenhals

B18

KILLSBERG PARK / STUTTGART -DE

an urban park on the site of the old fair and the former quarries

The project, promoted by the City of Stuttgart in Germany, covers a large area of 10 hectares used as an urban park.
The area has a rich history of environmental and urban use during the twentieth century: first used as a sandstone quarry, it then became a gardening and horticulture site, then a landfill, and finally an exhibition complex, with the pavilions built on the backfills of the old quarries.
During World War II the area was also one of the bases of the Nazi regime, collecting and sorting the Jewish population directed to the concentration camps.

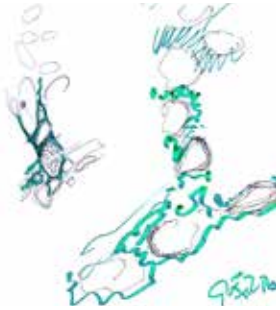
Right. Killesberg is an oasis of greenery in the urban landscape.
The park has soft, rounded shapes that create a sinuous landscape that follows the site's topography.
(Photos by Raffaella Sirtoli, Besco, Stefan Müller)

IL PROGETTO DELLA GARTENSHAU SUL SITO DISMESSO DELLA VECCHIA FIERA

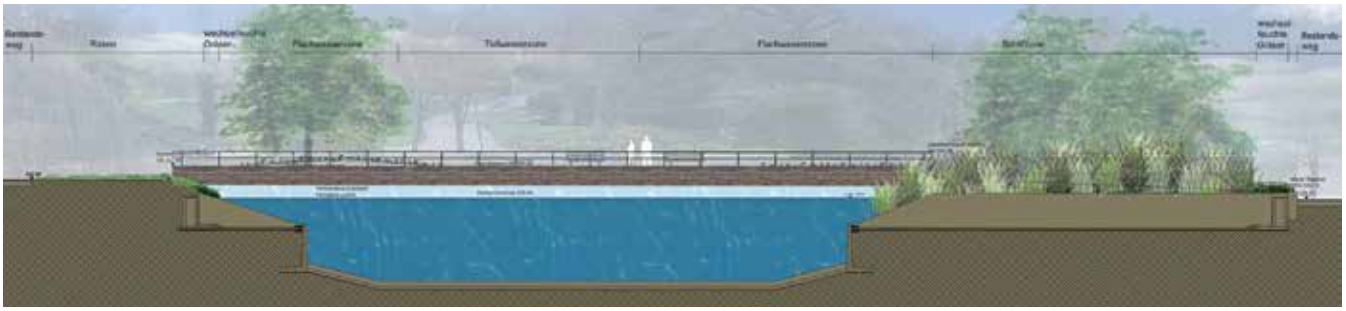
The idea of the park took hold in the 1990s, first with the application to the Bundesgartenschau in 1993, hosted in Stuttgart, and then with the move of the fair at the beginning of the twenty-first century.
The urban park is designed to connect the green areas and gardens of Killesberg. The project involved a major desealing effort, bringing the permeable surfaces from 6.5 hectares before the start of works to about 10.5 hectares after the works.
The slope of the area has strongly characterised the concept of the project.
The park is made up of small one-metre-tall hillocks - like cushions - that leave traces of the topography of the site and efficiently collect rainwater. Thanks to the slopes and different types of collection - from the neighbourhood to the park, up to the underground tank of 3,500 cubic metres - the water crosses the area and follows the paths, until it is stored for the management and maintenance of the greenery.

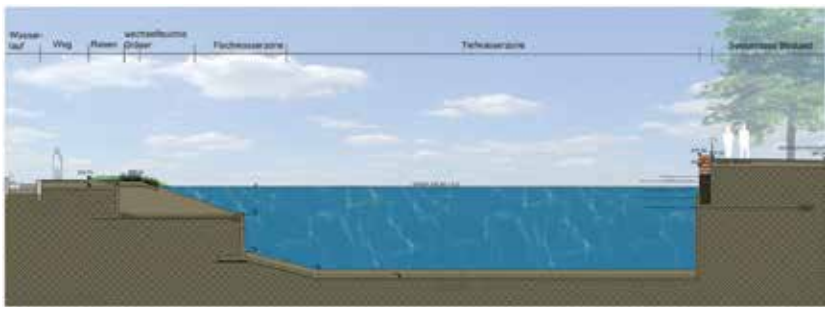
PROCESS OF TRANSFORMATION, RENOVATION AND REMEDIATION

to create an urban park with residences (200 accommodations), offices and services.
Between 2004 and 2005, an important historical survey of the contaminated areas (85% of the backfills) and a study to assess possible infiltrations and contamination were carried out at the site, which was strongly compromised; in the same period, an urban planning competition for the site, several architectural competitions for the built-up part and the landscape competition for the park were launched.
In 2007, the Fair was moved and the soil was reclaimed with the extraction of 315,000 tons of polluted land; from 2008 to 2013, the park was then built.



Masterplans, project sketches and basin cross-sections.
(Drawings by Rainer Schmidt Landschaftsarchitekten)





GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / The slope of the area has strongly characterised the park's layout and the regulation of water: small one-metre-tall hillocks - like cushions - efficiently collect the rainwater; thanks to the slopes and different types of collection - from the neighbourhood to the park, up to the pond and underground tank of 3,500 cubic metres - the water crosses the area and follows the paths, until it is stored for greenery management and maintenance.

Construction aspects of the blue infrastructure / The park's hydraulic rainwater collection system provides for delivery to an underground tank, from where it is sent to a newly built lake and thus returned to the surface hydrographic network.

Green infrastructure and public spaces / The green infrastructure is very simple: the hillocks covered with grass, occasionally dotted on the sides with trees. The public spaces essentially consist of paths and rest areas, created at the height of the ridges as green niches, with reserved seats and surrounded by the lawn.

Plant species and planting distances / /The design choices led to the creation of large grassy surfaces in relief with clearly outlined geometries. In the hillocks, on the west side of the park, specimens of poplar were inserted to create shaded areas to shield off the houses overlooking the park. Hygrophilous species (Typha) have been planted along the pedestrian path that runs through the park from north to south.
The largest surface is the grassy lawn, there are no flowerbeds or rows of trees, except at the western edge, where the poplars have been planted freely to give greater naturalness to the body of woods along the edge of the park.

Phytoremediation and phytopurification / The water treatment is carried out by the marsh vegetation that flanks the park's main path. The reeds that capture oxygen from the atmosphere, convey it to the roots, where it is released and used by aerobic bacteria for the degradation of pollutants found in surface waters.

Soil and bioremediation / The intervention involved the supply of large quantities of topsoil laid over the sterile soil of the previous settlements; this allowed the development of grassy coverings and trees that through the root systems remineralise the soil below.

Maintenance / The park's maintenance includes mowing of the lawn at regular intervals, and there is an emergency irrigation system. For the maintenance of the water canals, periodic cleaning of dirt and vegetation is necessary.

early '800

Killesberg is a hill north of Stuttgart, once mainly used for viticulture.

mid '800

Mining activities began and red sandstone quarries were opened.

early '900

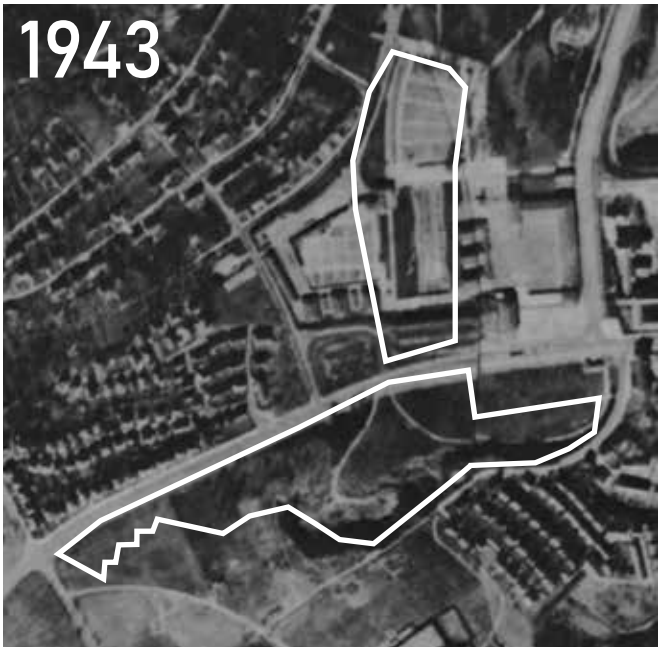
The city grew and Killesberg became one of the most exclusive neighbourhoods of Stuttgart, with detached houses and residences with gardens.

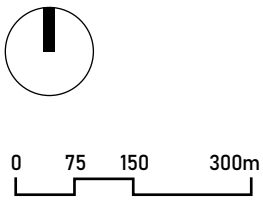
1939

The quarry was closed and the Killsberg area became home to the 'Reichsgartenschau', a gardening and landscape architecture exhibition designed by landscape architect Hermann Mattern.

1941-1942

The site became a collection point for Jewish citizens sent to the concentration and extermination camps. Since the 1960s, a stone memorial commemorates the more than 2,000 Jewish citizens who began their ordeal here.





Aerial photos and district transformation schedule. Note the evolution of the site, from quarry to exhibition complex, then park.

Right. Aerial view of the park.
(Photos by Raffaella Sirtoli, Besco, Stefan Müller)

1950

On the edge of the park was the Killesberg Exhibition Centre, with a total surface area of about 54,500 square metres, hosting 13 halls of different sizes and a conference centre.

1990

The location between a residential area and the park limited the growth of the Fair. The urban development strategy provided for its relocation and expansion outside the city.

2005

Pesch & Partner/ LA Lohrberg won the competition for the urban upgrading of the area. The project provides the framework for the neighbourhood's conversion.

2007–2009

The New Exhibition Centre was inaugurated and the old Killesberg Fairgrounds were completely dismantled together with the Parkhaus Rote Wand car park.

2008–2013

Landscape designer Rainer Schmidt won the competition for the creation of the park, which was inaugurated in 2013.

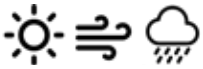
Top. Details, materials and vegetation.
(Photos by Raffaella Sirtoli, Besco, Stefan Müller)

Bottom. The semi-natural rainwater catchment basin downstream of the 'Grünen Fuge'. The water resources management system provides for first rainwater collection in a 3,500 cubic metre tank built in the basement of an old exhibition hall of the Fairgrounds.
(Photo by Raffaella Sirtoli, Besco, Stefan Müller)

MASTERPLAN KILLSPBERG PARK

INTERVENTION AREA

BUILT FABRIC AND PATHS

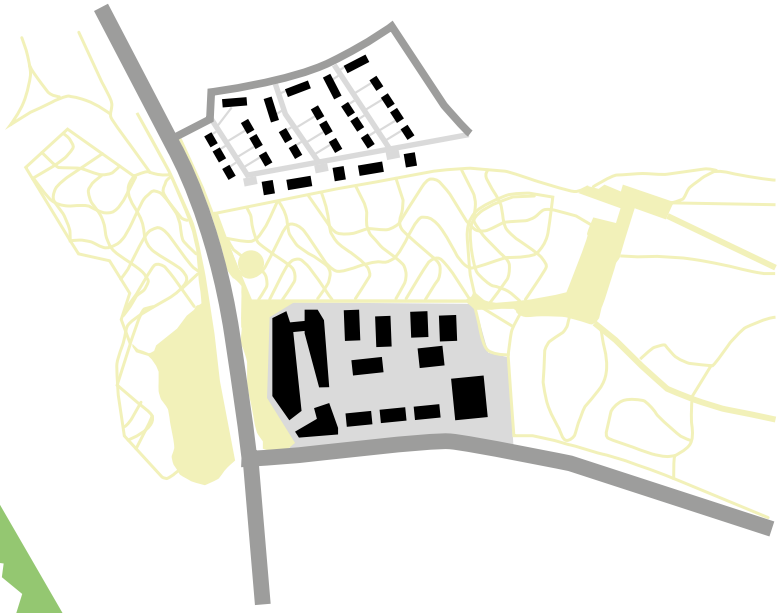


BUILDINGS

DRIVEWAYS

SQUARES AND PEDESTRIAN PATHS

SEMIPERMEABLE PAVED AREAS



GREEN INFRASTRUCTURE

CONTINUOUS ROW OF TREES

TREES AND / OR SMALL VEGETATED MASSES

HIGH TRAFFIC LAWN

SEMI-PUBLIC GREEN AREAS

PRIVATE COURTYARDS

BLUE INFRASTRUCTURE

CHANNEL AND PERMANENT BASIN

0 60 120 240m

The park and some design details: the canals that run alongside the pedestrian walkways and the integrated seating. (Photo by Raffaella Sirtoli, Besco, Stefan Müller)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
Città di Stoccarda

PROJECT TYPE
Urban park connection with the city's green infrastructure, called the 'green joint'

EX ANTE SITUATION
Cava, poi discarica, poi complesso fieristico espositivo.
I padiglioni della fiera si trovavano principalmente sui rinterri delle vecchie cave.

EX POST SITUATION
Urban park overlooked by residences and services

WORKS
Demolition of the old exhibition complex (17.8 ha including parking) and reclamation of the backfill of quarry areas on which it stood.
Construction of the urban park connecting the various parks and gardens of Killesberg (macante piece to complete the so-called 'green U' that extends from the Schlossgarten, to the parks of Villa Berg, Rosenstein Park, Wilhelma, Leibfridscher Garten, Wartberg and Killesberg up to the Feuerbacher Heide).
Construction of residences (200 apartments), offices, services (additional space for the Academy of Fine Arts) and social center.

SUDS
A hydraulic system for the collection of rainwater is foreseen, which is delivered to an underground tank and then conveyed to a new lake and returned to the natural cycle.
The park's lawn cushions are real biotopes, with flora and fauna determined by specific microclimatic conditions.

PARTICIPATION
The project is the result of a collaboration process with the local authority, citizens and residents.

URBAN PLANNING AND DESIGN TOOLS
Urban and architectural project
Landscape project.
Hydraulic Project

DESIGNERS
Architects Pesch & Partner / LA Lohrberg: masterplan and urban project.
Wulf & Partner: architectural project.
Rainer Schmidt Landschaftsarchitekten GmbH: landscape project.
Pfrommer + Roeder Landschaftsarchitekten: consultant landscape architect.
ARGE Zukunft Killesberg: project render.

AWARDS
2015 - WAN Landscape Award 2015, 1.Prize.
2014 - European Garden Award, 1.Prize, Category 'Innovative Contemporary Concept or Design of a Park or Garden'.
2014 - RTF-Award, 1.Prize, Category Landscape Design 'Built'.

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DER KILLESBERG
Ein Volkspark und seine Geschichte.

WEBSITES
www.redesc.de
www.landezine.com

SITE
Stuttgart, Germany

POPULATION
598,000 inhabitants

DIMENSIONS
10 hectares park

PERMEABLE AREAS
2.8 he before
11.5 he after

INVESTMENTS
7.5M €

C

squares public spaces gardens

C21

HALLE PAJOL AND ROSE LUXEMBURG GARDENS TRANFORMATION / PARIS - FR

from former railway depots to community public spaces

The Halle Pajol and the Rosa Luxembourg gardens are an ecodistrict in Paris, in the heart of the La Chapelle district, 18th arrondissement, which was once occupied by the Messageries de l'Est. It is a former railway area near the tracks of the Gare de l'Est, which was used as a postal service, including the Halle Pajol structure, the customs area and the Art Deco stone buildings, built in the 1920s. During its activity, the Halle Pajol was served by four railways, and it was a postal parcel loading/unloading platform, with a building technology typical of late 19th Century architecture.
The redevelopment focused on a 3.4 hectare area, with approx. 1 hectare of permeable surface, 3000 sqm of which is indoors.

Top right. The transformation of a former railway hub used by the national postal service into an ecodistrict included several environmental sustainability interventions. The garden developed below the Halle Pajol - a steel structure comprising 18 sheds and used as postal parcel storage deposit near the railway.
The building has been transformed by JAP Jourda Architectes Paris, following a redevelopment project that preserves the spirit of the place.
(Open spaces project and photos by IN SITU paysages & urbanisme)

Bottom right. The tanks that collect the rainwater channelled from the structure green roofs house species used in phytopurifying systems, such as Phragmites australis, Eichhornia crassipes, Nymphaea spp, Tyhpa latifolia.
(Photo by E.Farnè)

ENVIRONMENTAL AND SOCIAL REDEVELOPMENT AND ADAPTATION MEASURES

The project involves the redevelopment of a large area near the railway, including the postal building (former mail depot and sorting centre), the former customs area and the old Halle Pajol market.
The redevelopment was subjected to a delicate debate between the administration and the residents. The residents' involvement led the city of Paris to review the residential redevelopment project for the area, to meet the residents' request of recovering the historical buildings for social purposes, increasing public space and improving services.
The following units were created by redeveloping the historical Halle Pajol and the 1926 postal buildings: a 20-class college (600 students), a university building (IUT), a 4,000 sqm sports centre (including a gym, a martial arts room and a fitness area) and a shopping mall. The open public spaces include a large 4,000 sqm esplanade and a green area and (indoor/outdoor) garden system spread over approximately 9,000 sqm. The gardens are located along the border with the tracks - with a transition area comprising community vegetable gardens and green areas - underneath the Halle Pajol metal structure partly covered by solar panels. This public space is very welcoming, equipped for gatherings and stops. It is liveable and protected, and residents use it in their free time for individual or group activities, such as yoga, reading and playing.

THE PROCESS OF TEMPORARY REUSE AND CONCERTATION WITH THE INHABITANTS

Further to the ceasing of activities at the beginning of the 1990s, the SNCF site was abandoned for a long time. Between its divestment and the start of the new building project, the buildings were temporarily occupied by artists and social/cultural associations. A dance floor was turned into a theatre, and community vegetable and botanical gardens were created in the spaces outside. This phase allowed experiments with new forms of artistic expression, for the residents, in a temporary perspective.
In 1994, the city of Paris acquired the area, with the intention of demolishing both the Halle metallic building, and the Messageries unit, to build a densely populated residential area, with more than

The project represents na urban regeneration and eco-sustainable building redevelopment model. The architectural project, by French architect Françoise-Hélène Jourda, employs solely sustainable building materials, waste management, water management and energy production solutions. The Halle Pajol roof houses the second largest photovoltaic system in France. It comprises 1988 solar panels spread over 3,500 sqm with an annual production of 410,000 kWh. The youth hostel is a building with a low energy consumption and almost a positive energy, meaning it produces more energy than it consumes. The 220 sqm of solar panels cover hot water requirements. Through the installation of technical devices and an awareness campaign for its customers, hot water consumption in the buildings was reduced by 20%. The project entails rainwater recovery systems. The water is stored in reservoirs and then employed to manage the garden (plants and tanks) and vegetable patches. The green roofs cover a surface area of 1,740 sqm. Lastly, the redeveloped postal building (turned college) features a floodable courtyard.

Top. Plan of the Rosa Luxemburg Garden and ground connection of the Halle Pajol. Of particular interest is the design of the public space of the garden, covered and uncovered. The variety of equipped paths guarantees intimacy and frequentation at the same time, offering the inhabitants a space away from noise, protected, surrounded by greenery and of great aesthetic quality. Overall, the space is very attractive, lively and experienced by the people of the neighborhood. (Project and design by IN SITU paysages & urbanisme)

To the right. Areas equipped for play and free time. (Photo by E.Farnè)

600 new housing units.
The residents and the associations mobilized to protest against this project, which would have been built in an already highly-populated district, without green areas and services.
In the 1990s, two subsequent waves of protests blocked the project, which was suspended in 1999, and then resumed in the early years of the 2000s, although with a proposal more in line with the district residents' needs.
In 2002, the residents and local associations, with the aid of a team of voluntary professionals (urban planners, architects, sociologists) founded CEPA - Coordination Espace Pajol – with the (main and preliminary) purpose of redeveloping the Halle Pajol, considered to be a testimony of the industrial heritage that strongly affected the history of the La Chapelle district.
For over ten years - between 2002 and 2013 - an original consultation process involved the various 'institutional' players (public administrations, public services, operators, architects, landscape architects, etc.) and the civil community (residents, associations) in the urban project development. At the end of this process, the Halle Pajol and the Messageries building were redeveloped.
The mobilization gave rise to a district with several public services (library, gym, youth hostel, entertainment hall), schools and educational centres, stores, and green areas (esplanade, gardens). The positive impact of these new services and public spaces went well beyond the intervention's scope.


COATINGS
AND FLOORING
bituminous grit
concrete
stabilized
land
Stone
wood
VEGETATION
shared garden
exotic garden
meadow
tree-lined area
grass area
shrub area
ivy
scots pine
hornbeam
prunus
ash tree

1926

The Customs and Postal services moved to Rue Pajol; the Halle Pajol - a metal structure for goods loading - and the Halle Des Douanes - an Art Deco concrete building with a glass roof - were built.

1980s

When the industrial activities were terminated, the buildings were abandoned and the area was filled with urban waste.

1990s

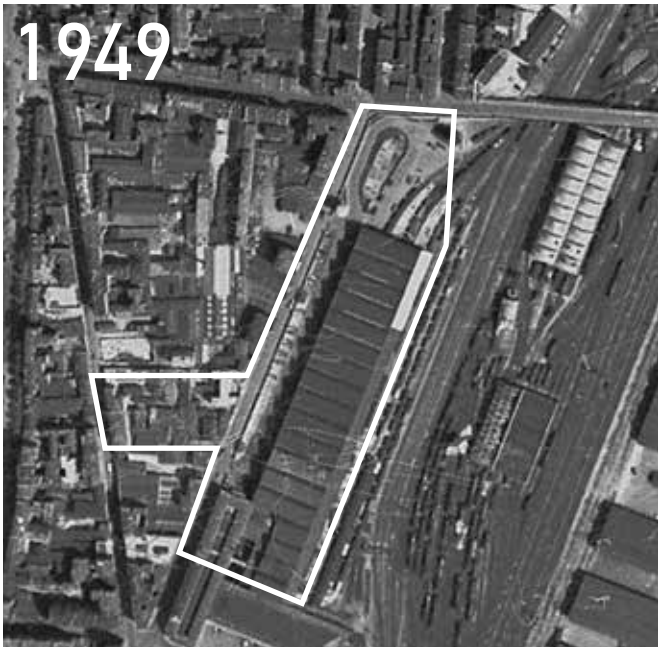
Artists, social-cultural associations and residents temporarily occupied the open spaces and the run-down buildings with theatre spaces, experimental artistic activities and community gardens.

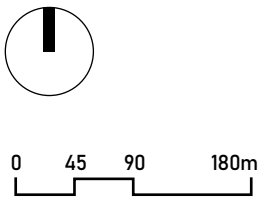
1994

The ZAC Pajol was established: the city of Paris wanted to acquire the areas and buildings, demolish the pre-existing structures (Halle Pajol and Batiment Des Messageries et Douane) and create a residential lot.

1999

The residents and the associations mobilized against this project, which would be included in an already highly populated district, without green areas and services.





Aerial photos and district transformation schedule
Note the evolution of the area, first with the reconversion of the volumes and then with the endowment of new public spaces and gardens.
In the last ten years we have gone from a mostly closed and mineral configuration to an open one with large equipped permeable green areas.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / The transformation of this area included environmental sustainability interventions, which enhanced the identity of the industrial heritage: pedestrian walkways flanked by perennial flowerbeds and longitudinal tubs, lie along the old railway tracks.
In the project, rainwater becomes a resource: it is collected on the roof and stored in tank-pools underneath the Halle Pajol steel structure, where a water garden with flower-filled areas and vegetable patches have been created, to obtain a shaded and relaxing environment.
Since the gardens are mainly located underneath the Halle roof, we can say that the project affects the hydraulic invariance volume. While in the outdoor sections, rainwater falls to the ground and penetrates the green areas and the beaten earth paths.

Green infrastructure and public spaces / / The project involved the creation of indoor/outdoor gardens and a transition area near the railway tracks with vegetable patches; the spaces created are accessible, usable, liveable and cultivable by the citizens.
In the outdoor area, a sort of floodable green square has been implemented, scattered with mountain pines to create a grove; an ash row marks the main path toward the Halle Pajol semi-covered area, creating a kind of green railroad. The metal structure houses large rectangular flowerbeds, with wooden seating elements nearby, and larger rest areas. Several tanks with hygrophilous species have been placed along the pedestrian paths, near the building, to store the rainwater collected on the roofs; this water is used to irrigate the gardens' green areas.

Plant species and planting distances / The project features rustic species that do not require any specific maintenance, such as grass and perennial herbaceous plants, shrubs and climbing plants. The rainwater collection tanks feature water species, such as water lilies, irises and water hyacinths. The area near the restaurants houses raised flowerbeds with herbs, cherry trees and small ornamental species.

2000

The area redevelopment project was reviewed, based on a program that was more in line with residents' expectations.

2002

CEPA - a group of voluntary professionals (planners, architects, sociologists), local associations, and citizens - was set up, with the common desire to redevelop the Halle Pajol and the postal-customs building.

2002-2013

A consultation between the public administration and the civil community (residents, associations, CEPA, district council) led to a new project to redevelop the buildings.

2004-2006

The area redevelopment site opened: it all started with the Halle deconstruction and creation of the sports centre and college.

2014

The works ended and the activities occupying the buildings, the Pajol esplanade and the public gardens were progressively launched.

In the urban vegetable garden areas, the species vary depending on the season, and create a colourful mix of vegetables.
The main project area houses avenues lined with ash trees and filled with bulky grass species on the bottom. Lawn areas with pine trees have been created near the floodable square, to create an urban pine grove and a playground. The semi-covered flowerbeds feature different herbs and shrubs, with the aim of creating a dense vegetation with variable volumes and hues.

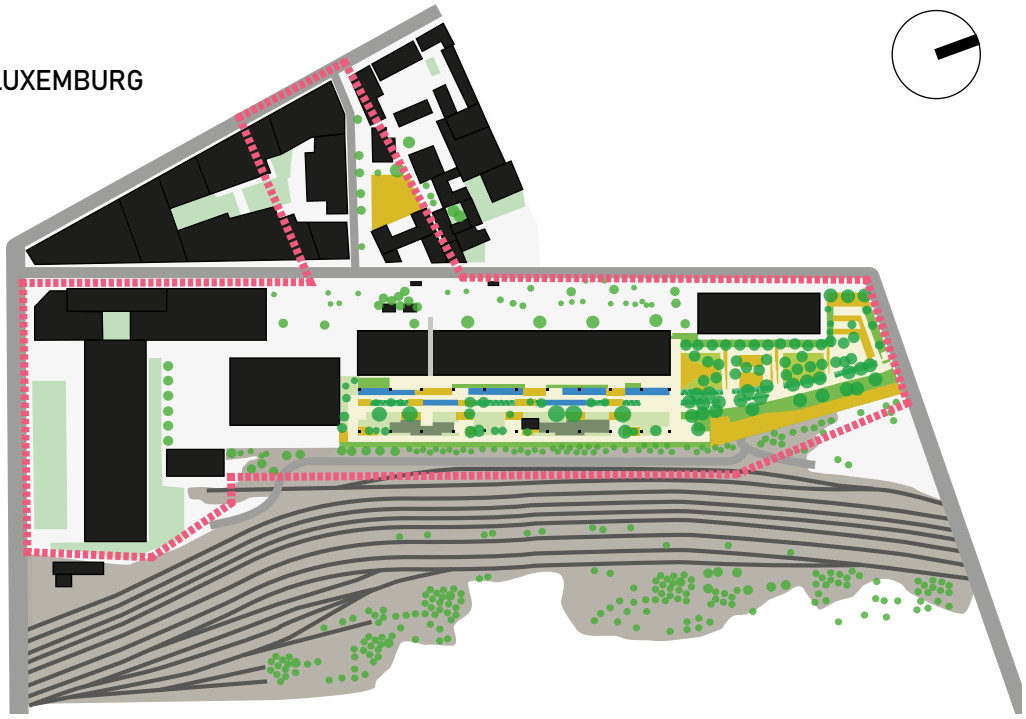
Phytoremediation and phytopurification / The tanks that collect the rainwater channelled from the structure's green roofs house species used in phytopurifying systems, such as Phragmites australis, Eichhornia crassipes, Nymphaea spp, Tyhpa latifolia.

Soil and bioremediation / The presence of new plant species, and of their roots in particular, positively affects the permeable soil mineralization. There is no mention of additional extensive remediation projects (also because a large part of the railway bed was left unchanged). Desealing interventions have been carried out inside the building.

Maintenance / The project entails limited maintenance costs and provides for a significant contribution by the vegetable gardens' habitues and keepers in managing the green areas. The projec'st green areas do not require special maintenance interventions, fertilization or plant protection treatments. It includes an irrigation system that distributes the rainwater stored in the tanks. The most significant maintenance is performed on the tree-lined avenues and lawn areas, with routine pruning and mowing.
The building and public space materials have been chosen to pursue energy self-sufficiency and reduce pollution and waste (including water).

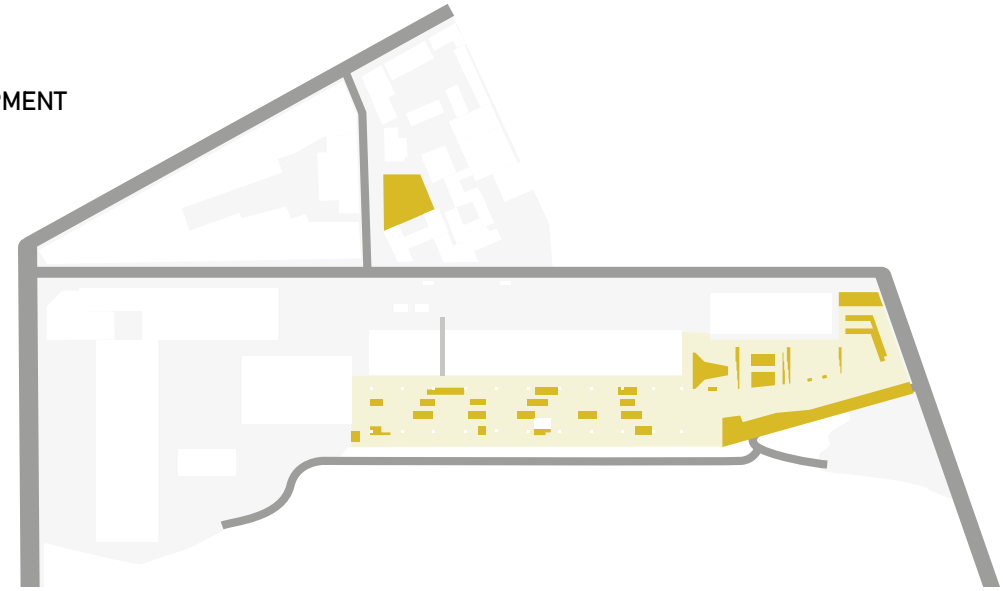
Details of the green project
and the structure of the
Halle Pajol.
(Photo by E.Farnè)

MASTERPLAN JARDIN ROSA LUXEMBURG



INTERVENTION AREA

COLLECTIVE PATHS AND EQUIPMENT



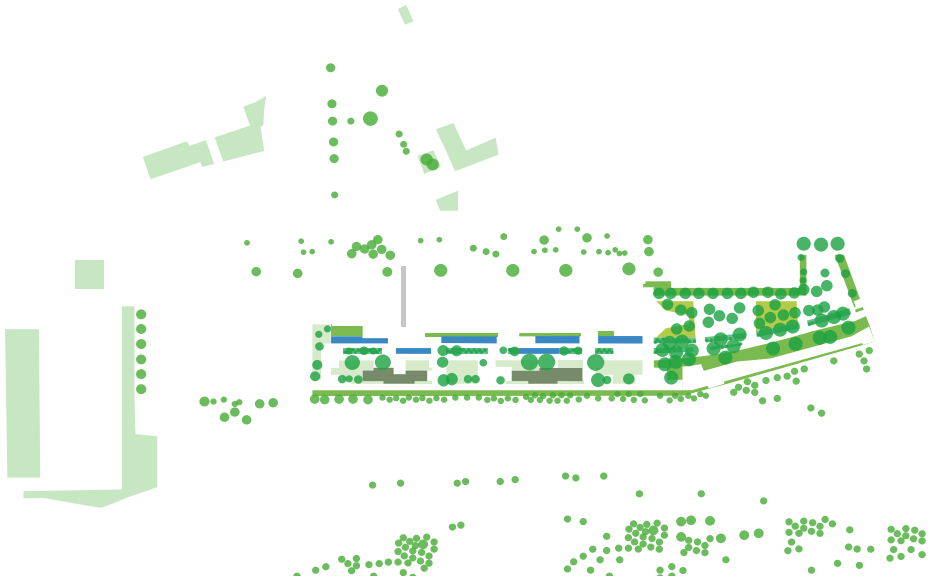
DRIVEWAYS

PEDESTRIAL AREA

SQUARES AND PEDESTRIAN PATHS ON THE GROUND STABILIZES

EQUIPPED AREAS

GREEN INFRASTRUCTURE



TREES

VEGETABLE GARDENS

SHRUB BAND

GRASSES

COVERED GARDEN

MEADOW

PRIVATE COURTYARDS

BLUE INFRASTRUCTURE

BASINS

0 25 50 100m

The main project area houses avenues lined with ash trees and filled with bulky grass species, perennial herbaceous plants, small shrubs and climbing plants.
It features rustic species that do not require any special maintenance: Miscanthus, Carex, euphorbia, convallaria, verbena, Clematis, ferns, stipa tenuissima, Carpinus, Fraxinus.
An interesting thing to notice is how Miscanthus sinensis is included in some blacklists of plants to be eradicated in Italian territories, according to regional Regulations and LD 230 of 15 December 2017, to adapt the regulation to the provisions of EU Regulation no. 1143/2014 of the European Parliament and of the Council of 22 October 2014.
(Photo by E.Farnè)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
City of Paris

PROJECT TYPE
Service building and neighborhood public garden.

EX ANTE SITUATION
Railway area in frieze on the tracks of the Gare de l'Est, with a covered structure consisting of the Halle Pajol and the brick building of the Postal and customs warehouse.

EX POST SITUATION
Neighborhood garden with play areas, green spaces and small vegetable gardens.
Residences and services to the structure of the old market.
Intervention with particular attention to renewable energy sources (3,500 square meters of panels were installed on the roof of the structure, the largest urban photovoltaic plant in France.

WORKS
Intervention for the recovery of the railway area, post office and customs building and the old Halle Pajol market; along the border with the tracks, depaving interventions and construction of a transition strip with community gardens and gardens.
From the recovery of the metal structure of the old market and from the 1926 post office, the following are created: a college of 20 classes (600 students); the IUT (university institute): a 4,000 m2 sports center (equipped with a gym, martial arts room, fitness area) and a 5,200 m2 Green Uno shopping park.
The public spaces include the 4000 square meter esplanade and green areas (covered and uncovered) for 9,000 square meters.

SUDS
Rainwater recovery systems are envisaged for the irrigation of gardens and vegetable gardens; 1,740 square meters of green roofs; a floodable courtyard in the post building recovered for the college.

PARTICIPATION
The Halle Pajol area has been the subject of a complex process of temporary reuse by inhabitants, associations and artists who have fought for the recovery of the area with collective functions and community green spaces. Thanks to the grassroots activities promoted by the community of the neighborhood, the city of Paris has revised its real estate plans to meet the inhabitants and the needs of local community services.

URBAN PLANNING AND DESIGN TOOLS
1994: ZAC Pajol approval
- 1999: suspension of the project (ZAC).
2000-2002 elaboration of a new program by the residents supported by the CEPA association.
From 2002 to 2013, a long consultation process with the formulation of a new redevelopment and recovery project for the two buildings (Halle Pajol and Batiment des Messageries et Douane).

DESIGNERS
In Situ Architectes
Paysagistes: landscape.
Agence Galiano-Simon: ZAC coordination and design of public spaces.
Jourda Architectes: Halle project.
Ateliers 2,3,4 - Bolze et Rodriguez-Pages: college project.
Brisac-Gonzalez Architects: sports center project.
Brossy et Associés: I.U.T.project .

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SITE
Paris, France

POPULATION
230 mil
city of Parigi
184 mil
18° Arrond.

DIMENSIONS
3.5
he tot
9,000
sqm gardens

PERMEABLE AREAS
0 he
before
0.7 he
after

INVESTMENTS
30M €
total
3M €
garden

C22

TRANSFORMATION OF THE MAZAGRAN ISOLATION AND JARDIN D'AMARANTHES / LYON- FR

from an abandoned area to a square and community public gardens

The Mazagran block is located in the heart of the Guillotière district, north of the 7th Municipality of Lyon. The district has been populated since the 19th Century by migrants, workers from South Italy, Turkey, Maghreb and China.
Today, the Mazagran block is known for its large community garden - Jardins d'Amaranthes - created by the residents, under the guidance of the artist Emmanuel Louisgrand. The garden is located on the land that formerly housed a parking lot and a series of run-down buildings that had to be demolished to make way for new residential buildings. The Mazagran block, before the redevelopment, was completely built-up for over 5,600 sqm, while today its buildings occupy just 1,000 sqm and the public space spreads over 4,600 sqm.

Right. The Jardines des Amaranthes is located in the Guillotière district, a sensitive urban area, in a context defined by the French Public administration as the primary recipient of city policies (1996-2014).
The project is an example of desealing of a former parking lot area, where the soil was made semi-permeable again by creating an art community garden.
Today, the green elements cover the majority of the surfaces made permeable with the desealing interventions, creating a continuous ground cover.
(Photo by L.Ravanello)

ENVIRONMENTAL AND SOCIAL REDEVELOPMENT AND ADAPTATION MEASURES

In the 1990s, the Mazagran block was the scene of social unrest and disputes with the residents over the district development planned by the Local Administration. The city of Lyon and the Grand Lyon - owners of different lots in the block - had planned for acquisition, demolition and transformation policies and interventions, to redevelop the Guillotière - an ill-famed area, albeit in the city centre and with great transport links.
This vision of the district as a troubled area was strongly opposed by the residents, and especially by the local associations, by suggesting interventions aimed at preserving and revitalizing the weak social relationships of the community, instead of the real-estate investments and scheduled demolitions (which were promoting gentrification).
Thanks to the residents' involvement, the city of Lyon changed its redevelopment project, creating a public area for the district with a strong social and environmental value. Today, the Mazagran block comprises a series of public spaces: a large 650 sqm permeable and fenced community botanical/ vegetable garden; a 350 mq playground; a 1,300 sqm tree-lined square paved with beaten earth; 1,000 sqm of connecting paths; and 1,300 sqm of lawn areas with benches, for gathering and resting. Overall, 1/3 of the space is covered with lawns and vegetable gardens, 1/3 is covered by the semi-permeable equipped square shaded by trees, and 1/3 by paths.

Furnishing elements, spaces equipped for play and socialization. (Photo by L.Ravanello)

A NEW PUBLIC SPACE IN THE DISTRICT AND THE GARDEN PARTICIPATED BY THE COMMUNITY

For the associations, preserving the Guillotière's popular nature - a central district integrated with the rest of Lyon's districts - was essential. The associations wanted to preserve and extend the Amaranthes public gardens, and redevelop the surrounding public buildings for social purposes.

The history of the Amaranthes public gardens starts in 2003, in the Mazagran block, with a run-down and degraded building that the Grand Lyon wanted to demolish with an urban transformation project in mind.

On the initiative of the Roger Tator Art Gallery, and with public funding, the artist-gardener Emmanuel Louisgrand was asked to create an orange metal greenhouse in the garden, to transform it into a temporary pop-up art garden.

In just one year, the greenhouse became a community garden, giving residents the chance to meet to tend to it. In no time, the garden became a social gathering, environmental, artistic, creative and social experimentation workshop.

With the Amaranthes Public Gardens, the district community proved to Grand Lyon's Public Administration how - through self-organization and educational/recreational practices based on urban gardening - it is possible to bring back people into public spaces. This action legitimized the social will, and the Mayor of the 7th Municipality - after numerous meetings - agreed to change the urban redevelopment plans, by leaving the Amaranthes Gardens where they are and investing

1990s

The Mazagran is a "troubled" block located in the heart of the Guillotière district, north of the 7th Municipality of Lyon. The district is populated by many immigrants and is the scene of frequent social unrest.

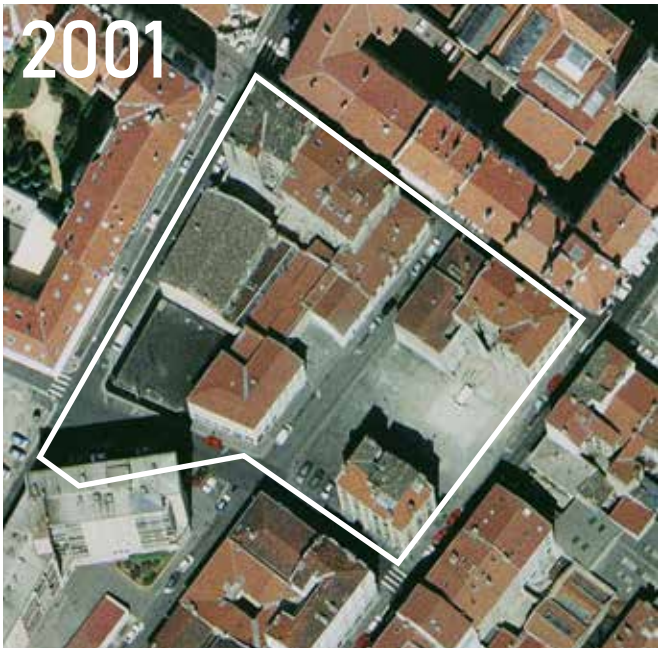
2003

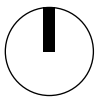
Grand Lyon presents the redevelopment project for the Mazagran block, to demolish a run-down building, according to the urban plan.

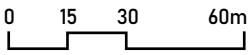
2003

On the initiative of the Roger Tator Art Galler, and with public funding, artist-gardener Emmanuel Louisgrand is asked to create an experimental project on the area.

The result is the famous orange metal greenhouse and the temporary pop-up garden.







GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / / Desealing interventions in the outdoor spaces - the parking lot area and the demolished buildings foundation area - increase surface permeability, reduce runoff and infiltrate part of the rainwater that falls on the surface.
The desealing-based intervention is inherently a Nature-Based Solution; the approach and depaving implemented, the creation of spaces for vegetable gardens, the green areas with plants and the tree-lined squares are all NBS that positively affect the people's optimal temperature and humidity comfort.

Green infrastructure and public spaces / The new community garden is a green area, partly planted with trees and permeable surfaces, which creates shade, ensures a good soil-permeability level, improves temperature comfort and reduces the district runoff. The interventions led to the creation of different green elements integrated in the garden: a large vegetable/botanical garden area, a tree-lined beaten earth square, a large cross-strip with shrubs, groundcovers and lawns, dividing the public space in two.

Aerial photos and district transformation schedule.
Note the evolution of the site over time.
In fact, between 2001 and 2007 the first part of the garden was built, half of the block is still dilapidated and built, on the left, while the right part is practically a parking lot, with the exception of the vegetable garden and the mass home to the first trees. The block is still split in two by the road.
In 2008, the configuration did not change much, while 11 years after the block it became all public pedestrian space and accessible to people. The road no longer crosses the block and the inhabitants can play there and find themselves in complete safety.

2004

The greenhouse becomes a community garden, and a social gathering, environmental, artistic, creative, and social experimentation workshop, regularly attended by the residents.

2005-2007

The garden extends thanks to further demolition.

after 2007

The administration decides to change the urban transformation plans, leaving the garden as it is and investing in public space with sports equipment, playgrounds and district services.

from 2007

The garden is managed by the Brin d'Guill' association, which organizes environmental, gardening and farming activities for local association and residents.

Today, the Jardin d'Amaranthes is a place of gathering, social aggregation and sharing.

The project is constantly evolving: the spaces, colours, shapes and volume change, increasing biodiversity and the venue's identity. In particular, the urban vegetable garden is a real oasis, with vegetables, flowers, shrubs, insects and small animals. The vegetable garden surface area has increased over time; the different portions have been enclosed with small mobile wooden fences, and connected to one another with raised wooden footbridges.
Around the project area, there is a green permeable square, with a dozen locusts, to recreate a small urban grove. There is a playground, seating, tables, tool sheds and small huts.
The Jardins d'Amaranthes feature a wide variety of plant species: different vegetables throughout the year, herbs, perennial herbaceous plants, flowers, small shrubs and climbing species. The trees planted are locusts, willows and small fruit trees, such as fig and apple trees planted in the vegetable gardens. Among the vegetable species, there are plants originating from foreign countries, which show the residents' desire to integrate and give value to the cuisine and traditions of some immigrant communities of the district.

Planting distance / Due to the peculiar project dynamics, the planting distance cannot be defined. Plant spaces are continuously transforming and becoming essential tanks of green and animal biodiversity.

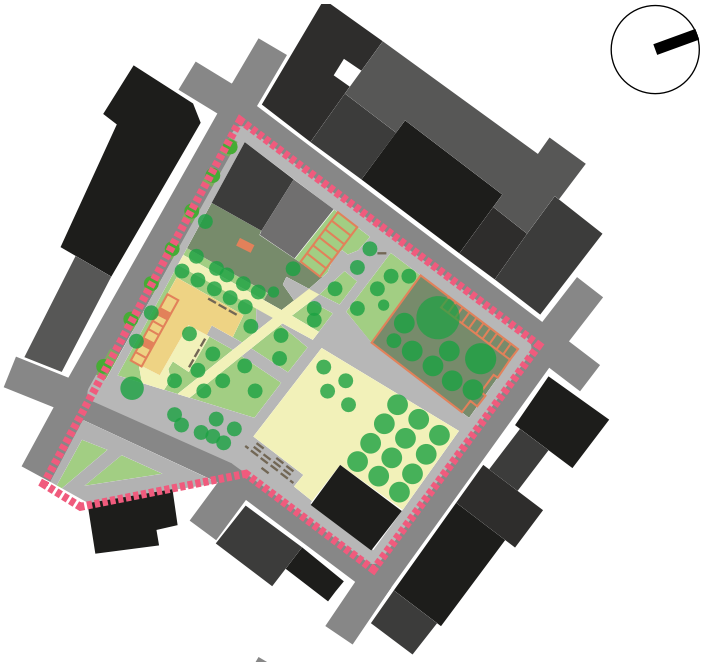
Soil and bioremediation / The demolition of run-down buildings and the removal of the asphalt layer in the parking lot area resulted in a 2,500 sqm permeable surface; the presence of plants, and, in particular, the roots development leads to an important soil re-mineralization.

Maintenance / The urban space is managed and cared for by residents and by the district associations created to support the gardens realization. The strong sense of community that has arisen around this project ensures constant care for the green areas. The garden is an open workshop to experiment with different types of synergic or biodynamic cultivation, and to study how to reduce water consumption, through different types of mulching and cultural mixtures.

The Jardins d'Amaranthes are characterized by a very rich variety of plant species: different vegetables throughout the year, aromatic plants, perennial herbaceous plants, flowers, small shrubs, climbing species.

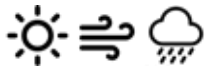
The arboreal component consists mainly of locust trees, weeping willows and small fruit trees such as figs, and apple trees planted in the vegetable gardens. Among the vegetable species there are plants typical of other countries, a sign of the residents' willingness to integrate and enhance the cuisine, the traditions of some immigrant communities in the neighborhood.
(Photo by L.Ravanello)

MASTERPLAN JARDINES DES AMARANTES



INTERVENTION AREA

COLLECTIVE PATHS AND EQUIPMENT



DRIVEWAYS

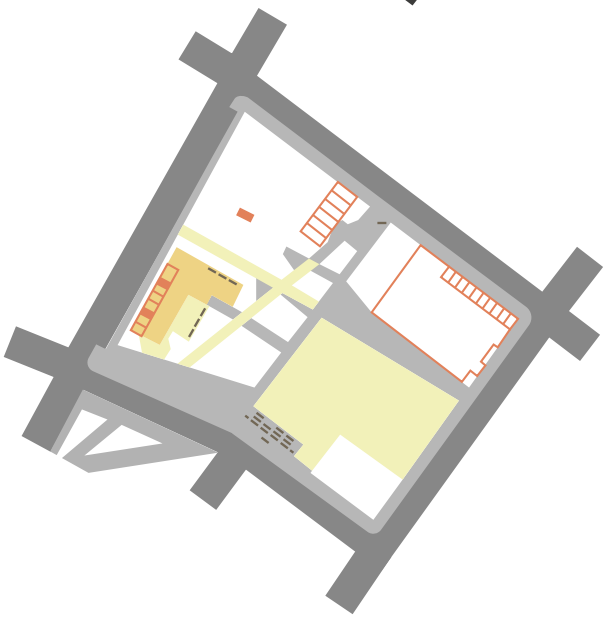
CONCRETE SIDEWALKS

SQUARES AND PEDESTRIAN PATHS IN STABILIZED

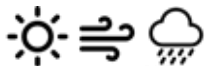
EQUIPPED AREAS

SESSIONS

GREENHOUSE AND STEEL STRUCTURE



GREEN INFRASTRUCTURE

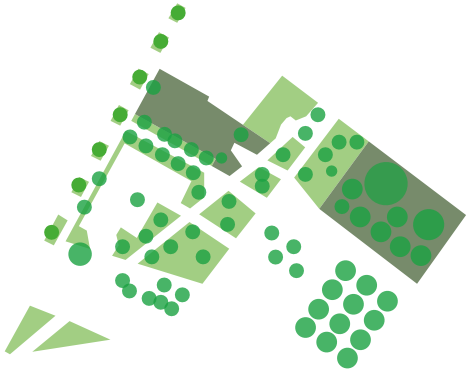


TREES

VEGETABLE GARDENS

MEADOW

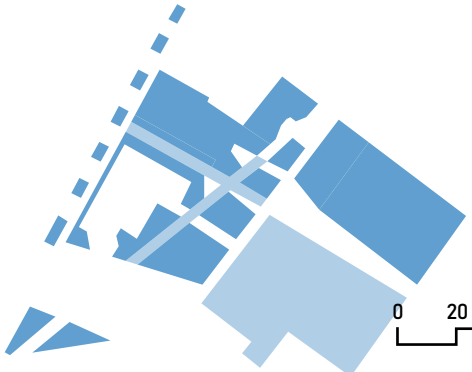
PRIVATE COURTYARDS



BLUE INFRASTRUCTURE

PERMEABLE AREAS

SEMI PERMEABLE AREAS



0 20 40 80m

The vegetation inside the garden with the typical fuchsia amaranth. Amaranth is a plant native to Mexico, with edible grains and usually consumed in ways similar to cereals.
The community gardens created are of two types: areas cultivated directly on the ground level and vegetable gardens in wooden boxes filled with backfill.
This type of vegetable garden has been designed to obtain productive spaces in urban contexts, to favor the work of the elderly and the disabled.
(Photo by L.Ravanello)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS

AIR QUALITY AND POLLUTANS REGULATION

NOISE REDUCTION

RUNOFF REDUCTION AND FLOOD

POLLINATION AND BIODIVERSITY

URBAN COMFORT AND MICROCLIMATE

PUBLIC SPACE ACCESSIBILITY AND RECREATION

IDENTITY SENSE PLACE HISTORY

BEAUTY OF NATURE

CLIENT
City of Lione
and Grand Lyon

PROJECT TYPE
Urban spaces of proximity; restoration of small public spaces as a result of urban regeneration processes with functional and social mixité (25% social housing) and increase in public spaces

EX ANTE SITUATION
Urban void (délaissé urbain) used as a parking lot in a residential area of the 19th century with a prevalence of immigrant populations.
The Guillotière district, in which the art garden project is part, is still today the subject of redevelopment by Grand Lyon with demolitions / reconstructions.

EX POST SITUATION
Artistic, community garden managed by the residents through associations.
The artistic garden is transformed over time into a shared garden and vegetable garden; all around there are both privately and publicly owned buildings intended for social housing.

WORKS
Demolition of pre-existing buildings and removal of the asphalt from the parking area.
Interventions by artists (project of the metal greenhouse, the garden and the murals).
Construction of several other (small) public spaces within the larger Ilot Mazagran.
Main greenhouse and garden; shared gardens of Amaranthes; plantation area of locust trees.

PARTICIPATION
The garden experience is typically bottom-up. The main protagonists are the artists and resident citizens through their associations. The project will extend to the entire Ilot Mazagran is supported by a 'spontaneous' participatory process. Later the inhabitants formed the Brin d'Guil association.

URBAN PLANNING AND DESIGN TOOLS
In 2011, a series of meetings organized by Le Grand Lyon made it possible to agree on some general objectives, which were then translated into a tender for the redesign of the block with the Amaranthes garden, and of the îlot Mazagran and other confined spaces.

DESIGNERS
Emmanuel Louisgrand of the Galerie d'art Roger Tator for the greenhouse and ephemeral artistic garden

BIBLIOGRAPHICAL SOURCES
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Noémi Quesnay (a cura di), *Les jardins partagés urbains: des lieux d'expérimentation du social ? Le cas du jardin d'Amaranthes à Lyon, dans le quartier de la Guillotière*, Université de Lyon, Institut d'Etudes Politiques de Lyon

Laurent Denis (a cura di), *Du jardin partagé au jardin de trottoirs Nature de quartier et éco-citoyenneté à Lyon*

Laboratoire d'Eco-anthropologie et Ethnobiologie (UMR 7206), Muséum National d'Histoire Naturelle, 2010

WEBSITES
www.lepassejardins.fr

www.jardinons-ensemble.org

https://territoridellacondivisione.wordpress.com/2012/04/15/lione-guillotiere-14/

www.journals.openedition.org/insitu/19446

SITE
Guillotière, Lyon, France

POPULATION
485,000 city inhabitants
18,000 Guillotière district

DIMENSIONS
4,500 sqm plot
650 sqm garden

PERMEABLE AREAS
0 he before
2,500 sqm after

C25

ZOLLHALLEN PLAZA / FREIBURG - DE

from parking lot to rain square

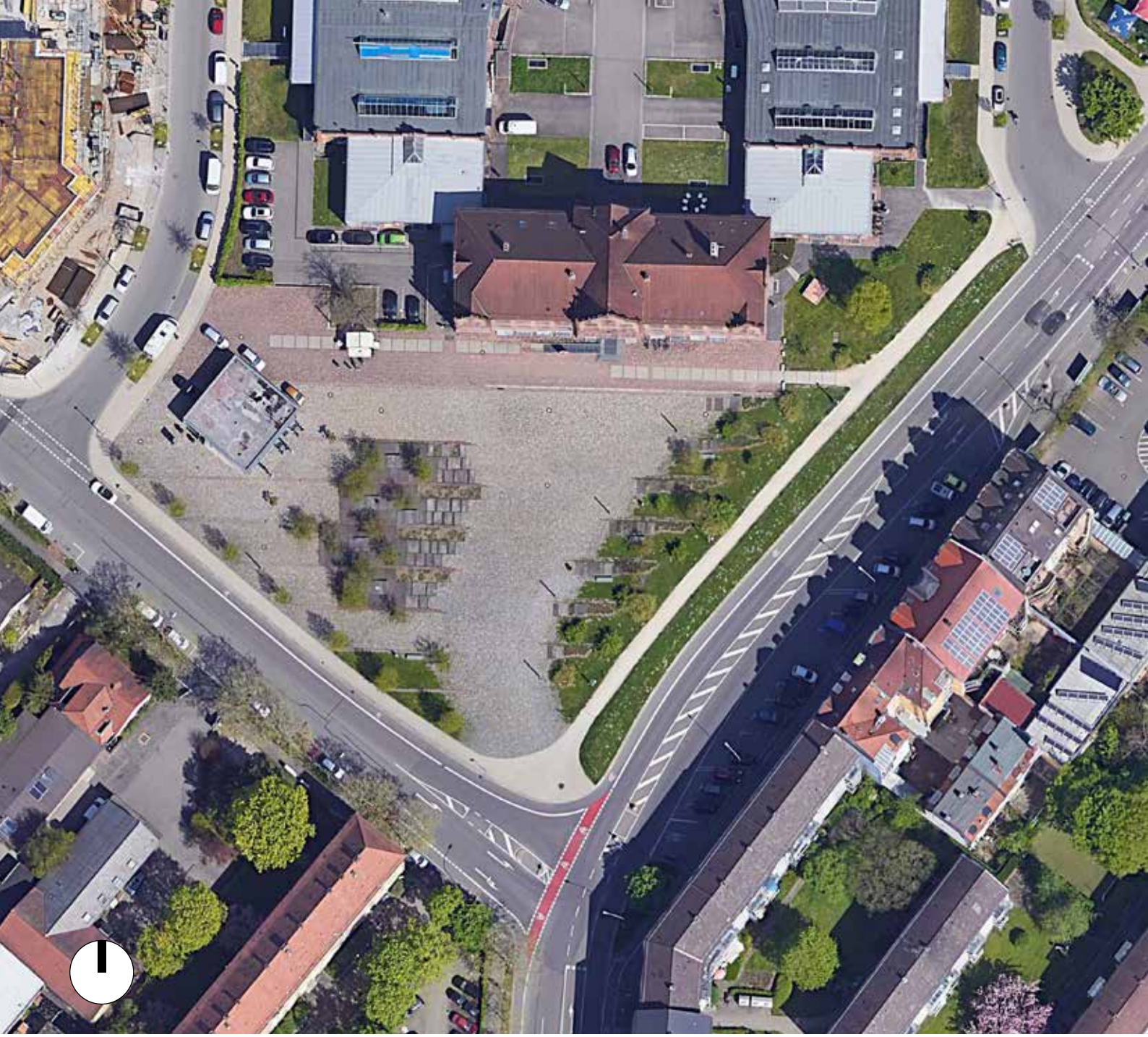
Zollhallen Plaza is an urban square designed as an actual rain square, capable of managing hydraulic and hydrological invariance volume, completely disconnected from the drainage system.
The square is located in front of a former railroad customs area, in the heart of a suburban district of Freiburg.
The redevelopment concerned a 5,600 sqm area, with approx. 1,500 sqm of permeable infiltrating surface.
The square works in depth, in section format, thanks to a series of infiltration systems which, from the top layer, infiltrate and collect the rainwater, passing through slots, lawn areas, and gravel trenches. The square top layer is rugged, with gentle slopes, channelled into a floodable sunken area. The rainwater collected here is conveyed into the phreatic zone, rather than into the drainage system.

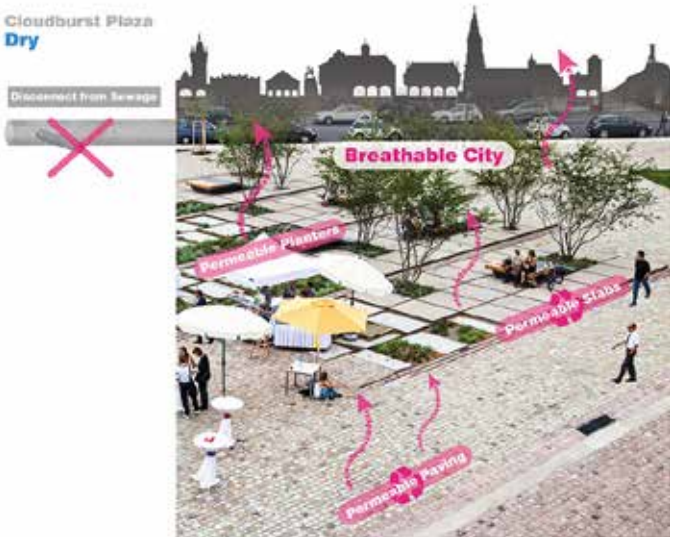
Top right. Today, the green elements cover the majority of the surfaces made permeable with the desealing interventions, creating a continuous ground cover.
(Photo by NM)

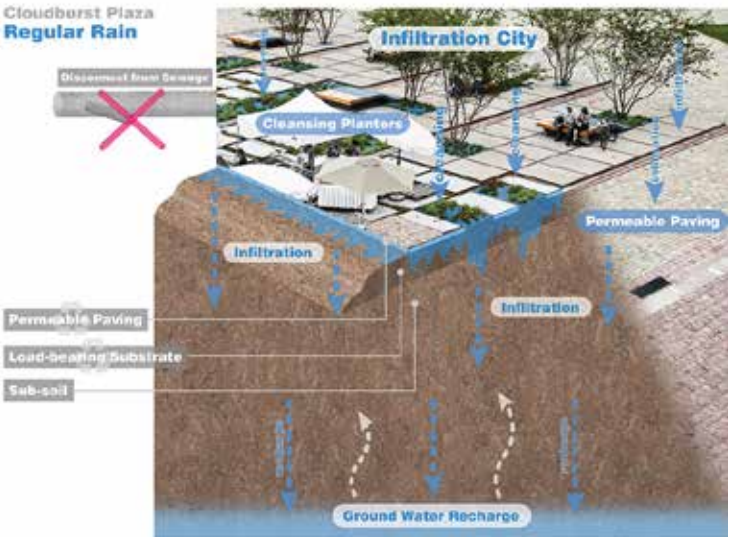
Bottom right.
Top view of the square.
(Photo by Brian Doherty)

WATER-SENSITIVE URBAN DESIGN FOR CLIMATE ADAPTATION

The square design is inspired by the railroad area's historical elements, thanks to the old tracks that have been recovered and added to the paving and a number of giant seating elements that can be used in different ways and that have iron and metal edges.
However, the project has both an aesthetic and functional purpose, by proving that each public mineral space, even those located in historical contexts, can be designed as a tool for climate adaptation. Disconnecting the square from the drainage system allows this city section to increase rainfall management capacity, ensuring hydraulic and hydrological invariance, also in adverse conditions, during extreme and extended rainfall events.
Thanks to the building assets, the square is also better equipped to manage climate events due to the heat island and heat wave effects, since the permeable and green paving increase evaporation and ground cooling.
From a green standpoint, cherry trees are scattered on the side of the square, ensuring a certain level of shade in the summer, while the ground infiltration points are covered with perennial and ornamental plants blended into the paving, which give the square a rustic look.
Building materials have been recovered from the former railway area as much as possible, allowing cost-effective resource management and a balanced integration of the materials in the context.
Through this redevelopment project, the public space, equipped with seating elements and a small food kiosk, has become a multi-functional and liveable place, used also as market and temporary event area.



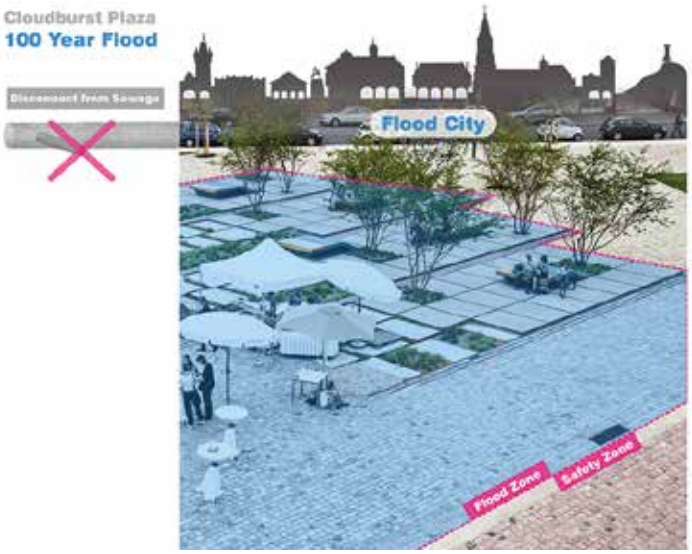

Cloudburst Plaza
Dry
Disconnect from Sewage
Breathable City
Permeable Planters
Permeable Slabs
Permeable Paving


Cloudburst Plaza
Regular Rain
Disconnect from Sewage
Infiltration City
Cleansing Planters
Infiltration
Permeable Paving
Infiltration
Permeable Paving
Load-bearing Substrate
Sub-soil
Ground Water Recharge

Square operating diagrams and project masterplan.
Zollhallen Plaza is the perfect example of a rain square.
Rainwater management is performed without any connection to the drainage system: flower boxes are water infiltration points (permeable planters); water is collected and purified by the plants, and then filtered by innovative built-in filtering media, which slowly releases it into the phreatic zone, and partly stores it, significantly reducing the hydraulic overload on the drainage system.
The square sunken areas, in case of need, can become temporarily floodable basins.
(Ramboll Studio Dreiseitl)
(Drawings and diagrams by Ramboll Studio Dreiseitl, photo area taken from GoogleMaps).

Bottom. Technical details of water drainage.
(Photo by L.Ravanello)



from 1900

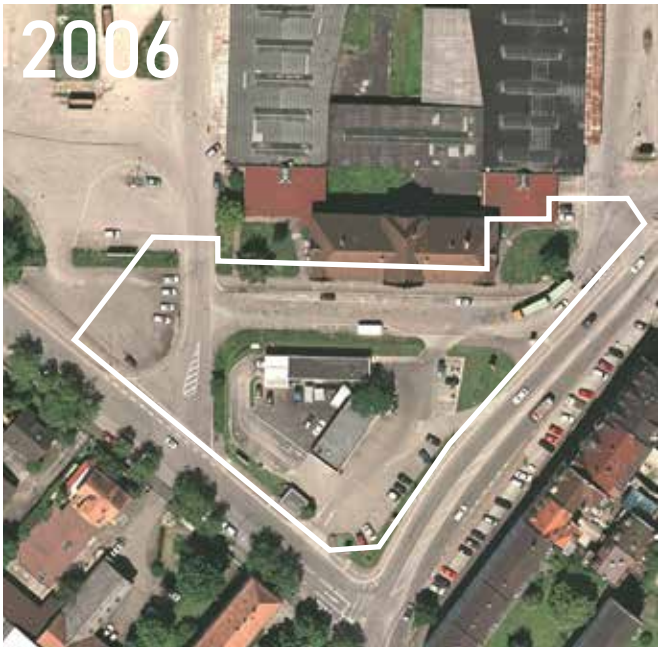
The entire district of Güterbahnhof is intended as a railway yard to separate freight traffic from the central station of Freiburg which is no longer able to cope with the drastic increase in traffic. The locomotive hall, a majestic brick building built in 1905 in the style of the industrial architecture of the time, overlooks the square.

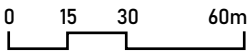
1980s

The decommissioning of the railway freight terminal begins: the unused area is used as a parking lot, awaiting new functions.

2009

Ramboll Studio Dreiseitl designs the new square completely disconnected from the sewage system which is already overloaded during intense meteorological events.





Aerial photos and time schedule of the transformation of the square. Note the large de-paved area in 2009, which corresponds to the subsoil area in which the storage and retention tanks are placed.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / The entire square rainwater management is performed without connections to the external drainage system, in total hydraulic and hydrological invariance and independence. Flower boxes are important water infiltration points (permeable planters); water is collected and purified by the plants, and then filtered by an innovative built-in filter, which slowly releases them into the phreatic zone, and partly stored, significantly reducing the hydraulic overload on the drainage system. The square sunken areas can, in case of need, become temporarily floodable basins, should critical events occur.

In the event of ordinary rain, the project entails the following stages: 1) biofiltration through the cleansing planters; 2) infiltration through the drainage surface; 3) groundwater filling; 4) disconnection from the drainage system.

In the case of weather events with a return time of 10 years, apart from the functions above, the following aspects are included: 1) increased infiltration from the drainage surface, due to the water gradient; 2) activation of the underground storage and drainage boxes, connected with an overflow; 3) pipe to the underground reservoir tanks.

In the case of weather events with a return time of 100 years, apart from the functions above, the following aspects are included a set floodable area, separated by the so-called safety zone.

The intervention involves open public spaces, and entails the use of mineral paving laid with techniques ensuring its partial permeability (draining slabs and joints, grout channels, etc.), underground reservoir boxes - usually made of plastic (low-cost) - and reservoir tanks for rainwater recycling. The filtering flowerbeds/boxes play an important role too, both to promote runoff infiltration into the subsoil, and to ensure a first bio-filtering effect.

Green infrastructure and public spaces / Small green niches have been created on the paved pre-project surface; a mixture of several herbaceous and shrub species to allow the development of vegetable and/or animal associations, developed in favourable environmental conditions and that will gradually take over the new space.

2011-2016

The Güterbahnhofs building is declared a national monument and completely renovated The locomotive hall and the ground floors house commercial activities and offices (fitness and wellness center, ceramic and natural stone laboratory, advertising agency, clinical research centers, pharmacy, graphic design studios and architecture).

The upper floors of the two side slats are instead redesigned with residential functions (apartments of various sizes, attics and a student residence).

2011

Inauguration of Zollhallen Plaza: following the conversion and demolition of warehouses and industrial buildings, the neighborhood is filled with new residents who frequent the square.

2019

The conversion of the Güterbahnhofs is now complete and Zollhallen Plaza is starting to host a weekly market.

Plant species and planting distance / From a botanical standpoint, species with low water and maintenance requirements were preferred, such as grass and perennial herb plants, e.g. sage, rudbekia, sedum, and nepeta.

The choice of cherry trees is interesting, from both an aesthetic and functional standpoint. This species makes the square aesthetically pleasing during the different seasons, thanks to the decorative elements of the trunk, flowers and lush canopy, and the red colours in autumn; also, the large canopy offers restoring shade in the summer, while the absence of leaves in the winter lets the light and heat of the sun - particularly pleasant in this season - through.

Many perennial herbaceous plants mixed with one another, herbs and some species of cherry trees were planted for the project.

Phytoremediation and phytopurification / No specific phytopurification project was established, although there is no doubt that the rhizosphere will trap pollutants and perform a phytoremediation process that were non-existent before.

Soil and bioremediation / The use of green elements, such as perennial herbaceous plants and trees, promotes soil re-mineralization and improvement of its chemical and physical characteristics.

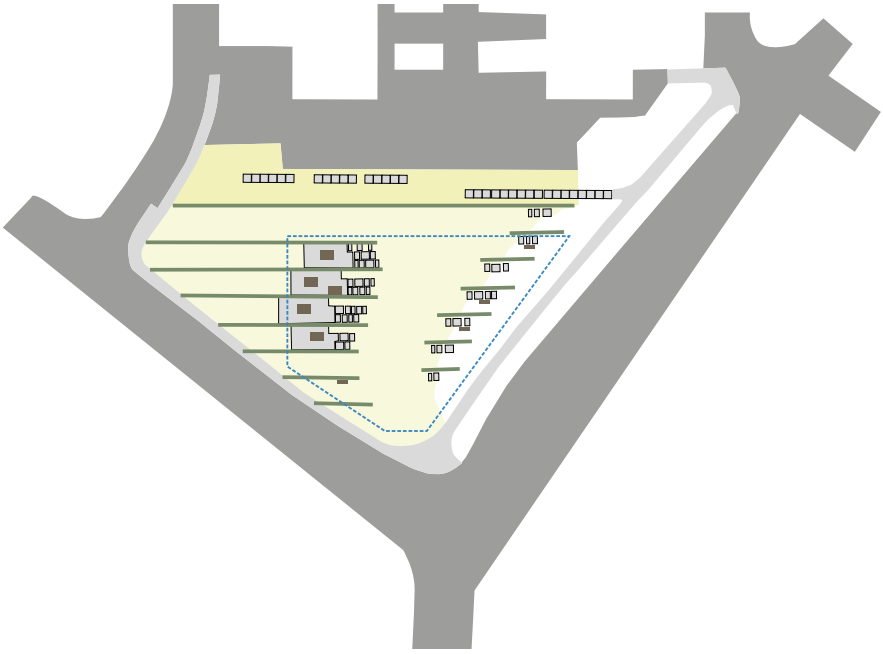
Maintenance / Given the limited green surface and the choice of species with low water and nutritional needs, maintenance requirements are low. The flowerbeds feature a gravel mulching, to reduce weed development and promote rainwater infiltration. Although no information has been provided on the matter, we can assume that the complex drainage system entails mid-high hydraulic costs.

Details of the furnishings of the square.
(Photo by L.Ravanello)

MASTERPLAN ZOLLHALLEN PLAZA

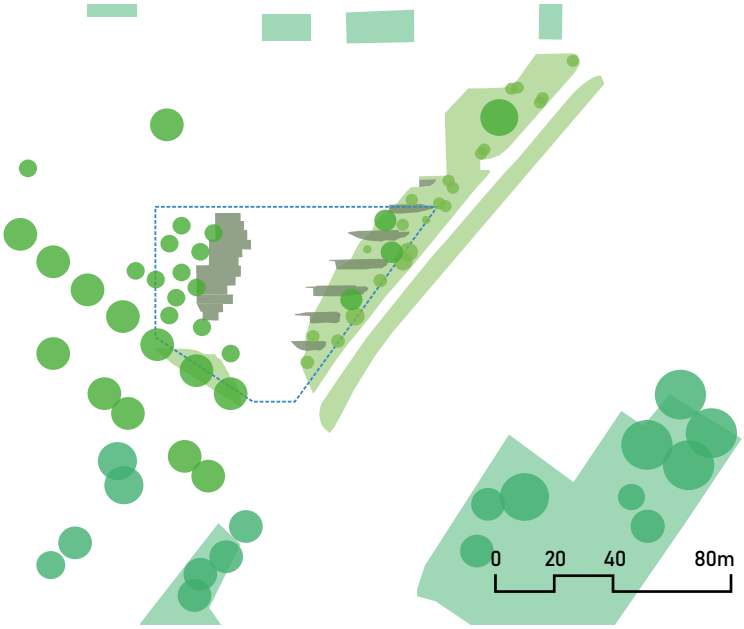
INTERVENTION AREA

PATHS AND FURNISHING ELEMENTS



- ROADS AND DRIVING ROUTES
- PAVEMENTS
- SEMI-DRAINING FLOORING
- WATERPROOF FLOORING
- INFILTRATING FLOORING
- INFILTRATION LAMINES
- SITTINGS

GREEN INFRASTRUCTURE



- CONTINUOUS ROW OF TREES, SINGLE TREES
- TREES IN PRIVATE COURTYARDS
- SMALL VEGETATED MASSES
- MEADOW
- RUSTIC GARDEN
- PRIVATE COURTYARDS

BLUE INFRASTRUCTURE

- FLOW AREA CORRESPONDING TO THE OVERALL DIMENSIONS OF THE TANK AND THE UNDERGROUND STORAGE TANKS

Detail of the infiltration areas: the species used have low water requirements and low maintenance, such as perennial grasses and herbaceous plants such as sage, rudbekia, sedum, nepeta.

Permeable, semipermeable and mineral floors are laid with techniques that ensure their partial permeability. For example, large concrete slabs with steel edge bumpers have drainage joints, as do porphyry cubes. (Photo by L.Ravanello)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
City of Freiburg in Breisgau

PROJECT TYPE
Urban regeneration

EX ANTE SITUATION
Parking

EX POST SITUATION
Water square and multifunctional public space

WORKS
The project reuses mineral and ferrous materials from the railway site. Rainwater management takes place in the absence of connection to the sewer system. The planters are the infiltration points (permeable planter) of the water which, thus collected and purified through the use of vegetation, are then filtered with an innovative in-built filter medium that slowly returns them to the water table and, in part, the stocca, significantly reducing the hydraulic overload on the sewage system. The depressed areas of the square function, in case of need, as temporarily floodable basins.

SUDS
The square's drainage, filtering and storage system is designed for return times of meteoric events.
With regular rains, the water table is fed (Infiltration city).
Weather events with a return time of 10 years involve storage (storage city).
Weather events with a return time of 100 years involve temporary flooding (Flood city).

URBAN PLANNING AND DESIGN TOOLS
Architectural, landscape and hydraulic project

DESIGNERS
Landscape Architecture
Ramboll Studio Dreiseitl

WEBSITES
www.ramboll.com
www.landezine.com

VIDEO
www.vimeo.com/53000609

SITE
Freiburg im Breisgau, Germany

POPULATION
230,000 inhabitants

DIMENSIONS
5,600 sqm

PERMEABLE AREAS
700 sqm before
1,500 sqm after

C39

VIALE MATTEOTTI / MILANO MARITTIMA - IT

from vehicular road to shared public space

Between 2017 and 2018, the Municipality of Cervia started a redevelopment and pedestrianization project for Viale Matteotti, in Milano Marittima, one of the most attractive and popular seaside destinations on the Riviera Romagnola, developed in little more than a century, based on the 18th Century garden city.
The avenue redevelopment intervention entailed a large-scale pedestrianization of the public space, removal of parking lots, depaving of 1/4 of the total surface, reconstruction of the underground utilities and creation of large rain gardens below the tall maritime pines that characterize this tourist destination.
Overall, the intervention area spreads over 4 thousand square meters.

The 'new' Viale Matteotti in Milano Marittima, a tree-lined street-garden, with large vegetated spaces crossed by pedestrian paths and areas equipped for parking and socializing. The project, which integrates with the cycle path coming from the pine forest, has seen the reconstruction of the road pavement, sidewalks and street furniture with new seats, plant protection grids, baskets, parapets and didactic panels designed ad hoc. The intervention is completed by a lighting system of the roadway with LED street lamps.
(Photo by E.Farnè and F.Poli)

QUALITY OF THE PUBLIC SPACE AND MEASURES OF ADAPTATION TO THE CLIMATE IN THE EVOLUTION OF THE BEACH CITY

Milano Marittima has a very recent history: its urban development only began in 1907 on the inspiration of English garden cities. In just over 100 years, first thanks to the elite tourism of the early 1900s and then to the mass tourism of the second post-war period, the sandy coast has been transformed into a trendy seaside resort, a real garden city. between the sea and the coastal pine forest.
However, the city has developed very quickly, not always preserving the nature and the sea which are the main environmental and economic resource of local tourism.
After the epoch of the economic boom, thanks to some difficult seasons that saw the hospitality sector in difficulty due to the mucilage of the late 80s, from the 90s the public debate on the need to restore quality to the cities of the coast becomes more and more relevant. urban and water quality.
Over the course of twenty years, local administrations have invested heavily, from the enhancement of the pine forest, to the collection of sewers, up to the quality of the public space and more recently on climate adaptation issues.
Viale Matteotti is, in chronological order, one of the most recent transformations promoted by the municipal administration of Cervia. The avenue project, which took place in conjunction with the experimental path of the Emilia-Romagna Region REBUS - on public space and climate adaptation measures - is an opportunity for the Administration to experiment with nature-based systems, still very little applied in Italy, and monitor its functioning and effectiveness.

THE DESIGN OF THE AVENUE AND WATER MANAGEMENT

Viale Matteotti develops about 500m from the sea, parallel to the coast; it is one of the most important streets in the tourist area of the city, where shops, activities and trendy clubs are concentrated. The avenue, entirely paved, has a double row of imposing maritime pines that shade the urban fabric and commercial activities.
The need to redevelop the most central stretch of the avenue and redo the underground services


JULIAN
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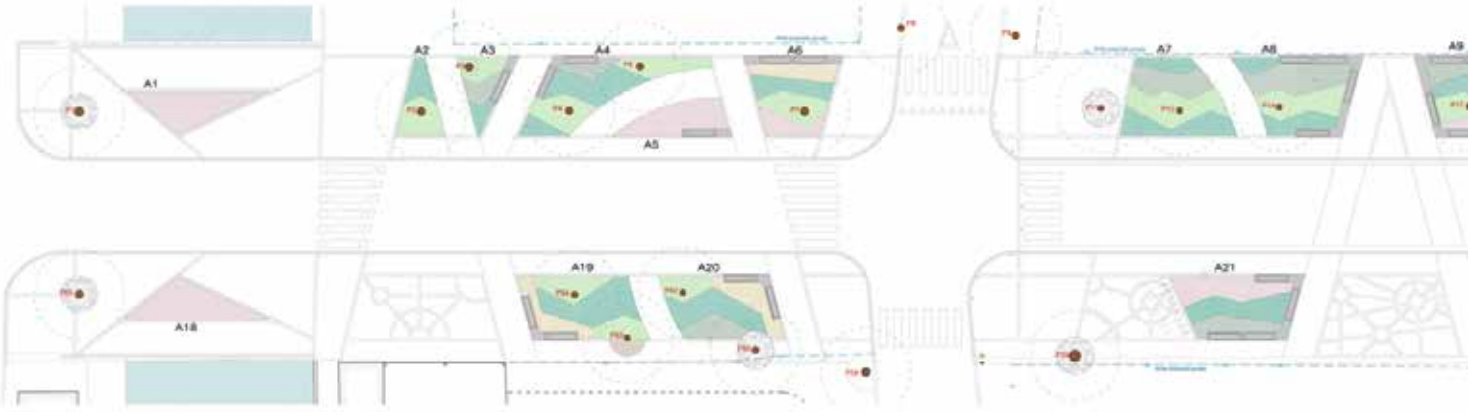


- about 200m of linear development, from the roundabout I Maggio to the Canalino - was an opportunity to rethink the flows, enhance the public space, improve urban comfort and increase soil permeability.

Like most of the resorts of mass seaside tourism, the city takes on a configuration with variable geometries during the seasons: in winter it is a small provincial town, with activities and services that work mainly in the center or on weekends; in summer it registers important tourist presences that make it crowded and dense. This seasonal condition greatly affected the choice of transformation of the avenue, in which an attempt was made to make more mobility systems coexist with the need to restore urban quality and adaptability to public space.

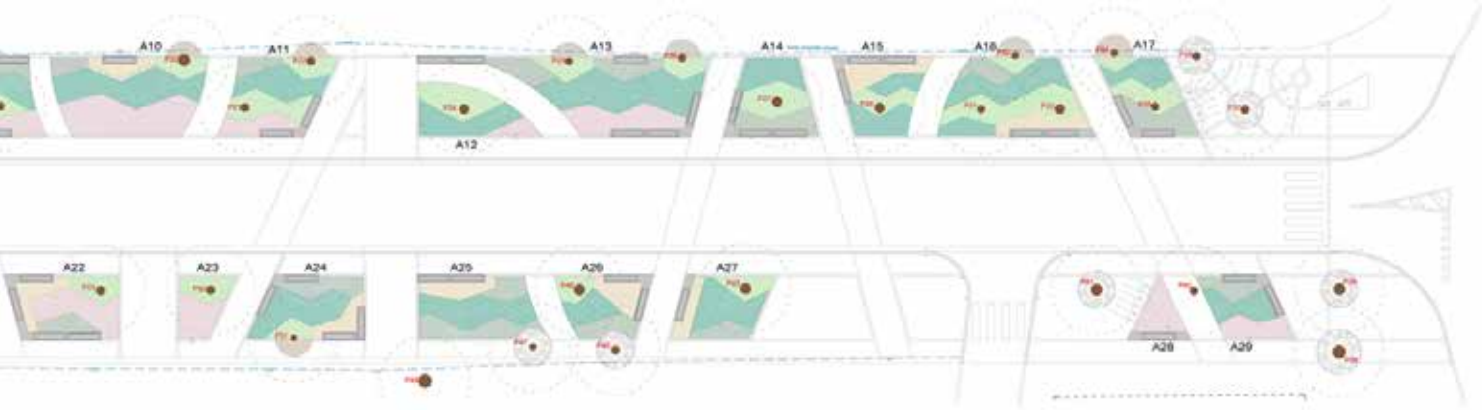
The Viale Matteotti project starts from three guiding principles:

- increasing public space and create an attractive, welcoming, liveable and wheelchair-accessible space.
- reducing the space taken up by cars and managing vehicle and pedestrian flows;
- managing and collecting rain for soil infiltration.

Thanks to the creation of large rain gardens below the trees, parking lots are completely depaved and removed, freeing up about 1/4 of the total public surface, with benefits for water management and for the maritime pines' roots. Rain gardens look like large depressed green flower beds on both sides of the avenue and in front of the stores. On the rain garden edges, passageways are reorganized with large sidewalks and comfortable benches.

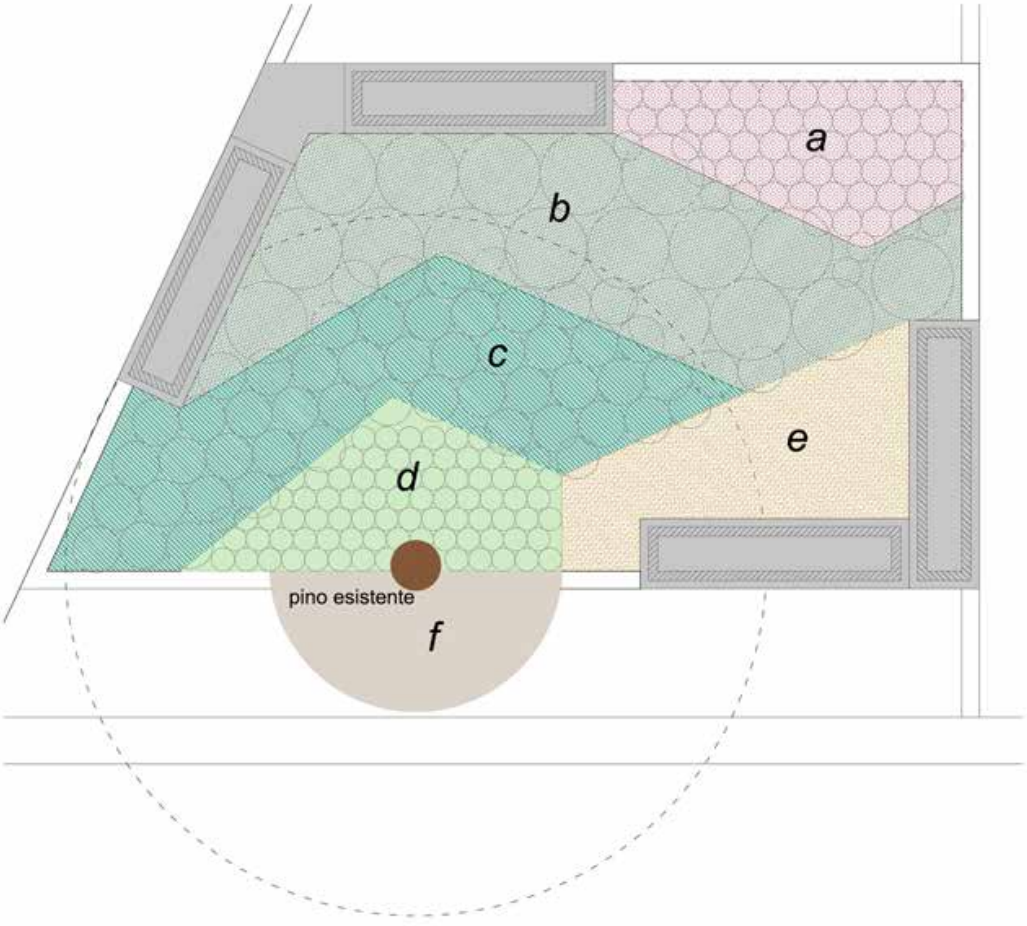
The central part of the avenue is still open to vehicle traffic, although with diversified configurations; in the winter and during summer days, vehicle transit is permitted, at limited speed, while during summer evenings it is completely prohibited, creating a large pedestrian public space. The result of this project is a large shared space where people and vehicles can coexist.

In order to ensure maximum accessibility and usage, all the surfaces are bordered by flush curbs, to remove all architectural barriers. The rainwater flowing from the buildings and the large sidewalks is channelled toward the rain gardens, the soil and the groundwater, via gentle slopes; the road network rainwater is collected in the drains connected to the sewage system.



At the top. Project plan.
(Landshapes Studio Project)

The right. Vegetation composition type.
A -Annual plants for seasonal flowering, 15-18 plants / sqm.
B -High shrubs h 80-100cm (Myrtus communis, Nandina domestica), 2-3 plants / sqm.
C - Medium shrubs h 50-70cm (Pittosporum nanum, Hypericum hidcote, Buddleia nana Blue Chip, Loropetalum, Punica granatum nanum, Rosmarinus officinalis prostratum, Euphorbia caracias or dendroid, Nandina domestica nana), 7-8 plants / sqm.
D - Perennial and upholstery species h 30-50cm (Convallaria japonica nana, Pachysandra terminalis, Euryops pectinatus, Erigeron annuus, Perovskia atriplicifolia, Pennisetum aloipecuroides, Imperata cylindrica rubra, Rudbeckia fulgida, Verbena bonariensis, Salvia nemorosa, Echinacea purpurea, Muhlenbergia capillaris), 20.
E- Natural pavement type concrete.
(Landshapes Studio Project)



1907

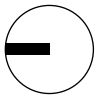
The Municipality of Cervia signs an agreement with the Maffei company, one of the most important Milanese entrepreneurial families, for the development of a vast area still uncultivated and unused along the coast, with the obligation on the part of the concessionaire to build villas, parks and gardens. . Thus was born a new seaside area called Milano Marittima, founded on the principles of the garden city of Ebenezer Howard.

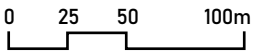
1934-1936

The construction of Viale Matteotti begins: first the section between the Rotonda Primo Maggio and the Canalino and then the 2,313 meters between the Canalino and the Canale della Cupa on the border with Lido di Savio.
The new road must connect Milano Marittima to the north and provide for the settlement of villas and commercial activities to showcase the excellence of the 'city of pines'.

1940s

The sumptuous villas of noble families and the bourgeoisie rise along the avenue, as well as hotels, the Arena-Mare cinema, the Taverna Verde-Villaggio del Libro, a rotisserie and some famous colonies.





Aerial photos and time schedule of the transformation of the avenue.
We are in a consolidated urban area, where the maritime pines and their thick umbrella-like foliage represent one of the elements of greater identity of the place. The project kept them, clearing the ground at their base.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND URBAN WATER SUSTAINABLE MANAGEMENT

Blue infrastructure / The hydraulic project entails the creation of two separate and interconnected drainage systems: the rain gardens, which collect the water from roofs and from the large pedestrian areas, and the white sewage system, which collects the rainwater from the road network and any excess water from the rain gardens. The initial hydraulic project involved solely the sewage system; by integrating the green infrastructure project into the avenue project, the sewage system has been integrated with nature-based urban rainwater collection, purification and groundwater infiltration systems.
The avenue project is an interesting hydraulic and hydrological invariance application, since it performs holding function both from a capacity and from a discharged volume standpoint.

Blue infrastructure construction aspects / The strip between the two urban façades of the avenue is 25 m wide. Rainwater flowing from the road network is intercepted by the drains along the road edge, while the water run-off from the large pedestrian paths in front of the stores and the buildings flows toward the green depressions, through gentle slopes in the paved surface. Flower beds are lower than the curb edge, and are decidedly concave in the last section, in order to ensure a reservoir bed. The extremely sandy and permeable soil promotes water infiltration in the subsoil, which is in any case controlled by drainage pipes connected to the sewage system. Where the flower beds could not be achieved around the trees, draining flexi-pave type materials have been used, by mixing gravel conglomerate and recycled binding rubber.

Green infrastructure and public spaces / The green project enhances the avenue's longitudinal continuity, with perennial ornamental shrubs and species, arranged in continuous single-type rows. Standing in the avenue's central section - the pedestrian area - you would have draining

1950s

Milano Marittima has a further urban boom, which definitively consecrates it as one of the most renowned seaside resorts in Italy where foreign tourists and famous people stay.

1980s

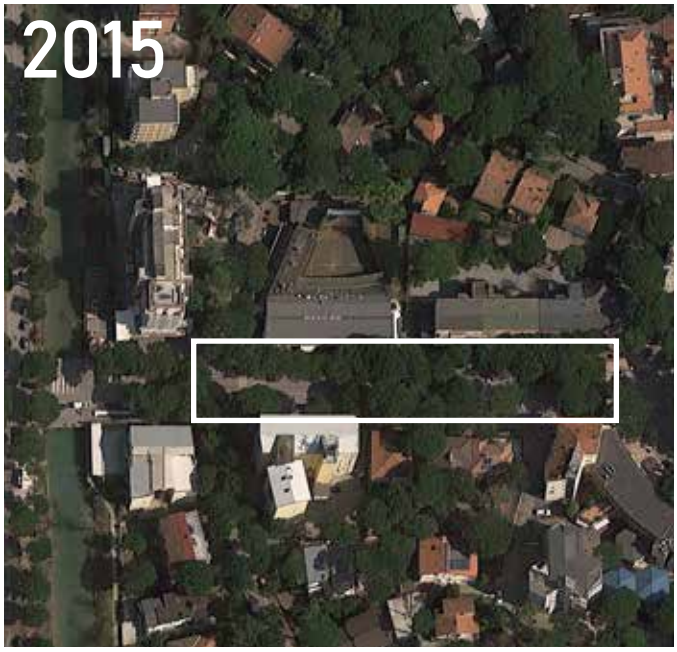
Some Art Nouveau villas and buildings along Viale Matteotti are demolished to make room for new multi-storey buildings destined to accommodate an ever-increasing flow of tourists and new trendy shops.

2017-2018

The Municipal Administration foresees the reconstruction of the central section of the Viale with the aim of facilitating slow mobility and promoting the attractiveness and livability of public spaces.

2019

Modifications to the road network continue, with the construction of the cycle path along Viale Matteotti Nord and the expansion of parking areas serving the center.



gardens on both sides, with large green and colourful areas. Each flowerbed houses many species and colours, generating a pleasant and attractive space. When you walk or stop on the sidewalk, in front of the stores, you are closer to the green areas and, thanks to the many benches, you can approach them, to look at the colours, shapes, pose and scent of shrubs, flowers and trees.

Plant species and planting distances / There are five green areas in the rain gardens: 1) annual ornamental species planted in May, to form colourful cushions along the roadside: Petunias, Zinnias, Ageratum, Impatiens, Begonias 2) 80-100 cm high shrubs, on the sidewalk side and/or behind the benches: Myrtle, Nandina; 3) medium shrubs and 50-70 cm perennial herbaceous plants in the middle of the flowerbed: Pittosforum, Hypericum, creeping rosemary, Nandina; 4) Perennial and ground covering species on the sidewalk edge; Pachisandra, Verbena bonariensis, Convallaria Japonica, Salvia nemorosa, Echinacea purpurea. Only ornamental plants have been chosen, to promote the attractiveness of this public space. Dense planting distances to promote the ground covering effect.

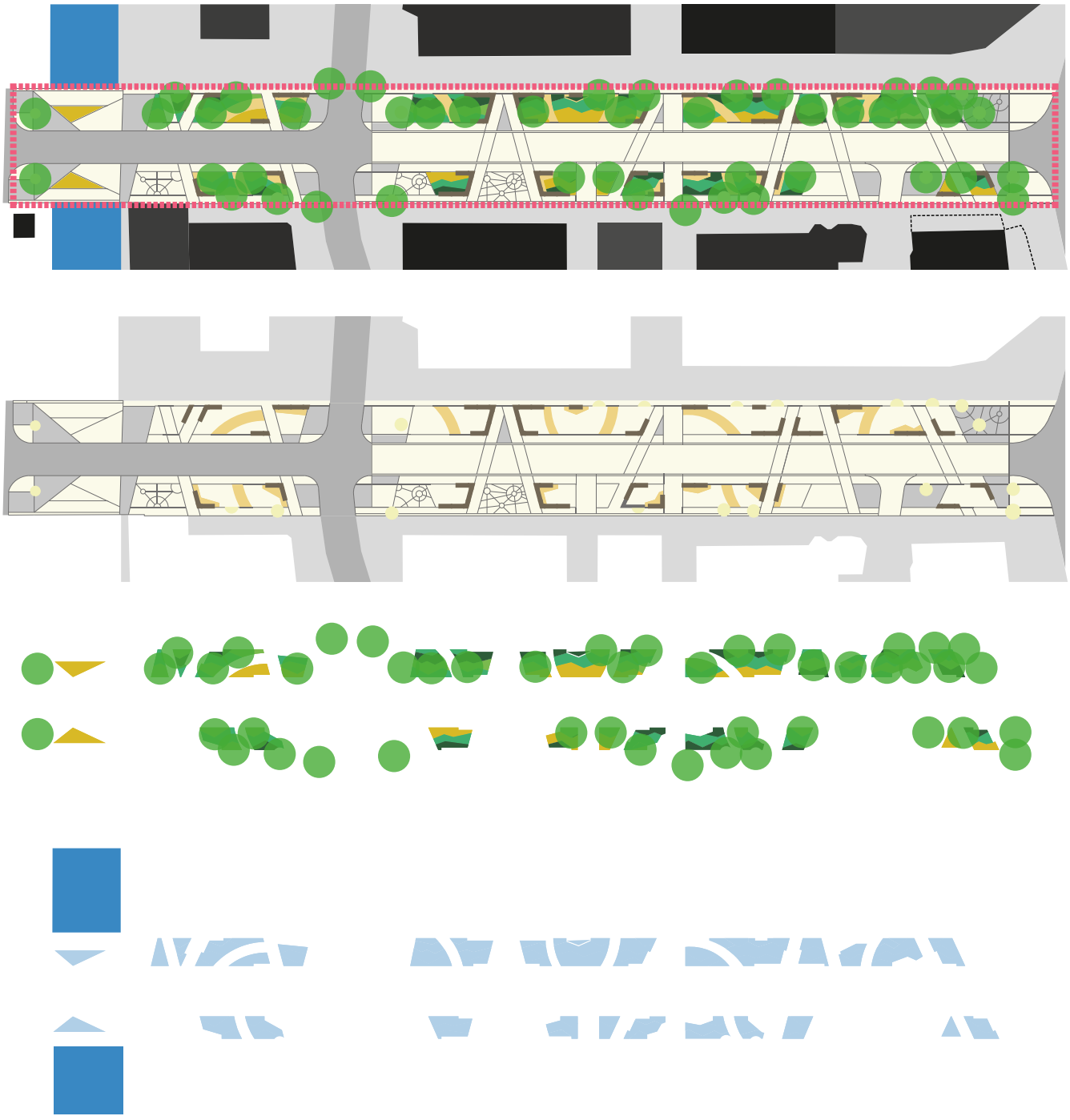
Rainwater management with SUDS and NbS / The rain gardens collect water, store it and promote its soil infiltration. Once the flower bed soil is saturated, excess water is discharged into the sewage system through an overflow system. Thanks to a simple sloping system, Water resource management is more resilient, and it promotes a natural water cycle: rain, run-off, soil infiltration and leaf evapotranspiration.

Phytoremediation and phytopurification - Soil and bioremediation / The flowerbeds in rain gardens have been created by replacing the green soil, in order to ensure the correct establishment and an improved nourishment of the plants.

Maintenance / Rain garden maintenance does not require any special interventions, because the species planted require little care. In any case, a water system provides water to perennial plants in case of dry seasons, and to the annual ornamental plants that are planted every year in spring during the historical Cervia citta-giardino - Maggio in fiore gardening festival.

Vegetation details. Both perennials and seasonal ornamental plants are planted.
(Photo by F. Poli)

MASTERPLAN VIALE MATTEOTTI



PATHS AND FURNISHING ELEMENTS

- ASPHALT DRIVEWAYS
- STONE WALKWAY
- PAVEMENT IN COBBLESTONES
- FLEXIPAVE AND BIOSTRASSE AT THE BASE OF THE TREES
- SMOOTH CONCRETE FLOORING
- BIOSTRASSE
- CURBS
- SESSIONS

GREEN INFRASTRUCTURE

- ROW OF PINE TREES
- TALL SHRUBS H80-100CM
- MEDIUM SHRUBS H50-70CM
- RAIN GARDENS WITH GROUND COVER PERENNIAL SPECIES
- ANNUAL PLANTS FOR SEASONAL BLOOMS

BLUE INFRASTRUCTURE

- PINE CANAL
- PERMEABLE FLOWER BEDS
- INTERVENTION AREA

0 15 30 60m

Top. The avenue during the construction phase, in October 2017.
(Photo by Paolo Gueltrini taken from https://www.cerviaemilanomarittima.org/2015/01/06/viale-matteotti/)

In the center. The newly inaugurated avenue, the works that have affected the stretch from the Rotonda Primo Maggio up to the First Traverse have been completed.
(Photo by Paolo Gueltrini)

Bottom. Details of the street furniture: the lighting on the ground and the new backrests of the seats that reproduce the texture of the urban fabric as envisaged by the projects of the 1930s. In fact, the pattern of the Master Plan of the Garden City of Milano Marittima covers every element characterizing the street furniture: the seat backs, the waste bins, the plant-saving grids for the existing pines.
(Photo by F. Poli)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
Municipality of Cervia

PROJECT TYPE
Redevelopment of a road section of a commercial avenue.

EX ANTE SITUATION
Two-way shopping avenue with tree-lined sidewalks on both sides.

EX POST SITUATION
Avenue-garden with green areas and roadside trees, mainly cycle-pedestrian.

WORKS
The project for Viale Matteotti plans to increase the public space and create an attractive and welcoming place, liveable and free of architectural barriers; reduce the space occupied by cars and manage the flow of vehicles and pedestrians; manage and collect the rains to infiltrate them on the ground.
Thanks to the creation of large rain gardens that accompany the trees, the parking lots are completely de-paved and eliminated, freeing up about 1/4 of the total public area for the benefit of the management of rainwater and the root systems of the maritime pines.

SUDS
The rain gardens appear as large depressed flower beds, vegetated and in bloom, on both sides of the avenue and in front of the shops. At the edges of the rain gardens, the walking spaces are then reorganized with wide sidewalks and large seats for people.
The hydraulic project envisages the creation of two distinct but interconnected drainage systems: the rain gardens, in which the waters of the roofs and large pedestrian areas are collected and the white sewer, which receives road rainwater and any excess from the rain gardens.

URBAN PLANNING AND DESIGN TOOLS
Architectural, landscape and hydraulic project.

DESIGNERS
Gruppo Lithos Architettura: architectural project.
Studio Landshapes (Paolo Gueltrini e Adele Fiorani): landscape project.

WEBSITES
www.pglandshapes.com

Facebook: Paolo Gueltrini LandShapes

SITE
Milano Marittima, Ravenna, Italy

POPULATION
1,520 inhabitans

DIMENSIONS
4,000 sqm

PERMEABLE AREAS
100 sqm before
1,000 sqm after

INVESTMENTS
1.110M €

D

temporary gardens

D30

JARDIN JOYEUX / AUBERVILLIERS -FR

from unused parking lot to highly biodiverse rock garden

The district along Rue de la Maladrerie in Aubervilliers, Île-de-France - in the suburbs north of Paris - was created in the 1980s, inspired by a at-the-time popular garden city and modernist architecture model, with an extensive use of reinforced concrete. Near the entrance to the city of Aubervilliers, in the Malandrerie district, there is an old run-down parking lot. The area has been transformed into a rock garden, thanks to a collective desealing action fostered by the OPH - Office Public de l'Habitat d'Aubervilliers - a public structure similar to Azienda per la Casa, which manages social urban housing assets.
The constantly-monitored experimental desealing intervention involved a 1,600 sqm parking lot area, transforming it into a very rustic green permeable area.

The Joyeux in Rue Lopez and Jules Martin parking lot is transformed into a rock garden.
(Photo by Wagon Landscaping)

THE EXPERIMENTAL GARDEN

The Malandrerie parking lot has been decommissioned to create a garden and make the soil gradually more fertile, going from a sterile impermeable soil to an active soil that can be planted. The project layout is very simple. The entire area is depaved, creating two spaces:

- an area where larger trees (big enough to shade the buildings) will be planted, to the east;
- the rock garden with shrubs, trees and perennial herbaceous plants, to the west.

Between the two spaces, there is an asphalt strip used as a pedestrian path. In order to foster the garden's development, the area has been enclosed, to monitor access and limit foot traffic.
The garden has been designed by the Wagon-Landscaping Studio, with the help of the residents, who carried out the intervention and the construction site, from asphalt cracking to gardening and planting. Thanks to this, the project was completed in a short space of time, at extremely limited costs.
The goal was to create a dynamic and evolving landscape, thanks to the capacity of pioneer plants to grow over time, following seasonal and climate cycles.

THE PROCESS AND THE BOTTOM-UP BUILDING SITE

The Aubervilliers project was developed in two stages:

- in the summer of 2015, the asphalt layer was cracked, crushed and left that way, to prevent any vehicle from accessing and parking;
- subsequently, the social housing agency entrusted Wagon-Landscaping with the transformation of the parking lot area into a giant temporary 1,600 sqm rock garden, that could gradually become a urban biodiversity observatory for schools and residents, thanks to the over 150 plant species introduced.

The temporary garden still exists, and its evolution in time is monitored.
Despite the project's low-tech nature, the desealing and planting interventions promoted a strong change in the venue's reaction to climate events, triggering rainwater collection and its penetration

into the subsoil, significantly changing the sublayer reaction to heat - especially in the summer - and creating natural shade, to the benefit of the surrounding buildings.
The project can be replicable on a large, small or extremely small scale. Desealing, if feasible, can be temporary, without completely removing or disposing of the mineral soil, promoting the colonizing effect of plants, with positive outcomes, right from the start. The active involvement of citizens is essential to achieve such a project, and, above all, for its maintenance and development over time, as the flora needs time to settle and pursue its evolution dynamics (which cannot be predicted before the works). In addition, the project must be accompanied by a suitable communication campaign to spread the benefits brought by biodiversity to the city.

Right. Parking lot desealing works in progress. The intervention was completed in 2015, in just 5 days, with the help of resident and artist Sylvie Da Costa and 7 gardeners (Photo by Wagon Landscaping and 93aubervilliers on Flickr)

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / As a result of the desealing intervention, a totally permeable surface to urban rainwater was obtained. Although the intervention was carried out on a very small scale, the time element has the dual role of improving access times to the urban drainage network - cracked asphalt becomes draining - and gradually operating a final transformation over the years - following the progressive pioneer action of root-taking, growth and development of the many species planted.

Blue infrastructure construction aspects / The intervention was achieved by cracking the asphalt with a jackhammer and retaining it on site, to be reused in line with a circular economy process. The materials were left on site also for economic reasons. In a situation like this, proceeding step by step, by monitoring the evolution of the soil and plants over time, is perfectly reasonable.

Green infrastructure and public spaces / The planners' goal was to lay the foundations for a dynamic landscape, which, thanks to the pioneer plants, is transformed and evolves over time and during the seasons, hosting new seeds, plants, colours, shapes, insects and animals. It is the different herbaceous species, pollinating insects and weather agents that affect the evolution times of the biocenosis created while the work was being carried out; nature regains control of an abandoned urban place.
The area is enclosed and is not accessible for educational purposes.

Plant species and planting distance / The botanical selection includes 100 specimens of young trees and shrubs and the transplantation of 1,000 perennial herbaceous plants and 2,000 Sedum. Some of the species planted: Stipa, Stachys, Dianthus, Phlox, sage, narcissus, verbena and poplar, all species with low water requirements and drought resistant that can survive in nutrient-poor soil. A mix of perennial flowering meadow seeds was scattered on the surface; the mix was prepared with annual wild species (such as poppies and cornflowers), which, during the first year of life of the meadow, acted as nurse crops, providing a rich and colourful blossoming, while wild perennial species (such as daisies, buttercups, carnations and grass) made up the actual permanent meadow. A perennial commercial grass plant (non-competitive with wild species) was used as mix base, to provide a fast cover for the initial soil, and help the meadow perennial species take root. The different species were arranged according to the spaces obtained by the cracking process; in addition, flowering meadow mix seeds were scattered over the entire surface.

1975–1980

The city of Paris expands towards La Maladrerie, a neighborhood of public housing, designed from the utopian idea of the architect Renée Gailhoustet to make the approximately 1,000 apartments all different from each other.

2000s

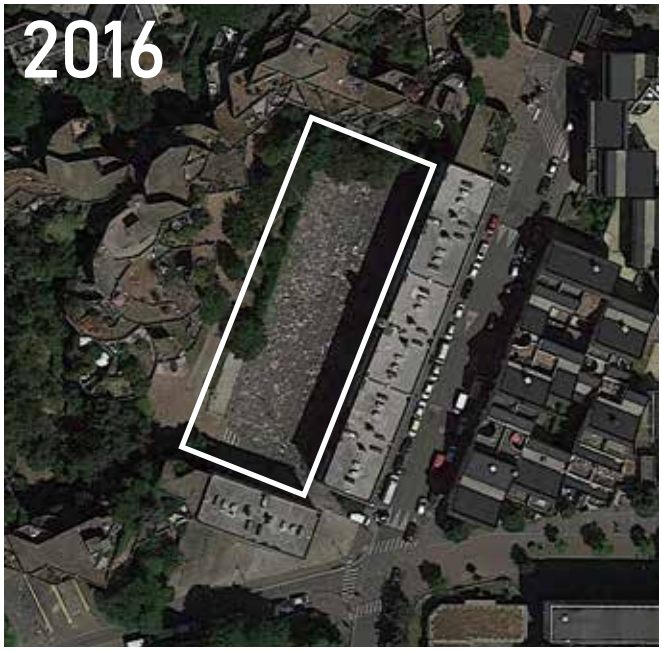
Paris expands towards La Maladrerie, a neighborhood of public housing, designed from the utopian idea of the architect Renée Gailhoustet to make the approximately 1,000 apartments all different from each other.

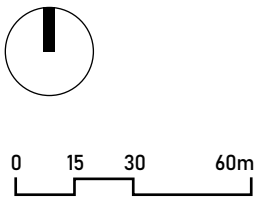
2015

The artist and resident of the Sylvie Da Costa neighborhood collaborates with Wagon Landscaping on the creation of the garden. The interventions end in 5 days with the contribution of 7 professional gardeners.

from 2016

Students and classes from the neighborhood schools organize visits to the garden.





Aerial photos and district schedule.
Note how the color of the pioneer vegetation changes as the seasons change.

Phytoremediation and phytopurification - Soil and bioremediation / Asphalt cracking and green planting are important solutions to help drain the rainwater captured by the former parking lot. The project does not directly implement a phytoremediation technique; however - if enough time is granted to the micro/macro flora and fauna combined action and weather events (especially cold, hot and rain) to demolish the asphalt, a natural re-mineralization will take place. One aspect that should be monitored - also by performing detailed analyses - is what will happen to some pollutant molecules - and specifically polycyclic aromatic hydrocarbons - contained in the asphalt, and how they will relate to the roots system.

Maintenance / Maintenance costs are limited, since no summer irrigation, or depaving waste material (inert, asphalt and cracked sublayers) removal are foreseen). Also, the green component will not be managed; the transplanted and new species will be left to grow freely in the niches obtained.

2018

Visits to the garden continue by the inhabitants of Maladrerie who can access the installation and discover it in a playful and educational way thanks to the creative support of Sylvie Da Costa. In particular, the leisure center of Saint Exupéry and the Finck Senior Club actively participate.

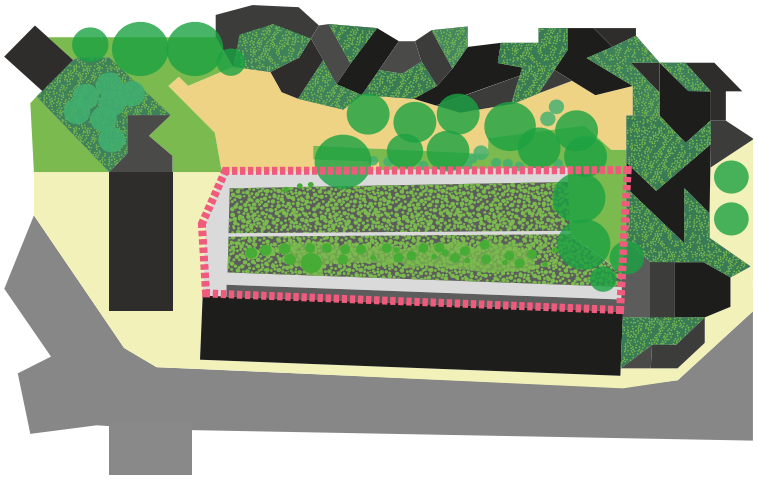
2018

As part of the European Heritage Days on the theme "the art of sharing", the city of Aubervilliers is organizing a mysterious walk with a stop in the garden.

Sylvie Da Costa and landscape architect Estelle Ollivier from the Wagon Landscaping agency present the project and invite the participants to actively contribute to the installation, planting new seeds and arranging the garden plants.

The intervention area is located in the neighborhood along Rue de la Maladrerie in Aubervilliers in Île-de-France - in the northern suburbs of Paris. The neighborhood was built in the 1980s following the model of a garden city with modernist-style buildings, which preferred the use of reinforced concrete. (Photo by Wagon Landscaping, 93aubervilliers on Flickr and Google Maps)

JARDIN JOYEUX PLAN



INTERVENTION AREA

PATHS

DRIVEWAYS

PEDESTRIAN ROUTES

ASPHALTED AREA PREVIOUSLY USED AS A PARKING LOT

GRAVEL PEDESTRIAN PATH

PEDESTRIAN AREA IN CONCRETE

GREEN INFRASTRUCTURE

TREES

SHRUBS

MEADOW

UNSEALED AREA WITH EXTRA FINE CRUSHING

HANGING GARDENS AND GREEN TERRACES

BLUE INFRASTRUCTURE

PERMEABLE AREA DESEALED

0 10 20 40m

The evolution of the garden and colors over time: during the first year after its realization (2016 - 1st row of images), with the first flowering (2017 - 2nd row of images) and nowadays (2019 - 3 Row of images). During the construction phase, 100 specimens of young trees and shrubs were planted, 1,000 plants were transplanted of perennial herbaceous plants and 2,000 Sedum. Among the inserted species we find Stipa, Stachys, Dianthus, Phlox, salvias, narcissi, everbene, all species with low water requirements, resistant to drought and to growth in nutrient-poor soils. The surface was sprinkled with a mixture of perennial flowering meadow seeds, with wild annual species, such as poppies and cornflowers. (Photo by Wagon Landscaping)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
OPH Office Public de l'habitat d'Aubervilliers

PROJECT TYPE
Temporary garden waiting for a new urban project.

EX ANTE SITUATION
Parking area

EX POST SITUATION
Garden created on the model of the rock garden

INTERVENTI REALIZZATI
Desealing with in situ conservation of the removed materials (asphalt) and creation of a garden on the existing substrate.
Were laid:
45 cubic meters of land,
15 cubic meters of gravel,
1,000 perennials,
2,000 sedums,
1 kg of special sowing,
100 trees and shrubs,
more than 150 species of different plants.

URBAN PLANNING AND DESIGN TOOLS
Landscape project and artistic.

DESIGNERS
Wagon Lanscaping

BIBLIOGRAPHICAL SOURCES
V. Dessì, E.Farnè, L.Ravanello, M.T. Salomoni M.T. (a cura di) *Rigenerare la città con la natura. Strumenti per la progettazione degli spazi pubblici tra mitigazione e adattamento ai cambiamenti climatici,* Maggioli editore, 2016

Lambertini A. (a cura di) *Urban beauty. Luoghi prossimi e pratiche di resilienza estetica,* Edizioni Compositori, 2013

WEBSITES
www.wagon-landscaping.fr

http://sdc71.net

https://patrimoine.seinesaintdenis.fr/Quartier-la-Maladrerie

SITE
Aubervilliers, Paris France

POPULATION
2.148mil city of Paris
80,000 Aubervilliers

DIMENSIONS
1,000 sqm

PERMEABLE AREAS
0 he before
1.000 sqm after

D32

TEXTURE PARKING / COURTRAI - BE

from parking lot to temporary garden

The Texture Museum of Kortrijk, Belgium, needed a public space for visitors and residents. Pending a thorough redevelopment of the area, the Basta and Wagon-Landscaping Studios were asked to redesign the parking lot in front of the Museum, to transform it into a temporary public space.
The Texture Museum collects and exhibits linen spinning and weaving tools, and precious lace and linen typical of the Lys Valley, in south-western Flanders. The Museum's history starts in the 1960s. The linen industry was the main local economic activity.
The desealing intervention was carried out on a 1,200 sqm parking lot area, depaved and green for 750 sqm.

The Texture Parking, a temporary garden based on the QR code in front of the Texture Museum, an interactive museum on linen spinning and weaving, opened in 2014.
The help of many volunteers, schools and sponsors was essential, over time, to create the museum and its educational development. (Photo by Wagon Landscaping)

THE TEMPORARY GRASS GARDEN

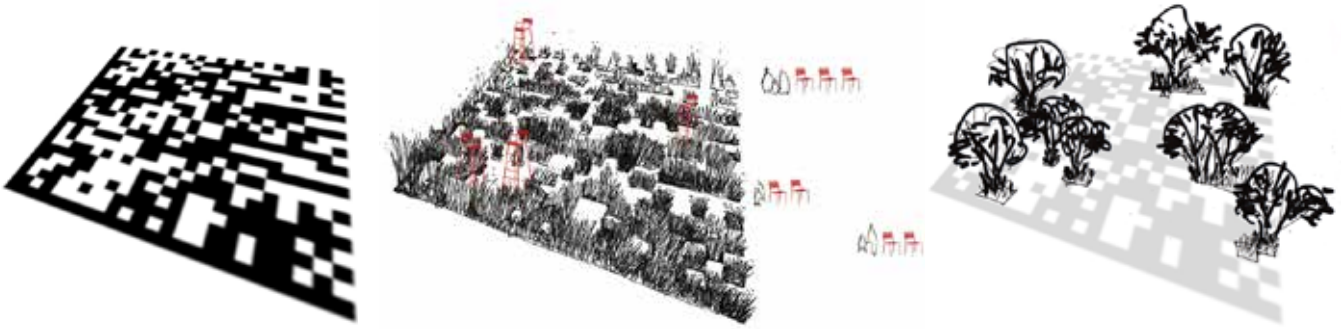
drawing the QR code of the Museum website on the ground.
The idea of the Belgian landscape gardener tasked with the project is to create a temporary desealing-based installation, with the elements and resources on site:

- the space, the asphalt, the pioneer plants;
- the community.

The final effect is an asphalt garden speckled with tall silver rustic plants, whose colour and informal appearance conjure up the image of flax fields.

THE PROCESS AND THE BOTTOM-UP BUILDING SITE

The project was completed in a very short time - five months for planning and one for implementing it - thanks to the help of residents and landscape gardeners. As with any community intervention, it became a social event, with the stories and the anecdotes of the residents, who went over the history of the place and of the linen industry.
The QRcode black modules were drawn on the asphalt with chalk. The ground was then drilled, cracked, broken and planted with grass species. The result is a garden with micro permeable and green areas, to create a rustic urban space, a temporary labyrinth defined by the flexible and tall Miscanthi sinensis, and with red-coloured seating and wooden benches of different heights scattered around.
Although temporary, the Texture Parking Garden is a new recreational space for the Overleie district, and a strong incipit for local redevelopment, pending a final transformation and restyling. More often than not, in local communities, young people and residents invest their time in greening projects on paved and run-down areas, sometimes aided - like in this case - by landscape gardeners and associations.



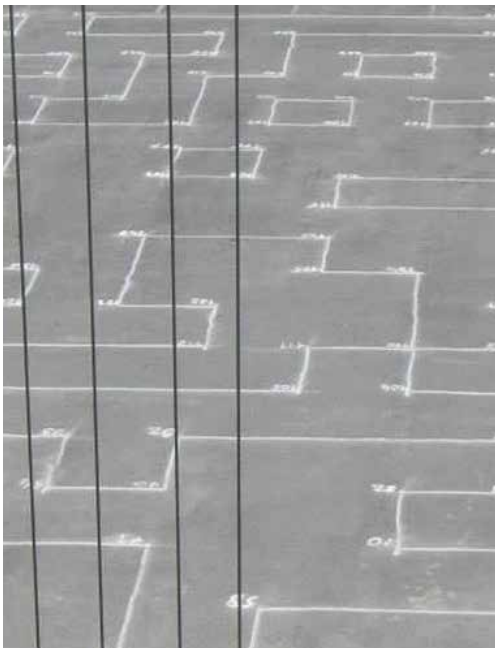
Temporary garden project: 3D of the QRcode and section diagrams.
The "making-of": the project was completed with the help of the residents. The garden today: it has become the target of barbarities and negligence, and it requires periodical maintenance.
(Photo and drawings by Wagon Landscaping)

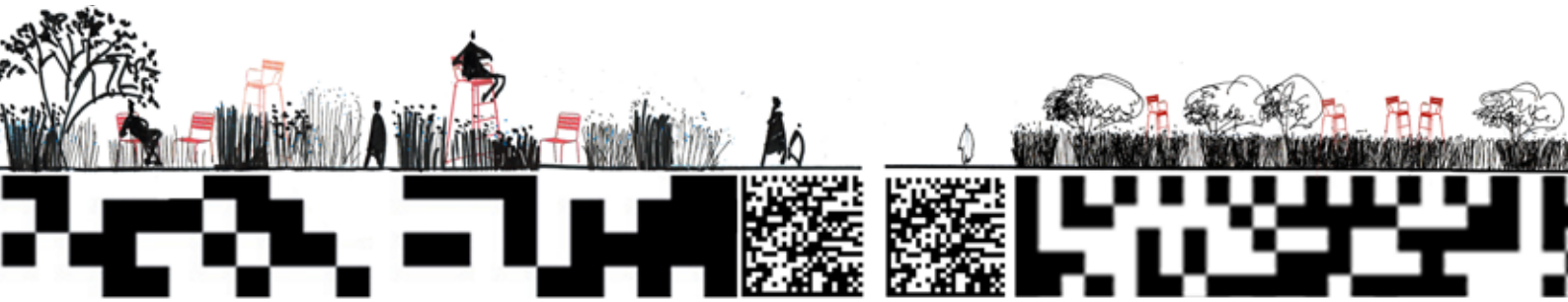
GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / Desealing made the paving semi-permeable, improving access times to the urban drainage and infiltration network.

Blue infrastructure construction aspects / The intervention was achieved by etching and cutting the asphalt with a diamond-edge saw. The materials were then disposed of and partly reused to create drainage screed. The garden - based on the desealing of 750 sqm of asphalt - can collect a good portion of the first rainwater of the parking lot.

Green infrastructure and public spaces / The permeable flowerbeds obtained by depaving the asphalt surface were planted with grass species, e.g. Miscanthus sinensis. This species was selected due to its silvery flower that recalls linen - to which the Texture Museum is dedicated. The final result is a temporary labyrinth with flexible plants. The small flowerbeds are not big enough to create a favourable habitat with its own evolutionary dynamics; however, in the context where it has been implemented, it reduces solar radiation accumulation surfaces, improving the comfort and well-being of the garden visitors.





Plant species and planting distance / Miscanthus sinensis is a grass species original from Japan and China, belonging to the Poaceae family. The silver-coloured flowers, and the brown trunks in the autumn, give it an informal look. These very rustic plants, with limited water requirements - typical of grass plants - are ideal in nutrient-poor soils, and to create green backgrounds.
The project included a regular 30x30 cm planting distance, to create an even green cover; gravel was used as mulching. The plant is an infesting and rapid-growth species.

Phytoremediation and phytopurification - Soil and bioremediation / The project area is too small to have a possible bioremediation effect; however, if it was extended over a larger area, it would be consistent with the phytoremediation principles.
The man-made mineral soil "breaking" rationale is much more feasible than it sounds, on a large, small and very small scale; it can be performed temporarily, without completely removing or disposing of the mineral soil. Desealing (which here is only temporary) is the incipit to create future redevelopment projects, aimed at increasing local resilience.

Maintenance / The project maintenance costs are very limited. Grass species are recommended to recreate green areas, due to their limited care requirements - pruning once a year - and because they do not need fertilizers or plant protection treatments.

1982

The flax industry was the most important economic activity in southern West Flanders.
Following the crisis in the sector in the 1960s, Bert Dewilde fears that local history will be lost and begins to collect work tools to be offered in original exhibitions and educational paths. In 1982, he opens the National Linen Museum to the general public.

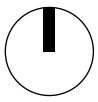
1998

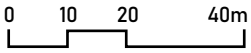
Thanks to donations and the support of volunteers, the Flax Museum opens, dedicated to finished linen products. The museum is renowned for reproducing lifelike scenes rich collection of lace.

2009

Under the leadership of Lies Buyse, the museum is thoroughly renovated and moved to a more significant location, inside a former industrial building in the center used in the 1900s for the distribution of linen.

Architects noArchitecten and Madoch transformed the building into a modern museum, highlighting its industrial past. The gold-colored cover is a reference to the Lys River, also known as the Golden River.





Aerial photos and district schedule.
Note how in the alternation of the seasons also the color of the grasses changes, in spring green, in late summer and dry autumn.

To the right. High seats and benches positioned along the paths between the Miscanthus sinensis.
(Photo by Wagon Landscaping)

2014

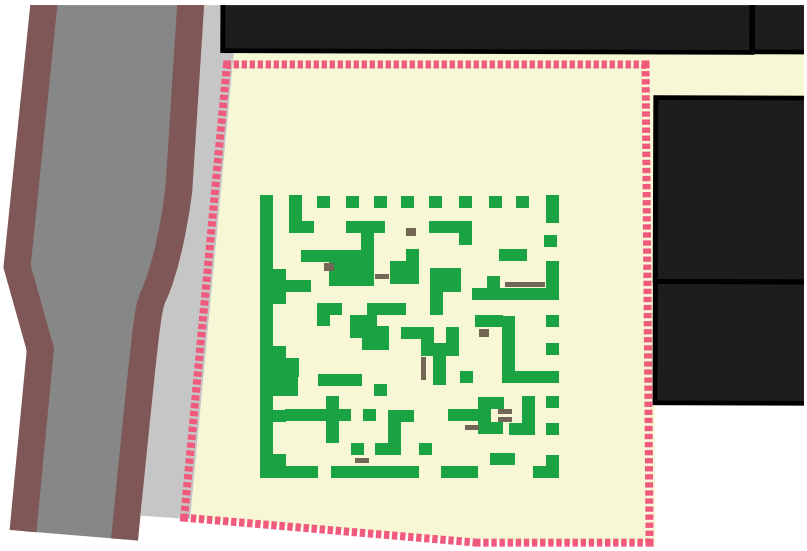
After two years of closure, the museum reopens and is renamed Texture Museum, Museum of Linen and River Lys.
However, it needs a temporary square pending the redesign of the public spaces in front of the entrance. Studio Basta and Wagon Landscaping propose a garden based on the museum's QR code. The result is a labyrinthine path among the grasses that recalls the flax fields along the "golden river" Lys and immediately becomes a usable and attractive space for museum visitors and residents of the neighborhood.

from 2014

The square is still set up with the labyrinth of Miscanthus sinensis which takes on different colors during the seasons and today represents a meeting point, a space for play and free time.

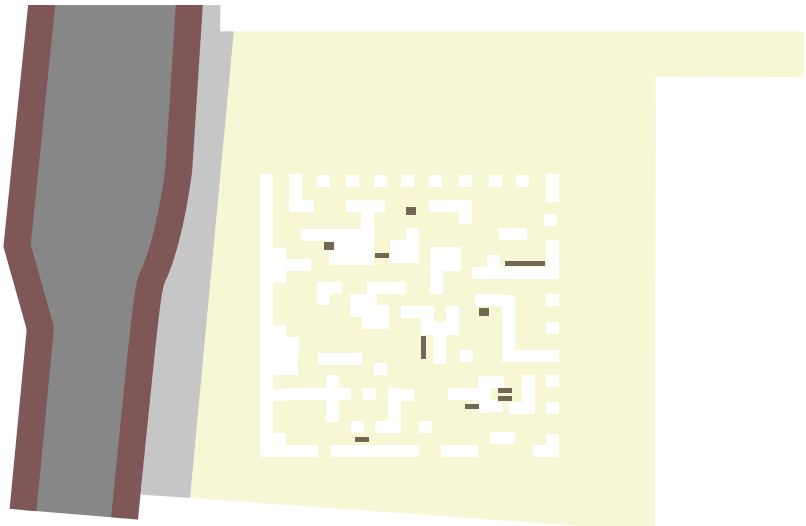
"The architects NoArchitecten and Madoc expanded the original 1912 building with a yellow crown on the roof, in reference to the Lys - Golden River, the historical artery of the region's economic development. The exhibition space was divided into the Curiosity Room, of the Lys and that of the Treasury. The first is on the ground floor and allows the public to hear, see and taste everything related to linen. On the first floor it traces the events of the river and the corresponding evolution of entrepreneurship, competence and technology in the region. It is a story of mixed fortunes, of workers with severe periods of crisis, of thinkers and doers. Finally. In the last room, under the golden roof, some authentic pieces, lace and precious damasks are kept."
(Photo by Klaas Vermaas on Flickr, Artribune and Toerisme Kortrijk, text by Elisa Stellacci from Ecosustainable Architecture)

TEXTURE PARKING PLAN



INTERVENTION AREA

PATHS AND FURNISHING ELEMENTS



DRIVEWAYS

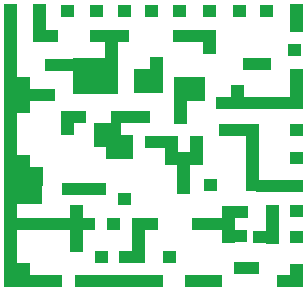
PEDESTRIAN ROUTES

CYCLING ROUTES

PEDESTRIAN SQUARE

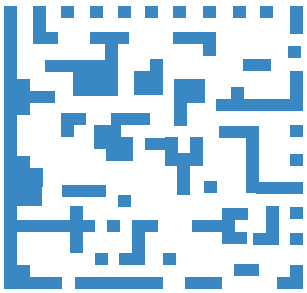
SEATS

GREEN INFRASTRUCTURE



DESEALED AREAS WHERE MISCANTHUS SINENSIS HAS BEEN PLANTED

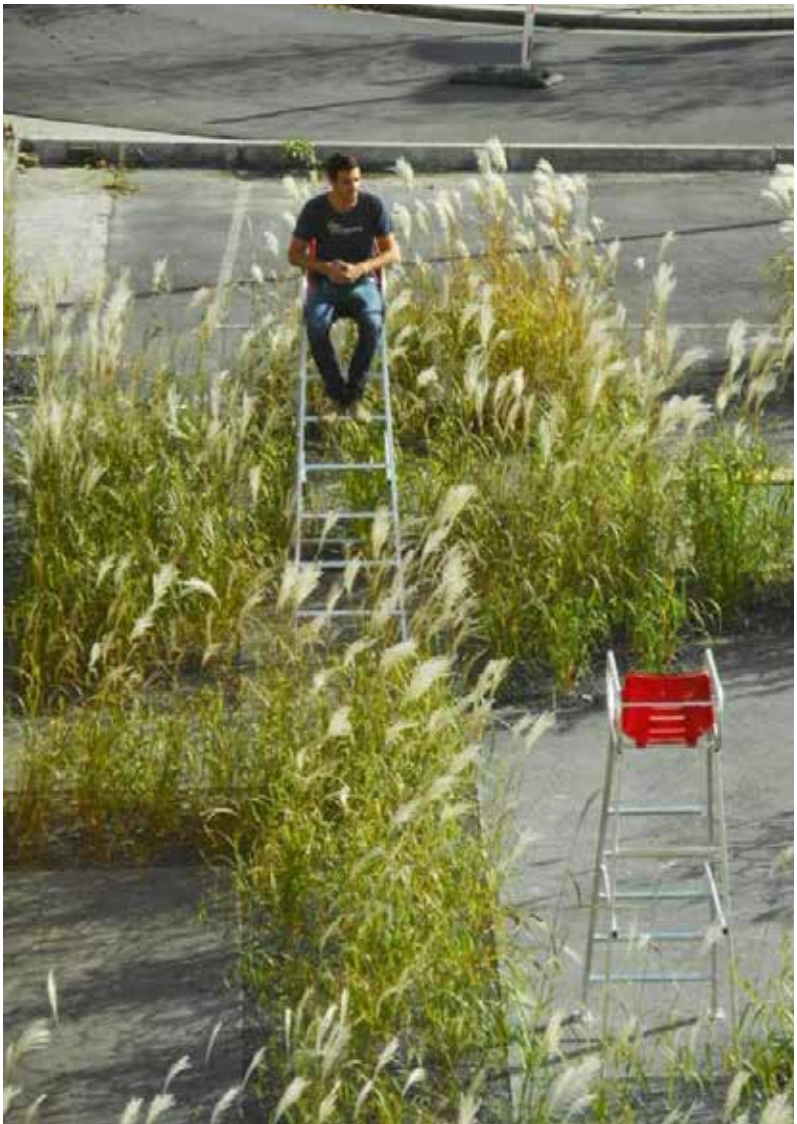
BLUE INFRASTRUCTURE



DEPAVED INFILTRATION AREAS

0 5 10 20m

Miscanthus sinensis is a grass species original from Japan and China, belonging to the Poaceae family. It has been chosen for the Museum because the silver flowers recall the flax crop - to which the Texture Museum is dedicated. The plant height ranges from 0.80 to 1 m; it has an average and erect growth. It prefers a sunny location and a well-drained soil, but it can survive in part shade. It comprises a clump of very thin and linear leaves, green and creamy white in colour. Although it is considered a deciduous plant, its long leaves dry up in the winter, without falling, and they look amazing covered in ice. Its flowers are spikes, typical of beige-coloured ornamental grass plants, and they have delicate silvery glares when open. Since it is a sturdy, very rustic, drought- and disease-resistant plant, it is perfect in public flowerbeds and parks, where maintenance costs must be low, and also in private gardens where the owners don't have time to tend to them. The Miscanthus sinensis is included in some blacklists of plants to be eradicated in Italian territories, (regional Regulations and LD 230 of 15 December 2017, to adapt the regulation to the provisions of EU Regulation no. 1143/2014 of the European Parliament and of the Council of 22 October 2014). (Photo by Wagon Landscaping)



ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS

AIR QUALITY AND POLLUTANS REGULATION

NOISE REDUCTION

RUNOFF REDUCTION AND FLOOD

POLLINATION AND BIODIVERSITY

URBAN COMFORT AND MICROCLIMATE

PUBLIC SPACE ACCESSIBILITY AND RECREATION

IDENTITY SENSE PLACE HISTORY

BEAUTY OF NATURE

CLIENT
Textile Museum of Courtrai (Kortrijk)

PROJECT TYPE
Temporary garden waiting for a new urban project

EX ANTE SITUATION
Parking area

EX POST SITUATION
Equipped temporary garden

WORKS
Desealing of part of the asphalt pavement facing the entrance to the Museum.

URBAN PLANNING AND DESIGN TOOLS
Landscape project.

DESIGNERS
Wagon Lanscaping: landscape project.
NoArchitecten e MAdoc: arhitectural design

WEBSITES
www.texturekortrijk.be/en/

www.wagon-landscaping.fr

www.architettura ecosostenibile.it/ architettura/del-paesaggio/ texture-giardino-qr-512

www.studiobasta.be

www.landezine.com

www.greggiovivai.it/ prodotti/graminacee/ miscanthus-sinensis-kleine-silberspinne

www.util.be/fr/selection/ noa-architecten/ transformation-d-un-depot-en-musee-courtrai

www.noa-architecten.net

SITE
Courtrai (Kortrijk), Belgium

POPULATION
75,000 inhabitans

DIMENSIONS
1,250 sqm

PERMEABLE AREAS
0 he before
760 sqm after

E

bottom-up initiatives

E32 DEPAVE IS PARADISE / U.S.A, CANADA, OLANDA, U.K. urban nature and bottom-up public space care measures

E32

DEPAVE IS PARADISE / U.S.A, CANADA, OLANDA, U.K.

urban nature and bottom-up public space care measures

Depaving steps.
1. CO-PLANNING/CO-DESIGNING THE ACTION:
selecting the area;
- creating the community-group:
- history and characteristics of the area, soil and water presence;
- soil infiltration and rainwater management testing:
- choosing the type of garden to be created (community, educational, natural, etc.);
- obtaining support from a gardener and/or soil/water flow expert;
- identifying the garden manager(s);
- drawing and designing the garden together;
- obtaining permits and authorizations;
- budgeting the costs.
2. DEPAVING:
- re-using and disposing of the materials;
- preparing the work tools for
the soil;
- construction site safety techniques;
organizing the construction site.
3. CREATING THE GARDEN AFTER DEPAVING:
- creating the garden;
- restoring the soil;
- gardening.
(Photo by Depave - Depave Paradise)

In different cities worldwide, there are movements and communities promoting urban depaving and bottom-up renaturation measures. They are independent, informal citizen associations, working together to tackle the environmental and social impact of urban cementation and sealing.
These action groups depave excess urban asphalt to create green areas and permeable gardens, capable of capturing rainwater, purifying it, infiltrating it into the soil, and also promote biodiversity, local landscape attractiveness, urban resilience and people socialization.
The first group that gave strength and method to this collaborative and shared depaving action, is Depave, an association based in Portland, North America, which has been working since 2008 and has developed a work method to support all the other Depave communities worldwide.

BOTTOM-UP DEPAVING AND CITY RENATURALIZATION

Depave groups promote the transformation of built-up cities to reduce their environmental impact and improve sustainability using bottom-up measures. The goal of these informal groups is to bring nature back into cities and urban landscapes, through action- and awareness-raising oriented projects, so that residents can become the true protagonists of a public space and green area recovery movement in their cities.
Depave groups think that cities should go back to being liveable and human-sized, where people, plants and animals can live in a healthy environment, with clean air and water, thriving forests and urban parks, and areas dedicated to social and local agriculture, where the community is committed, active and protagonist.
The depaving measures implemented by these associations to bring nature back to their cities pursue true community values:

- promoting citizen participation and awareness;
- working for the community and promoting a personal and team growth process, based on self-esteem, self-efficacy and self-determination;
- bringing out latent resources and allowing people to take action and consciously reclaim their potential, overturning the perception of their own limits to achieve results that surpass their expectations.

Depaving actions involve institutional and community partners.
INSTITUTIONAL PARTNERS:
- Environmental preservation (soil, water, air, biodiversity, urban planning and redevelopment) bodies and institutions;
- regional bodies;
- provincial bodies;
- local bodies;
- community partners
COMMUNITY PARTNERS:
- associations;
- schools (parents, teachers, students);
- organizations;
- parishes;
- universities;
- companies and businesses;
- residents.
(Photo by Depave - Depave Paradise)

PROCESS

Depave's action model is leading by example. Thanks to a method and a manual that describes all the practical steps and process stages before taking action, the Depave movement has already spread to several cities and groups, with a collaborative and virtually conflict-free attitude. In essence, there are three Depave movement stages; they define each conceptual/operational and project-building step and the roles of the players involved:

- stage 1: co-planning and co-designing the measure with all the players involved, analysing the regulatory, bureaucratic, planning, construction site organizational and managerial aspects of the area that is the subject of the transformation;
- stage 2: depaving together and developing the primary role of the people involved;
- stage 3: creating the garden and managing it with the community.

Creating the workgroup and the community that will implement the different measures is a sensitive and essential step: all the players must be involved in planning the measure, implementing it and creating the garden.

In the ten years since its foundation in 2008, Depave has involved almost 4,800 volunteers in demolishing and recouping over 165,000 square meters of paved soil (almost entirely by hand!), and has created over 63 new community gardens and green areas, which have absorbed billions of cubic metres of rainwater (not channelled into the sewage system), absorbed fine particles and stored C02.

Depave's action has inspired and promoted the creation of many other groups in other cities and countries:

- Depave groups in Portland, Cleveland, Nashville, Tennessee, Puyallup and other cities of North America;
- Depave Paradise group in Canada - working in many different cities and states, such as Toronto, Peterborough, Ottawa, Alberta, Winnipeg, Nova Scotia, North Bay, York Region – and the Sous le Pavés Association in Montreal, Quebec;
- Depave UK, active in Shropshire, England, for the United Kingdom;
- Operatie Steenbreek, active in many cities and provinces, in Holland;
- a newly-founded group of citizens in Ferrara, Italy, supported by the informal Centro

di Educazione alla Sostenibilità network, which shared awareness-raising and training meetings with Arpae, Laboratorio REBUS, and the Perfect and SOS4LIFE projects.

These movements support each other while also trying to create a network and - along with Environmental Protection Administrations and Bodies - they promote the Depave philosophy in other cities and territories worldwide. The tangible actions are planned down to the last detail, and oriented toward the personal growth of individuals and groups and construction site safety; it promotes strong interaction and great awareness in its participants, creating an extremely positive and collaborative environment.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS SUSTAINABLE URBAN RAINWATER MANAGEMENT

Blue infrastructure / Depaving measures are carried out to transform urban impermeable surfaces into permeable areas, improving urban drainage access and infiltration times.

Blue infrastructure construction aspects / The interventions are carried out using two techniques: 1) the asphalt surface is cut with a diamond-blade saw, creating cross-hatch lines to lift small/large portions with a pry-bar; 2) the concrete surface (harder and made with different mixtures) is smashed with a jackhammer. The materials are then disposed of in a landfill and partly reused to create drainage screed.

Green infrastructure and public spaces / The desealing projects promoted by Depave include bottom-up interventions to restore and/or create new micro-habitats: tiny ecological niches occupied by many plant species. These interventions can be divided into three categories: 1) new road greenery with rain gardens; 2) new gardens in parking lots, school yards, in front of stores or on churchyards; 3) permeable soil areas near trees.

2007

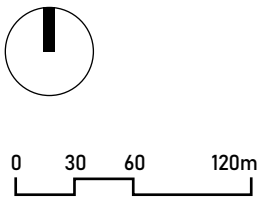
Born in Portland, Oregon, the Depave movement to promote the transformation of waterproofed areas with the active support of local communities.

2008

Following the first intervention at the corner of Fargo Street and North Williams Avenue in North Portland, the 'International Towards Carfree Cities' conference begins to talk about the initiatives of volunteers and residents to remove portions of excess asphalt, in order to create permeable areas and small community gardens.

2011

The depaving actions are for the first time illustrated in the participatory urban planning manuals. New York urban planner Mike Lydon, who coined the term 'tactical urbanism', mentions Portatland's experience in the second edition of the open source publication 'Tactical Urbanism: Short-term Action, Long-term Change '.



Aerial photos and time schedule of the transformation of the street inside the block on Rue de Trottoir in Montreal.

Plant species and planting distance / The most used species on depaved concrete and asphalt urban spaces are rustic species with limited water and maintenance requirements; these characteristics positively affect the green area maintenance costs, and the species adaptation in the urban context. The main species are: grass and groundcover plants and rose shrubs.
Planting distance is established based on the species used, the available permeable areas, and the desired aesthetic effects (instant, natural or geometric effect). In small spaces, grass, bulbous and ground-covering plants should be preferred; in larger areas, shrubs and other herbaceous species should be added.

Phytoremediation and phytopurification / Permeable desealed portions reduce the runoff effect, by slowly filtering rainwater captured by plant species. The new permeable surfaces house special plants that can survive in polluted environments, including annual and perennial grass species and several types of reeds.

Soil and bioremediation/ Desealing asphalt surfaces and converting them into permeable green surfaces significantly helps to remineralize soil, improving the infiltration of oxygen, water and other chemical elements that are essential for soil's microbic life. This kind of project solutions helps reduce urban pollution caused by road traffic and residential heating, as pollutants are captured and trapped in the rhizosphere portion.

Maintenance / Generally, in this kind of project, species with low water and maintenance requirements are planted; furthermore, some project measures (such as selecting the best-suited plants and their group spatial distance based on their physiological characteristics) or the use of agronomic techniques (such as mulching) help reduce management costs.
The help received from the many volunteers involved since the beginning of the bottom-up process ensures continued care and maintenance of the recovered spaces, which the same volunteers feel as if they own, with undoubted benefits for the entire community.

2012

Green Communities Canada imports the project to Canada and organizes the first Depave Paradise event at Kingston's Mulberry School in partnership with Red Squirrel Conservation.

This first hands-on training activity on desealing techniques is a great success and depave communities are starting to form in other Ontario cities.

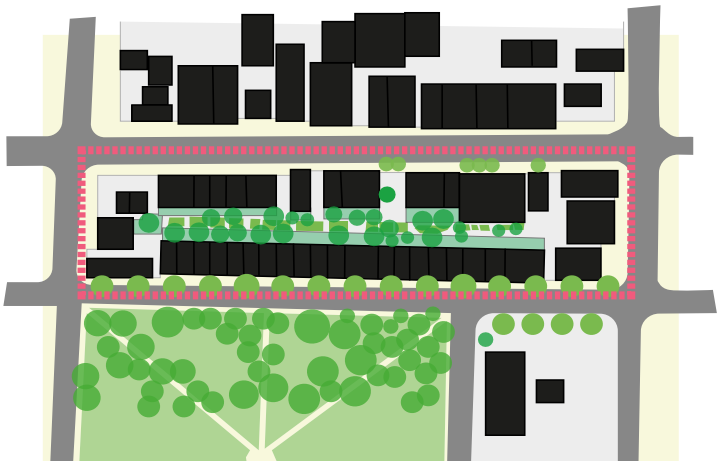
2019

The Depave communities have unsealed over 9,000 square meters of asphalted area, in 23 cities in North America, for a total of approximately 5,400 cubic meters of diverted rainwater.

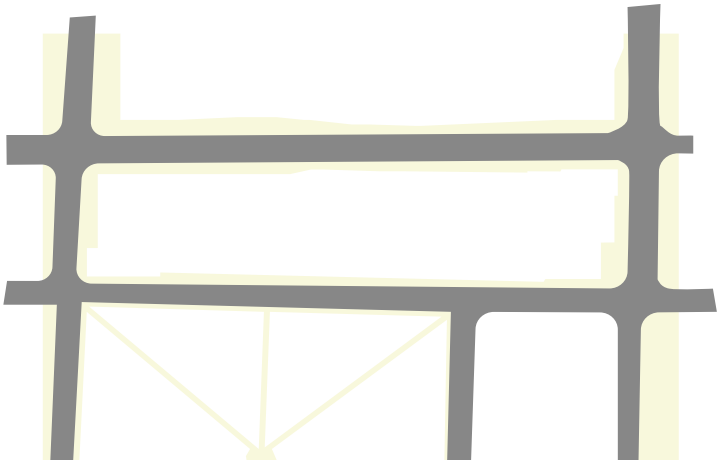
The concrete way of doing things, planned in every detail, oriented to the growth of the individual and groups and to safety on the construction site, promotes strong interaction and great awareness in those who participate, creating an extremely positive and collaborative climate.

The most suitable species for revegetating urban spaces removed from asphalt and concrete are often rustic and / or less maintenance, because they favor the life of flora and fauna, and have greater resistance to water emergency conditions. (Photo by Depave Paradise)

RUE DE TROTTOIR A MONTRÉAL PLAN



INTERVENTION AREA

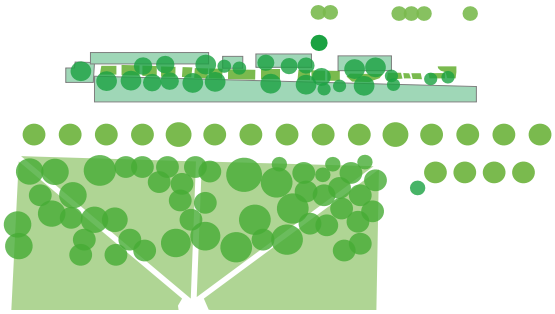


PATHWAYS

DRIVEWAYS

PEDESTRIAN ROUTES

GREEN INFRASTRUCTURE



ROWS OF TREES ALONG THE ROAD

TREE ISOLATED
AND / OR SMALL VEGETATED MASSES

LAWN / PARK

TREES INSIDE THE LOT BUILT ALONG
THE COMMON PATH

PRIVATE COURTYARDS

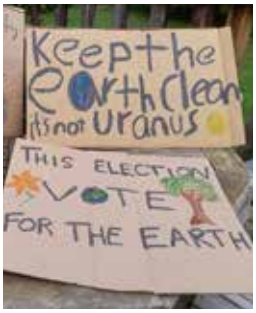
DESEALED AREA
WITH EXTRA FINE CRUSHING

BLUE INFRASTRUCTURE

DEPAVED INFILTRATION AREAS

0 25 50 100m

The depaving projects aim to transform cemented and asphalted surfaces into urban green spaces, creating more natural habitats, which help reduce the effects of the heat island, air pollution and improve urban rainwater management systems. .
The micro interventions or practices from the bottom of desealing allow to obtain different benefits: increase in permeability, reduction of run off, possibility of planting small and micro-scale greenery.
The images above and below highlight some interventions in comparison, before and after the de-paving action.
(Photo by Depave Paradise)



ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
Community of citizens, environmental associations.

PROJECT TYPE
Depaving of impermeable soil and construction of gardens and permeable vegetated areas

EX ANTE SITUATION
Imprevious paved area

EX POST SITUATION
Raingardens

WORKS
Desealing of part of the asphalt pavement.

URBAN PLANNING AND DESIGN TOOLS
Participatory process/ project.

DESIGNERS
Citizens
and volunteer technicians.

WEBSITES
www.depave.org

www.facebook.com/depave

www.depaveparadise.ca

www.souslespaves.ca

www.operatiesteenbreek.nl

www.facebook.com/
operatiesteenbreek

www.
shropshirewildlifetrust.
org.uk

www.facebook.com/
wildlifetrusts

www.urbancenterferrara.it

www.facebook.com/
UrbanCenterFerrara

SITE
North America
Canada
England
Holland
Italy

DIMENSIONS
small interventions of approx.
50/100
sqm

PERMEABLE AREAS
0 he
before
165,000
sqm with 63 interventions

F

urban tools and detailed plans

F41

ADAPTATION PLAN FOR THE CITY CENTRE OF MEDICINA / BOLOGNA - IT
urban, environmental and social regeneration strategy, along the Medicina Canal

F42

THE BOMPORTO INDUSTRIAL AREA ADAPTATION PLAN / MODENA - IT
hydraulic risk management and forestation for heat regulation

F37

ØSTERBRO ADAPTATION PLAN/ COPENHAGEN - DK

a district redesigned with climate adaptation measures

In 2012, the city of Copenhagen developed an experimental climate adaption plan in the Saint Kjeld district, to redevelop and transform the public spaces in the Østerbro suburban working-class area. This was the first existing Danish district redesigned according to water sustainable management measures with nature-based solutions.
Rainfall increase is a great challenge for the city, often affected by intense storms that challenge the existing urban hydraulic system and people's safety. The idea behind the Østerbro area is protecting the city by redesigning the public road space and green areas as an infrastructure for the city's safety and for people's health and well-being, to tackle the heat island effect and abundant rainfall. The plan completely overturned the approach toward climate change adaptation, as it proposed to work not just through the drainage system or by increasing taxes for routine city maintenance interventions, but also on the city's public space and visible surface - by making it greener, more attractive and more sustainable - and by involving the community in sharing and implementing those choices.
The area affected by the plan spreads over 105 hectares, and construction sites are currently under way.

Top right. Rain garden created between a residential street with high cycle and pedestrian accessibility and the garden square of Tåsinge Plads. (Project by Tradje Nature with GHB, photo by Luisa Ravanello)

Bottom right. Aerial view of Tåsinge Plads. The project involved the de-paving of a large asphalted area and the creation of an equipped green space. Overall, more than 1,000 square meters of asphalt have been greened, over 50 new trees planted and pebbles and granite tiles reused for cycle and pedestrian paths. (Project by Tradje Nature with GHB, photo by Luisa Ravanello)

STRATEGIES AND NATURE-BASED SOLUTIONS FOR THE RENOVATION OF THE PUBLIC SPACE

The proposals developed in the plan offer a wide range of strategies to meet the different hydraulic issues in the district.
The main key principle of the plan is recovering 20% of the road area and immediately adjacent area area, through a widespread desealing action, to optimize public space and parking lots. The permeable area obtained from the road surface amounts to approximately 50,000 square meters, and the plan foresees to use it for the development of new urban spaces, with heat and water regulation and social functions. This choice is crucial to preserve the existing city functions and improve the use of public space by residents.
In the larger urban spaces, such as Saint Kjeld's Square and Tåsinge Square, the plan provides for the creation of public spaces founded on mutability and integration between city and nature, by offering experience in close contact with trees, water and plants. For instance, the Saint Kjeld's Square roundabout has been redesigned as a circular green area, with hundreds of plant and tree species and spraying systems to cool people on hot summer days, and large lawns at different heights to protect people from road noise and encourage children and adults to play. This way, surface area is doubled, extending the urban space with important social benefits - to the site's life and attractiveness, by creating new coffee shops and playground areas - and natural areas- to improve microclimate and water management.
In this plan, water plays a central role. The key concept is the idea that urban spaces can be flooded when it rains, and that water should remain there for a short period of time - 24, 36 or 48 hours - to lessen the burden on the drainage system, without compromising access to the area.

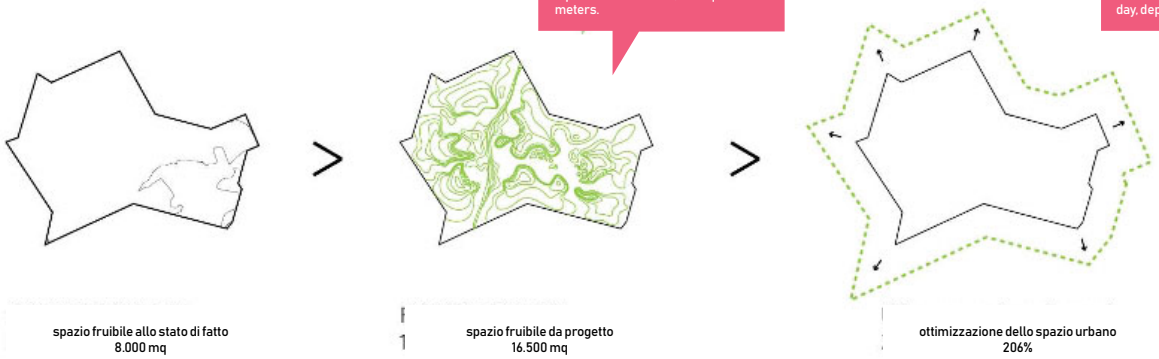

NØRD
NØRD

Space!

The space available in the St. Keld area is optimized and the current flat surface of 8,000 square meters transformed into a garden square with hills of 16,500 square meters.

206%

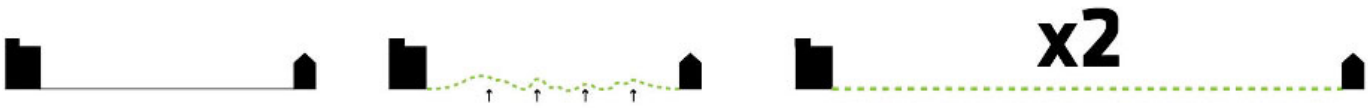
This creates more space to capture, for example, rainwater, to increase biodiversity and to create diversified spaces that can be used at different times of the day, depending on the season.



spazio fruibile allo stato di fatto
8.000 mq

spazio fruibile da progetto
16.500 mq

ottimizzazione dello spazio urbano
206%



Left and bottom. The project for the transformation of Skt. Kjelds Plads, a 13m roundabout giving access to the neighborhood. In the center there were already some trees and an unused green area. Before the intervention, the vehicles crossed the roundabout too quickly, also because the residents could not use the central green space.
The project saw the reduction of the space dedicated to circulation and the creation of a green and usable urban square, with large natural areas now colonized by insects and birds and a space for the residents of the neighborhood.
(Project by SLA Architects, photo by Luisa Ravanello)

The plan project works in synergy with slow mobility, by introducing cycling paths which - through rain gardens created adjacent to the roads - also act as surface rainwater channels, from the district toward the port. These systems improve the urban environment biodiversity and the quality of the water collected from road and cycling path surfaces.

PROCESS

The plan and the implementation projects have been developed with the city of Copenhagen, in partnership with Tredje Nature - a Danish firm with young professionals specialized in highly sustainable urban projects - after winning the Europan11 tender, in December 2011.
The tender proposal required a visionary plan to manage the rainfall impact and strengthen urban life, starting from the district roads and open spaces. Thanks to this plan, Copenhagen proves that rethinking an existing public space is possible, by mixing nature, architecture, sociality and water resource management.
The works started in 2014, after an intense debate with the residents, in support of the implementation. The construction sites are still under way.




1990s

Østerbro becomes one of the most exclusive neighborhoods in the city, with wide streets lined with restaurants and businesses, art galleries and cafes frequented by young families of residents.

2011

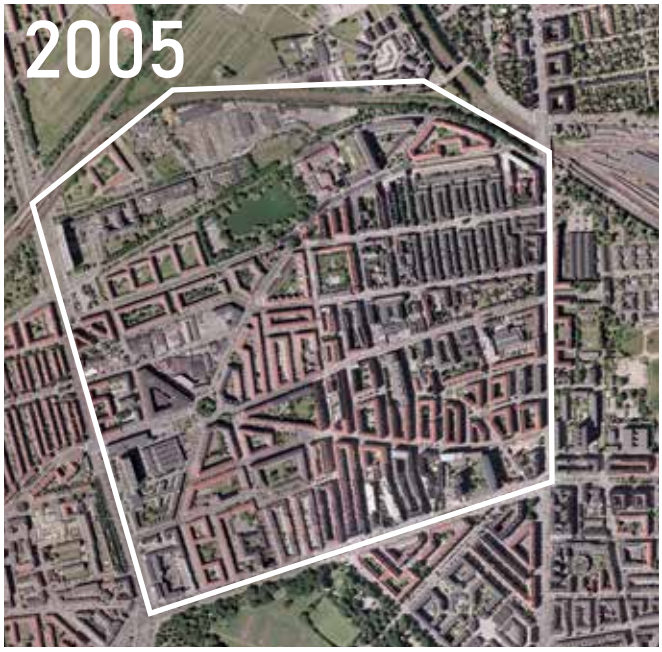
In July 2011, following several days of heavy rain, the San Kjeld area in the historic district of Østerbro was completely flooded. Damages are estimated for 1 billion and 400 million euros.

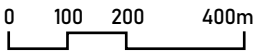
2011

The Tredje Nature architecture studio wins the Europan DK International Competition with a proposal for the regeneration of the neighborhood in terms of climate.

2012

The Copenhagen Climate Plan is published, an ambitious and original program of interventions that provides for the creation of detailed plans to define urban interventions for adaptation to climate change.
The Plan provides for a 20% reduction in CO2 emissions and the pursuit of a carbon neutral city by 2025.





Aerial photos and time schedule of the transformation of the neighborhood.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE WATER MANAGEMENT

Hydraulic project and urban drainage systems / The hydraulic project is designed to manage urban rainwater both at the neighborhood scale and at the architectural and building scale of the block, mainly through SUDS and NbS:

- in the first case, the morphology and the different heights of the public spaces allow, between the upper and lower parts, to slow down, retain and accumulate water, instead of immediately delivering it to the sewer system. The shares of the rain gardens created on the road and of the floodable public areas built on squares, car parks and gardens are such as to allow the collection and correct drainage of contributions from the impermeable or partially permeable areas of the neighborhood;
- in the second case, the different solutions combine green roofs, hydraulic accumulation and reuse systems for toilets, washing machines and irrigation purposes, draining green spaces with trenches and underground infiltration gabions. In this way, the solutions eliminate access to the sewerage system for small and medium intensity events and reduce the influx in the event of intense events.

The adaptation plan is an exemplary application of hydraulic and hydrological invariance and the combination of all the solutions prevents the crisis of the water evacuation system.

Green and public spaces project / The green infrastructure project is conceived together with that of the hydro infrastructure and consists of two elements:

- the permeable and vegetated spaces along the roadside, where rain gardens and floodable ditches obtained from desealing are created;
- permeable public spaces, such as squares and gardens, in which biotopes, vegetated masses, humid retention gardens and permeable mineral spaces are found.

Tåsinge Plads is a mineral square and a public garden, an oasis in which more than 1,000 square meters of vegetated soil with over 50 trees have been made permeable.
Skt. Kjelds Plads is a green urban space created through earth movements, with which to promote

2014

Work starts to transform the Østerbro district into Copenhagen's first Climate Resilient Neighborhood. The strategy envisages that, thanks to an integrated and functional network of green and blue infrastructures,

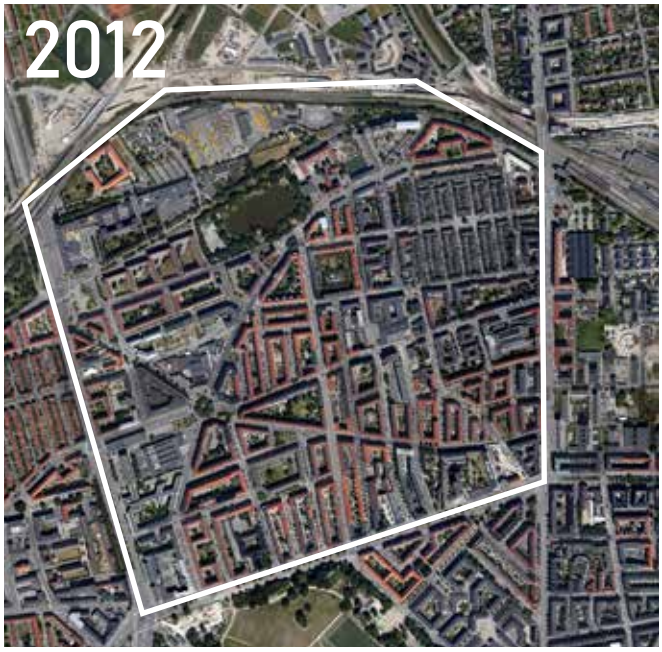
30% of rainwater can be managed in situ, without aggravating the existing sewage system.
The first work, the garden square of Tåsinge Plads, is completed.

from 2015

Residents begin to actively participate in the transformation of the neighborhood with small self-managed projects for the construction and care of semi-public / private green spaces.

2019-2020

All major works are nearing completion, namely Tåsinge Plads, Skt. Kjelds Plads and Bryggervangen.



plant and animal biodiversity and public use. The space has a particular hilly morphology. The area remains accessible on the edge to vehicular traffic, while the earthworks and vegetated spaces towards the road protect the public areas in the center.
Bryggervangen is a continuous green corridor that acts as a penetration and retention area for rainwater. The large unused areas are transformed into vegetated spaces with high biodiversity that can collect the waters in the event of a hydraulic emergency.
The areas of private courtyards are redesigned as retention basins that collect water for irrigation in case of rain while in dry weather they are recreational spaces.
Vertical green walls with climbing plants are created on the facades of the buildings to reduce energy consumption and improve living comfort.

Rain management through SUDs and NBS / For events of low and medium intensity of rain, the intervention envisages that interception systems (green roofs, columns) and slowdown systems (ditches, depressions, filtering trenches) mainly 'work' and only the partial involvement of the networks port evacuation sewers. For high-intensity events, the saturation of the networks and the involvement of open-air surfaces designed for accumulation (rain-gardens, flood ditches and flooding rain basins) are expected, without causing crisis to the urban fabric and the sewer system.

Species and planting distance / The addresses of the adaptation plan refer to a vegetation typical of the rainy climates of Northern Europe, consisting mainly of perennial herbaceous plants, ferns, hostas and grasses; among the tree species the presence of birches, willows, locust trees and maples stands out. The green squares are designed to evolve over time, towards more complex conditions of real urban groves adapted to the frequent presence of water; very rich are the lower layers of coverage consisting of a thick undergrowth. In green roof projects, on the other hand, plants suitable for growing on minimal, rustic and efficient substrates in the absorption of rainwater are chosen.
The addresses of the plan envisage the planting of tree-lined rows along the streets of the neighborhood and the creation of compact vegetated masses characterized by herbaceous species in urban open spaces, parking lots and squares.



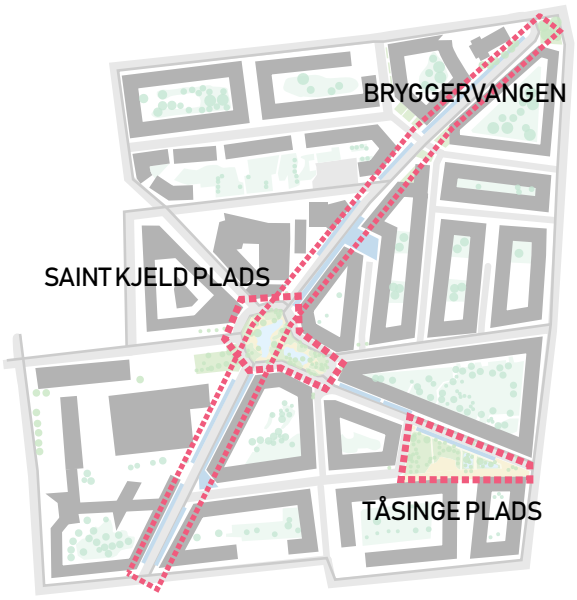

Phytoremediation and phytopurification / The thick vegetation of the rain gardens activates phytodepuration and rainwater treatment processes.

Soil and bioremediation / The unsealing of asphalted surfaces, the creation of green surfaces and therefore the use of numerous plant species contribute to the remineralization of the soil, the contribution of organic matter and the improvement of water management.

Maintenance of the NbS / On some rain gardens, monitoring of the vegetation cover, the growth of plants and their degree of prosperity, before and after the rainy phenomena, was activated, thus analyzing the strengths and criticalities of the objectives of the recommendations indicated.

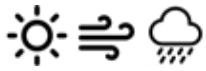
Left and top of this page. Construction details of the rain gardens of Tåsinge Plads.
The curbs have interruptions every 150-200 cm to collect the rainwater inside the depressed flower beds.
When the rain gardens develop linearly, transversal passages are provided every 20-30 meters that allow people to cross them without getting dirty and trampling the vegetation and soils. In these cases the floors are made with isolated blocks, in stone or concrete, so as not to obstruct the collected rains.
Inside the rain gardens it is possible to place pipes for drainage, having the foresight to use perforated covers of the larger wells.
(Project by Tradje Nature with GHB, photo by Luisa Ravanello and Raffaella Lombardi)

Some images of the participation path that involved the inhabitants of the neighborhood. The plan for the transformation of the Østerbro district aims to demonstrate how an eco-district adapted to climate change can be created, starting from an important work of sharing with the citizens and creating resilience and attractiveness at the same time. The project envisaged a 20% reduction of the space dedicated to cars to return it to citizens and develop adaptation interventions.



INTERVENTION AREA

COLLECTIVE PATHS AND EQUIPMENT

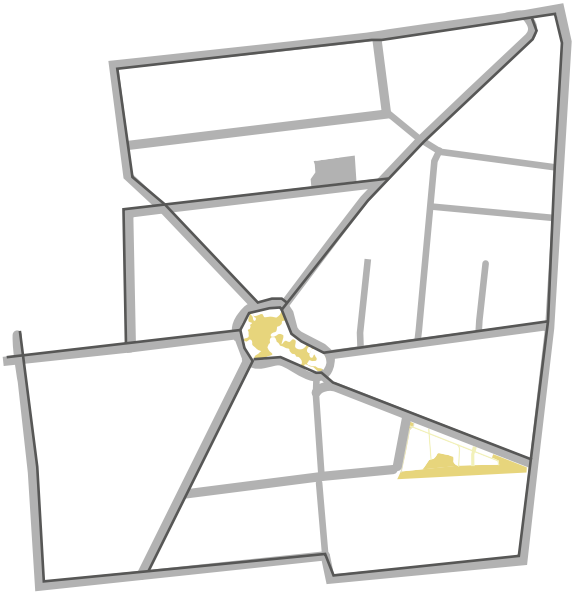


ASPHALT DRIVEWAYS

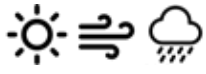
CYCLE PATHS

PEDESTRIAN PATH

PEDESTRIAN AREA IN STABILIZED CEMENT



INFRASTRUTTURA VERDE



TREES

TREES IN PRIVATE COURTYARDS

LAWN / INFILTRATION AREA

PRIVATE COURTYARDS

INFRASTRUTTURA BLU

RAIN GARDENS WITH SHRUB VEGETATION

FLOOD AREA OCCASIONALLY

0 50 100 200m

The new Sankt Kjelds Square and Bryggervangen. In 2020 the project won the prestigious 'Årets Arne' prize awarded by the Danish Association of Architects. (Project and drawings by SLA Architects with HOFOR, NIRAS, Via Trafik, Jens Rørbech, Ebbe Dalsgaard A / S, photo above and below by Luisa Ravanello, photo in the center by Mikkel Eye)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
City of Copenhagen

PROJECT TYPE
Transformation of an existing neighborhood into an eco-neighborhood, thanks to the rethinking of public street spaces.

EX ANTE SITUATION
Streets and mineral urban public spaces.

EX POST SITUATION
Streets and public spaces conceived as Nature-based Solutions.

WORKS
The plan includes several interventions located throughout the district:
- Tåsinge Plads, the first project carried out in 2014, which consists in the transformation of a completely asphalted square into an equipped green space;
- Skt. Kjelds Plads is a large roundabout to access the district which, following the reduction in vehicular traffic, will be transformed into a renaturalized green square;
- Bryggervangen will become a continuous green corridor to connect F'lledparken and Kildevldsparken as a penetration and detention area
rainwater;
- Future Green Courtyards, or micro-unsealing interventions of the inner courtyards of the blocks to collect and infiltrate the rainwater of the roofs;
- Climate Resilient Block, a pilot project to put into practice innovative scalable solutions from the climate and energy point of view, for the construction of eco-sustainable buildings.

SUDS
The neighborhood's public spaces are redesigned to adapt to climate change, through an endowment of tree-lined and permeable spaces along the streets, in the roundabouts and on the edge of public and pedestrian spaces into which rain gardens and green areas are introduced.

CHRONOLOGY
2011: Europan Competition.
2011: Tredje Nature wins with a proposal for climate adaptation.
2012-2016: implementation of the plan and design of the areas.
Since 2014, the construction sites are still underway.

DESIGNERS
Tredje Nature: neighborhood regeneration strategy in a microclimatic key, urban planning and landscape project of the neighborhood.
Tåsinge Plads / GHB: landscape project.
Malmos: implementing subject.
Orbicon and Viatra: engineering consultancy.
Skt. Kjelds Plads / SLA Architects: landscape project.
ALECTIA: consulting company.
Bryggervangen / SLA Architects with Jens Rørbeck: landscape project.
ALECTIA: consulting company.

WEBSITES
www.klimakvarter.dk

www.facebook.com/klimakvarter/

www.worldlandscapearchitect.com/first-climate-adapted-neighborhood-copenhagen-denmark-tredje-natur/#.XB6EZVVKjIU

www.worldlandscapearchitect.com/first-climate-adapted-neighborhood-copenhagen-denmark-tredje-natur/www.tredjenatur.dk

www.abitare.it/en/architecture/sustainable-elements/2015/03/01/san-kjeld-copenhagen-first-climate-change-adapted-neighbourhood/

SITE
Saint Kjeld, Østerbro, Copenhagen, Denmark

POPULATION
602,400 inhabitans

DIMENSIONS
105 he

PERMEABLE AREAS
0 he before
21 he after

F38

REDEVELOPMENT PLAN ALONG THE TREKVLIET CANAL / THE HAGUE - NL

from industrial site to new ecodistrict via an incremental process

The city of Hague, in the Netherlands, wants to redevelop a decommissioned production area, by combining a significant population growth with big ambitions on climate adaptation. The Binckhorst industrial area identified by the Municipality will be essential in achieving these goals. Today, Binckhorst is an entirely sealed and mainly industrial 130 hectare area, which will be transformed into a highly-populated urban and mixed use area. The Municipality is planning to build a lot of new houses and a new road network, currently under way. This combination puts public spaces under a lot of pressure, and requires an investment for its future quality, starting from the areas along the Trekvliet Canal.

Top right. The Plan area (Photo from www.denhaag.nl)

Bottom right. Aerial view of the Binckhorst site with the Trekvliet area highlighted. (Photo from Google Earth)

A FLEXIBLE TRANSFORMATION PLAN BASED ON THE GREEN AND BLUE INFRASTRUCTURES

The plan proposed entails the development of a robust green-blue infrastructure, integrating climate adaptation solutions and defining a high-quality public space for the district's future development.

The plan is focused on the Trekvliet Canal area, which will be the first portion of Binckhorst to be transformed into a highly-populated mixed used urban area. The Canal carries some historical significance for the city: it is an ancient transportation infrastructure, a water management backbone and a recreational public space. In order to revive these precious characteristics, the project intends to redefine the Canal area as an environmental infrastructure accessible on foot and by bike, with a series of high-quality public spaces perpendicular to the watercourse. These areas follow the original polder structure and the urban development texture. The sequence of green and blue public spaces structure the future urban texture, and collect, store and filter rainwater, covering the drainage basin.

By taking into account existing invariants (fragmented private properties and road networks), and following a gradual flexibility, the plan entails a series of reservoirs capturing and trapping the rainwater in public spaces and along the path network.

PUBLIC-PRIVATE PROCESS AND INCREMENTAL IMPLEMENTATION

The Plan process and the transformation strategy do not follow a fixed design and a linear path: they allow an incremental district development, fostering private initiatives. An active partnership and the continuous debate between the planners and the City helped define 12 green and blue spaces where Trekvliet's future development will be structured. These areas strengthen the Canal's historical significance, offering a consistent materialization of public space and a simultaneous planting diagram. In addition, they give the chance to enhance different local entities to develop micro-scale district projects, where climate adaptation is ensured by nature-based solutions.

This requires skills and a clear vision by the Administration on how to achieve climate adaptation

Reijneerwatering
Architect Mutterskade
Clingendeal eo.
Ververssingskanaal
Koninginnerngracht
Laakkanaal
De Vliet
Singelgracht
Laakhaven
Trekvliet

Up. Scheme of the main blue infrastructure of the city of The Hague.
In the center. Intervention masterplan and calculation map of rainwater collection and storage areas.
Down. Project section green areas along the 'Green Canal'.
(Drawings by De Urbanisten)

Opposite page. Trekvliet between past and present, images of the neighborhood before the transformation process.
(Photo by Thom Buys, Jan Smit and Walter Montenarie taken from GoogleEarth)

objectives (water and urban heat stress management), since there is no general plan.
The Hague plan was created for a city with critical rainfall management issues, and the message that comes from the Netherland experience is quite interesting: any transformation should be kept under control by public administration, albeit whilst debating with private players on the quality and the performance of environmental structures, in order to ensure the investments' sustainability and resilience, and the liveability of the city and its public spaces.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND SUSTAINABLE WATER MANAGEMENT

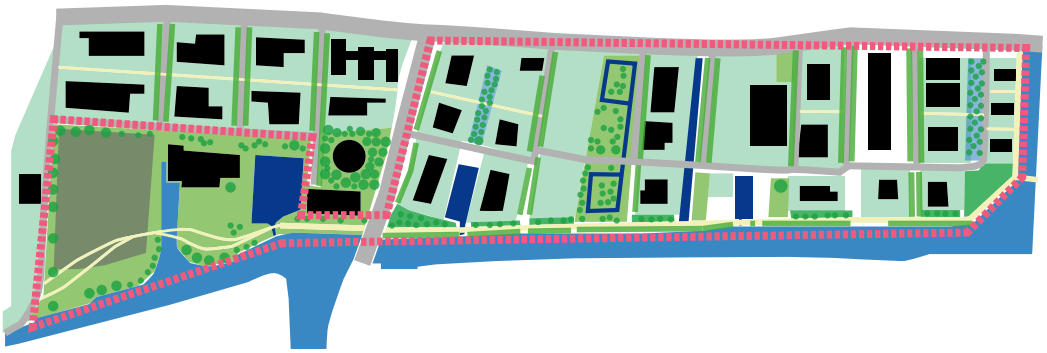
Hydraulic project and urban drainage systems / The city of The Hague, and the Netherlands in general, are the home of the 'polders', i.e. stretches of sea artificially reclaimed through dams and water drainage systems, which are today even 4-7 m below sea level.
The heights at which the Plan sets the road axes, green areas and cycle-pedestrian paths allow the collection and correct drainage of contributions from waterproof or partially permeable pavements.

Green and public spaces project / The canal is the backbone of the public spaces identified by the Plan, for the management of water resources and the creation of recreational green areas conceived as a widespread and punctual set of solutions based on nature and capable courtyards and squares to accept an excess of rain.
The new public spaces are mainly aquatic habitats with lake species and semi-humid environments with species that have adapted to the significant presence of water. The plant species and planting layouts will be defined with the final project.

Management of rain phenomena through SUDS and NbS / The plan integrates different types of NbS and SUDS (rain gardens, flood ditches, retention and detention basins) in both public and private spaces, with the aim of creating a neighborhood resilient to climatic changes and extreme weather events (heavy rains, floods, river floods or heat waves).

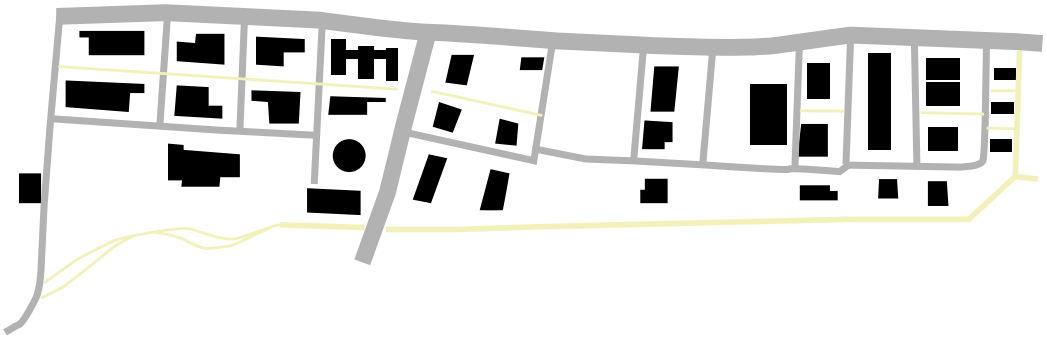
Phyto-remedies and phyto-purification - Soils and bio-remedies / The plan includes phyto-purification green areas. The creation of new vegetated areas will favor the activation of the soil remineralization processes.

MASTERPLAN TREKVLIET



INTERVENTION AREA

BUILDINGS AND PATHS



BUILDINGS

ASPHALT DRIVEWAYS

PEDESTRIAN PATH

GREEN INFRASTRUCTURE

ISOLATED TREES, IN GROUPS AND / OR SMALL VEGETATED MASSES

GREEN STREETS WITH ROWS OF TREES

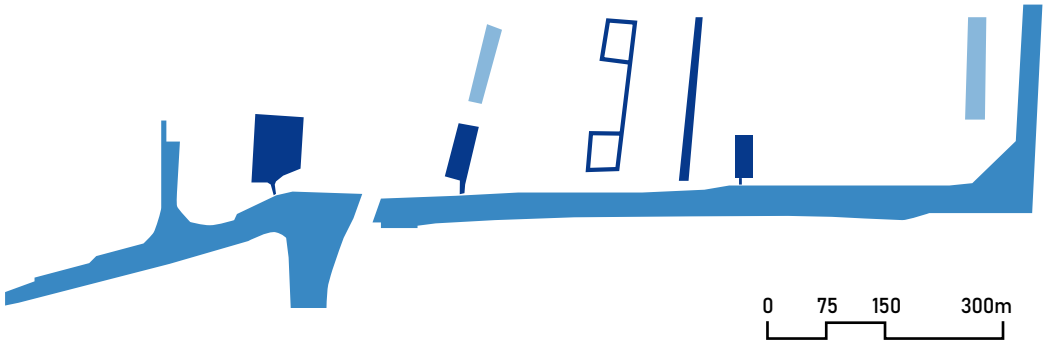
LAWN AREAS

PRIVATE COURTYARDS

VEGETABLE GARDENS

RIVERSIDE GARDEN

BLUE INFRASTRUCTURE



CANAL

RAIN GARDENS WITH SHRUB VEGETATION

FLOOD AREA

The regeneration project of the Binckhorst industrial area envisages that the strip along the Trekvliet Canal be transformed into a Waterfrontpark.
The canal promenade develops in diversified green bands with recreational functions where people can work, live, play sports, have fun and relax.

The Waterfrontpark will be equipped with landings, public docks, buildings overlooking the water with services on the ground floor. The quay will become the main route and will be equipped for various uses. (Landscape project by OKRA)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS

AIR QUALITY AND POLLUTANS REGULATION

NOISE REDUCTION

RUNOFF REDUCTION AND FLOOD

POLLINATION AND BIODIVERSITY

URBAN COMFORT AND MICROCLIMATE

PUBLIC SPACE ACCESSIBILITY AND RECREATION

IDENTITY SENSE PLACE HISTORY

BEAUTY OF NATURE

CLIENT
Municipality of The Hague, Planning Department.

PROJECT TYPE
Masterpan

EX ANTE SITUATION
Industrial area

EX POST SITUATION
Residential district and tertiary

SUDS
Rainwater recovery systems, green roofs, flood gardens.

URBAN PLANNING AND DESIGN TOOLS
Feasibility study on a waterfront for climate adaptation.

CHRONOLOGY
2016-2017: feasibility study.

DESIGNERS
THE URBANISTS
in collaborazione con
The Hague City Planning Department,
City Engineering Bureau,
Delfland Water Board.
OKRA: landscape project.

WEBSITES
www.urbanisten.nl

www.denhaag.nl/nl/in-de-stad/wonen-en-bouwen/bouwprojecten/gebiedsontwikkeling-binckhorst/ontwikkeling-trekvlietzone.htm#

SITE
The Hague (Den Haag), The Netherlands

POPULATION
515,000 inhabitants

DIMENSIONS
130 he along Trekvliet canal

PERMEABLE AREAS
0 he before
30 he after

F40

PARCO NOVELLO REGENERATION PROGRAMME / CESENA - IT

reconversion of abandoned areas between the former fruit and vegetable market and the railway

The Novello urban park in Cesena is developed on the outskirts of the historical centre, along the railroad tracks, above the state route SS726 tunnel, near the abandoned sites of the former fruit and market vegetable and in front of the railway station.
The entire area is subject to a complex urban redevelopment program - the PRU Novello - and falls within the City's redevelopment policy to transform the numerous agro-industrial run-down buildings.
The park spreads over 10 hectares. The entire PRU area spreads over 70 hectares.

The aim of the project is to activate a process of transformation and definition of the relationships between the parts of the urban fabric and the territory; this through the configuration of a new park, a large green hinge, pedestrian and cycle path, connected to the naturalistic areas of the Savio river, and the connective engine of the open space and landscape of the city of Cesena, and of the adjacent spaces,
The area is in fact in close contact with the railway infrastructure (which divides it into two macro-portions), with via Ravennate and with the via Emilia and relates to the former industrial areas of Arrigoni and the Sugar factory transformed in recent decades into university, commercial, office and residential centers.
(Photo by Raffaella Lombardi)

THE NOVELLO PARK MASTERPLAN

The Park project is developed between the railroad tracks, the Sant'Egidio district and the INA-Casa complex "Le Vigne", between the former fruit and vegetable market areas and other agro-industrial run-down sites - above the state route SS726 tunnel, the Secante, which crosses the city over a distance of 1.6 km, and in front of the areas between the railway station and the University, in the historical centre's direction. The Novello Park is part of a complex urban redevelopment program; to date, almost 10 hectares of the park north of the railway tracks have been completed.
The Park has a linear layout, and it has been designed as a diversified open space system, comprising dense wooded areas alternated with grassy meadows created on gently sloping ground and rainwater collection reservoirs. This alternation of forest and meadow areas hides the tracks from view; in addition, thanks to the numerous underpasses along the north-south axes, pedestrian and bicycle connections between the two parts of the City divided by the railway are promoted.
Along the entire east-west axis, the Park is developed along a continuous bicycle/pedestrian path, created through fragmented sections and connecting all the green areas, the University areas, the run-down PRU areas with tertiary and residential use, and some commercial areas.
Along the railway north border, there are several tree-lined and shaded parking lots, and some bicycle parking areas near the main underpass that connects the Sant'Egidio district to the historical centre, passing through the railway station.
The Secante - state route SS726 - runs underneath the Park in a 2 km tunnel. The Secante project underneath the railway tracks was devised in the 1990s, with a dual intent: on one side, so as to not affect the agricultural sector and the centuriation landscape north of the City, where many of the fruits then conveyed to the local industrial sector are cultivated; on the other hand, to start a local development process contrasting soil consumption to invest on run-down areas. The Secante tunnel is entirely covered by the Novello Park; above ground, its presence is detected by the tall ventilation stacks at the east and west ends of the Park.
The growth of the dense forest areas anticipates and accompanies the evolution of the district that will be built north-west of this area, in the former fruit and vegetable market site.

Masterplan and project sections. The public park and the system of open spaces act as mediators of the relationships between the new urban intervention, the consolidated city and the landscape of the Roman centuriation.
The reinterpretation of the landscape and its reasoned insertion into the design are the peculiar characteristic from which the design strategy is developed, then declined in the specific interventions of the various areas concerned.
The supra-secant linear park and the redeveloped spaces in front of the station and on the school campus form the heart of the project. In correspondence with the current pedestrian underpasses of the railway, the park tilts with two wide openings to facilitate crossing. In this way we want to create a cycle-pedestrian continuity to connect the new district up to the Via Emilia towards the center.
(Landscape design and LAND study drawings)

TRANSFORMATION PROCESS AND DYNAMICS

Transformation of the area started in the 1990s, with the idea of placing the state route underground and converting the two historical factories of Cesena - Arrigoni and the Sugar Factory, that were decommissioned in the 1960s-1970s - to limit soil consumption and promote urban and environmental sustainability.

In 2000, the General Regulatory Plan (PRG) - classifies the area as an 'urban redevelopment framework', comprising the entire area around the railway station, including Cesena's former fruit and vegetable market. This area was once dedicated to agro-industrial activities, which have now been mostly transferred to the new production areas, outside the City. Its centrality, the fact that it was mainly publicly owned, and the growing deterioration of the run-down areas were the elements that lead to its identification as an ideal place to implement an urban redevelopment program.

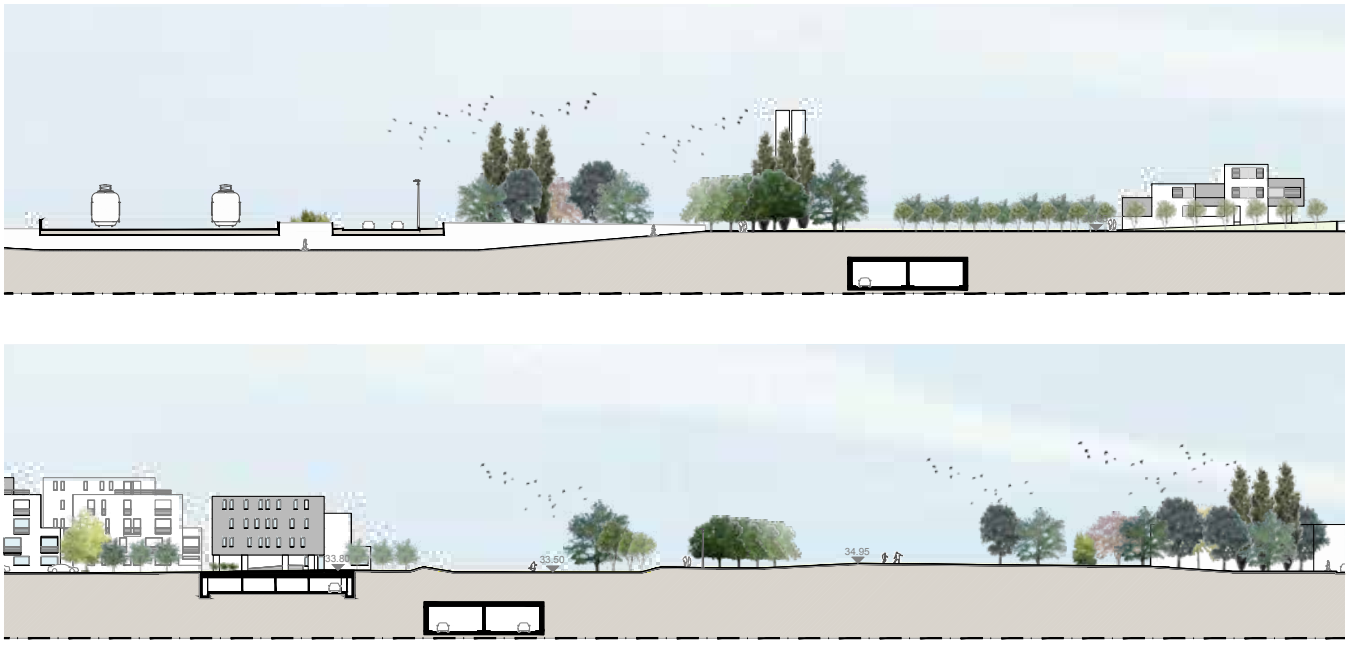
The transformation project started in 2006, with the creation of a Feasibility Study to establish an STU, an Urban Transformation Company. The study defined the intervention perimeter, quantities, uses and infrastructures required, assessing the economic-financial feasibility of the transformation.

The feasibility study was the reference for the international tender for the urban transformation project, which ended in 2008 with the victory of Studio Gabrielli from Genoa, alongside Camerana, from Turin, and Land Srl, from Milan.

In 2012, the urban planning phase was concluded, with the Programme Agreement signed by the Municipality of Cesena, the Province of Forlì- Cesena, the STU and four private owners who joined the project.

The PRU project is developed along the railway, in 5 independent sections from an urban standpoint (4 to the north, and 1 to the south, in front of the railway station):

- North area (sections 1 - 2 - 3 - 4): north of the railway station, the project is developed in the area comprising the former fruit and vegetable market, other decommissioned agro-industrial activities, and the Secante zone. The City's northern entrance is characterized by the 10-hectare urban park - which reaches the Savio River to the west, and covers most of the Secante tunnel to the east, with a green bicycle path from the river to the station, and



three bicycle/pedestrian paths from the railway tracks to the city centre. The new district will be mainly residential, with integrated office and commercial services. All the new buildings face south, overlooking the historical centre and the hills, right above the park;

• South area - near the historical centre (section 5): in the former Arrigoni area - which houses the high school campus and the Faculty of Psychology - all public spaces will be redeveloped and pedestrianized, and the existing parking lots will be moved underground. A square will be created in front of the Station, to improve the entrance to Cesena, by moving the coach bus station to another area near-by. This way, railroad transportation will be revitalized and the public transport hub will be strengthened. An office tower will be built in the middle of the area, with commercial and sports activities on the ground level, to enliven this central part of the city, even outside of school hours.

The PRU redevelopment concerns 76 hectares, with 17 hectares of permeable areas and 10 hectares of urban park. The Park, the parking lots connected to the railway station, and the creation of a bicycle path system for the new district and the park, along with the underpasses and the Secante, are the parts of the 2000 PRG, 2006 PRY and 2008 Project Tender that have already been carried out. Due to the real estate and economic crisis, the building part of the program remains unfulfilled to date.

from 70s

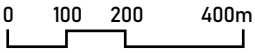
The decommissioning of the factories that historically worked and marketed sulfur and locally produced fruit began, using the neighboring railway transport.

2000

The PRG defines the area as an 'urban redevelopment area', perimeter the entire area around the railway station, including the former fruit and vegetable market.

from 2000

Implementation of the 2nd lot of the Variante della Via Emilia - Secante di Cesena begins, which extends for about 2.43km, involving the central core of the city and underground alongside the Bologna-Ancona railway. The project involved the construction of a junction (Cesena Nord) for connecting the new residential - commercial - school area of the former sugar factory. The junction develops in an artificial double-barrel tunnel with two lanes in each direction below via Cavalcavia and runs underground for about 1.6km, exiting in the open at about 200 meters from the Kennedy viaduct.



Aerial photos and time schedule of the transformation of the area.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND URBAN WATER SUSTAINABLE MANAGEMENT

Blue infrastructure / The PRU area is flat and it not affected by geological and geomorphological instability. The stratigraphic stages comprise a layer of clay and silty-clay soil, alternated with silty layers with an average thickness of 15 meters, which cover a layer of gravel-sand deposits. The groundwater is located underneath the bonding layer, more than 15 meters below the ground level, and the local hydro-geological layout makes a possible rising very unlikely.
The project entails a substantial increase of the permeable and semi-permeable surface, changing from about 9 hectares to over 9.8 hectares, with a reduction of the Imp impermeability index from 68.1% to 65.5%. To a certain extent, the hydraulic invariance principle will be naturally respected by the programmed interventionsm; in any case, overflow reservoirs will be included in the different sections, also to make them all independent, both due to their different building times (from a time-related perspective), and due to the wide extension of the area, with different water bodies (from a territory-related perspective).

Blue infrastructure construction aspects / In all the sections, the collection networks for white and rainwater coming from roofs/covers and squares/streets will be completely separated from the sewage system. The wastewater collected separately will flow into the existing mixed network by gravity. Rainwater will be conveyed to the existing sewer lines along Via Cavalcavia and Via Ravennate (section 1), Via Ravennate and Via Russi (section 2), Via Russi (section 3), Via Perticara and Via Montecatini (section 4) and Via Europa (section 5). Concerning compliance with the hydraulic invariance principle, the PRU includes a total minimum water collection volume of 914.70 cubic meters, with defined surfaces for each section.
Furthermore, reinforced meadows and semi-permeable paving will be used on parking lot spaces, to ensure the largest draining surface possible in the large parking areas included in the Programme.

2006

The project for the transformation of the area is launched, with the preparation of a Feasibility Study for the establishment of an Urban Transformation Company (STU).

2008

The Municipality organizes an international design competition for the definition of the urban project, won by the Land studio of the landscape architect Andreas Kipar with Studio GAP.

2012

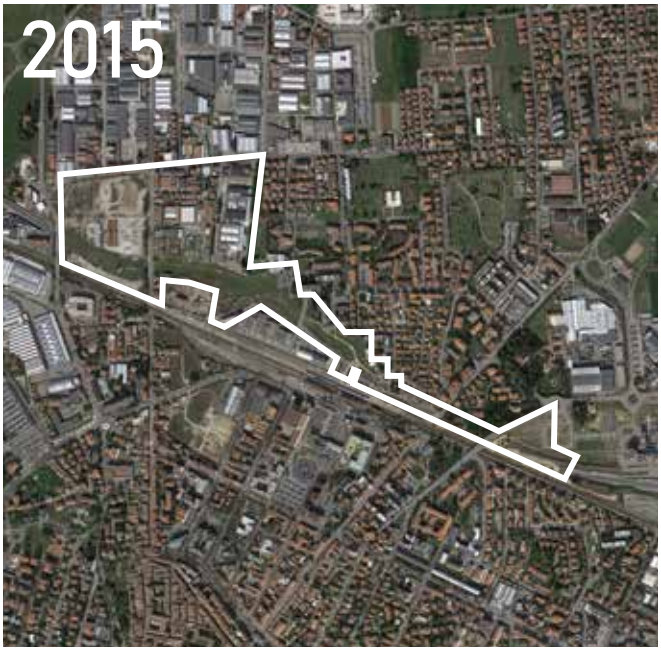
The urban planning process ends with the signing of the program agreement.

2017-2018

Work begins on the 1st lot designed in BIM, or rather, in IWB, a new parametric methodology designed specifically to manage the transformation processes of green areas in the name of environmental sustainability.

2019

Inauguration of the first residential area and the urban park.



Green infrastructure and public spaces / The green infrastructure project includes the large linear park along the railway, connected with the redeveloped districts and areas to the north, with the river to the west, and with the historical centre to the south. In the linear park, forest areas are alternated with equipped meadow areas and services, parking lots, green and reservoir areas; while the area in front of the station and university is a tree-lined equipped square.
The park forest areas are designed to have a wide biodiversity and an increased natural aspect on the depressions that act as reservoirs to better manage the rainwater. The meadow areas house the Park social structures: playgrounds, sports facilities and connecting spaces between the existing gardens, near the commercial and sports activities, schools, church and INA-Casa "Le Vigne" in the district. The public green landscaping project features a tree row system parallel to the paths, which are mediation elements compared to the infrastructural green strip. In the equipped areas, organized by age groups, deciduous leaf trees are planted, to promote shadowing in the summer, and sunlight in the winter.
A named square will be built in the future at the park entrance, between the station square and the university campus, at the point where the pedestrian flows going from the station to the urban centre will be organized. These spaces will be articulated by water features, tree-lined areas and turf spaces to increase the draining surface.

Plant species and planting distance / In order to ensure that the environment is as natural as possible, the trees will be planted at a curved distance, to limit the perception of any geometric alignment and make the urban forest areas look more natural. The species have been selected to carry out precise functions, based on the different areas: 1) Forest areas: Quercus ilex, Quercus robur, Carpinus betulus, Fraxinus ornus; Fraxinus excelsior, Acer campestre, Acer monspessulanum, Acer opalus, Populus nigra Italica, Populus tremula; Cornus spp.; 2) Water bodies: Eichormia crassipes; Ranunculus penicillatus; Nymphaea spp.; 3) Road green: tree rows of Quercus Ilex ; 4) parking lots at ground level and linked to the Station: Fraxinus excelsior, Sophora japonica; 5) Signs of the original agricultural function of the centuriation: species with abundant blooming, such as Cercis siliquastrum, Prunus spp. and continuous tree strips; 6) Square between the station and the university:

Up. Details of the greenery and pavements.
(Photo by Elena Farnè and Raffaella Lombardi)

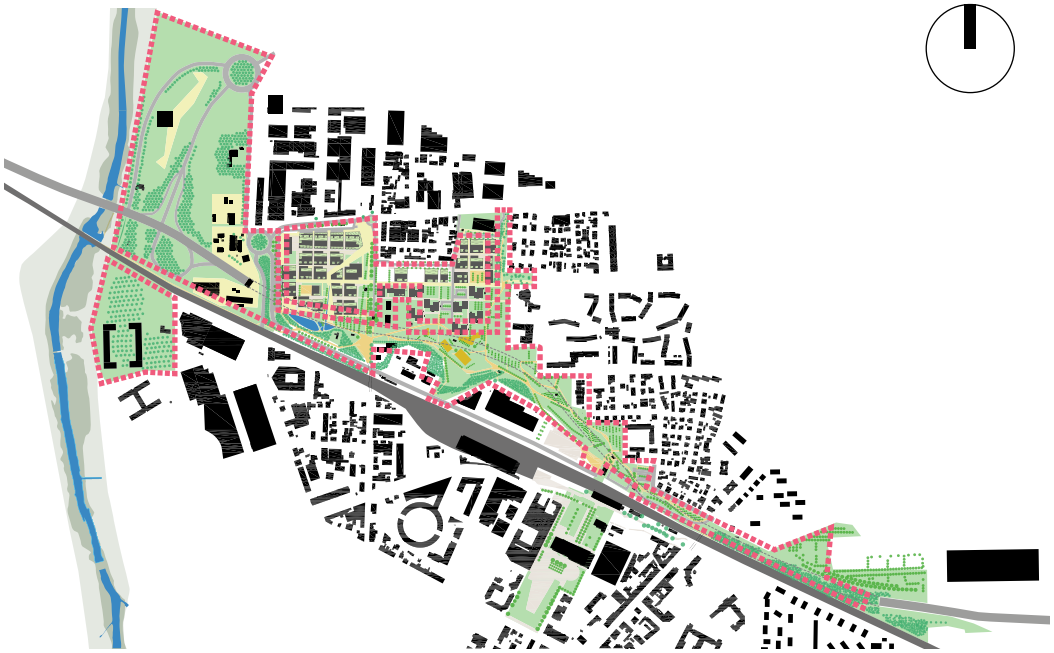
evergreen Quercus ilex systems for the rows, and deciduous species, such as Morus alba Fruitless e Pyrus calleryana Chanticleer for rest areas and tree-lined squares.

Rainwater management with SUDS and NbS / The project includes reservoir areas in the park to manage the rainwater coming from the buildings and the road and square surfaces, with subsequent flowing into the existing sewage system. This rainwater management method results from the presence of non-permeable soil and the Secante tunnel, preventing water infiltration on the entire park surface.

Phytoremediation and phytopurification / The project entails the construction of a urban forest, infrastructural green, public green and district green system, designed with a filtering function to limit fine particulates, reduce noise and preserve the soil.

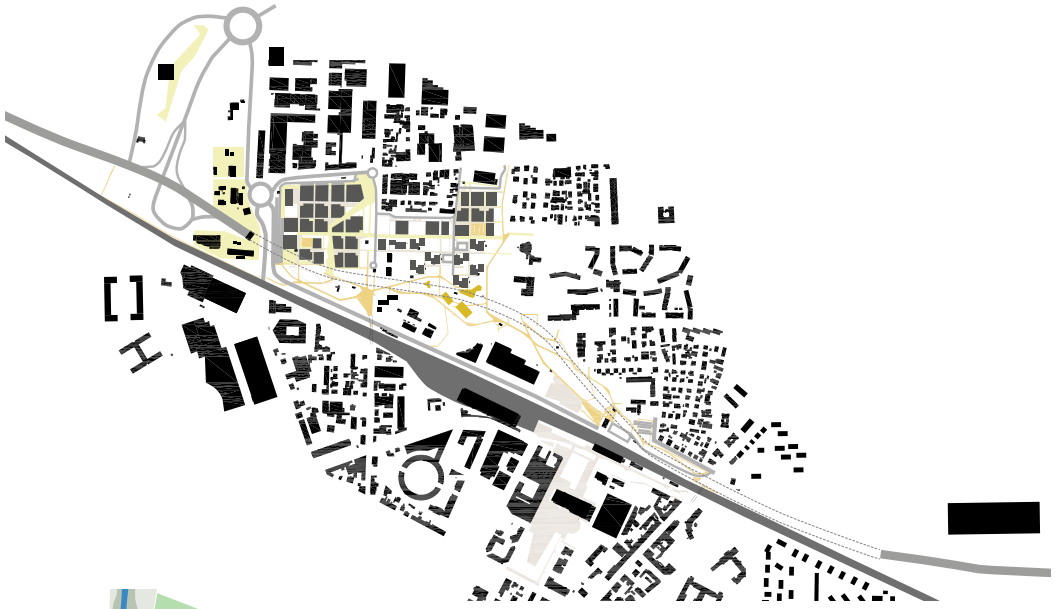
Maintenance / Maintenance of the green infrastructures does not require any special interventions, as the rustic species planted have limited water and maintenance needs. Meadow surfaces are mowed frequently, while groundcovers are mowed periodically and road trees are trimmed.

MASTERPLAN
NOVELLO PARK



INTERVENTION AREA

BUILDINGS AND PATHS



EXISTING BUILDINGS

NEW BUILDINGS

RAILROAD

FREEWAY

UNDERGROUND SECTION OF THE FREEWAY

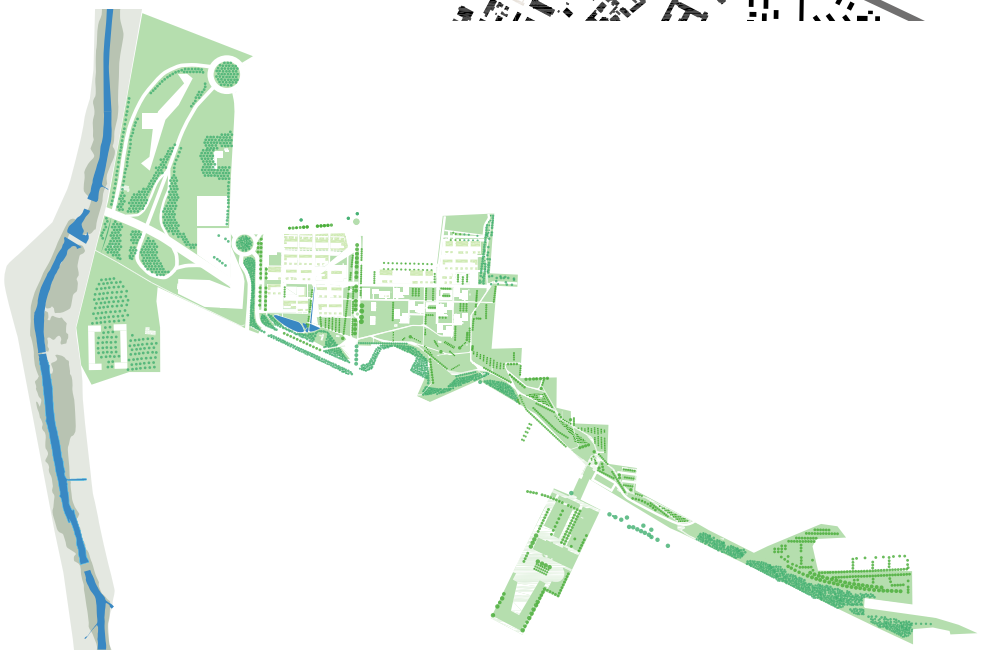
ASPHALT DRIVEWAYS AND PUBLIC PARKING AREAS

SIDEWALKS AND WALKWAYS ALONG THE STREET

PEDESTRIAN PATHS IN THE PARK

EQUIPPED AREAS

INFRASTRUTTURA VERDE



TREES IN ROWS

INDIVIDUAL TREES, IN GROUPS AND / OR SMALL VEGETABLE MASSES

MEADOW

GREEN ROOFS

BLUE INFRASTRUCTURE

SAVIO RIVER

PONDS

RIVER FLOOD AREA

0 175 350 700m

The linear park represents the great challenge of a city towards a concept of sustainable settlement and becomes a system open to the territory which, involving all the places it touches, connects them in an articulated cycle-pedestrian system.
The design strategy is divided into five different areas of intervention with specific and peculiar characteristics, both for the landscape design and for the functional organization.
The urban forestation areas, the green shoulder that accompanies the intervention and which, in its development, incorporates and mitigates all the components that exert a perceptive impact on the new intervention: the bundle of railway tracks, via Cavalcavia, the new viability of access and the ventilation chimneys of the Secante.
The infrastructural green area includes the strips along the minor roads and the parking lots that mediate with the surrounding context.
The public green area includes the surfaces on which the main cycle and pedestrian connection paths and equipment of collective interest stand.
The neighborhood greenery is characterized as a penetration of the park, widespread within the structure of the new neighborhoods.
The extremely regular character of the fabric creates defined spaces for different uses, favoring the division between public and private.

In this page. Glimpses of the park, materials and details. (Photo by Raffaella Lombardi)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
Municipality of Cesena

PROJECT TYPE
Urban park and eco-neighborhood.

EX ANTE SITUATION
Intermodal rail-road junction, a disorganized set of voids, production buildings, residential margins and transport infrastructures.

EX POST SITUATION
Equipped public green area.
the large linear park exactly above the underground tunnel of the city traffic artery, ensuring its inspection and providing the plant equipment of the road system (ventilation, plumbing and special systems etc).

WORKS
The public park and the system of open spaces act as mediators of the relationships between the new urban intervention, the consolidated city and the landscape of the Roman centuriation. The reinterpretation of the landscape and its reasoned insertion into strategic planning are the peculiar characteristic from which the planning strategy is developed, then declined in the specific interventions of the various areas concerned.
With the intervention, about 1,300 new trees are expected, more than 2 km of new connected cycle paths, 2 areas equipped for children of different age groups, 2 equipped fitness areas, 1 sports field.

SUDS
The intervention is an interesting green application that allows rainwater to infiltrate a waterproof and mineral underground building; in this sense it constitutes a Nature-based intervention; in fact, NbS is the approach and the set of solutions that allow the most resilient management of the water resource, reducing run off and creating real linear urban green areas.

URBAN PLANNING AND DESIGN TOOLS
Urban, landscape and architectural project.

CHRONOLOGY
2008: international competition of ideas.
2012: signing of the Program Agreement.
Starting from 2017 the construction sites are still in progress.
2019: inauguration of the park.

DESIGNERS
Studio GAP Associati: coordinamento gruppo di lavoro, progettazione architettonica e urbanistica.
Studio Camerana&partners: progettazione architettonica e urbanistica.
Bruno Gabrielli: progettazione architettonica e urbanistica.
Pietro Cozzani: progettazione architettonica e urbanistica.
Studio LAND: progetto urbanistico e paesaggistico.
T.T.A. studio associato: viabilità.
Jacobs Italia SpA: progettazione impiantistica.

WEBSITES
http://www.comune.cesena.fc.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/39777

www.bimportale.com/parco-novello-cesena/
https://www.sinergospa.com/en/portfolio/parco_novello_cesena/

SITE
Cesena, Forlì-Cesena, Italy

POPULATION
97,190 inhabitants

DIMENSIONS
27he Urban Redevelopment Program (PRU)
6he PARK

PERMEABLE AREAS
9 he before
9.8 he after

INVESTMENTS
2M €

F41

ADAPTATION PLAN FOR THE CITY CENTRE OF MEDICINA / BOLOGNA – IT

urban, environmental and social rege,eration strategy, along the Medicina Canal

In 2018, the town of Medicina - in the province of Bologna - participated in the Urban Redevelopment Tender promoted by the Emilia-Romagna Region, developing the project "Lungo il Canale di Medicina" ("Along the Medicina Canal"), an urban, environmental and social redevelopment strategy for the town. The program is organized into a series of interventions to adapt public spaces to climate change and community-involvement measures aimed to residents, companies and local youth. The program – with a funding of 1 million 400 thousand euros – concerns different urban areas developed along the canal that crosses Medicina from south to north:

- environmental restructuring and wet areas, and drainage systems, to manage water regulation and treatment aspects;
- public spaces to be reforested and made permeable once again, to adapt to intense rainfall and heat, and create liveable places to foster public heritage care measures;
- run-down areas, where reuse processes and company/district services to be set up;
- securing road networks and integrating slow mobility systems.

The program interventions and measures are implemented on a system of areas spreading over almost 8 hectares, flanking the Medicina Canal for about 1.7 km in the city centre.

Top right. Top view of Medicina with highlighted the route of the Canal. (Aerial photo 2007, ProLoco of Medicina)

Bottom right. The co-design phase. (Photo by Kiez Agency)

URBAN ADAPTATION STRATEGY

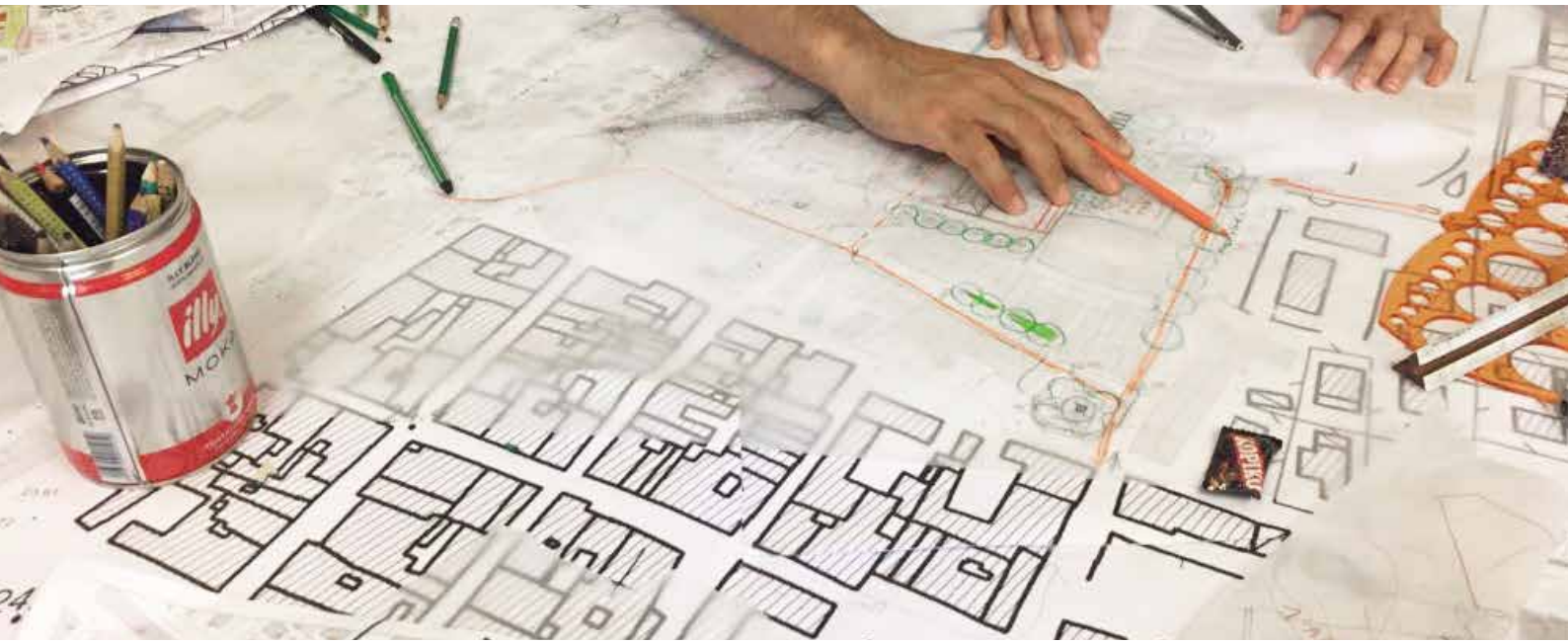
The Medicina Canal is an important drainage canal on the Bologna plain. It originates on the Apennines, at about 65 m a.s.l., as a branch of the Sillaro River. For its entire length (19 km), it heads north, crossing Medicina and then continuing toward the plains.

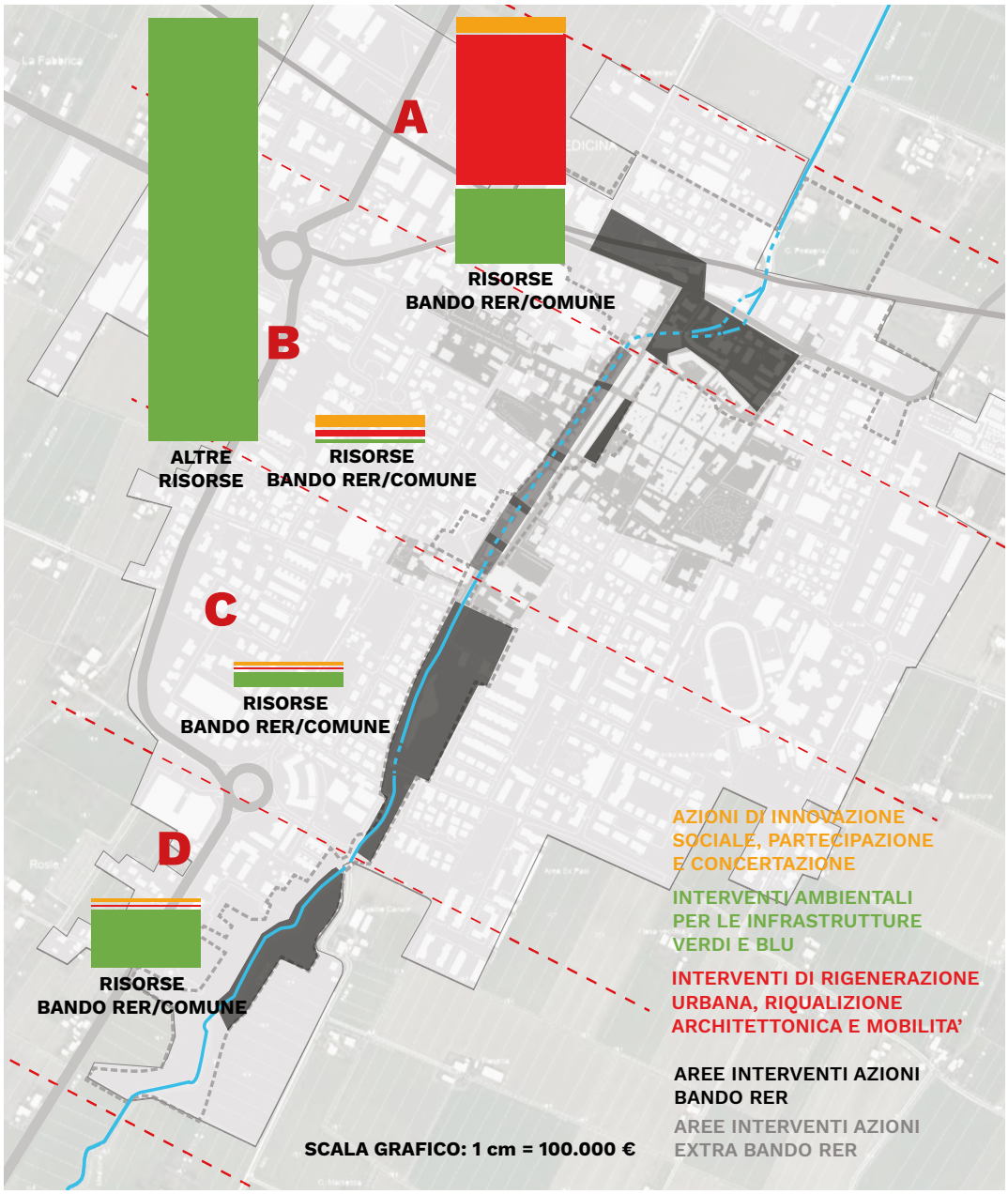
In the city section, the Canal has serious static and hygiene-sanitary issues. Waste water is discharged into it, and the covered urban section is manifestly collapsing in some portions.

The redevelopment program along the Medicina Canal includes a series of environmental remediation and climate change adaptation measures, by focusing on the redevelopment of public spaces, water purification and increase of natural areas in the city. The different interventions are aimed at creating a green infrastructure in the northern area of the historical centre, to lower the temperature, manage intense rainfall, and redevelop the Canal section crossing the city – the blue infrastructure – by connecting it to sustainable urban drainage systems and to the sewage network.

The program entails several interventions along the canal:

- urban redevelopment of the parking lots and public areas on Via Fava. Traffic-calming systems, a new cycling path and parking-lot depaving to plant shading trees;
- environmental and landscaping redevelopment of the entire Borgo Paglia district, north of the historical centre, between the rainwater canal and Via Fava. The project includes the construction of a wet garden to manage rainwater, and canal phytopurification, with a flood reservoir, the creation of two tree-lined pedestrian squares with seating and lighting elements, the redevelopment of two existing parking lots with a sustainable urban drainage





system - rain garden and channel drain - and the planting of trees to create shade and the creation of a public garden;

- the redevelopment of a former city warehouse as community building;
- the construction of a drainage portion in the canal's culverted section, and the restoration of the former wash house areas, at the entrance of the Mondine Park, with a new shaded and permeable garden;
- the creation of a large water overflow and phytopurification area, south of the built-up section, in the environmental restructuring zone.

In parallel with the interventions, the program entails the activation of several follow-up measures:

- a public debate process with the people living in front of the Canal;
- a participation process addressed to the Borgo Paglia residents aimed at activating cooperation agreements to care for common assets;
- two social innovation paths: one addressed to companies and young people, to manage the former station as an entrepreneurial training and development hub, and the other addressed to the third sector and the residents, to manage the community building;
- a communication plan .

To the left. Project feasibility and governance scheme. The bar diagrams show how the investment in green and blue infrastructures (in green, 40%) is substantially similar to that on brownfields and the mobility system (in red, 50%). The remainder of the overall investment (10% in orange) is invested in listening and participation processes and public debate.

To the right. Images of the participatory process dedicated to Borgo Paglia, the new public spaces and the Neighborhood House which was structured in two macro-phases: the first aimed at sharing the project and defining a program for the use of the spaces; the second is oriented to the management and planning of the collective space. (Photo by Kiez Agency)

CO-DESIGN AND IMPLEMENTATION PROCESS

Before taking part in the tender, the public administration created a joint-planning team capable of developing a medium/long-term strategy for the city, along the entire urban section of the Medicina Canal.

The joint-planning team included administrators, managers and city councillors, and an external professional team to define the strategy, interventions and measures - selected via a public call - the relevant bodies (such as the Consorzio di Bonifica Renana - owner and manager of the canal), the CON.Ami Agency (owner of the networks), and Hera SpA (sewers manager).

The team worked according to the REBUS method, with progressive co-planning and solution-implementing meetings, and by discussions among the transdisciplinary group. The team's role was to develop and define the strategy with the Municipal Administration, and plan the interventions and measures before applying to the tender. When the works started, the topics, the areas and the work perimeters were different than the final ones; they have been constantly reviewed in a progressive comparison between the analysis of the issues and priorities, planning, local listening, and cost budgeting. The REBUS working method was essential to define and share the choices between administrators, experts and players, in a transdisciplinary process, where the different analyses determined the strategy and its feasibility, the process and related costs.

Currently, the Municipal Administration has concluded the final planning phase and has stipulated an agreement on the works with the Region. The hub-enabling processes in the former station, and resident participation have already started, while the debate on the Canal will be activated in 2020. The first works should be awarded between 2020 and 2021.

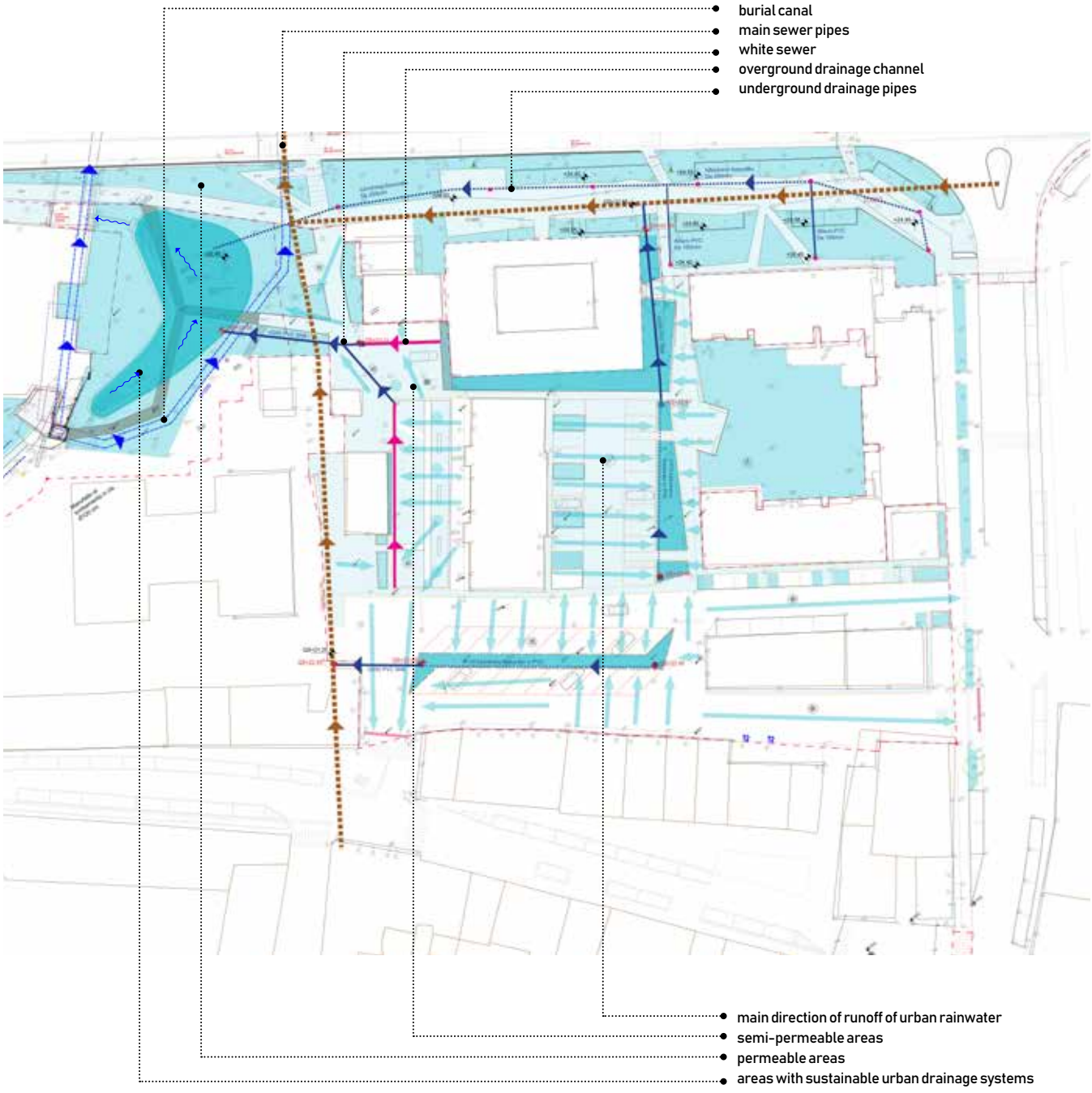
Along the Medicine Canal. Urban, Environmental and Social Regeneration Intervention promoted by the Municipality of Medicina (BO) in the 2018 Urban Regeneration Regional Call. The project involves the rehabilitation of the urban stretch of the reclamation canal, the redesign of the public spaces of the village north of the historic center with a Nature-based approach and the involvement of the local community for the shared management of open spaces and some buildings intended for public functions. An integrated system of green-blue-gray infrastructures for heat regulation and rain management was designed on the public spaces of the village.
Thanks to the slopes of the road surfaces, the rain flows into the rain gardens and there, thanks to the vegetation, the rainwater undergoes a phytoremediation treatment before being returned to the canal.
The interventions include the construction of a wet retention garden for the phyto-purification of all rainwater gravitating in the village, the introduction of rain gardens in the parking lots for water management, a continuous / contiguous system for shade with the planting of new trees, the creation of a small pedestrian square, the creation of new sidewalks

drained and / or permeable surface
before > 30%
after > 65%

and cycle paths and the creation of small seats and shared equipment for the use of the inhabitants. The rainwater is gradually conveyed to the damp garden by means of drainage-slotted pipes and using former drainage channels as vectors.

The rainwater from part of the neighborhood will be conveyed to the humid garden and a flow rate will be derived from the Medicina canal in case of rain, improving the quality of the effluent leaving the humid garden itself (phyto-remedy).

The drainage of the rainwater of the village is thus rethought from a NbS perspective: the inflow into the network will be slowed down thanks to capillary interventions of desealing of squares and parking areas, infiltrating, as far as possible, with draining trenches connected to the drainage network and creating retention volumes up to the humid garden of the former mill. The layout of the drainage is completed by the lowered green strips that receive, retain and infiltrate the rains of the public spaces subject to desealing.
(Project: architect Elena Farnè, engineer Raffaella Lombardi, architect Sebastiano Sarti, agr. Paolo Gueltrini, engineer Francesco Pinosa)



In the photo the images of the northern area of Medicina near the former station and the culvert canal near the old Mulino Gordini. The canal has been a strategic development element of the city, for the water supply to support agriculture, the operation of the mills and the presence of entities and activities along its axis. Due to severe sanitation problems, in 1930 the canal was drained along the entire urban stretch and still today serves as a non-regular sewer drain, while above ground it is occupied by illegal superfetations. (Photo by Kiez Agency)

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS SUSTAINABLE URBAN RAINWATER MANAGEMENT

Hydraulic and urban drainage system project / The hydraulic project has been devised on an urban scale, over 2 km, upstream-to-downstream. The Medicina Canal is a primary blue infrastructure, and will be equipped, where possible, with floodable green areas, to help manage intense rainfall and rainwater purification, with nature-based solutions and sustainable open urban drainage systems. The project will include:

- the creation of a phytopurification garden on the southern section, comprising a 2,000 sqm filtering bed with horizontal submerged flow;
- re-naturalization of the Canal banks along the former wash area;
- securing of the entombed section and channelling of the existing drains toward the public sewage system;
- creation of a wet garden in the northern section, near the former mill, with submerged phytopurification and horizontal submerged flow system, capturing the urban rainwater from Borgo Paglia.

Blue infrastructure construction aspects / The urban drainage systems used comprise gravel and grit filtering soil, topsoil and hygrophilous species. Thanks to the gradients and water flow branches, the two phytopurification gardens, the rain gardens on the parking lots and squares, and the swales in the public areas capture the rainwater not collected by the drainage system and purify it.
Auxiliary drainage system sections will be placed near the SUDS, since the local clay soil has a poor natural infiltration level.

Green and public space infrastructure / The green infrastructure project has been designed alongside the hydraulic infrastructure plan, and it essentially comprises four elements:

- trees and green elements in run-down areas, to create a widespread shading system;
- permeable spaces alongside the Canal, to purify water through phytopurification and water plant gardens;
- rain gardens and swales obtained from desealing processes in public spaces;
- gardens and equipped squares, subject to cooperation agreements, to manage the green, vegetable and community assets.

Species and planting distance / The project will focus on typical Po Valley species, by favouring rustic species, except for a few ornamental species in some community gathering venues.
Tree species include: oaks, elms, ashes, maples, Sophora, European nettle trees, willows, lindens, and fruit varieties of Prunus. Shrub species include: Rosa Canina L., Cornus sanguinea, Cornus mas, Ligustrum vulgare, and Salix alba. Groundcovering plants include: Pachisandra terminalis, Pittosporum and Edera Helix. Marsh species include: Iris pseudacorus, Tipha, and Fragmites.
The trees are planted in rows and compact plant groups, where possible, to increase the level of shading on the ground. Some monumental species are included, in isolated form.

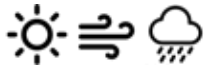
Phytoremediation and phytopurification / The lush water plants of the wet gardens south and north of the Canal, and along the wash area, triggers rainwater phytopurification and treatment processes. Apart from their high aesthetic value, the species selected have a great pollutant degradation and water oxygenation level.

Soil and bioremediation / Desealed mineral soils are finished with topsoil obtained from the trenches on the phytopurification garden areas. The soil - reused on site - allows for a significant economy of scale within the construction sites, and increases the supply of organic matter to the plants.

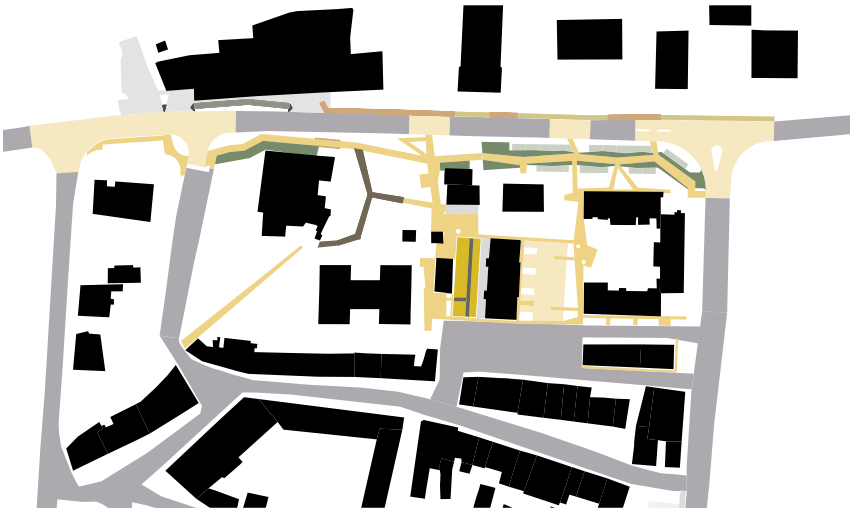
Maintenance / The main maintenance interventions are related to the green section. A non-reusable irrigation system will be implemented to help the plants take root within the three first growing seasons; after that, a possible emergency irrigation system may be included.

MASTERPLAN BORGO PAGLIA

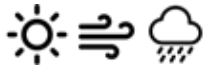
BUILDINGS AND PATHS



- BUILDINGS
- ASPHALT DRIVEWAYS
- DRIVEWAY BIOSTRASSE
- PEDESTRIAN BIOSTRASSE
- STABILIZED CEMENT
- DRAINING PARKING LOTS
- WALKWAY
- SMOOTHED CONCRETE



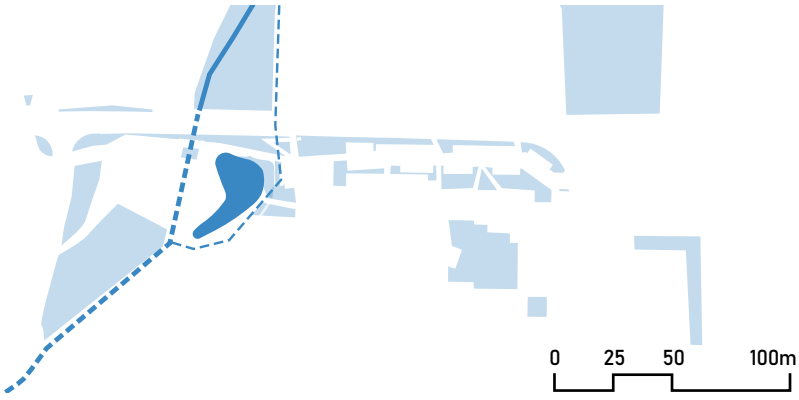
GREEN INFRASTRUCTURE



- ISOLATED TREES, IN GROUPS PRE-EXISTING
- ISOLATED TREES, IN GROUPS OF NEW PLANT
- SHRUBBY GREEN
- PRE-EXISTING GREEN AREAS
- FLOWERY MEADOW
- NORTH PHYTODEPURATION DAMP GARDEN

BLUE INFRASTRUCTURE

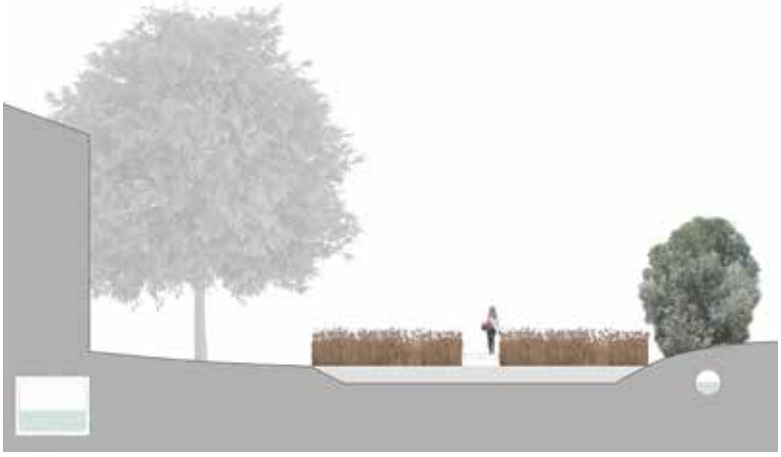
- MEDICINA CANAL
- 1ST GRAVESTED BRANCH OF THE CANAL
- 2ND GRAVESTED BRANCH OF THE CANAL
- FLOOD AREA
- PERMEABLE AREAS

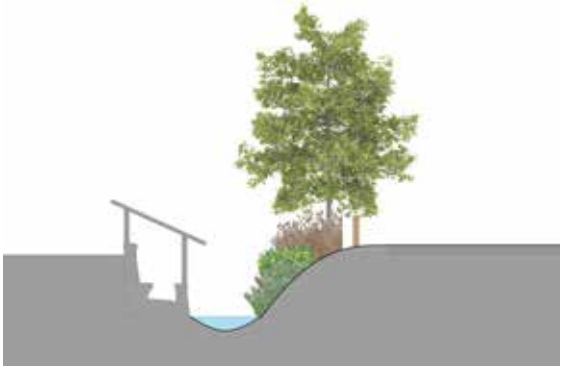


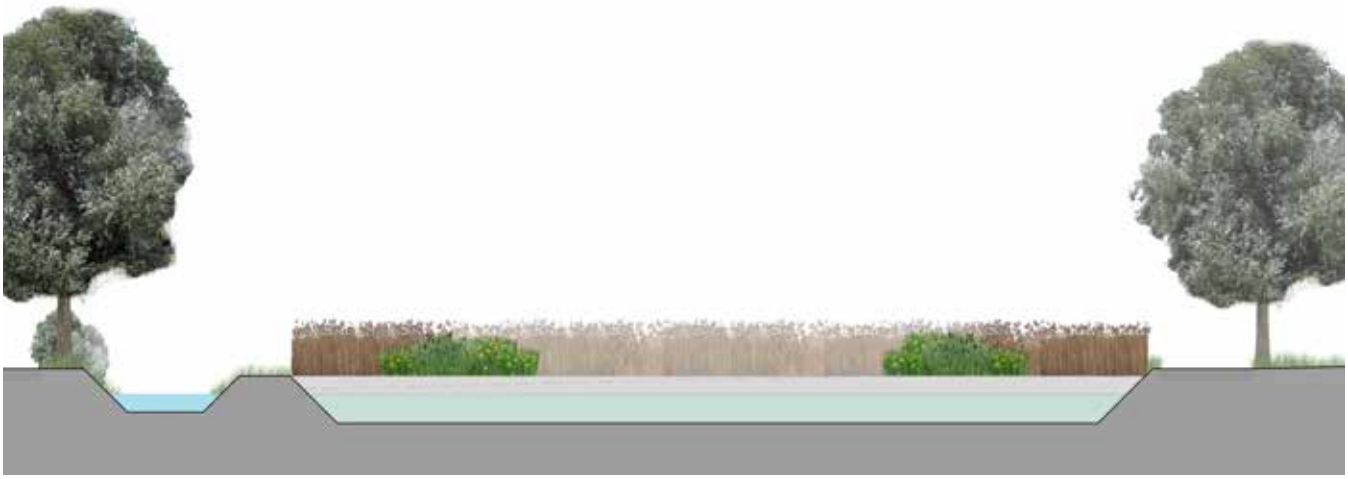
Project sections on the canal and open spaces. (Project: architect Elena Farnè, engineer Raffaella Lombardi, architect Sebastiano Sarti, agr. Paolo Gueltrini, engineer Francesco Pinosa)

A wet garden will be created in the area of the former mill. Here there is a hydraulic diverter on the right of the same riverbed, with its autonomous underpass of via Fava. It is planned to maintain the use of the old riverbed on the left as a lean channel and as the main branch for the drainage of the canal waters. With the construction of a water park - garden, it is planned to build a phytodepuration in the sub-riverbed with a horizontal submerged flow system in the right secondary branch.

The southern phytodepuration intervention has the purpose of improving the quality of the water entering the town as well as creating a natural environment in the context of the ecological corridor of the canal, with the planting of species typical of the humid environments of the ditches suitable habitat for different species of butterflies. The geometry of the basin will allow to fulfill, in the free portion above the filter bed, the hydraulic invariance function for the future urban intervention planned in the immediate vicinity.







ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS

AIR QUALITY AND POLLUTANS REGULATION

NOISE REDUCTION

RUNOFF REDUCTION AND FLOOD

POLLINATION AND BIODIVERSITY

URBAN COMFORT AND MICROCLIMATE

PUBLIC SPACE ACCESSIBILITY AND RECREATION

IDENTITY SENSE PLACE HISTORY

BEAUTY OF NATURE

CLIENT
Municipality of Medicina.

PROJECT TYPE
Redevelopment of a portion of the historic center along the Medicine Canal.

EX ANTE SITUATION
In 1930 the canal was buried by the municipal administration and by private individuals, who proceeded to build a concrete slab for the entire urban stretch.
Over the years the insole has been occupied by frontists with courtyards and parking lots, garages, walls and dividing nets, superfetations, backs of commercial and restaurant activities or mobile equipment.

EX POST SITUATION
The regeneration intervention aims to act on the Canal by improving its structural safety, hydraulic safety, water quality and maintenance.

WORKS
The project provides for the environmental regeneration and safety of the Medicina canal and its waters, and the regeneration and urban redevelopment of the northern area of Borgo Paglia and of the abandoned areas on Via Fava.
The challenge is to face in a long-term perspective the complexity of environmental issues related to water and that of urban regeneration issues in order not to leave behind any part of the city and none of the inhabitants who experience the problems of the canal or those of a obsolete and disused urban fabric, devoid of ecological equipment and services.

SUDS
The intervention is based on desealing and involves the construction of filter basins for a more resilient management of the water resource, reducing the runoff and creating real controlled phyto-purification areas.
In particular, interventions will be carried out for:
- southern phytodepuration, with the aim of improving the quality of the water approaching the inhabited center of Medicina by means of a surface filter bed equal to about 2,000 square meters with a horizontal submerged flow system on the right bank of the canal;
- intervention on the former washhouse and renaturalization of the banks;
- interventions to make the gravestone section safe to plan interventions both in structural terms and in terms of health and hygiene / environmental;
- humid garden to the north, near the former mill, where there is a hydraulic diverter on the right of the same riverbed, with its autonomous underpass of via Fava. It is planned to maintain the use of the old riverbed on the left as a lean channel and as the main branch for the drainage of the canal waters. In the context of the construction of a water park - garden, it is planned to carry out a phytodepuration in the sub-riverbed with a horizontal submerged flow system in the secondary right branch.

URBAN PLANNING AND DESIGN TOOLS
Urban, landscape and hydraulic project.

CHRONOLOGY
2017: participation in the Regional Call for Urban Regeneration of the Emilia-Romagna Region project.
2018: participation and listening to citizenship.
2020: realization.

DESIGNERS
Elena Farnè: coordination of co-planning table, intervention strategy and actions.
Kiez Agency: participatory process.
Lombardi Studio: hydraulic project.
Sebastiano Sarti: recovery of the mill and design of abandoned buildings and slow mobility infrastructures.
LandShapes studio: landscape project.

WEBSITES
www.comune.medicina.bo.it

Facebook: Piano Strategico Locale di Medicina

SITE
Medicina, Bologna Italy

POPULATION
16,770 inhabitants

DIMENSIONS
12,000 sqm

PERMEABLE AREAS
3,000 sqm before
4,000 sqm after

INVESTMENTS
1.4M €

F42

THE BOMPORTO INDUSTRIAL AREA ADAPTATION PLAN / MODENA - IT

hydraulic risk management and forestation for heat regulation

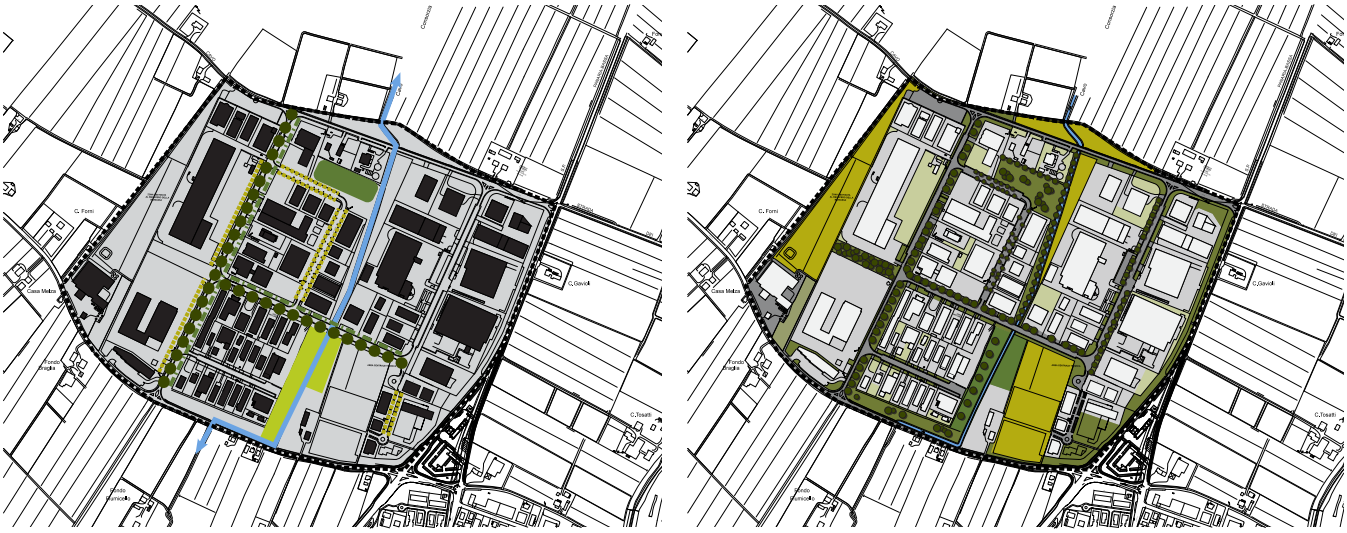
The Bomporto Eco-Industrial Park (province of Modena) adaptation plan defines the 10-year strategic action plan to mitigate and adapt the area to climate change.
The Bomporto industrial area was selected as case study for the LIFE-IRIS European project, which entailed the development of measures to improve the resilience of the entire production sector, by planning interventions in public areas and in open private spaces, and focusing in particular on managing the flooding risk, that the territory is strongly affected by.
The plan applies to an area of over 80 hectares.

To the right. The 'industrial pocket garden' in via Fermo Corni, one of the first interventions to be suitably realized.
(Photo by F. Poli)

THE INDUSTRIAL AREA MASTERPLAN

The Bomporto industrial area - located on the plains north of Modena - houses about 70 companies of different sizes and types, mostly belonging to the manufacturing industry.
Currently, the area is mainly characterized by densely-urbanized and impermeable surfaces - mainly artisan production companies - surrounded by the plain farmland. The industrial area's territory is crossed by the Secchia River (2.5 km away, average capacity of 42 cubic metres/s) and the Panaro River (600 metres distance, average capacity of 37 cubic metres/s). Both rivers are main tributaries of the Po River, and they cross the plain farmland, particularly affected by flooding risk. In January 2014, heavy floods ravaged the Bastiglia and Bomporto territories, due to the Panaro overflowing. We are in a historical land reclamation territory, which has always lived with the risk of river and water-course flooding.
The adaptation masterplan entails several physical measures:

- urban forestation of the public road network and of the green areas of the section, planting tree species capable of increasing the thermal comfort level and mitigating polluting factors and the VOC (Volatile Organic Compound) concentration;
- creation of a public garden for workers, to recover an unused interstitial space and increase the area's social use and attractiveness;
- depaving of the parking lot areas, by replacing the draining materials, to improve the percentage of permeable soil and tackle heat waves;
- creation of roadside rain gardens, by reconfiguring the existing roadside flowerbeds with soil depression, to capture the rainwater coming from roofs, roads and parking lots.;
- creation of a floodable reservoir basin to store and purify sedimentation water from suspended solids, remove nutrients and infiltrate the water;
- use of cool materials to replace the existing industrial warehouse roofs with a high SRI (Solar Reflectance Index) coating and/or painting the building façades with anti-radiation reflecting paints;
- replacing the lighting systems with LED technology.



Top left. Adaptation Plan: project concept for strategic actions of urban regeneration and identification of public and private green areas subject to interventions. (Schemes by Brenso architecture & design)

Bottom left. The agronomic and landscape project of the 'industrial pocket garden' which was based on the principles of accessibility, insertion in the context, environmental mitigation, ecological function and visual mitigation. The final project was drawn up on the basis of an analysis of the place on a broad territorial scale: the relationships with the surroundings and the mesh of the paths and open spaces in relation to the built fabric of the industrial sector were investigated, and then read, outside, the plot that the agricultural landscape draws on the territory. These signs led to the natural identification of the compositional elements and the main axes of the green area project. (Drawings by ECO esterno contemporaneo)

TRANSFORMATION PROCESS AND DYNAMICS

The adaptation plan was promoted and developed by the Modena Consorzio Attività Produttive, along with the Municipality of Bomporto (MO), through the Life Iris European Project - Improve Resilience of Industry Sector.

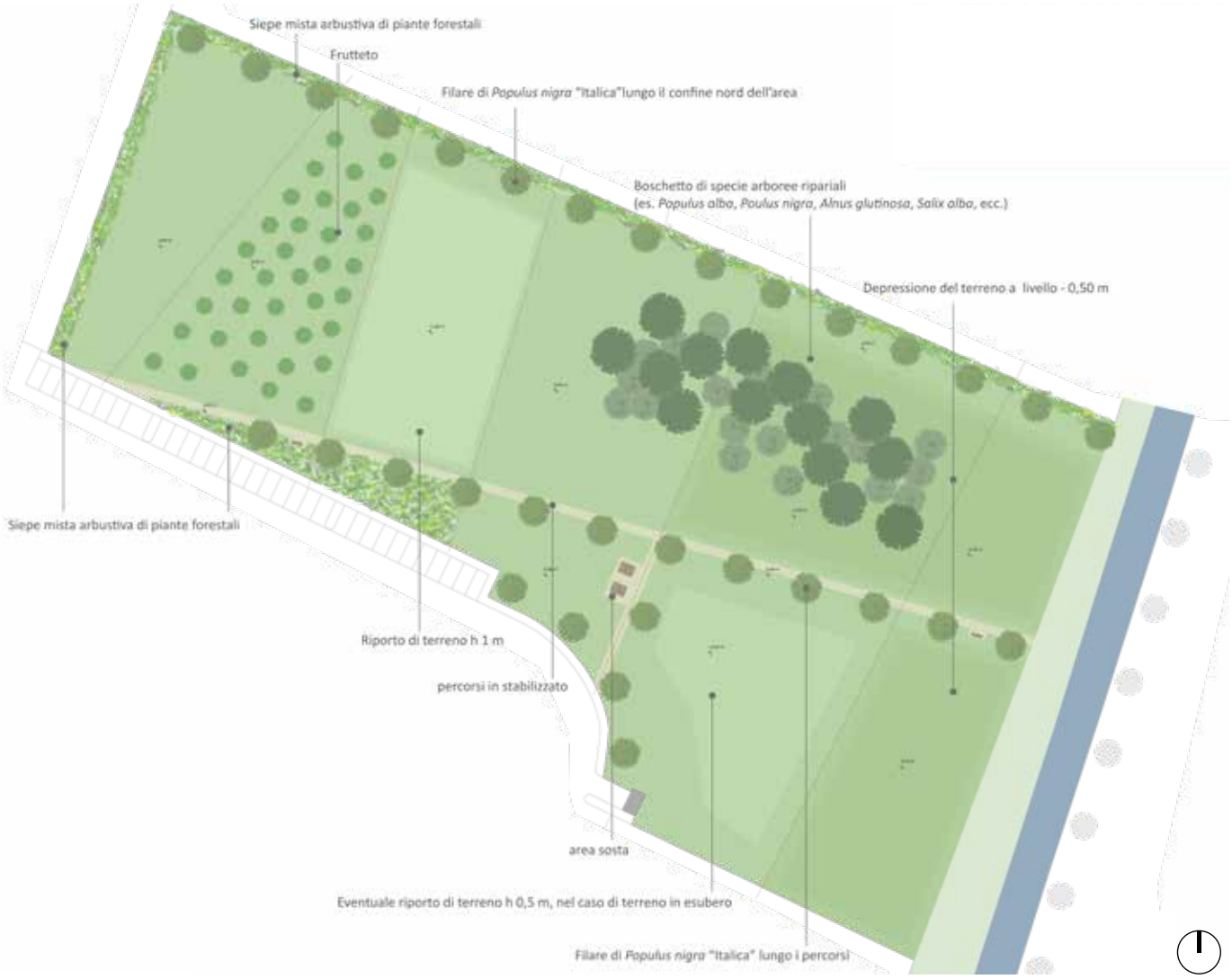
The Life IRIS project - started in September 2015 and ended in 2019 - accompanied and supported companies in the industry sector to make their facility and production warehouses more resilient to climate change. The project trial areas were selected based on two criteria:

- companies belonging to the same industrial area;
- companies belonging to the same production chain..

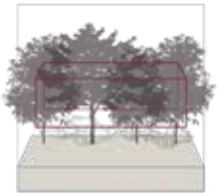
The Bomporto case falls within the first trial framework, and is characterized by the presence of an area management body and the area classification as Eco-Industrial Park; the area management body is Modena's Consorzio Attività Produttive. In four years of activity, 13 actions have been developed in Bomporto, divided into three different types:

- information and training measures for companies;
- planning and data analysis measures;
- public space design and sector resilience trial measures, and creation of an adaptation masterplan.

The masterplan design measures have been developed by Modena's CAP, following the results of the REBUS training course. The latter has been promoted by the Emilia-Romagna Region since 2015, and experimented on run-down and artisan production areas that required redesigning from a public space and climate adaptation standpoint.



VISUAL MITIGATION



visual mitigation of the surrounding buildings
through the inclusion
of tree and shrub species

MAINTAINING BALANCE

the tree species allow good environmental mitigation
and the maintenance of equilibrium
also in terms of biodiversity

LANDSCAPE CONTEXT

use of forest vegetation for a correct landscape
integration and requiring lower construction costs,
greater guarantee of engraftment
and less maintenance over time

90s-2000s

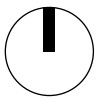
Implementation of the industrial area of Bomporto begins, which occupies a total area of approximately 80 ha, of which 6 still to be implemented. It houses about 70 companies of different sizes that operate mainly in the manufacturing of mechanical devices and metal products. The area is served by wide parallel and perpendicular streets with large green lawn areas.

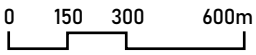
2014

During the winter, abundant rainfall causes a sudden flood of the Secchia river, which breaks the right bank in Ponte dell'Uccellino and causes the flooding of the entire lower Modena area. The river flood reaches the town and the industrial area of Bomporto over 24 hours after the embankment subsidence with high water lines.

2016-2017

The Consortium participates in the LIFE IRIS EU project and appoints the industrial site of Bomporto for the preparation of a Climate Change Adaptation Plan and the implementation of pilot actions.





Aerial photos and time schedule of the transformation of the area.

GREEN AND BLUE INFRASTRUCTURE AND SOIL: NATURE-BASED SOLUTIONS AND URBAN WATER SUSTAINABLE MANAGEMENT

Urban drainage system and water project / The plan entails the creation of rainwater storage, purification and infiltration systems, through shallow, multi-functional green spaces, and a floodable basin and rain gardens in particular:
The floodable basin will be fed by the water network, in the event of network overflow, and will gradually return the water after rainfall events, promoting infiltration into the soil. There are many purposes for this intervention: adaptation of the industrial area to intense weather events; reservoir for the Fiumicello Canal overflow peaks; water collection during the summer; use of the water for irrigation purposes; improvement of the industrial area waste water quality; underground refilling; and area landscaping redevelopment;
The rain gardens will be implemented on the roadside as depressed flowerbeds capable of capturing the rainwater flowing from roofs, roads and parking lots.

Blue infrastructure construction aspects / The floodable basin will be linked to a municipality-owned free area of approx. 18,000 sq.m on the side of the Fiumicello Canal's southern section. The green areas will act as an expansion zone to temporarily store part of the flood volume required for the correct water drainage system layout, in case of events with a long return time. A wide ditch will be dug, and the connection mouth between the channel and the reservoir basin will be reshaped, to promote the correct water flow in case of need. The cost of the works - estimated at 250 thousand Euro - will be probably sponsored by the companies in the industrial area and public funds, with possible Community/regional funds.
The rain garden helps to reduce the run-off effect. Through this system, the water can reach the underground or the conduits more slowly, as it passes through several draining layers, before going back into the subsoil or reaching the sewage system. The cost of the intervention will amount to 1 million Euro, and will be possibly divided into different instalments.

2017-2018

Following the approval of the Adaptation Plan, the ECO contemporary exterior landscape agronomist studio is commissioned to design the 'industrial pocket garden'.

During the design phase, various meetings are held with companies in the sector to present the initiative to the users of the area.

2019

Implementation of the pilot interventions of urban regeneration with the implementation of the first section on the 'industrial pocket garden' in via Fermo Corni.

from 2019

Following the first pilot action, some private entrepreneurs show an interest in financing urban desealing and forestation interventions on the public spaces of the sector to improve the quality of the area also from an ecological-environmental profile.

Green and public space infrastructure / The green infrastructure project has been structured based on the public property - comprising the road networks, two urban green areas and the Fiumicello Canal areas - and the private layouts - the areas in front of the artisan production facilities and the bordering agricultural areas.
The masterplan redefines the road network section: 1) in front of the private properties, the mineral materials will be replaced by draining materials - concrete and lawn - or with mechanically stabilized earth; 2) in roadside flower beds, the curbs will be reconfigured and the land will be prepared to create rain gardens and plant rows of trees; along the north-south axis, new trees will be planted on both sides; along the east-west axis, the trees will be planted on the northern side, to shade the façades facing south.
In the green standard areas, trees and shrubs will be planted in rows and with isolated groups comprising 3-4 plants, and rest areas and paths will be created.
Along the Fiumicello Canal,, a green depression will be created, with water and forest species, to obtain a floodable reservoir basin.

Plant species and planting distance / The species suggested in the masterplan and planted in the garden concern three types of interventions: for the rows and along the paths, black poplars (populus nigra'); for forestation areas, white poplars (populus alba), black poplars (populus nigra) and black alders (alnus glutinosa); for bordering the area and along the border with the treatment station, on the northern side of the lot, forest shrubs. There are two planting distances: linear for rows, mixed quincunx for forestation and forest areas.

Phytoremediation and phytopurification / Inside the floodable basin, the water plants will need to trigger rainwater phytopurification and treatment process; therefore, in the implementation phase, species with a high pollution degradation power and capacity of water oxygenation should be preferred.

Rustic flowery lawn details and stabilized path. (Project by ECO esterno contemporaneo, photo by F. Poli)

Soil and bioremediation / In order to compensate the excavated earth and rock, and where temporally compatible, desealed mineral soil should be mainly filled with the topsoil obtained by excavating the floodable basin and rain gardens areas. The topsoil reused on site will allow important economies of scale in the APEA (Area Produttiva Ecologicamente Attrezzata / Ecologically equipped production area).

Maintenance / The main maintenance interventions concern the green areas.

MASTERPLAN BOMPORTO

INTERVENTION AREA FASE 1
(GIÀ ATTUATA)

BUILDINGS AND PATHS

BUILDINGS

ASPHALT DRIVEWAYS
AND PUBLIC PARKING AREAS

WATERPROOF CORPORATE
COURTYARDS

GREEN INFRASTRUCTURE

PRE-EXISTING TREES

NEWLY PLANTED TREES

MEADOW

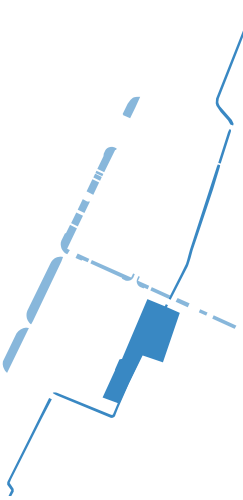
FARMLAND

DE-FLOORING
FOR DRAINING PARKING LOTS

RAIN GARDENS

GREEN PRIVATE COURTYARD AREAS

BLUE INFRASTRUCTURE



CAVO FIUMICELLO / CANAL

FLOOD BASIN

RAIN GARDENS

0 150 300 600m

The 'industrial pocket garden' in via Fermo Corni has a simple and functional design for the use of the area and at the same time evocative of the rural landscape that surrounds it. Five ideal NE-SW lines divide the space following the direction of the agricultural plot. This division of the project area, in addition to laying the foundations for a planimetric drawing, gives the possibility to divide the spaces according to the different functions to be included, and possibly to assign intervention priorities in order to divide the construction works into periods different and subsequent.

A single main path "cuts" the entire area transversely, connecting the area pertaining to the Fiumicello cable with the west part of via Corni onto which the green area overlooks; a secondary route, shorter and positioned in correspondence with one of the aforementioned routes, facilitates access for those arriving from the southern part of via Corni. A grid is thus created that divides the space into eleven large sectors, each of which has its own autonomy that composes a puzzle and overall project. This spatial conformation offers the possibility of generating an abacus of distinct elements with the opportunity to carry out a project over time, by successive steps, following a time schedule and effective intervention planning.
(Project by ECO esterno contemporaneo, photo by F. Poli)

ECOSYSTEM SERVICES PROVIDED

NUTRITION BIOMASS | AIR QUALITY AND POLLUTANS REGULATION | NOISE REDUCTION | RUNOFF REDUCTION AND FLOOD | POLLINATION AND BIODIVERSITY | URBAN COMFORT AND MICROCLIMATE | PUBLIC SPACE ACCESSIBILITY AND RECREATION | IDENTITY SENSE PLACE HISTORY | BEAUTY OF NATURE

CLIENT
Municipality of Bomporto (MO) with Consortium of Production Activities Areas and Services of Modena

PROJECT TYPE
Climate Change Adaptation Plan

EX ANTE SITUATION
Production sector, since 2013 Ecologically Equipped Production Area.

EX POST SITUATION
Proposed implementation of strategic actions to support enterprises, in particular small and medium-sized enterprises (SMEs), to become more climate resilient and to test the effectiveness of adaptation measures, implemented through a cluster and chain approach supply.

WORKS
The Adaptation Plan provides for a total of 13 shares distributed over a ten-year period. The first pilot actions were from 2017 to 2019, namely:
- Info Point for companies with the creation of a reference office within the Modena Production Activities Consortium to coordinate all activities relating to the issues of mitigation and adaptation to climate change and energy efficiency;
- training for companies with the organization of seminars and educational workshops to sensitize local operators on issues of urban resilience and promote concrete adaptation actions to climate change;
- Clima Desk for companies, or a service for assessing the company's vulnerability to weather and climate events;
- Emergency Plan and Automatic Alert, or coordination and synergy of the information of the different alert plans managed by the various local authorities;
- simulation of ex-ante and ex-post outdoor comfort with the elaboration of maps of the thermal comfort of the industrial sector in the current state and simulation of the effects produced by the actions on public spaces provided for by the Adaptation Plan in order to evaluate the benefits and the hypothetical results;
- pocket garden with the transformation to green of an unused interstitial space in order to reduce its decay and increase its usability and attractiveness.

SUDS
The plan provides for the construction of works for the storage, purification and infiltration of rainwater, through shallow multifunctional vegetated spaces, in particular a flood basin and rain gardens.

URBAN PLANNING AND DESIGN TOOLS
Urban planning strategy, pilot area landscape project.

CHRONOLOGY
2016-2019: participation in the LIFE-IRIS Project.
2016: publication of the Adaptation Plan.
2018-2019: implementation of the first pilot information and training actions for companies; data planning and analysis; design of public spaces.

DESIGNERS
BRENSO architecture & design: coordination of co-design table, interventions strategy and actions.
HydroPro: hydraulic project.
ECO contemporary exterior: 'pocket industrial garden' landscape project.

IMAGES
Francesca Poli

DRAWINGS
BRENSO architecture&design
ECO esterno contemporaneo

WEBSITES
www.lifeiris.eu

Facebook: lifeirisproject

YouTube: Life IRIS

www.capmodena.it/life-iris-improve-resilience-of-industry-sector

SITE
Bomporto, Modena Italy

POPULATION
10,161 inhabitants

DIMENSIONS
80 he

PERMEABLE AREAS
14 he before
15 he after

INVESTMENTS
2M € tot Adaptation Plan