LANDSCAPE INFRASTRUCTURE FOR THE XXIst CENTURY

New Identities for New Landscapes

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LANDSCAPE INFRASTRUCTURE FOR THE XXIst CENTURY:
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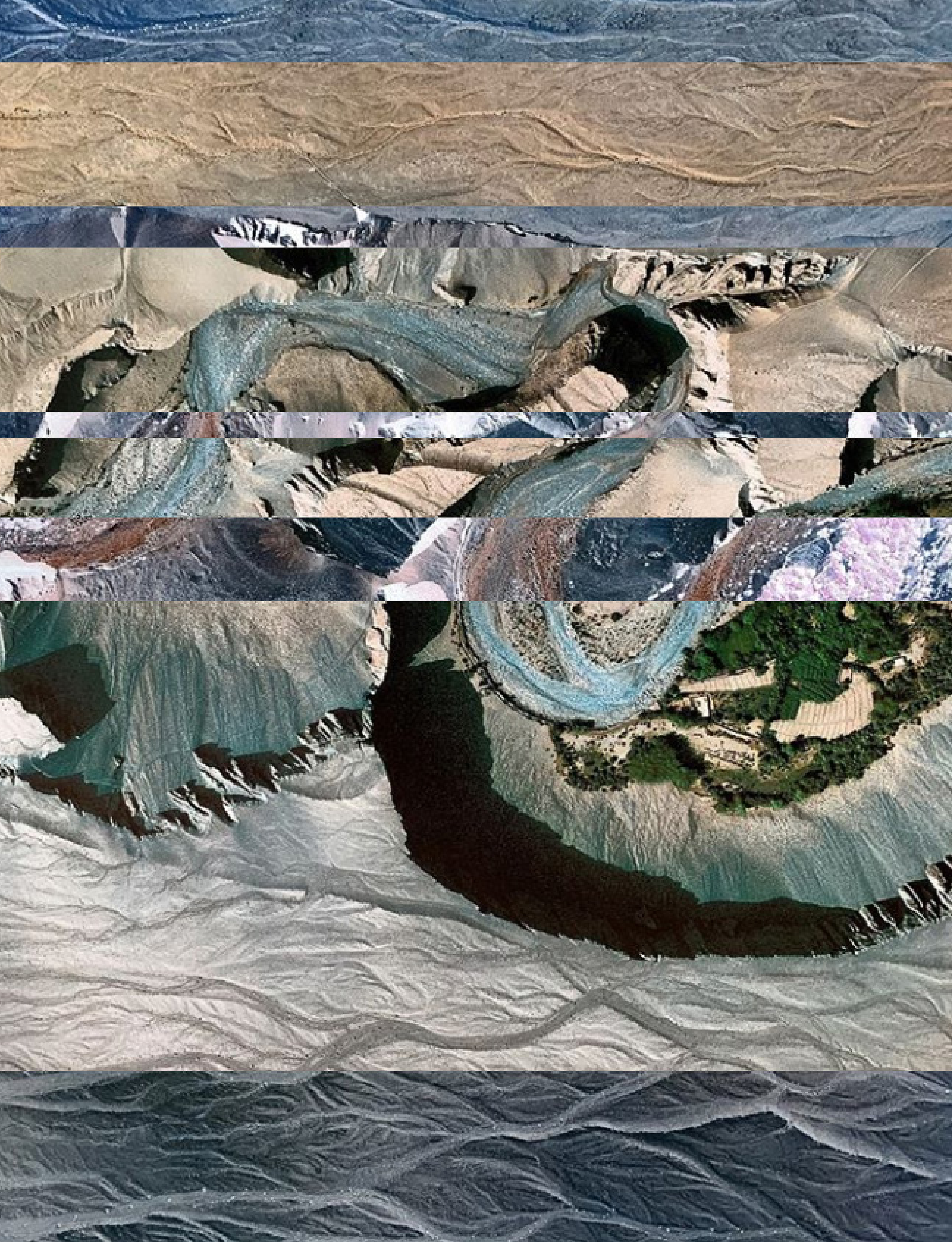

CHAPTER 1:
INTRO

1.1 The Context of the Research

Over the last twenty years cities have emerged as the dominant form of human settlement and as the main economic and environmental actors; at the same pace at which their economy thrives, so their environmental impact is increasingly evident globally[1]. The formation of immense megalopoli, in many regions of the world has marked the end of a transition beginning in the last few decades of the nineteenth century, from the modern city to the contemporary city (Arbury, 2005), which is overwhelmed by the global phenomenon of decentralization and flattening of the gradient of density[2].

To satisfy the territorial extension of economic exchange, the size and ramifications of infrastructural systems have systematically expanded, producing saturation effects and stimulating an exceptional urban explosion that has dispersed over an enormous range of inhabited settlements, economic activities and services of every type, helping to create a horizontal model of urbanization [3], which has substantially replaced the "densely populated cities that were the norm of the nineteenth century" (Bruegmann, 2006, Bélanger, 2017).

The process of globalization of socio-economic structures, albeit with the aim of offering more people greater levels of mobility, choice and information, has led to the creation of a sprawling and fragmented urban landscape (Noguè, 2010), where depopulation, deconstruction and decline are some of its most visible effects; a condition also defined as "a kind of fractal archipelago of fragmented landscapes" (Careri, 2006), with new types of landscapes dominated by standardization, homogenization, repetition, discontinuity, cloning, artificiality, thematization and often trivialization.

Cities, more than any other settlement system, have emerged as the human habitats in which most has been invested to increase the efficiency and effectiveness of the systems that compose them (Paolinelli, 2018), a transition that has marked the dawn of "the Anthropocene Era"[4], a geological era in which the terrestrial environment, understood as the set of physical, chemical and biological characteristics in which life develops and evolves, is strongly conditioned, at both local and global scale, by the effects of human action (Crutzen, 2005).

The recent signing of the Paris Agreement[5] and the more recent "New Urban Agenda" in 2017 marked a major milestone in recognizing the fragile nature of our planet and in the realization that the actions undertaken in these current years will have fundamental consequences on the global biological and cultural diversity. Therefore, allowing a sustainable and resilient coexistence of urban environments is an essential condition for safeguarding human existence and for reducing the interconnected effects of global urbanization, climate change and environmental degradation (Lerup , Watkin, 2005).

1. Although only a little over 50% of the world's population today lives in cities, occupying less than 2% of the earth's surface, we know that 80% of economic production is concentrated in urban areas and between 60 and 80 % of global energy consumption (Kamal-Chaoui L., Robert A., 2009, Steiner, 2013; IPCC, 2016);

2. As stated by the United Nations World Urbanization Prospects (reports: 2014, 2016, 2017), contemporary cities are characterized by the enormous extent of their urban fabric, but at the same time, they are becoming ever denser. For decades, in all regions of the world, the urban surface has expanded much more rapidly than population growth, a trend that is revealed in the increasing erosion of the border between urban centre and periphery and a marked expansion in urban fabric that is occurring on a large scale, involving, in the process of the construction of the city, considerable amounts of land and agricultural landscape.

3. See Secchi 2000, Brenner, 2014, Bujis 2013, Haynes, 2009, Tan 2013, Tunas, 2013, Sassen, 2004.

4. While it is yet to be accepted in the international chronostratigraphic scale of geological time (according to the dictates of ICS, International Commission of Stratigraphy), the Anthropocene Era is thought to coincide with the time interval starting with the Industrial Revolution of the 18th Century and continuing into the present, ie since the last significant increase in concentrations of CO2 and CH4 in the atmosphere began. See Zalasiewicz et al., 2008, 2010.

5. See COP 21 (2016), Article 7.

From the environmental point of view, there are two main concerns related to urban sprawl: the first is related to its rate of growth and expansion, which makes the city a powerful engine for land and resource consumption, the second is linked to the high level of air pollution that cities produce[6]. This incremental growth of urban surfaces has certainly been facilitated by rapid technological development, which has made mechanical, technological and infrastructural devices[7] essential for organizing the material flows on which contemporary economy and society rely (Haynes, 2009, Soja, 2010).

In the light of this awareness, landscape historians, urban theorists, architects and landscape architects but also geographers, sociologists and many other professional figures, have once again turned their attention to the large systems of infrastructural networks, that are key to the expansion and functioning of our cities, looking for effective solutions to find a balance between the demand for use and the sustainability and quality of urban environments.

Landscape, in this context, has confirmed its important role in the disciplines of design and planning of urban environments, since many of the social, economic and environmental challenges that Europe and the world have to face, concern uses and cultural meanings of land and are integrated into the landscape: Climate change, energy needs, health, food security, migration and urbanization, are just some of the new urgent emerging challenges, which are generating alternative strategies in an attempt to combine urban infrastructure with biophysical systems.

The complexity of the phenomena described implies, to all intents and purposes, the involvement of the discipline of Landscape Architecture, leading to the emergence, especially in the last ten years, of new flexible design practices and forms, in response to the growing demand for renewable and integrative forms of urban development.

6. Approximately 75% of carbon dioxide emissions in the atmosphere come from cities (IPCC, 2016)

7. Infrastructure have grown in complexity parallel to the urbanization of the world (Sassen, 2003, 2013, Hall, 2013).

1.2 Grounds for the Research

Given the current global situation and the problems we need to face, landscape architects are more than ever before confronted with the task of planning and transforming "complex cultural landscapes" (Weilacher, 2017), which are becoming ever more extremely complex and dynamic. In the coming decades, huge economic capital will have to be invested in building an enormous quantity of urban infrastructure and public works on a global scale, to provide a decent existence for the growing world population (Hoogstad, 2013). Despite this, many governments and in particular the business community, as main guarantors of these operations, are not sufficiently aware of the problems and the culture associated with these activities (Hoogstad, 2013, Easterling, 2016).

At this time, when it is essential to react and develop new forms of cohabitation for our civilization, the discipline of Landscape Architecture seems to suffer from widespread intellectual dissipation and a tremendous cultural disparity, reflecting a multitude of heterogeneous ideologies which attempt to define a world that is being continually reshaped and reinterpreted by new forces, translating into a schism between the way landscape is scientifically understood and the way it exists cognitively, mnemonically and emotionally for people (Girot, Imhof, 2017). As emerges from the most recent debates on the contemporary role of the landscape project, *«what shows the lack of clarity, which is almost everpresent, in the substance of landscape projects and the ability to build relationships, is the fact that this is often confused with the tangled theme of sustainability in an out and out deceptive process of greenwashing»* (Cortesi, 2017).

«Today, as often happens in many other fields of operation, we are faced with a great confusion and the risk of a redundant use of the concept of landscape, declined into an infinite number of attributes and nouns: there is the sublime landscape, the cultural landscape, the landscape of the mind and landscape of sound and others. Also included are marginal landscapes and degraded landscapes that must be brought back to a new quality life while avoiding all sorts of fashions destined to die as happened for other abused concepts» (Treu, 2017).

This distortion of meaning and significance can be defined as interscalar, since it expands to different categories of design and can be identified at an even more specific level, for example, when dealing with issues related to the relationship between landscape and infrastructure.

Many experts, worldwide[8], recommended "Green Infrastructure as the best remedy for all kinds of unwelcome side-effects related to current changes in the environment such as climate change, agricultural revolution, urban transformation and so on" (Weilacher, 2017).

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[8] As Professor Dr. Udo Weilacher recently pointed out in the article "Green Infrastructure and Landscape Architecture", the board of the German Association of Landscape Architects (BDLA) declared, in 2017, that "green infrastructure" is the central future theme for landscape architecture; Furthermore, G. I., has been adopted within the strategy "Europe 2020" to enhance Europe's natural capital ("Green Infrastructure (GI) — Enhancing Europe's Natural Capital, (GI) (COM(2013) 249 final" Brussels 2013); In 2015, the European Commission, was asked to elaborate a strategy, by 2017, for a "trans-european network of green infrastructure". Moreover, G.I. has been defined by the American Association of Landscape Architects as the "centrepiece of smart regional and metropolitan planning, ensuring communities have a liveable environment, with clean air and water, for generations to come" (www.asla.org/greeninfrastructure); In China, the Peking University, organized, in March 2009, a symposium called "Greenways as Green Infrastructure", which had a major impact on the planning policies of the country.

Although this strategy has been put into practice in different ways and in many cities around the world, to date there is no shared definition of the term, which has in fact assumed multiple names over time: "Green Infrastructure", "Green Urban Infrastructure", "Green & Blue Grids", "Ecological Infrastructure" being the main ones.

When observing the role of these strategies it is noticeable that there is a marked prevalence of attention "for the protectionist and safeguarding apparatus to the detriment of the transformative and innovative intrinsic power of the landscape project" (Cortesi, 2017): in other words, they focus on the optimization of ecosystem services, an approach which is based on the functional value of nature, measuring it by calculating the components of our world and habitats as separate entities, attributing to them a price to better value them in the future (Weilacher, 2017). The use of the add-on "Green", refers to a traditional and stereotyped reading of the landscape, which is definitely outdated. As stated in the European Landscape Convention, the landscape is not only pleasant, green and/or natural, but rather: *«a certain portion of territory as perceived by populations whose character derives from the action of natural and or human factors and from their interrelations [...] it is the essential component of the life context of the populations, expression of the diversity of their common cultural and natural heritage as well as the foundation of their identities [...] regards the natural, rural, urban and periurban spaces [...] concerns both landscapes that can be considered exceptional, that landscapes of everyday life and degraded landscapes»* (Council of Europe, 2000).

Many Landscape Architecture projects have indeed demonstrated over centuries that the discipline does not merely concern itself with what is green, but more in general with open spaces, pertaining to many different contexts. The progressive interpenetration of urban areas with the landscape, and of environmental and landscape issues, have prompted new projects to work on the margins of specific design skills (Marinoni, 2006, Balmori 2010, Corner 2010, Waldheim 2016, et al), constituting important new challenges for the landscape architecture profession and for the disciplines that contribute to the production of urban environments. Disciplinary assets, which for a long time have tended to be kept separated as watertight compartments, today are no longer antithetical elements, but seem to be able to shape new forms of coexistence and hybridization, playing a strategic role for cities.

This awareness brings us back to the central question underpinning the research project:

Why do we talk about "green" infrastructure, instead of "landscape" infrastructure, and what differentiates them?

1.3 The Subject of the Research

The subject of the study is the emerging practice of landscape design, which aims to provide operational solutions using an interdisciplinary approach and a systemic vision of the functioning of the urban environment, going by the name of *Landscape Infrastructure*. It is an operative category of the Landscape Architecture discipline, which bases its theoretical roots in the re-contextualization of the notion of landscape, focusing on the reciprocity of the relationship between landscape and infrastructure and the production and configuration of the urban environment (Bélanger, 2008, 2012, 2016).

The association of the two terms "landscape" and "infrastructure", constitutes an interesting "structural coupling" between material and symbolic, between implicit uses and meanings, between forms of appropriation and signification processes (Castoriadis, 2001), which goes beyond the most frequently used terminological slogan; it fits into the spectrum of new urban practices which, by overcoming the reductionism of traditional functional categories of urbanism, can connect the physical, material, cultural and symbolic dimensions, inherent in the urban environment. For this reason, the reference to the XXIst century contained in the title refers to the urgent challenge concerning the improvement and transformation of urban landscapes, focusing the attention on contemporary public space and on the strategic and operational role that the landscape and its design have taken over.

The research therefore stems from the need to understand what this new design typology consists of and what the role of *Landscape Infrastructure* projects, in the processes of transformation and creation of cities, is today.

The subtitle of the research thesis, "new identities for new landscapes", amplifies the transformative role of this category of interventions, be they those which insist on new contemporary landscapes, be they those landscapes inherited from the transformations of modernity which constitute ordinariness in urban environments: de-industrialised areas, abandoned railway lines, ruined riverbeds, as well as waste landscapes, interstitial spaces, voids, cracks and caesurae in the urban fabric (Bianchetti, 2014), fringes of metropolitan realities, hybrid intervals of infrastructural connections, "neutral places", landscapes of third generation or post-modernity, where the dialectic of opposites is consumed and potential new openings are defined (Bertelli, 2017).

It is in these contexts that there are problems linked to identity (Sudjic, 2013, 2016), precisely because it is in these places that "identity is lost, where the transformative tensions are stronger and are translated into heated conflicts" (Cellamare, 2012).

The identities of these urban landscapes are not predetermined, but are rather made up of all the processes that characterize the city's production (Sudjic, 2016), that is, the practices that constitute its "writing" (de Certeau, 1990), and which define a "sense of places".

"Identity is the product of a continuous urban narration" (Cellamare, 2012) and this is seen in the landscape project, which by its nature is dynamic and cyclical in its temporal dimension (Cortesi, 2017). Therefore, it is reasonable to conclude that the identity of an urban landscape is the indefinable a priori outcome of an evolutionary process over time.

For these reasons, the overarching question to which this thesis will strive to answer is:

With which processes and operational tools can interventions of urban transformation attributable to the design typology of Landscape Infrastructure generate new landscape identities through the interaction of the various infrastructural (urban), cultural and environmental components?

1.4 Aim, Method and Structure of the Research

In the disciplines that contribute to the design of the urban environment, such as Landscape Architecture, Urban Planning, Architecture and Engineering, the interconnections between practices, both academic and professional, constitute a fertile field of research (Deming, Swaffield, 2011). In the summary classification of the research categories in Landscape Architecture identified by Deming and Swaffield (2011), this research adopts an inductive and reflective approach, using the *classification*, the *interpretation* and the *projective design* strategies (Fig. 1).

	INDUCTIVE **(Theory building)**	**REFLEXIVE** **(Theory /practice interactions)**	**DEDUCTIVE** **(Theory testing)**
Objectivist strategies	**Description**	**Modeling and correlation**	**Experimentation**
Constructionist strategies	**Classification**	**Interpretation**	**Evaluation and diagnosis**
Subjectivist strategies	**Engaged action**	**Projective design**	**Logical systems**

Figure 1: Classification of Research Methodologies in Landscape Architecture by Deming M.E., Swaffield S., 2011, Landscape Architectural Research: Inquiry, Strategy, Design, Jon Whiley & sons, Hoboken, New Jersey.

The structure of the research is configured in three parts, for each of which a different analytical strategy has been developed:

The first part of the research consists of Chapter 2, "LANDSCAPE, INFRASTRUCTURE, CITY", which aims to define the nature of the renewed interest in the relationship between landscape, infrastructure and production of urban environments, in contemporary times. The method used is of the inductive type, specifically the "classification" methodology: «*one of the most fundamental and elastic of research activities*» (Thwaites, 1998, LaGro, 1999, Milburn et al ,2003, Tai, 2003, Deming and Swaffield, 2011, pp.127). The survey strategy is the result of a combination of two different "classification" approaches:

- "Typology", which consists of the application of the logic of taxonomy to a more comprehensive catalogue of phenomena, seeking to categorize and marshal a vast array of variant design forms and motifs, typically as a response to pragmatic cultural and environmental problems. (Deming e Swaffield, 2011, pp. 133).
- "Literature review": the most recommended[9] strategy to use whenever there is a lack of clarity or consistency in the use of a particular term

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9. Deming, Swaffield, 2011, pp. 146

or concept. As pointed out by Whiston Spirn[10], it is the strategy for initializing new inquiries or theories in Landscape Architecture.

Chapter 2 focuses first on the semantic dimension of the terms “landscape” and “infrastructure” (Paragraph 2.2 e 2.3), identifying and describing different ways of reading each of the terms through a critical literature review, striving for the establishment of patterns of association between the two concepts. The multiplicity of interpretations that the binomial infrastructure and landscape can take on constitute the starting point of the research; The hypothesis underlying this first part of the research is in fact that:

Although the association of the terms landscape and infrastructure, apparently seems an oxymoron, it is in fact a tautology.

The research does not investigate new definitions of landscape and infrastructure, but rather, through the bibliographical survey, different readings and interpretations of the two concepts, which can verify the aforementioned hypothesis and answer a series of fundamental questions:

What meanings today are attributed to the term infrastructure and which to that of the landscape?

What concepts make the landscape recognizable in its conceptual autonomy, and which ones can relate it to infrastructure? Is this a two-way relationship?

Paragraph 2.4 and 2.5 constitute a more in depht analysis of the state of the art in contemporary infrastructure. They collect the main definitions of the term infrastructure reported in dictonaries and encyclopaedias and the various and different definitions of the most widespread “coloured” infrastructure planning strategies.

The second part of the research, contained in Chapter 3, “LANDSCAPE INFRASTRUCTURE”, uses the reflexive approach, through which it is possible to *«move back and forth between deductive and inductive perspectives, modifying their theoretical propositions in the light of the evidence, revising their understanding of the evidence (its categories, and its meaning and significance) in light of theoretical concepts and exploring new possibilities of understanding and new ways of knowing»* (Deming and Swaffield, 2011, pp. 9).

Paragraph 3.1 aims to summarize the current state of understanding of the relationship between landscape and infrastructure, by means of a bibliographic survey of the texts and contributions that deal specifically with this topic; by comparing and analyzing these documents, by reviewing texts and statements, mainly American and European, by professionals belonging both to the academic world and to the practice of Landscape Architecture, it can be seen which roles are attributed to the operational category of

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[10] *«What landscape architecture now needs is a series of review articles on particularly important or newly emerging areas of research. For many disciplines, from the humanities to the social and natural sciences, review articles are the primary mode for advancing and defining a field. A review article is a major contribution. It is usually written by a senior scholar who surveys hundreds of books and articles and presents a synthetic overview of this comprehensive bibliography, probing such questions as: What are the principle themes and threads of inquiry, and what are the key works and contributions in each area? What are the regions of agreement and disputed territories? What are the gaps in knowledge and which are potentially fertile areas of knowledge? . . . Without such [review] articles for our own discipline, how can we arrive at an understanding of the status of the many fields within landscape architecture?»* (Spirn, 1989, pp. 121)

Landscape Infrastructure, also through the definition of principles, which the identification and selection of the study cases, in the next phase will demonstrate.

The strategy used for paragraph 3.2 is that of "interpretation" (Deming and Swaffiled, 2011, pp.152-173) characterized by the mediation between the observed data of the second chapter and the theoretical concepts brought to the investigation by the literature review of *Landscape Infrastructure*. This reflexive process is used to formulate the second hypothesis of this research, which is that:

Having ascertained that the notion of Landscape Infrastructure arises from a renewed understanding of the urban landscape and the processes and systems that inhabit it, considering it as an operational infrastructural terrain, through the chiasmus of the two terms, two facets of meaning are recognizable:

- *"Infrastructure as landscape": this involves the use of "non-biological, non-dynamic and non-active" material*[11] *of urban infrastructure as a built landscape, which can become a bearer of new functions and biodiversity;*
- *"Landscape as infrastructure": this implies considering the landscape as "not mechanical, non-linear, support for living systems"*[11]*, as an infrastructural terrain capable of shaping the urban environment and regenerating deteriorated landscapes, through processes of restoration of ecological processes and integration of the contemporary infrastructure with biophysical systems.*

This interpretive strategy for the two different *Landscape Infrastructure Typologies* sits between the objectivist and subjectivist positions, placing itself in the broad spectrum of *Design Research* (Frayling, 1993, Lunenfeld, 2003, Steenbergen, 2008, Deming, Swaffield, 2011), in which the research and the project exchange knowledge, as the survey is conducted on the "finished product", with the aim of enriching the theory and identifying the methods and design tools of *Landscape Infrastructure*, making it the object of the study as well as the research method.

In support of this phase, a matrix was used to select multiple instrumental study cases, thus subdividing them by *Landscape Infrastructure* typology, a technique "which is considered particularly helpful to compare and learn across projects" (Francis, 2001). The selection process for the case studies concerned only projects carried out in Europe, as operating in highly stratified contexts, in the context of this research, is considered a factor that facilitates bringing out significant aspects in the analytical methodologies and techniques, interpretation, reading and transformation of very complex and stratified environments over time, in relation above all to their identity factor.

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11. Bélanger, 2016.

A total of four different projects were selected, two of which were considered relevant in the context of "Infrastructure as Landscape", and two others in the context of "Landscape as Infrastructure".

The selected cases are finished projects that fit into urban environments with strong cultural and landscape diversity. They are deliberately different from each other, to enable exploration of the differences both within and between the cases.

Each case study is analysed with reference to an "observable canvas" structured in the form of a dossier. The areas of investigation listed in the dossiers are structured in such a way as to provide information regarding the application solutions used and the emerging aspects related to the governance of the territories being transformed, as well as highlighting which tools and methods informed the planning process and the desired synergistic interrelationship between abiotic and biotic infrastructure. Particular attention was paid to the grammatical and poetical aspects of the project.

The results of the survey are reported in narrative form, describing the identity and character of the new landscapes created. Each analysis dossier contains, together with the narration, photographs, plans and other graphic material, which are an integral part of the case study investigation.

In support of each of the dossiers, semi-structured interviews were carried out with the designers who guided these transformative processes, in order to outline more precisely which principles guided the methodological process of each of the projects in analysis.

The questions to be answered by analysing the case studies are the following:

By which methodologies and techniques does the Landscape Infrastructure project give rise to highly stratified and consolidated urban environments such as those in Europe?

What paradigmatic meanings underlie the two types?

Are there techniques, tools and design methods that unite and / or differentiate the two types? If so, which ones?

What processes must be activated to ensure that the action of landscape transformation and / or recovery enriches the identifying factors of the place?

What processes and planning strategies trigger and are triggered by the two design types?

Does Landscape Infrastructure design derive from the strategic planning of Green Infrastructure or vice versa?

Is there a specific discipline within which to recognize such transformative projects?

What impact do these projects have on the nature of the profession of Landscape Architect?

The strategy developed for this third phase of research combines analysis and synthesis, since, as demonstrated by a number of contemporary theorists (Berger, Corner, and Meyer, among them), the analysis and synthesis of procedural tensions are among the more effective methods to grasp the potential for new transformative and / or operational knowledge, intrinsic to the landscape project (Deming, Swaffield, 2011, pp. 210).

In the fourth chapter of this work, all the information regarding the two types of project collected through the case studies is elaborated on. The analyses and interviews contained in Chapter 3, as significant and representative examples, constitute the reference basis for drawing up the conclusions, contained in Chapter 4.

The data collected in the dossiers, are examined, criticized and sorted according to a methodological process that has the renewed relationship between infrastructure and landscape as its reference point, in order to define which interpretative tools, design practices and strategies, be they common or specific, have been undertaken.

The selective coding of the data and the comparison of the analysis of the four projects, makes it possible to identify the decisive phases of the design process, the tools and the recurring practices in the two different types of *Landscape Infrastructure*, as well as those that occur exceptionally. Looking back over the phases that generated the projects, consulting the archive material made available by the various professional firms involved in the research, interviewing the main actors in the design process, and finally, through the direct observation of the results, it was possible to define the projects as a set of actions implemented to achieve certain objectives, and to identify the different philosophies underpinning the project outcomes.

The aim of the research is to add body to the theory and practice of Landscape Architecture in the field of *Landscape Infrastructure* design, through the identification of intervention methodologies, tools and techniques, which can be used at various scales of design and are adaptable to a wide range of landscapes affected by important modifications and transformations due to the impact of infrastructural projects.

Research shows that infrastructure, historically the main engine of growth and improvement in urban development, has become, in the contemporary, global city, a means through which a new connotation to the foundations of the city can be given.

In both types of design identified (Infrastructure as Landscape, Landscape as Infrastructure) the *Landscape Infrastructure* project is a powerful tool for generating new public spaces and increasing urban resilience.

By pushing back the limits and giving more scope for the potential of *Landscape Infrastructure* projects, they should take on an even more structural role in the development of new urban landscapes, thereby enriching the sphere of urban planning with tools, techniques and practices relevant to the construction and transformation of open spaces and providing a suitable response to the social and environmental changes of our time.

Keywords:

#Landscape #Infrastructure #LandscapeArchitecture

#DesignTypology #PublicSpace #UrbanLandscapeProject

#CaseStudyResearch #UrbanSpaceSystems

CHAPTER 2:
LANDSCAPE, INFRASTRUCTURE, CITY

2.1 Prolegomenon*

*: a formal essay or critical discussion serving to introduce and interpret an extended work (Definition of prolegomenon according to MerriamWebster Dictionary)

The detachment of infrastructure from the land is a metaphorical concept that coincides with estrangement from place, with the loss of urban public spaces, with the spread of design indifference towards site and context, and more generally with the separation of architecture from urban planning and of civil engineering from the rest of the disciplines that contribute to the transformation of cities. This detachment can be traced back to the period between the first half of the 1960s and the decade of the 1970s, the age which saw the development of the modern process of densification of metropolitan systems and the consequent progressive fragmentation of the landscape (Paolinelli, 2003, Morelli 2008), a process which gave life to the "global city"[12].

At the same time, in the major cities of many western countries, a serious fiscal and financial crisis arose due to post-war expansion practices, mainly in the United States of America. The best known is that of New York; its infrastructure, the subway system, parks and public spaces fell apart and the revenue stream of its administration was no longer able to cover production costs subject to increasing demand from a growing urban population[13]. In this regard, a declaration of the 1950s by the American landscape architect Garret Eckbo is particularly interesting due to its far-sighted and in some measure still current nature:

«Our theory of landscape design for the balance of the 20th century must be concerned with the realities of the now and grossing problems of the overall outdoor environment of the American people, rather than with obstructions about system of axes or poetic subjectivities about nature. We have tremendous problems of unprecedented social and aesthetic potential ahead of us. As we prepare for them and work on them, we can absorb and assimilate old ideas build on the strong base of landscaping tradition and go on to a unified expression of integrated social and natural landscape that has never been seen before» (Eckbo, 1950).

With the emergence of the suburbs, the new metropolitan city became something new, both in terms of the way of life and in the ways of construction, thus fuelling reflection on living and on the morphological and typological aspects of the city (Pavia, 2008). In the 1970s, the first medical reports on the spread of diseases related to the respiratory system, cardiological disorders and tumour forms in urban centres were published (Javicoli, 1973), which indicated how building hygiene had proved completely insufficient in responding to problems emerging from the new forms of urban expansion: air, water and soil pollution affected the whole territory, revealing how the origin of these problems could not be limited to the building dimension alone.

Lewis Mumford, pupil of Geddes in the 1960s, further developed his master's concepts, in parallel with the digression that was the Modern Movement, carrying out a ferocious critique of functionalistic urbanism claiming a different role for technology.

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[12] See: Harvey 1973, 1990, 2008, Bujis et al., 2013, Brenner 2014, Sassen 2004, 2010, Secchi 2010, et al.

[13] *«In 1950, cities were predominantly creations of the rich world, which accounted for 60% of the urban population even if it included the relatively poor in addition to the well off. Now that 70% of the city dwellers come from the developing world, cities are more likely to be poor in absolute terms»* (Sudjic, 2016, pp. 6)

As emerges from the reading of "The City: Utopias and Reality" authored by Françoise Choay, Mumford "defends the citizen from the car, in the name of a conception of traffic similar to that of Wright, and inspired by the latest advances in civil engineering; to the rigidity of the habitat of Le Corbusier, it opposes the agility, the changeability, the flexibility of solutions made possible today by the construction techniques" (Choay, 1973). Like Geddes, Mumford accepts the growth of the metropolis and assumes it as an emerging datum of the new urban condition. The new production systems and the new transport and communication infrastructure are the elements that will structure the widespread urbanization of the city, assisted by a "permanent green matrix" for rural uses, while for public recreation there will no longer be parks or nature reserves, but "the whole regional landscape that assumes the role of landscape park" (Mumford 1960).

These considerations were followed by the publication of the revolutionary text by Ian McHarg, "Design with Nature", which radically changed the way of dealing with urban and regional planning, setting out a plan characterized by response to the environmental context in which human activity acts as a dynamic driving force (Howett, 1987). He too clearly recalls the problem of the separation of urban disciplines, declaring that, at the time, the practice of urban planning was entrusted to:

«those who by instinct and training were especially suited to gut and scar landscape and city without remorse. […] The engineer's competence is not the design of highways, merely of the structure that composes them – but only after they have been designed by persons more knowing of man and the lands» (Mc Harg, 1969, pp. 1-5).

The new attitude of environmental revolution[14] emerging in European thinking during the 1970s, along with the studies of the ecological school of Chicago on urban behaviour, the complaints of Jane Jacobs (1961) written in response to the plan of Robert Moses to drive a highway through Greenwich Village in New York, the solicitations originating from the marked environmentalist and ecological sensitivity of the new cultural climate (Black, 2006), would result after a few decades in legislative provisions that subjected large portions of land to protection and environmental protection.

According to the historian Allan Ruff: *«this arose not so much out of any changing attitude toward the environment, but from the failings of human technology»* (Ruff, 1982 pp.1). Moreover, the rapidity of technological developments and the massive expansion of the urban fabric posed the problem of "redefinition" of the relations between buildings and open spaces and the role of landscape design in urban areas, mainly caused by the transformation of the dualistic relationship between cities and countryside and *«towards the conceptualization of landscape existing within a field of relationships, involving both nature and culture»* (Swaffield, 2002, pp. 73, Whiston Spirn, 1989).

[14] See: Nicholson, 1972.

In relation to the increasing difficulties in the management and understanding of these renewed relationships, there developed in the 1970s a sort of crisis in the theory of Landscape Architecture, which James Corner (1991), like Ruff (1982), identified as the consequence of the emergence of the objectifying logic of technology as the dominant force in our world, a process whose origin dated back to the seventeenth and nineteenth centuries. He identified this theoretical crisis with the definitive separation between two cognitive aspects of the urban environment production: *Techne* and *Poiesis*[15]:

«*Techne became a separate body of instrumental or productive knowledge and Poiesis became an autonomous creation of a subjective and aesthetic reality. This separation coincided with the origin of modern science (technology) and modern aesthetics (art). It also involved an irretrievable alteration of the role of theory in architectural production*» (Corner, 1990).

As proof of what James Corner claims, when railways, parking lots, subways and tramways break through the historic city, two different ways of understanding and conceiving mobility infrastructures as elements of construction and use of the city emerge from architecture and urban planning disciplines: On the one hand we find those who start from a mnemonic will, that is to say from the memory of the city still alive, in which they find the foundation from which to attempt a new presentation. On the other hand, a strictly rhetorical line based on the construction of a discourse on the city in which the specific elements of the present situation are subjected to a process of abstraction and expanded, redesigned and re-interpreted semantically (Lyotard, 1984, De Solà-Morales, 1988, Marinoni, 2006).

The mnemonic will perceives the road as a public space, while the infrastructure (extra-urban roads, railways, parking intermodal nodes) as phenomena to be countered as moments of disruption in the physical and social spatial balance of the traditional city. The rhetorical will refers rather to the need to interpret the new elements of the metropolitan condition, questioning itself on new and alternative ways of understanding human settlement within the contemporary paradigms of "flow" and "transience"[16].

Instances coming from distant disciplinary and cultural horizons, on the one hand the environmentalist horizons of a scientific nature and on the other that of conservation and protection of the landscape based on aesthetic considerations, "found themselves cohabiting in the same normative instruments, generating misunderstandings around the different notions of landscape and environment, immovably overlapped and identified" (Marinoni, 2006).

Considering the urgent need to face the disintegration phenomena of the urban environment, the "mnemonic" approach, pushes architects and urban planners to conceive structures able to order the chaos of the new metropolitan dimension that the cities had assumed (Marinoni, 2006), such as the zoning and the "tabula rasa" that for the modernists configured the city. As pointed out by Elizabeth Meyer: «*the marginalization of landscape in the discourses of the modern has blinded many of our practitioners and historians to the multi-violent relationships and structures that characterized the modern landscape*» (Meyer, 1992, pp. 30).

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[15] See: Lyotard, 1984.

[16] See: Castells, 1978, 1996, Whiston Spirn, 1989, Corner, 1991, Swaffield, 2002, Marinoni, 2006, et al.

The infrastructural network was, in a sense, idealized as the holder of the power of organization of space, a trend that revealed itself with extreme clarity in the field of mega-structural architecture[17], which for almost a decade saw the proliferation of the conception of urban configuration projects, "monumental follies" on a large scale, characterized by total indifference to local geography (Waldheim, 2015, Lyster, 2016).

The mega-structural trend produced rigid models through which to impose an abstract formal and social order, and ended in the 1970s with an extremely negative balance. Buildings no longer bear any meaningful and conscious relation to the surrounding environment and large infrastructure (motorways, viaducts, ring roads, etc.), separated from context and the land, completed the real detachment of urbanism from architecture[18]. Consequently, many humanists, such as Edmund Husserl (1970), Martin Heidegger (1977) and Alberto Perez-Gomez (1983), attributed much of modern society's problems to the disengaging effects of technology and capitalism, arguing for a more human built environment (Corner, 1991).

On the other hand, there are many experiences going hand in hand with the line of thought that infrastructure can be considered as a possible engine of renewal, both cultural and physical, which can stimulate the theorization of new ways and forms of conceiving and understanding the city: Christopher Alexander, in "A city is not a tree" (1965), sought out new ways of prefiguring urban models through the study of the properties of "relationship spaces" that form the "structure" of cities, trying to draw from biological structures new forms of settlement, which frame the urban fabric in the full complexity of its relations and complex interactions, unlike what happens in "artificial cities"[19].

One of the first significant satires on the modernist vision of the city is that of the "City as a scrambled egg", introduced by the British architecture critic Reyner Banham (1959). As a counter concept to Le Corbusier's image of the medieval city as an egg and unlike the CIAM's city of the urban core with designated outskirts, the centre was now seen to be everywhere (Jauslin, 2015, Eisenschmidt, 2016).

This departure from modernist imagery of the city enables the reworking of these ideas towards a new kind of visionary comprehension of the terrain of contemporary urbanization:

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[17] The concept of a megastructure, as a conceptual framework of urban space, a proponent of a landscape completely constructed from architectural artefacts, presents itself as an infinitely extensible infrastructural framework within which smaller units can be positioned; It has been applied to a wide range of projects among which we can list, for example, the Comprehensive City Project by Mitchell and Boutwell (1969), which theorized the creation of a transcontinental city that would be linearly extended from east to west for all the United States, and the Universal City of Raimund Habraham (1966) also modeled as a linear city, both designed to colonize the entire Earth's surface (Banham, 1976).

[18] See: Pavia, Ricci, 2005, Marinoni, 2006, Weilacher, 2017, et al.

[19] «*The tree of my title is not a green one with leaves. It is the name of an abstract structure. I shall contrast it with another, a more complex abstract structure called a semilattice. […] Both the tree and the semilattice are ways of thinking about how large collections of many small systems go to make up a large and complex system. More generally, they are both names for structures of sets. […] A village is made up of a number of separate closed groups of people. But today's social structure is utterly different. […] There are virtually no closed groups of people in modern society. The reality of today's social structure is thick with overlap – the system and acquaintances form a semilattice not a tree*» (Alexander C., 1965, pp 21-24).

Instead of being a process for generation in the city, fragmentation becomes a way of experiencing or perceiving the city (Kozak, 2008). Kevin Lynch, 1960, elaborated the first "cognitive maps" to provide orientation criteria in the city as experienced by car.

A few years later, Reyner Banham (1971) learned to drive in order to read Los Angeles, trying to understand that new type of metropolitan city «*the result of what survived from the architectural era of the megastructures*» (Banham, 1971, pp.224), many intellectuals of the time defined as «*the noisiest, smelliest, the most uncomfortable and the most uncivilized city of the United States. In short, a stinking sewer*» (Raphael, 1968), and that «*the engineering-trained author regarded as a kind of machine*» (Marshall, 2016). With the same intent, Robert Venturi and Denise Scott Brown (1972) explored the forces shaping the city in an attempt to learn popular culture:

«*Learning from the existing landscape is a way of being revolutionary for an architect. Not the obvious way, which is to tear down Paris and begin again, as Le Corbusier wanted to in the 1920's, but another, more tolerant way; that is to question how we look at things*» (Venturi, Scott Brown, Izenour, 1972, pp.1).

This new way of looking at cities «*steered architects' gaze away from what had become repetitive iterations of functional Modernism to something more exuberant. Embracing the shamelessly promotional neon wilds of a place that was disconnected from the crisp rationalism of architecture schools, they gave the practice a license to lighten up*» (AIA, 2016, Gold Medal). Both Banham, Venturi and Scott Brown, in other words, redefined the way the intellectual world – and then the wider world – perceived the city. Jane Jacobs, in "The Economy of Cities", urges us to consider the "reinvention" of cities as a factor of guaranteed success [20], from a perspective by which «*a city is never complete and cannot be a product of a single vision*» (Sudjic, 2016, pp. 24).

Patrick Condon (1988) considers human artifice a source of spatial experience in landscape, suggesting a shift from the modern meaning of space, constituted by the placement of objects, to a more phenomenological approach based upon enclosure (Sudjic, 2016, pp. 74).

The cultural context summarized above, marks the transition from modernism, to postmodernism, a condition strongly critiqued by cultural critics such as David Harvey (1990) and Andreas Huyssen (1987).

This shift, from "modern" to "postmodern" thinking expresses the evolution in the material basis for society «*from one in which wealth is created through predominantly industrial activity, to one in which symbols (and symbolic capital) assume a greater prominence*» (Swaffield, 2002, pp 240, Koh, 1982).

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[20] In "The Economy of Cities", Jane Jacobs, through a series of tangible examples, demonstrates how the most successful cities are the ones that are continually able to reinvent themselves.

The shift fuelled by the cultural change of the perception of *«nature, the quality of its order and the nature of time and space»* (Whiston Spirn, 1989, p.1), brings a radical change in design thinking, causing the re-evaluation of old forms and stimulating the creation of new ones. The modern movement encouraged a more individual approach that saw the designer interpreting the role of the all-powerful creator artist. The theories were based on the principle that "form ever follows function" (Sullivan, 1896, Greenough, 1947, Wright, 1958), a way of designing that juxtaposed and contrasted the natural and the human order and, in doing so, prompted the contemplation of what it means to be human[21].

Post-modernism, on the other hand, corresponds *«to a much more diffuse and self-questioning position»* (Swaffield, 2002, pp. 240), stimulating the search for new forms of design *«that resonates with the place's natural and cultural rhythms, that equals, amplifies, clarifies or extends them, contributes to a sense of rootedness in space and time»* (Whiston Spirn, 1989, pp.1), moving the focus of attention onto topics such as responsibility, sustainability, environmental protection, human health, towards a new alliance[22] between the world of life and the natural world (Prigogine, Stengers, 1979), recognizing the "fragmentary" living condition of contemporary metropoli (de Certau, 1984).

Other significant contributions to this cultural shift in urban planning are the studies of the ecologist Howard T. Odum (1973) on complex systems and methods of modelling energy flows, providing significant new pathways for a better understanding of how systems need to structurally change over time in an open-ended continuous process; These studies, aided by the research of his brother Eugene P. Odum (1969, 1971) on the ecological roles of the landscape, allowed for the formulation of a new interpretation of the city in the form of "human ecosystems"[23], the interacting assemblage of living things and their non-living environment (Lyle, 1975). In other words, as Condon underlined describing Christopher Alexander's *A Pattern Language: Towns, Buildings, Construction* (1977), the city started to be viewed *«as habitat—a complex system of interdependencies that together comprised the patterns of a language»* (Condon, 1988).

Through this expanded open-ended ecological optic, *«urbanization becomes a field of shared, polyvalent practices as opposed to a specialized or exclusive discipline such as engineering, architecture, or urban design»* (Bélanger, 2017, pp. 103), enabling the consideration of cities as "urban ecologies" (Odum, 1994, Bélanger 2017), connected to each other according to the patterns of their organization.

«A pattern language may thus be understood as a network of patterns that are linked and interdependent. Used in combination, patterns can create complex forms and typologies» (Swaffield, 2002, pp. 232).

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[21] See: Whiston Spirn, 1989.

[22] The study of the "thermodynamics of dissipative theories", conducted by the Nobel Prize winner for Chemistry in 1977, Ilya Prigogine, explained in theoretical terms the behavior of complex dynamic systems such as living organisms, ecosystems and economic and social systems. He defined these systems of dissipative structures by the ability to structure themselves in coherent and orderly forms and to maintain them over time. These two properties are due, according to Prigogine, to two essential and necessary characteristics: The first is that an open system corresponds to a dissipative system, ie in relation to an external environment with which it activates exchanges of energy and matter. The possibility of maintaining a coherent structure over time is a condition induced by the capacity of the system to feed itself by drawing resources from the external environment and at the same time providing for the entropic dissipation induced by internal processes, discarding residues, waste and releasing heat to the outside. The second one is that a dissipative system is a complex system; a whole that is more than the sum of its parts, are conditions of the complexity of the system and of the strong cohesion among its many constructive elements. The time factor is present both in the theories of Eugene Odum (1969), and in those of Prigogine, velocities are identified, sometimes through a more specific description of some aspects of kinetics of the urban system, sometimes identifying them with the collection and use of environmental resources.

[23] *«All ranks of ecosystems are open systems, not closed ones»* (Evans, 1956).

These developments in science, created interesting opportunities for the development of new insights into the geometry of the form generated, as written by Anne Whiston Spirn[24], not only by «*the patterns formed by natural processes and their conformity across scales*» (Whiston Spirn, 1989, pp.88), but also for the ones generated by cultural dynamic processes.

Henceforth, reconsidering the relationship among nature, culture and technology, the landscape becomes, in its various forms, a primary asset on which to focus attention, powering a gradual re-configuration of the discipline of Landscape Architecture as an "expanded field" (Jacobs P., 1991); a mediatic[25] discipline deeply rooted and intertwined with society, environment and artefact, offering new opportunities to juxtapose nature and culture (Foucault, 1983), and thus re-interpret the concept of landscape and of infrastructure.

[24] Anne Whiston Spirn was declared winner of the "Sir Geoffrey Jellicoe Award" at the IFLA World Congress on July 18, 2018, "for the scope of her international work, influential for design and planning for the years to come" (www.aiapp.net).

[25] Referring to the definition of "mediation" of M. Hays (1984): «*the construction or production of relationships between levels or instances of the various subjects (such as economy, technology, politics, religion and legislation, etc.) and the various social adapting analysis and findings from one level or instance to another*».

2.2 Land-Scape

«If we want to understand ourselves, we would do well to take a searching look at landscapes. […] our unwitting autobiography, reflecting our tastes, our values, our aspirations and even our fears» (Lewis, 1979)

Starting from the second half of the twentieth century, the push to understand the complicated dynamics of production of the contemporary city opened the comparison between two different horizons of understanding the landscape.

On the one hand, landscape is interpreted as geographic surface space, defined by the combination of soil, geographical features, climate, flora and fauna. On the other, the artistic-pictorial representation of the territory and its panoramas, landscape is considered as artistic and environmental heritage, to be protected with a conservative attitude and therefore to be safeguarded by any transformation work. The American Geographer Richard Hartshorne explained that *«the use of the same word to mean, on the one hand, a definitely restricted area, and on the other, a more or less defined aspect of an unlimited extent of the Earth surface»* (Hartshorne, 1939,1949, pp. 154), generated great confusion as to the meaning of *landscape*, exacerbated by many different cultural interpretations of it.

Before the "ecological revolution" the perception of the world as "man versus nature" led, in many cases, to the conceptualization of *«nature as inherently "good" and cities and development as inherently bad»* (Mossop, 2006, pp. 168). This consideration of nature viewed as good and morally innocent, according to Marc Treib (1999) and John Dixon Hunt (2000), derives mainly from the almost complete dominance of naturalism in the public green spaces of United States of America, such as Central Park in New York, which, being designed to look like natural gifts and therefore as landscapes that had always been there, led to an alteration in the perception of time in the collective imagination. As Roland Barthes (1972) sought to reveal through the comparative example of "foamy detergents"[26], these landscapes did not intrinsically harbour specific meanings, rather elaborated myths about humans and nature. The quality of pastness, represented in North America, fulfilled an idea about landscapes recognizable since the age of The Renaissance[27], which the geographer Denis Cosgrove (1998) identified as the "landscape idea": a representation of collective life in nature, conceived in response to social and economic changes in people's relationship to the land.

The impact of postmodernist ways of thinking stimulated a greater engagement with social and cultural issues (Meyer, 1997). Starting from the 1960s, different disciplines began a wide range of research projects in response to the excesses of a spatial science that had influenced the broad scope of humanistic geography supporting a "cultural[28] landscape perspective" (Holdsworth, Groth, Hayden, et al), in other words focusing on the possible understandings deriving from the study of the ordinary, everyday built environment.

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26. Barthes R. (1972), "Mythologies", p.38.

27. Dixon Hunt J. (1992), "Reading and Writing The Site".

28. In 1951, John Brinckerhoff Jackson, started to produce the first issue of "Landscape" magazine, beginning a campaign to "reverse American visual illiteracy", by promoting the humanistic effort that he called cultural landscape studies (See Groth P., 1996)

One of the first ground-breaking declarations, which perfectly captures this shift in attention towards landscape and its meanings, is contained in "Townscape", written by Gordon Cullen in 1961, who defined the "city as a particular form of landscape". This postulate marks a clean break with the context and tradition demonstrated by the reductive interpretations of functionalism (Marchigiani, 2005). According to Cullen, the urban project had to guarantee the city the same values of visual recognizability as the Renaissance city, achievable through the correct configuration of the spaces where the daily life of a given community takes place[29].

The consideration of the city as a particular form of landscape, in comparison to the above-mentioned dichotomy, implies the adoption of a different conception of what the term landscape means, clearly in contrast both with the "traditional" concept focused mainly on natural beauty and aesthetics as per the definitions of Benedetto Croce[30] or Joachim Ritter[31],and as geographical conception of part of the Earth's surface.

«From […] a post-modern perspective landscape seems lees like a palimpsest whose "real" or "authentic" meanings can somehow be recovered with current techniques, theories or ideologies, than a flickering text displayed on the world processor screen whose meaning can be created, extended, altered, elaborated and finally obliterated by the merest touch of a button» (Daniels, Cosgrove, 1988, pp.8)

With this statement the American geographers wanted to express how the professionals in charge of the transformations of landscapes at the time were specialized in reading certain parts of it in a generalist way: to an ecologist landscape was a habitat to protect at any cost from any kind of urban alterations that could destroy it, to an architect it was a site to build on, or to a planner a given area of land suitable for certain usages. As each discipline interpreted landscape according to its own interest and perception, therefore, its comprehension was reduced to a «*flickering iconographic text displayed on a screen*» (Olwig, 1996, pp. 630).

During the 1980s the focus on landscape started to attract a broader audience, mainly because the traditional and essential landscape approach was no longer an appropriate framework for understanding complex social geographies (Holdsworth, 1997). In order to clarify the confusion generated by these diverging approaches, many prominent researchers re-examined, in the historical and geographical context, the substantive[32] meaning of landscape, «*as a place of human habitation and environmental interactions*» (Olwig, 1996, pp. 630), in an exploration of the evolution of the notion of landscape, focussing on the unnaturalness of landscape[33], with the aim of expanding its meanings for a broader interdisciplinary discourse:

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29. An interpretation of the urban space that will be officially shared only 40 years later by the European Convention on Landscape.

30. B. Croce (1902) Tesi fondamentali di un'estetica come scienza dell'espressione generale, (1928) Aesthetica in nuce;

31. In 1963 the German Philosopher J. Ritter provided a definition of landscape that, for some is still considered valid nowadays: «*landscape is nature, becoming aesthetically present in the Gaze of a sensitive and sentient observer. not the field outside the city, not the river as a boundary, channel of trade and problem for bridge-builders, not the mountains and plains of the shepherds and the caravans are such landscape. the only become landscape is man "freely" enjoys the sight without any practical interest, to be nature as himself*» (J. Ritter, 1963). See also Ritter J. (1989), Landschaft. Zur funktion des Aestetischen in der modernen Gesellschaft (1963), in Subjektivitat, Sechs Aufsatze, Surhkamp.

32. The term "substantive" is used referring to the definition of Merriam-Webster (1961), meaning «*real rather than apparent […] belonging to the substance of a thing*», see also Olwig K. (1996).

33. See Arriola A. (1993), Modern Park Design: Recent trends, Toth ed., Amsterdam; See also Lootsma B. (2000), SuperDutch: New Architecture in The Netherlands, Princeton Architectural Press, New York; Ibelings H. (2000), The Artificial Landscape: Contemporary Architecture, Urbanism, Landscape Architecture in The Netherlands, Nai Publishers, Rotterdam.

«Why is it, I wonder, that we have trouble agreeing on the meaning of landscape? The word is simple enough, and it refers to something which we think we understand; and yet to each of us it seems to mean something different» (J. B. Jackson, 1984).

The German term *Landschaft,* and the Dutch *Landschap,* are considered the terms from which the english word *Landscape* derived, at the turn of sixteenth century, evolving from *Landsceap* and *Landscipe.*

At that time the two words were used to mean a district, a tract of land, a region or a country[34], more in general a "restricted piece of land", rather as the Romance-language versions of the word, *Paesaggio* in Italian, *Paisagem* in Portuguese, *Paisaje* in Spanish, all derive from the latin *Pagus* meaning "a defined rural district".

«The French, in fact, have several words for "landscape", each with shades of meaning: "terroir", "pays", "paysage", "campagne". In England the distinction was once made between two kinds of landscape: woodland and champion – the latter deriving from French "champagne", meaning a countryside of fields» (Jackson, 1984, pp. 5-6).

The etymological studies conducted first by Stilgoe (1982), then by Jackson (1984) and Olwig (1993), have amply demonstrated how, in reality, these terms did not indicate only a certain territorial unity, but contained, in their North-European root, *«meanings of great importance to the construction of personal, political and place identity»* (Olwig. 1996, pp. 631).

Even though it is true that, in Danish, the word *Landskaber* indicated a determined administrative territory (Olwig, 1996), the Danish term shares, with *Landschaft, Landschap* and *Landscipe,* the combination of two roots:

- *Land* indicates *«A space defined by clear boundaries, even if not physical»* (Jackson, 1984, p.6), therefore signifies both place and the people living in that place (Jackson,1984, Olwig, 1996, Whiston Spirn 1998, Leatherbarrow, 2017)
- *Skabe* and *Schaffen* mean "to shape"[35], and the dutch *Schappen,* although the term is no longer in use, meant "to shape" referring to the Biblical sense of "creation" (Jackson, 1984, Olwig, 1996, Whiston Spirn 1998)
- The suffixes *-skab* and *-schaft,* as in English *-ship,* also mean association, partnership (Arther, Borden, 1982, Whiston Spirn 1998)

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[34] See: Bosworth and Toller, 1966-1972, Olwig, 1996, et al.

[35] In "Discovering the Vernacular Landscape", the American historian J.B. Jackson, gives several examples of this change of meaning: "waterscape" was a word already used in the tenth century to describe the system of aqueducts, pipes and drains necessary for operation of a mill; "Housescape" instead meant all the housework (Jackson, 1984, p.7). This comparison highlights how *-scape* indicates not only a composition of similar objects, but also something like an organization or a system, demonstrating how, originally, the term landscape, does not indicate a scenario or a panorama, but rather the organization and composition of the spaces created by mankind on Earth.

«*Landscape was imbued with meanings, etched by custom in the land, that were at the heart of the major political, legal and cultural issues of the time. It was a centre of the process by which members of of the non-noble estates of merging national bodies sought to establish identities as active, politically engaged and patriotic citizens*» (Olwig, 1996, p. 635)

The varied understandings of the word landscape (scenic, territorial and constructed domain for social community), have in common the fact that planning is the basic task needed to create them. Landscapes exist through the labour of construction.

As Cosgrove (1979) wrote: «*Landscape is already artifice in the moment of its beholding, long before it becomes the subject of pictorial representation*», thus it cannot be equated with nature or environment. It follows that, by the recovery of the inherent and symbolic meanings of *landscape*, lost for centuries, it is possible to argue that *landscape* is a *nexus* (Olwig, 1996), the result of a construction, both physical and symbolic, which as a cultural production, continuously requires re-signification works according to the variety of social and political contexts it describes.

Throughout the history, the term landscape has been interpreted with great flexibility to respond to the change of social contexts (Cosgrove, 2004): «*When capitalist economies and industrial practices developed in Northern Europe, and eventually in North America, the notion of "land" as the bearer of sustenance was supplanted with "land" as property. This altered our relationship with land from appreciating its productive capacities to support life and structure society to envisioning it as simply another commodity for acquisition*» (Herrington, 2009, p.34).

Through the liberation of the inherently territorializing concept of landscape, which had for many years laboured under a distorted meaning, and in the recognition that humans created landscapes, the landscape historian John Brinckerhoff Jackson, re-defined its significance:

«*A landscape is not a natural feature of the environment but a synthetic space, a man-made system of spaces superimposed on the face of the land, functioning and evolving not according to natural laws but to serve a community – for the collective character of the landscape is one thing that all generations and all points of view have agreed upon. A landscape is thus a space deliberately created to speed up or slow down the process of nature. As Eliade expressed it, it represents man taking upon himself the role of time*» (Jackson, 1984, p.8).

The awareness that the landscape is a creation of human beings has its roots in the first topographical interventions of mankind: the claiming of the land of the Dutch or the reclamation and transformation of the terrain of the Po

Valley and the Maremma, are therefore considered by Jackson as *"synthetic landscapes produced simply by spatial reorganization"* (Jackson, 1984, pp. 3-8)[36].

Hence the revelation that landscapes are not natural acknowledges the role of human beings in their creation. Moreover, although Jackson was mainly concerned with vernacular landscapes, his definition offers a very useful tool for analysing all types of landscapes by introducing the idea of time, which opens the definition of landscape to ideas about memory, experience, sequence and structure. As a consequence, the binomial association of nature and culture, as well as the contradictions that emerged in the modern era between urban and rural, seem to no longer have any sense or meaning in the light of this "new" interpretation of the "true nature" of landscape:

«*For the significance of space in landscape terms the allotment of land for private or public use is that it makes the social order visible. Space even a small plot of ground identifies the occupants and gives him status and the most important the world it establishes lasting relationships. As the word itself suggests a boundary is what binds us all together in a group that which excludes the outsider or stranger. The boundary creates neighbors it is the symbol of law, order and permanence. The network of boundaries, private as well as public, transforms an amorphous environment into a human landscape, and nothing more clearly shows some of the cherished values of a group than the manner in which they fix those boundaries, the manner in which they organize space. And because these values change in the course of time, the organization of space also undergoes a change, which is one reason why the contemporary landscape is so different from that of even a hundred years ago*» (Jackson, 1980, p.12).

The above-mentioned revised way of conceptualizing the production of space, constitutes what Denis Cosgrove, twenty-four years later, theorized as the starting point for a «*spatial and cultural turn that significantly re-worked the relationship between the social sciences and traditional hermeneutic fields within the humanities*» (Cosgrove, 2004, p.57). In fact, the consistent feature of the landscape's expressions throughout time is that it transcends the modernist dualism because it is both cultural and natural, hence it overhauls the way of conceptualizing space: «*as a function of natural and social processes but also as an outcome that in turn has social agency able to create and transform the material world*» (Cosgrove, 2004, p. 68).

The fact that the word *Land* (also a component of *landscape*), due to its etymological roots, couples territory with created structures of coexistence, confirms that a landscape is a performative product of its environmental and social operations, a result of constructive intentions (Leatherbarrow, 2017), which possess strong power of configuration of the space.

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[36] The word *synthetic* emphasizes the rupture with the common conception of the time that landscapes result only from external natural processes. Rather, Jackson holds that landscapes can contain natural features, such as plants growing in a meadow, but once the meadow is seen as a view, a resource or a place to graze cattle, only then does it become a landscape. See: Jackson, 1984, pp.8).

Henceforth, it can be affirmed that any city can be considered "a particular form of landscape" (Cullen, 1961), one of interdisciplinary nature, a product of the interaction of cultural and natural systems, *"composed of designed structures and spaces"* (Jackson, 1990, p. 152). Nevertheless, it allows the shift from a modern-structuralist position to a post-modern post-structuralist one[37], moving from a functionalistic predetermined and fragmented approach, to a holistic and interdisciplinar approach (Swaffield, 2002), in which landscape is conceived as a continuum of meaning (Hagstrum, 1968, Whiston Spirn, 1998).

*«Not to know, and to confuse landscape and nature, is to equate landscape with mountain, meadow farm and country road, but not highway or town. […] Notions of landscape as countryside, but not city, falsely fragment intimate connections» (*Whiston Spirn, 1998, p.130).

By way of confirmation of the definition of the city given by the Italian architect Aldo Rossi in his book "The Architecture Of The City"[38], as being the collective memory of its people, the *"man-made system of spaces superimposed on the face of the land"* described by Jackson, is the complex sum of the products of those who design its buildings, by the engineers who lay out its sewers and roads, by the political legislations that shape its development, by the lawyers who frame the statutes that govern its land tenure.

In brief, it can be argued that a city is a landscape that *«is shaped by technological shifts and changes in patterns of social interactions»* (Sudjic, 2016, p. 27).

Cities possess dynamic qualities as much as every type of landscape, they have the ability to change and evolve over time, which is why to ensure their existence *«we are faced with the necessity of evolving structures and forms which can develop in time, which can remain a unity and maintain the coherence on the components at all stages of their growth»* (Bodegraven, 1952). As Tim Ingold reminds us: *«landscape is never complete, neither "built" or "nonbuilt", it is perpetually under construction»* (Ingold,1993, p.3).

This reasoning brings us back to the studies on complex systems by the ecologist Howard T. Odum (1973). In the same year as the publication of the enduring definition of landscape by Jackson (1984), Michael Houg's "City Form and Natural Process" and Anne Whiston Spirn's "The Granite Garden", further developed the discourse relating ecology and the city by attempting the development of theories and methods applying the understanding of ecology and natural processes to a more sophisticated conception of cities and urban processes, forcing the development of systems involving both human and natural processes (Lyle, 1985, Mossop, 2006).

[37] See paragraph 2.3 of this research.

[38] *«One can say that the city itself is the collective memory of its people and like memory it is associated with objects and places. The city is the "locus" of the collective memory. This relationship between the "locus" and the citizenry then becomes the city›s predominant image, both of architecture and of landscape, and as certain artifacts become part of its memory, new ones emerge»* in Rossi A. (1966), "L'architettura della città", Quodlibet, Roma.

«An ecosystem is the interacting assemblage of living things and their non-living environment. […] We human beings are integral, interacting components of ecosystems at every level, and in order to deal adequately with these systems, we have to recognize that simple fact» (Lyle, 1985, p.180).

Since all ranks of ecosystems are open systems (not closed ones) connected by flows of energy and materials (Evans, 1956) and having acknowledged that every ecosystem works on the base of a precise pattern of energy flow that corresponds with its structure, we can consider any *landscape*[39] of any size as an ecosystem (Lyle, 1985), in which *«the variety of forms that stem from the same process is the result of response to differing the conditions of context, or to the interaction with other processes»* (Whiston Spirn, 1989, p.88).

«Such a preposition poses a challenge to conventional methods of planning design and construction and management of the urban landscape and to the structure and spaces of which it is composed. […] the issues of time and change, process and pattern, order and randomness, being and doing and form and meaning […] will bring urban landscape design in tune with theoretical currents in other fields […] multiple layers of meaning, when congruent, will resonate, combining complexity and coherence, amplifying the aesthetic experience of city» (Whiston Spirn, 1989, p.92).

So, despite the fact that for centuries landscape was considered as the natural opponent of the city, nowadays it is arguable that there is actually no discrepancy between city and landscape: the city pervades the very capillaries of the landscape, while the landscape pervades the very capillaries of the city in the form of food, water, energy and also nature (Timmermans, Woestenburg, Annema, et al, 2015).

Consequently, beyond the physical appearance and the traditional contradiction between man-made urbanisation and nature evolving in a completely separate process, a city can be comprehended as a "synthetic" landscape formed by an intertwined set of structures resulting from diverse and competing forces, cultural and natural, whose patterns vary in response to the specific context.

The meaning of the term "landscape" changed because our society changed.

Henceforward the term *landscape «invokes the functioning matrix of connective tissue that organizes not only objects and spaces but also the dynamic processes and events that move through them»* (Wall, 1999, p. 233).

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[39] See note 29.

This awareness leads to new design strategies that are based on the acceptance of the hybrid nature of these landscapes and the idea that landscape (and the discipline of landscape architecture) can be the opportune "tool" to work with natural processes, structuring new hybrid relationships and interactions among the things it supports[40], prefiguring ideal concepts of landscape as meaningful infrastructure.

[40] See: Corner, 1999, Wall, 1999, Mossop, 2006, Bélanger, 2008,Guldi 2012, Jakob 2012, Weilacher 2017, et al.

2.3 Infra-Structure

The word *infrastructure* is often used to describe the complex of facilities that constitute the essential basis for an activity[41], or, in other words, all the basic man-made systems and processes, working in synergy to produce and distribute a continuous flow of goods and services[42], while *landscape* is defined as *"an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"* (Council of Europe, 2000).

In order to identify a correspondence of meanings between landscape and infrastructure, given the complex nature of systems and constructions that are generally referred to by using the term infrastructure, it is useful to consider how the content of the previous paragraph (2.2) has led to the critical examination of the ability of landscape architecture to contribute to the configuration of urban infrastructural space. The consideration of landscape as a "*man-made system of spaces superimposed on the face of the land*" and the acknowledgment that a city can be considered as a "synthetic" landscape formed by an interconnected set of structures encouraged the critical stance toward the separation of the practices responsible for the creation of cities, giving important rediscovered relevance to the discipline of Landscape Architecture in the urban field.

Across a range of disciplines, many authors have articulated this newfound relevance of landscape (and of infrastructure) in describing the temporal mutability and horizontal extensiveness of contemporary cities (Waldheim, 2016). This research paper sets out to demonstrate that the concepts of landscape and infrastructure, though generally associated with two different cultures which are almost antithetical, can rather constitute a tautology, mainly in the context of the contemporary discussion on the configuration and re-configuration of the city.

To demonstrate this thesis, it is useful, as in the previous paragraph, to recover some lost meanings with the etymological study of the term *infrastructure* (Fig. 1).

Etymologically, the term infrastructure derives from the Latin *infrastructura*. It is made up of the suffix *infra-* meaning *underneath*, *lower*, more in general *what is below*, and *structura* meaning «*the constitution and the distribution of the elements which, in a relationship of association and functional interdependence, form an organic complex system or a part of it» (Treccani, 2018),*which derives from Latin *struere* meaning to build.

The literal meaning of the word infrastructure is therefore "construction that is below, that cannot be seen". From the late Middle Ages, however, the suffix *infra-* acquired a different meaning in Latin: that of "channel". For this reason, infrastructure means not only "what lies beneath" but also a construction that unites, that links, that acts as a path and that connects.

[41] Definition reported on the Dictionary of Italian Language, Olivetti, 2014.

[42] De Cesaris (2012).

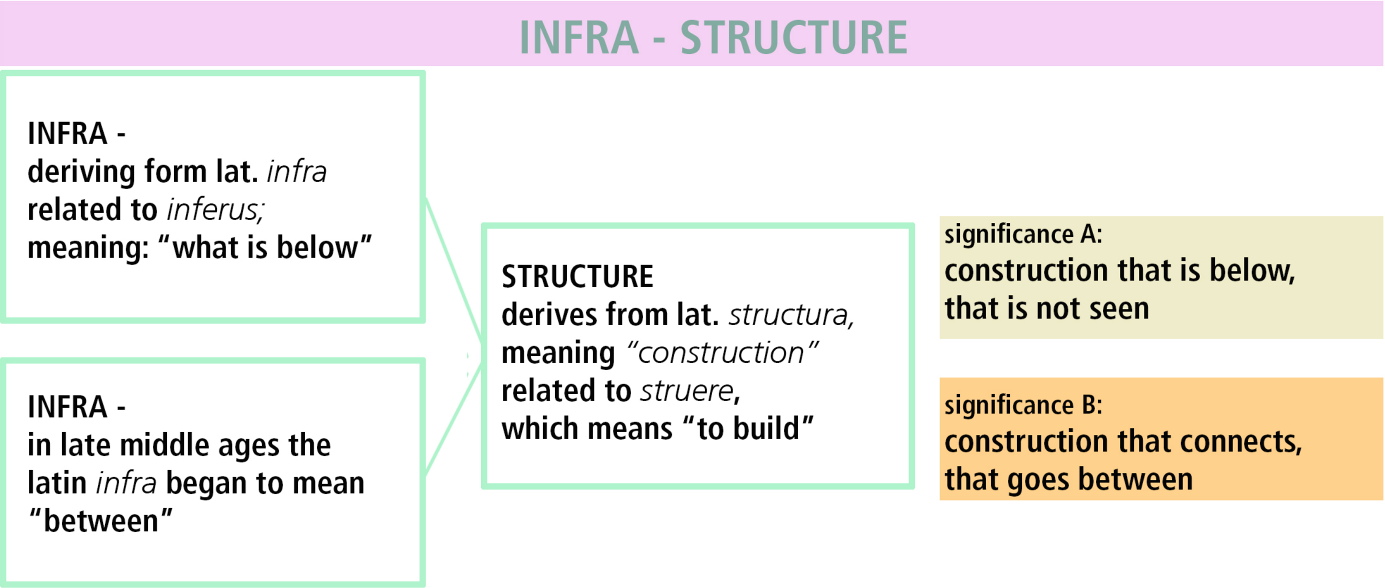
INFRA - STRUCTURE
INFRA - deriving form lat. *infra* related to *inferus;* meaning: "what is below"
INFRA - in late middle ages the latin *infra* began to mean "between"
STRUCTURE derives from lat. *structura,* meaning *"construction"* related to *struere*, which means "to build"
significance A: construction that is below, that is not seen
significance B: construction that connects, that goes between

Figure 1: Ethymological study of the word "infrastructure". Source: Author.

The image that best translates this concept is the architectural archetype of the *bridge*, which is able to join construction to nature by connecting two banks, two shores or two sides (Ugo, 1991).

The power of the bridge as an element that unites what is separated was grasped, as early as 1909, by the German philosopher George Simmel: «*Overcoming [...] the obstacle, the bridge symbolizes the expansion of our will on space [...] becomes aesthetic value when it completes the union of the separated, not only [...] to fulfil the practical ends, but when it makes the connection immediately visible*» (Simmel, 1909, p.10)

Simmel compares the roles played by the bridge and the door to explore their social significance, arguing that human impulses are embodied in these two archetypes: the human being is both a "connecting creature" and a "bordering creature", hence the bridge and door become marks on the landscape that reflect our desire to connect and to border, to link whilst maintaining some separation. The bridge allows for connections, whilst «*the enclosure of his or her domestic being by the door means…that they have separated out a piece from the uninterrupted unity of natural being*» (Simmel, 1909, p.10), allowing us to manage the separation of our space within the social or public space. Simmel's essay is still relevant for its very useful insights on the nature of infrastructure, because it predominantly focuses upon social connectivity, trying to understand how these connections are negotiated and managed.

The word *bridge* derives from the Latin *pontem* (accusative of *pons-pontis)*. Nevertheless, the Greek *pontos* and *patos* with which it means *passage*, *crossing*, deriving from the root *path* meaning *to go*. The Greek word *pontos* and the late medieval Italian word *"ponto"* also means *"sea";* therefore it is arguable that the Indo-European root of the term is imbued with the concept of "vastness" and "passing", ie the "sea" is also a path between the Earth and people *(ponto),* just as the "bridge" *(pontem)* is a union of lands and people and the overcoming of an apparently impassable vastness. For these reasons the German philosopher considered the act of connection by the creation of paths, which visibly connect two places, as «*one of the greatest human achievements*» (Simmel, 1909, p.6), while the "miracle of the road" is the medium through which it is possible to accomplish the «*freezing of movement into a solid structure*» (Simmel, 1909, p.6). Both the road and the path exist because of the "will to connection" of mankind: «*The achievement reaches its zenith in the construction of a bridge. Here the human will to connection seems to be confronted not only by the passive resistance of spatial separation but also by the active resistance of a special configuration. By overcoming this obstacle, the bridge symbolizes the extension of our volitional sphere over space*» (Simmel, 1909, p.6).

Simmel's statement gives rise to the idea of the bridge as one of the most powerful pieces of infrastructure, making mankind feel connected, both aesthetically and practically, because «*the bridge gives to the eye the same support for connecting the sides of the landscape as it does to the body*» (Simmel, 1909, p.6)[43].

Heidegger was similarly drawn to the archetype of the bridge, as can be seen from the following quotation: «*It is not limited to connecting two shores, but it is precisely the passage of the bridge that reveals them as such [...] It unites the river, the banks and the territory in mutual proximity. The bridge gathers the earth around the river as a region [...] it is a place*» (Heidegger, 1951). For this reason «*the two basic constructions of mankind are dwellings and bridges*» (Heidegger 1971, pp. 152-53), respectively consisting in the architectural structures that organize space by creating settlements or places, while the latter, the bridge, is a metaphor for the connective structures that organize space by creating pathways. It follows that, as outlined in the previous paragraph of this chapter, since the word *landscape* is formed by *land* (a space defined by clear boundaries, even if not physical) and *-scape (*a composition of similar objects, an organization or a system), by the juxtaposition of the two terms it is possible to understand *landscape* itself as the *infrastructure* which testifies the presence of human beings on the planet, or in the words of Jackson: «*a man-made system of spaces superimposed on the face of the land, functioning and evolving not according to natural laws but to serve a community*» (Jackson, 1984, p.8).

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[43] By contrast, the door serves our need to limit those linkages and find separation; it «*represents in a more decisive manner how separating and connecting are only two sides of precisely the same act*»; as the door can be opened and closed at will, it represents both enclosure and limits as well as freedom and movement. See: Simmel, 1909, p.6.

The newfound understanding of the landscape concept proposed by Jackson goes a long way towards recovering similarities, not new, but forgotten, between two long-standing professions:

«*A narrow and pedantic taxonomy has persuaded us that there is little or nothing in common between what used to be called civil engineering and garden or landscape architecture, but in fact from an historical perspective their most successful accomplishment are identical in result. The two professions may work for different patrons, but they both recognize space for human needs, both produce works of art in the truest sense of the term. In the contemporary world it is by recognizing this similarity of purpose that we will eventually formulate a new definition of landscape: a composition of man-modified spaces to serve as infrastructure or background of our collective existence; and if background seems inappropriately modest we should remember that in our modern use of the word it means that which underscore not only our identity and presence, but also our history*» (J. B. Jackson, 1984, p. 8).

Thus *Landscape* and *Infrastructure* can be considered as a tautology, because the two terms share the same task: they both constitute the means that allow us to enter in relation to the space that surrounds us and in which we carry out activities.

Just as landscape does, so infrastructure establishes a connection between man and nature. Moreover, the fact that connecting and separating are part of the same process, brings us to the issue of *boundaries.* In an essay written by Jackson (1980) for scholars of landscape architecture, addressing the argument of how to date the birth of a community from a landscape architecture point of view, he argues that while conventional historians prefer to date it from the moment in which laws are established, the landscape student, being interested about how space is organized by a community, should identify it with the: «*drawing of a boundary, the efficient dividing up of the land among several families, the providing of roads and places of public assembly, and the setting aside for land for communal use. […] As the word itself suggests, a boundary is what binds us all together in a group, that which excludes the outsider or a stranger. The boundary creates neighbors; it is the symbol of law and order and permanence. The network of boundaries, private as well as public, transforms an amorphous environment into a human landscape, and nothing more clearly shows some of the cherished values of a group than the manner in which they fix those boundaries, the manner in which they organize space*» (Jackson, 1980, p.12).

Hence, since landscape is a composition of spaces, it follows that «*it is also a composition or web of boundaries […] that can serve a variety of functions*» (Jackson, 1984, p. 13).

Through the study of history, Jackson outlines how the concept of boundary has evolved over time: in the city-states of Classical Greece, as well as the Roman *Limes,* the boundary was meant to isolate and protect, and when possible to avoid contact; it was a long and continuous fortified zone, representing the division between two powers or the limits of a political influence. As a matter of fact the *bridge* for the Ancient Greeks was a ploy that defies Nature by altering it and therefore an outrage to be avoided as often as possible, whereas the Romans were great builders of bridges, yet also considered them as something sacred to be entrusted to the protection of a priest of higher rank, the *Pontifex* (Pavia, 2008).

The boundary as an instrument of separation can be found also in the most basic units of political landscapes, such as a farm, a village or a nation, which usually contain, at their core *«an isolated structure surrounded by a buffer zone and a very visible boundary»* (Jackson, 1984, p.14), be it a church surrounded by fences or walls, a courthouse or a school. The communication between the "isolated structure" and the outside *«is normally formalized by a portal or gate or architectural entrance way»* (Jackson, 1984, p.14), or, for example, a bridge.

From this brief analysis it may clearly be seen how the concept of *boundary* is imbued with a double meaning: On one hand it is a protective and exclusionary political instrument, on the other it is the basic tool for the creation of landscapes. This is further confirmed by the modern example of the National Grid System of Northern America, both as a method of distribution of land according to the merits of the family in colonial New England, and as a free enterprise procedure after the *Gold Rush*, it is *«one of the most ambitious schemes in history for the orderly creation of landscapes, of small communities»* (Jackson, 1980, p.13), constructed with no relation to the open space encompassing it (just as any fortified wall).

With the advent of the industrial revolution, when the notion of "land" as the bearer of sustenance was supplanted with "land" as property[44], and more precisely with the invention and mass distribution of the automobile[45], there was a noticeable change in the relationship between landscape and infrastructure, which has in some ways heavily affected our understanding of boundaries. As Jackson (1980) once stated:

> *«For centuries the country road had merely been a path, a clear space created by some local ordinances to enable people to come to town to pay taxes, to go to church, to a market […]But shortly after the Revolution, the building of roads became a matter of national concern, and from then on it began to play a role in the landscape until (as we all know) it is now the most powerful force for the destruction of creation of landscapes that we have»* (Jackson, 1980, p. 16).

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[44] See: Jackson 1980, Cogrove, 2004, Herrington, 2009.

[45] The dispersion and domestic isolation of the urban population were the fundamental ingredients for the development of the automotive industry that characterized the Fordist city(Secchi 2000, 2005).

This shift made itself known both in terms of perception and physically: firstly, the impact of railways and then of cars profoundly affected not only the way people travelled, but also the way people perceived the world, introducing the notion of exploration[46]; secondly, both the railway and road began to change the landscape itself:

«*When the railroad came into town, it destroyed the uniformity of the grid system […] The streetcar had much the same effect: it extended the range of commuters and gave them a wider choice of places to live, it decentralized many small businesses, and at transfer points it fostered a cluster of stores and services. And the street itself began to assume a new role: the practice of placing utilities under the street pavement- water, gas, sewerage, light and eventually telephone lines – gave the street a permanence which it had never previously had, so it became more important than the properties on both sides of it. As in almost every other part of the landscape, the road or street or highway became the armature, the framework of the landscape. The piece of land no longer determined its composition*» (Jackson, 1980, p. 17).

Western cities, in particular, had to face the transition from the old compact commercial city to the new industrial metropolis formed of a central core and a ring of residential suburbs. Throughout the urban world, the small and fragmented islands of infrastructure came together to be merged, integrated and consolidated with larger systems of designed and standardized regulated networks, in order to provide predictable and reliable services in, around and even beyond the metropolis (Tarr, Dupuy, 1988; Graham and Marvin 2001). The new urban suburbs, allowing people to live in a fairly pleasant place away from the pollution and poverty of the "inner city", gave people the opportunity to work in areas in full urban and economic expansion. The advancement of transport technologies greatly facilitated the separation between home and work, leading to the development of a spatial structure for a completely different urban environment: from one based on the family nucleus, to another based on the domestic production unit (Schaeffer and Sclar, 1975), which is exactly what Jackson described so well with what he called "auto-vernacular landscape"[47] characterised by the shapeless banality of suburban housing, strip-malls, highways and motor-courts, common urban landscapes, which prior to his writings had been considered unworthy of study:

«*I see it as a composed set of structures and spaces designed to accommodate the auto as distinguished from spaces designed to accommodate people […] I am struck by the number of outdoor public spaces that owe their existence to the car and the number of structures and spaces, created by the automobile, which bring us together [in] what might be called a new kind of mini-urban landscape*» (Jackson, 1994, p.152-153).

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[46] See Paragraph 2.1, Banham (1959), Lynch, 1960, Venturi (1972).

[47] Jackson J. B. (1994), "The Future of the Vernacular".

In the case of the transport sector, in an attempt to keep the traffic in and around cities flowing, zoning has been adopted as a method of designing most of the traffic arteries. "Cost-benefit" analyses and concern for pedestrian safety have been the justification for the total separation of the connective systems for motor vehicles from all other public uses of the urban space. Unfortunately this planning criterion has played a decisive role in reinforcing, rather than resolving, the separation between many of the conceptual categories and planning practices embodied in the disciplines traditionally responsible for the urban production. Roads are often considered essential for access to community facilities, yet they can also reduce access to the information stored in urban space: *«if sized to accommodate cars and trucks, they may unnecessarily inflate spaces and walking distances for a village population that travels largely on foot or by bicycle. A road can also reduce the information stored in wilderness landscapes if, along its length, it attracts unplanned development that destroys forest or jungle and encroaches on animal habitats and indigenous territories»* (Easterling, 2016, p.135)

The city physically defined and crystallized within orderly hierarchies was definitively shattered during the second half of the twentieth century, leaving a strongly diversified urban landscape to emerge, one characterized by the disordered dissemination of different elements (De Simone, 2014).

«I should tell you of the hidden [city of] Berenice, the city of the just, [...] linking a network of wires and pipes and pulleys and pistons and counterweights that infiltrates like a climbing plant» (Calvino, 1972, 1974 p. 148)

In the sprawling post-modern city, urban space can be compared to a "mesh" where "in-between spaces", pockets of poverty, brownfield sites, "rust belts", but also "fallow lands" emerge (Diener, 2006). In other words the urban space results in what Franco Purini once defined as "a cemetery of unhappy fragments", where the breakage is expressed in the multiplication of fractures, which segment and alienate individuals and social groups living in the city, the places and activities that constitute it and relationships between people, places and activities.

Over the course of history and especially during the shift from the Fordist to the global economic model, urban settlements have gradually become dependent on an ever-increasing and complex interaction of infrastructure networks, a system whose growth allows ever-increasing technological control over the landscape[48](Hall P., 2000, Timmermans, Woestenburg, Annema et al, 2015).

The restructuring of centre-periphery relationships goes hand-in-hand with the "blurring and re-articulation of the urban fabric", leading to the juxtaposition of disjointed urban elements and the disintegration of hinterlands (Brenner, Schmid 2012, 2015).

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48. The urban planner Peter Hall (2000), interpreted the urban transformations, due to the waves of progress that have followed over time, in terms of "Kondratiev' cycles": the first takes place in the first half of the nineteenth century, linked to the improvement of the road network and at the beginning of rail transport; the second is located in the second half of the nineteenth century and is connected to the full development of the railway networks and the telegraph; the third arose in the first half of the twentieth century, resulting from the development of the motorway and the radio; the fourth cycle corresponds to the development of electronics and telecommunications in the second half of the twentieth century, while the fifth refers to the transformations of the post-modern city and consists of the convergence of these technological developments into complex mechanical and telecommunications networks.

As a result, different urban fragments might be located side by side without being functionally linked with each other; rather, they are oriented towards different nodes and centralities. In this process, a whole range of infrastructure arrangements are produced in order to connect various parts of the planet, generating a logistical space that forms the physical support of activities, which strongly structure any urban space[49].

Consequently, experientially and operationally, «*the infrastructures and flows of material have become more significant than static political and spatial boundaries*» (Wall, 1999, p. 234), so the urban landscapes of contemporary cities are indeed structured by a "web of boundaries"[50], but those boundaries are more often constituted by the physical presence of the infrastructural networks that run through them.

Following the urban theory of Henri Lefebvre (1970), urban space can be understood as a "differential space", in which differences come to light and interact with each other, where separations and space-time distances are replaced by oppositions, contrasts, superimpositions, and the juxtaposition of disparate realities. The production of the urban fabric supports and enables urban practices which connect people and places in a range of different kinds of movements that crisscross the urban fabric and at the same time bind it together and define it (Brenner and Schmid 2012, 2015).Through these movements and its related activities people create a multi-scalar social reality and produce large and extended urban territories that transgress all kind of borders (Bertuzzo, 2018). The superimposition and interpenetration of borders (or boundaries) of such networks has also been defined by Raffestin (1980) as "grids of power" incorporated into the territory, which mark and identify it. They are accompanied by diverse orders and rules (e.g. traffic ordinances or complex planning systems) but simultaneously they are continually challenged by the process of urbanisation itself, thus disbanding existing territorial entities and redefining them.

Every urban area is defined and affected by a characteristic set of networks related to spatial praxis and that has evolved over the course of history. Those networks are in turn based on a material infrastructure (such as streets, highways, airports, cables electricity lines and landfills) which is constantly being improved and which is constantly expanding over the land, and while growing erases the boundary between the city and rural areas (Strang, 1996, Schmid, 2014) but simultaneously they themselves constitute new boundaries, because they are the material side of instruments of structuring, control and order of the land (Lefebvre, 1970, Schimd, 2014, Easterling, 2014, 2016).

So, «How is one to conceive of both the organization of a city and the construction of a collective infrastructure?» (Foucault M.,1983, p. 239, 1991)

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[49] Typical effects are the well-known urban corridors evolving along major axes of transportation. One of the main drivers of this de- and reterritorialization is the production of a functionalised logistical space that leads to a complex and multi-layered system of hubs and spokes (Veltz, 1996).

[50] Jackson J.B. (1984);

In 1993, the science and technology historian, Rosalind Williams, noticed how the modern infrastructure network, by channelling the circulation of people, goods and messages, is, in a sense, idealized as the holder of the power of organization of space, thus deeply transforming the spatial relations by the establishment of hard lines that are privileged over the places and people left outside those lines: «*as the physical networks continued to be laid down in the nineteenth and twentieth centuries, in layer upon expensive layer, they legitimated themselves in a self-reinforcing cycle of hegemony*» (Williams, 1993, p.395). For these reasons, she considers connective systems as a primarily phenomenological concept rather than a sociological one, because: «*these constructions are tangible structures existing in geographical space, and their components are related primarily in physical rather than social terms […] When engineering involves the creation of such structures, it looks more like a "mirror twin" of landscape architecture or of urban planning than of science*» (Williams, 1993, p.380). The similarity of intent between the Landscape Architecture and Civil Engineering found by Williams, like the previous one by Jackson (1984), refers to a different interpretation of infrastructural systems. In her essay, Williams, suggests the use of a different language to examine the production of technological systems of connections: instead of the one of sociology, she advocates for the use of the language of cultural geography[51].

Among the cluster[52] of examples of work that convey the deeper study of cultural landscapes and the structural changes described above, one which really stands out is the essay *Landscape as Infrastructure: [Infrastructure as Landscape, Landscape as Infrastructure]* written in 1996 by the groundbreaking American Landscape Architect Gary Strang, who supported the imperative need to «*allow the natural landscape and the landscape of infrastructure, which occupy the same space, to coexist and perform multiple functions*» (Strang, 1996, p. 14), a condition achievable through the reassessment of the relationship between urban settings and natural processes, developing a design method capable of permitting the coexistence of nature and infrastructure, "acknowledging the potential for appropriating infrastructure as landscape" (Ibid.).

Moreover, similarly to Rosalind Williams (1993) in "Cultural Origins and Environmental Implications of Large Technological Systems", he suggests drawing on the example of the ability of some architects from the beginning of the XX century who demonstrated an uncommon understanding of *structure*, *nature* and *technology*, including through the development of new *languages* capable of developing new spatial possibilities.

The use of the concept of linguistics to understand a structure is not new, and has been used by many eminent authors belonging to diverse disciplines[53].

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[51] «*According to cultural geographers, the main elements of the cultural landscape in both the rural and the urban environment are centres or settlements of differing scale (houses, villages, cities) and pathways connecting the settlements […] The outstanding feature of the modern cultural landscape is the dominance of pathways over settlements. In the city, the central element in modern urban organization is the street or highway, as opposed to the square, market, forum, or particular buildings. Outside the city, the dominant element of organization is the roadway or other transportation and communication networks such as railway lines and electric power lines. […] Nature is not a means to the creation of a product, unless one interprets the "product" in this case as the creation of a second nature, of a cultural landscape from the given physical one. "In the cultural landscape man 'builds' the earth, and makes its potential structure manifest as a meaningful totality" (Norberg-Schulz, 1980, p. 4)* » (Williams, 1993, p. 380).

[52] See also: Davis (1990); Walker (1990), Zukin (1989, 1991), Knox (1993), Holdsworth (1997).

[53] For example, by Christopher Alexander (1977), see paragraph 2.2.

One of the most important contributions of linguistics to the field of architecture was made by the Swiss linguist and semiologist Ferdinand de Saussure (1857, 1913), considered one of the founders of modern linguistics, in particular of that branch known as structuralism.

Language, for de Saussure, is a system of signs[54] in which all the linguistic signs are in solidarity and "the value of one is not that of the simultaneous presence of others" (de Saussure, 1916). Each sign must be considered only in the whole system of which it is a part because "the word depends on the system, there are no isolated signs" (Ibidem).

Structuralism in the field of Architecture, derives actually from a most effective processing of the Saussurian definition of what a language is: *structure*, in this sense, is a unitary system whose elements are determined by reciprocal relationships and cannot therefore be picked up individually, as isolated atoms. A structure is "a system of pure values" (de Saussure, 1916) organized according to principles of regulation that constitute the schemes or internal laws of its operation. In fact, echoing de Saussure, the Structuralist Architects adopted the following definition of *structure*:

«*A structure is a complete set of relationships in which the elements can change, but in such a way that they remain independent of the whole and retain their meaning. The whole is independent of its relationship to the elements. The relationships between the elements are more important than the elements themselves. The elements are interchangeable, but not the relationships*» (Luchinger, 1981).

Nevertheless, as Weilacher and Hopstock remind us: «*the Dutch architect Herman Hertzberg, one of the influences behind the structuralist movement, promoted the creation of adaptable and flexible spatial systems which mankind could make its own in any way it wanted*» (Weilacher, Hosptock, 2018, pp. 96)

Similarly to the Structuralist architects, the Metabolist movement in Japan (1960-1970), and more generally the Metabolist approach to planning, adopted large infrastructural frameworks, which they called "artificial ground", formed by platforms, grids, walls and towers to which prefabricated and adaptable units were assembled in different combinations by the users, emphasizing change, adaptability and replaceability, whereby spaces that can be supplanted without compromising the entire structure (Zhongjie, 2010, Lyster, 2016).

«*If we ask what the thing is that gives structure to space, we can answer that it is communication. Although we can consider communication actual mobility, when things or people are in a state of flow, it is also possible to have visual communication in instances in which nothing really moves. The process of formalizing the communicational activities and flows within spaces is what we mean by giving structure to architectural or urban spaces*» (Kenzo Tange[55]).

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[54] The sign always consists of a signifier and a meaning, that is, an "acoustic image" (a set of pronounced syllables) and a "concept" (for example, that of "bridge"). The link between signifier and meaning is arbitrary, established on the basis of a convention shared by a community of speakers. Central to this context is the thesis that the value of a word is a function of the linguistic system to which it belongs. See De Saussure F. (1916), "Cours de linguistique Générale".

[55] Quoted in Luchinger, 1981, pp.50. and Weilacher, Hopstock, 2018, pp.97

It is evident that this theoretical approach has nothing, or very little, to do with the rigid architectonic framework which configured the practical applications of Structuralist and Metabolist architects in the second half of the twentieth century; the definition of *structure* given above actually describes a mutable system, one in which the relationships of the elements change over time, very similar to the complex ecological systems described in the works of the Odum brothers[56] and, as empirical evidence, to landscape (Lister, 2007). In this regard, the French philosopher Gilles Deleuze, in 1967, wondered how it was possible to recognize structuralism[57], stating that:

«*Language is the only thing that can properly be said to have structure, be it an esoteric or even non-verbal language. There is a structure of the unconscious only to the extent that the unconscious speaks and is language. There is a structure of bodies only to the extent that bodies are supposed to speak with the language which is one of the symptoms. Even things possess a structure only in so far as they maintain a silent discourse which is the language of signs*» (Deleuze G., 1967, pp. 170-171)

As pointed out by Deleuze, every *structure* works on the base of a *language*, being it a verbal or non-verbal one, which enables communication and the stability of the relationships between the entities that form it but simultaneously allow it to change.

Similarly to Deleuze, the German landscape architect Peter Latz, in 1987, in the context of the design of a redevelopment project for an industrial waste area, the Harbour Island of Saarbrucken, invented a "syntactical" design concept: «*A new syntax had to be developed for the city centre that would fit the existing urban structure back together again, tie in the varied manifestations on the site but now throw memories away, trying instead to crystallize out of the rubble what had been thrown into the rubble, and lost; We produced a syntactical design for an open urban space*» (Latz, 1987, p.42).

The landscape architect and Professor at the Technical University of Munich, further declared: «*I am definitely certain […] structure is more important than form […] I also try to convey that in discussion at the university, which is not always easy because structures are relatively unattractive at first glance. They area not very exciting. They are usually neutral, something in the background, essentially, like the percussion in a band. The solo trumpet steals the show, but there is only a rhythm because the bass and drums create it. They both have to be there, however […] The language of things and the way things are combined create information that is linguistic in character. If they are to acquire this linguistic character, they need everything that language constitutes: they need diversity of accurate terms and strong syntax. My soft spot for this approach is certainly also something to do with the fact that I am the product of a language with strong syntax, and I learned Latin*» (Latz, 2007, in Weilacher, 2007, p, 87)

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[56] See paragraph 2.1.

[57] See Deleuze G. (1967), "How do we recognize structuralism?".

The Architect Gary Strang (1996) analysing the complexity of the hidden (infra) structures of the city of New York, as described by Harry Granick in 1947[58], recognized that the system of infrastructure had become «*so complicated that it has begun to take on qualities of nature itself and, therefore, presents the same threat of random catastrophe that nature does. Infrastructure, like nature, is resilient and adaptable, but is also unpredictable and uncontrollable*» (Strang, 1996, p.13).

Parallel to this acknowledgement, the landscape ecologist Richard Forman (1995), stated that «*like all living systems, the landscape exhibits structure, function and change*» (Forman, 1995, p.5). Moreover, in his publication "Land Mosaics", he stated that the *boundary,* drawing from the discipline of landscape ecology, can be seen not just as barrier, but also considered as «*a zone composed of the edges of adjacent ecosystems*» (Forman, 1995, p. 85). This awareness reinforces the thesis that landscape and infrastructure constitute a tautology because in this perspective they are both relationships systems which put things and people in communication, creating a dialogue between different units.

By means of this post-structuralist[59] shift, since we know that landscape is a living and changeable set of relationships, infrastructure can be considered as a system of nodes and networks which together with many other systems form part of the landscape itself. So, it is reasonable to state that Landscape Architecture can be the best -placed non-verbal language to better interpret, describe and configure the signs of their structures[60].

«*The future quality of infrastructure will be the landscape… Not just any landscape but an ecologically intact and aesthetically satisfying one*» (Ganser, 1991)

The effects of this theoretical shift upon design disciplines was profound. At the end of the twentieth century, the dissolving of boundaries between traditionally separated disciplines finally became the core subject of the critique on the production of urban space.

Architects such as Peter Eisenman (1992), Rem Koolhaas (1995) Kathy Poole (1998), Robert L. Thayer (1998) and Stan Allen (1999), among others, inspired by the *Mille Plateaux* (1980) theory of Felix Guattari and Gilles Deleuze, designed alternative thought models to read the current urban situation of the time. Rem Koolhaas in his essays "Whatever happened to Urbanism" and "Generic City" (1995) highlights the gradual disappearance and simplification of relationship systems (both natural and social) defining the city, neither as land-scape nor as town-scape, but as a "scape" that has lost its prefix in the "smoothness"[61] of its surfaces; Robert Thayer (1994, 1998), commenting on the design exhibition "Eco-Revelatory Design: Nature Constructed/ Nature Revealed"[62], which gathered the works of many architects and landscape architects who mainly dealt with water systems and the urban space, noticed

[58] See Strang G. (1996) p. 12 and Granick H. (1947), "Underneath New York".

[59] «*A shift from structuralism to post-structuralism represents a move from a belief that meaning in the world derives primarily from the structural relationships within language, to a position which rejects the possibility of meaningful structures, or at least the possibility of identifying such structures in an objective way. In place of formal structures and processes of investigation, we have instead a continually changing field of relationships, whose meanings are in constant flux, and which are open to continual interrogation and re-presentation*» (Swaffield, 2012, p. 240).

[60] Current study at the TU Munich illustrates that "structuralism in landscape architecture reaches far beyond the structuralist approach in architecture" and states that this theory should be definitely developed far more in the future as a "versatile strategic instrument for the landscape architectural design practice" (See Peisl J., 2014 and Weilacher U., 2017).

[61] See Guattari F, Deleuze G. (1980).

[62] The exhibition was held at Temple Buell Gallery, University of Illinois at Urbana-Champaign, Sept. 28-Oct. 20, 1998; at Chicago Botanic Garden, Mar. 6-Apr. 11, 1999; Boston Architectural Center, Sept. 12-Oct. 15, 1999.

that while many of the projects submitted were seeking to remedy ecological dysfunctions, and others passively opened the viewer's eyes to an ecological reality, taken as a whole the submissions were forming a «*rudimentary pattern language with which to reveal and accept full responsibility for human intervention in the land and its ecosystems*» (Thayer, 1998, p.118).

«*Technology has been the principal method by which we intervene on the land and modify ecosystems to ensure our existence, yet its various manifestations are most often ignored in discussions of the designed landscape. […] In the ordinary landscape the instances in which intentional land design aims at a higher, symbolic meaning and embodies that meaning in some decipherable form are few when compared with the countless millions of "ordinary" landscapes structured by the dominant, operative, contemporary technological paradigms*» (Thayer, 1998, p.119)

In his review, Thayer concentrated his interest on the "human technologies" that consume landscapes and destabilize ecosystems, advocating the "transparent exposure of the truth of any landscape", which is not the design act of revealing but rather the healing dimension of design, a «*corrective process in the landscape […] revealing the true nature of our ecosystems*» (Thayer, 1998, p. 119). He recognizes clear patterns of connection emerging among and between the projects submitted for the exhibition, which fully confirm the necessity for a comprehensive shift in the notion of landscape within the evolving social consciousness of the environment of the twentieth century, which could lead to an acceptance of sustainable techniques and technologies.

A few years earlier, in "Grey World, Green Heart", foreseeing what would happen, he stated: «*There may be a partial return to a version of "form follows function" but this time the function is not mechanistic (in the narrow modernist sense) but ecologically (in the post-postmodern sense). Form will follow a highly complex, evolving notion of the core interrelationships of nature, and will be expressed uniquely in the surfaces of local landscapes as experienced by local cultures. Sustainable landscape form and content will seek to reveal this ecological order through an interplay of surface and core unique to both place and culture […] The continually unfolding complexity of the natural world and the inability of traditional forms to represent these changes will result in the evolution of new, unfamiliar surface-core relationships. A critical function of landscape architecture and environmental art will be to continually reinterpret the relationship of human beings to their environment in spatial, visual terms*» (Thayer, 1994, pp. 191-192).

Consequently, the city can be read as a "fluid continuum of interweaving systems" as observed by Angélil and Klingmann (1999).

During the twentieth century, the blurring of the boundaries of the design disciplines pertaining to the realm of production of the urban fabric was a source of controversy because although the creation of technological infrastructure is a powerful instrument for facilitating the creation of space, that space had only been occupied only by the products of architecture, while landscape, in this context, had long suffered from loss of space. But taking together the forces of the three disciplines, a new window is opened for a new paradigmatic construction of the urban structure:

«If architecture is declared landscape, infrastructure is declared architecture, and landscape is declared infrastructure, the precondition is created to understand the phenomenon of the city otherwise» (Angélil & Klingmann, 1999, pag. 20).

According to Angélil and Klingmann (1999), technological infrastructure, as conduit of information and movement, simultaneously creates connections and boundaries, and therefore, systems of infrastructure might be understood both as networks and as porous membranes. When the theme of infrastructure is finally put in the context of landscape architecture design, it creates the favourable conditions for the creation of a *«hybrid morphology [which] unfolds from a system of relations between different, sometimes contradictory forces, no longer […] an absolute but in reference to other structures in an unceasingly renegotiated process» (*Angélil, Klingmann, 1999).

These observations led to new design strategies that are based on the acknowledgement of the hybrid and disturbed nature of urban landscapes and to the idea that landscape architecture can be the discipline to “bridge” layers of systems of different origins.

Stan Allen was one of the first architects to call on architects to *«redirect their own imaginative and technical efforts towards the question of infrastructure»* (Allen, 1999, p.51). He concentrated his interest on “Infrastructure Urbanism”[63]: considering architecture as a material practice, dedicated to concrete proposals and realistic strategies of implementation, marking a return to instrumentality and a move away from the representational imperative in architecture (Allen, 1999).

Thus, he developed a thickened horizontal landscape of infrastructural affordance, as a “field condition”[64], in other words, “any formal or spatial matrix capable of unifying diverse elements while respecting the identity of each. Field configurations are loosely bounded aggregates characterized by “porosity and local interconnectivity” (Stan Allen, 1985, 1997, 1999), which, mimicking the open-ended processes of nature, he argued, are capable of responding dynamically to the future conditions. In his proposal for the Barcelona Port (1996), the infrastructural space serves also as a versatile and changeable public space.

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63. See Stan Allen (1999), “Infrastructure Urbanism”, in Points + Lines: Diagram and Process for The City, Princetown Architectural Press, New York, p.49.

64. In 1985, he published his essay entitled “Field Conditions”, trying to find a solution to what he called “one of the most obvious failures of modern architecture: its inability to adequately deal with the complexities of urban contexts” (Allen 1999). Allen studies the concept of “field condition” applied to architecture, proposing a theoretical design model able to better understand its operative field, that is a distinct but connected set of meanings: “With the “field conditions” idea, I wanted to preserve the double sense of working “in the field,” open to change, accident and improvisation, and at the same time, the more abstract sense of a “field of forces” — organizational systems and material assemblages that are serial, expansive, non-hierarchical and open-ended” (Stan Allen, in Stan Allen by Nader Tehrani, BOMB Magazine, 2013).

In this context neglected, abandoned landscapes, large post-industrial sites, in-between spaces and more generally, voids, started to attract to an ever greater degree the attention of landscape architects and urban planners, and in unprecedented ways (Wall, 1999), with the aim of providing a "resilient structure" that can withstand the unpredictable changes fuelled by political and economic forces present in the urban realm.

Amongst the most representative projects of this new paradigmatic position towards landscape and infrastructure is Peter Latz's transformation design of *Landschaftspark Duisburg-Nord* (Germany) in 1991, which is the benchmark for the redevelopment of former industrial brownfields into mixed-use use public spaces[65],where ecological and socio-cultural objectives blend (Corner, 1999, Nijhuis et al 2015). The German Landscape Architect and his team, as a matter of fact, developed four separate individual park concepts, based on the most formative basic elements of that landscape, which were subsequently superimposed on each other again[66], with the aim of overcoming the separation between *Techne* and *Poiesis* that James Corner (1990) identified as the factor responsible for the theoretical crisis of the discipline of Landscape Architecture[67].

In a conversation with his former student Prof. Udo Weilacher, Latz declared: «*It is more about taking items over in their totality and understanding their original functions […] We sometimes decide to leave the stump of a factory chimney, or whole sections of wall standing, even if they would provide all those many thousand tons of broken concrete for road building. But we want to keep them in their role and in their historical function, and sometimes invest in the surviving building components with the new meaning that can stimulate readings of existing material. […] The rail system in Duisburg-Meiderich is available with the gigantic park and extends well out beyond the 230 hectares into the adjacent urban spaces as a language system, I quickly realized that the team had to learn how the locomotive runs, and thus understand how the rail system functions, and its movement pattern. This was to produce one of the future language layers, and it was essential to ensure that it was not destroyed at any point […] I wanted to develop systems that are both highly artificial and highly ecological […] So technology and nature not as contrasting pair, as in early Modernism, but technology and nature in accord. Here I am interested in a possible congruence with the ecological concept. This has nothing to do with the need for harmony; no, the technical idea is to try to integrate natural sequences as much as possible, and to let nature be nature. On the other hand, nature we create artificially must allow us to find an aesthetic language that is identical with the technical one. For example, if I am working in some technical industrial complex I can't plant clumps of trees in the English style, because that would produce a contrast. But if I plant the trees on a grid or in rows then I am working with the same language as in industrial architecture and the trees will*

[65] Referring to this project, Latz declared that: «*The contradictory nature of places like this is worrying […] If we assume that the industrial process took a strictly rational approach, that there must have been detailed principles that were clearly comprehensible behind everything incomprehensible, then we are postulating about the existence of rules and systems that make it possible to penetrate the chaos*» (Latz, 2003, p.64).

[66] Weilacher U. (2007)

[67] See paragraph 2.1 of this research.

still flourish, just as they would in a free, landscape composition. I am absolutely allergic to the idea that nature should reconquer something for itself. That is definitely not what is intended, as it simply means that nature is triumphing over technology. Then we have lost society as a whole. We have to keep a hold on technology and integrate it into our environment […] The water canal is an artefact aiming to introduce natural processes in a devastated and perverted situation. These processes work according to the rules of ecology but are initiated and sustained by technological means. Man uses the artefact as a symbol of nature, but is still responsible for the process. It is the most natural and at the same time the most artificial system» (Latz, 2007, p. 119-131)

Other different, but equally significant European innovative experiences are identifiable in the work of OMA studio in the Netherlands, especially in the context of the city of Rotterdam with the Kunsthal Museum project (1992): a ramp is designed to connect *Westzeedijk* Street to the Kunsthal building by forming a bridge, which which is used as entrance, as rooftop garden and entrance to the park. Another front-running firm which addressed the increased complexity of the city with a landscape approach in Europe is West8, founded by the Dutch Landscape Architects Edzo Bindels and Adriaan Geuze, which experimented with new forms of public spaces by concentrating their attention on "emptiness" rather than "over-planning" (Wall, 1999, Corner, 1999). The project of the *Schouwburgplein* (1996) is one of the most striking examples of a multi-layered underground structure containing utilities and services, which on the external surface becomes a public square which can be transformed to enable temporary structures and covering to be erected, depending on the needs of users (Geuze, 1995, Wall 1999, Corner, 1999).

In North America, Linda Pollak and Sandro Marpillero, proposed, for the small post-industrial site of Petrosino Park in New York (1996), the development of a "new kind of public space" able to activate its boundaries as the "new thresholds" which participate in the city's identity[68]. Similarly, in a later study on the Bronx in Manhattan called "Beyond the box" (1999), the two architects mapped the disjuncture of the superimposed layers of the urban fabric, in different scales, with the aim of using the spaces in-between to create a new heterogeneous public space.

Across the water in Japan, the Yokohama Design Forum in Japan, has been cited by many relevant experts[69] as an example of a new trans-disciplinary practice and "infrastructure as public space"[70]. Both OMA and FOA practices conceived the project for the site as a nexus of infrastructures whose use could be maximized by the careful analysis of the *flows* of goods and people, thereby studying the patterns of use of the space. In the winning project in the competition, authored by "Foreign Office Architects" (founded by the Spanish Architect Alejandro Zaera-Polo and his partner Farshid Moussavi),

[68] See Pollak L. (2000).

[69] See: Frampton, 1999, Wall, 1999, Ruby, 2002, Shannon & Smets, 2010, Balmori & Sanders, 2011, Allen & McQuade, 2011, Jauslin 2015, Waldheim, 2016, et al.

[70] See Shannon, Smets (2010).

the infrastructural building is used as a kind of a park or public open space via the construction of a highly complex three dimensional surface that performs as an urban landscape, producing "differentiated surfaces as a means of reconciliation with the complexity of the systems, for the creation of an unbounded landscape, rather than an over-coded delimited place" (FOA, 1995, Wall, 1999).

«*Negotiating the whole range of disciplinary transgressions possible among the three disciplines in one single project, Yokohama is as much infrastructure as it is architecture and landscape. It uses all of the disciplinary frameworks, merging them but not losing ground, creating an anti-object with iconic strength, an experiment with technological vigour*» (Jauslin, 2015, p. 250)

The aforementioned renewed interest in topography, site, ecology, infrastructure and geography that emerged at the end of the 1980s has since the 1990s come to permeate the work of many designers, and has definitively repositioned the landscape context for the architectural and environmental arts, also in the semiotic, ecological and political sense (Corner, 1999).

In North America, a series of symposiums on this phenomenon showed the urgent need to rethink the mono-functional realm of infrastructure and for the reformulation of the more traditional concerns of urbanism, re-examining the role of Landscape Architecture in the urban realm in order to rescue the city from the devastation wrought by the increasing standardization of infrastructural systems. Since 1997 a growing body of literature, given the heading of *Landscape Urbanism*[71], has been underlining this progressive blurring of the boundaries between urbanism, architecture and landscape architecture, ecological and cultural forms and processes, providing a new "landscape view" on the state of the city in which landscape is not only a cultural product, but also the active *medium* to shape contemporary culture and through which an appropriately open-ended, responsive, and indeterminate urbanism might be conceived (Corner, 1999, Waldheim, 2016).

«*Landscape serves as a metaphor for inclusive multiplicity and pluralism, as a kind of synthetic "overview" that enables differences to play themselves out. In these terms, landscape may still embrace naturalistic and phenomenological experience, but its full efficacy is extended to that of a synthetic and strategic art form, one that aligns diverse and competing forces (social constituencies, political desires, ecological processes, program demands, etc.) into newly liberating and interactive alliances*» (Corner, 1999, p.1).

Many projects and theoretical explorations of *Landscape Urbanism* have focused on infrastructure "as the most generative public landscape" (Mossop, 2006), signalling the coming centrality of the instrumental engagement both with the functions of infrastructure and with ecological processes[72],and adapting to the new social and cultural needs of contemporary communities. Infrastructure, taken to be part of the synthetic landscape of the city, has become part of the design process or strategy, providing new opportunities for new connections and new future events (Ellin, 2006).

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[71] The term Landscape Urbanism emerged for the first time in April 1997 on the occasion of the exhibition "Landscape Urbanism", held at the Graham Foundation in Chicago and curated by Charles Waldheim; According to the Swiss Landscape Architect Christophe Girot (2005), Landscape Urbanism is «*meant first and foremost to decipher what happened in the city landscapes of the last decades and to consequently act upon them. It addresses a complex and almost inextricable condition that is strangely occurring at four corners of the globe*» (Girot, 2005, p.89)

[72] Ecology is incorporated in Landscape Urbanism as the dynamic complex assemblage of resources, species and climate operating in a multiple feedback loop. See Forman 1984,1995, 2014.

From this perspective landscape and infrastructure merge and are the vessels of collective life, aiming, this time, to enhance the quality of the landscape (Shannon & Smets, 2010, Nihijus & Jauslin, 2015).

James Corner, in fact, defined *Landscape Urbanism* as «*an attitude of looking at cities as if they are landscapes and landscapes as if they are cities*» (Corner, 2004); Unlike previous more object-based ideas, such as "cityscape" or "infrascape", the Landscape Urbanists concentrate their attention on the dynamic structures and processes which form the urban landscape, shifting the interest from "objects to fields, from singularities to open-ended networks" (Corner, 2003). Infrastructure is seen to be in co-dependency with ecology and its systems, considered both to be adaptive fields, responsive and capable of evolving and transforming with their surroundings.

In this view, as demonstrated in the next chapter, the synthesis of landscaping, ecological, engineering, architectural and urbanistic skills and tools for the creation of space form the basis for the invention of new landscapes created though new forms of practices and transdisciplinary alliances, capable of reading landscape and infrastructures in forward-thinking ways.

«*Whether it be the laissez-faire discourse of chaos theory, the iconoclastic stand of a tabula rasa approach to urban design, or the melancholic complaint of better things past, the fact is that these dogmas have still not delivered any satisfactory remedial solutions to the current state of urbanism. It would be preferable […] to accept differentiated readings of the urban landscape, readings which may reveal some inherited qualities from the past but may also be capable of repairing and clarifying opacities of the present. We need now to reinvent a language to present, with strong new landscape identifiers, capable of integrating the complexity and contradiction of each place. These actions must respond amongst the others to these very landscapes that have been either irremediably altered or effaced by the forces at work […] A new way of looking a tour urban landscapes could deliver a better, more complete understanding of the multiplicity of phenomena at hand […] It is therefore important to plead for an open, differentiated, and non-dogmatic reading of landscape, where both past traces and potential futures can be grasped synchronously. A site should be thought of within an evolving self-referential frame, a visual frame meant to qualify and strengthen the natural potential of a city over time*» (Girot, 2006, p. 94).

2.4 State of the Art of Current Infrastructure: Neologisms

As seen in the previous paragraph, the word infrastructure is a combination of the Latin prefix “infra” and “structure”, but the meaning of the term has undergone changes in parallel with technological developments. In reality, infrastructure before 1700s[73] consisted mainly of roads and canals used for transportation and irrigation, and only a few advanced cities had aqueducts that serviced public fountains and baths, while even fewer had sewers, ports being a feature of only the most powerful commercial cities.

The four urban phases described by the political geographer and urban theorist Edward Soja[74] clearly highlight how, before the industrial revolution, cities grew in an organic manner and in close interaction with the landscape, which was the physical counterpart of the infrastructure that was needed to transport people, food, water and energy. The decision about the *site* where a city must arise was far more dependent on the strategic characteristics of the environment[75].

As they became the physical representation of concentrations and interactions of various landscape developments, cities rapidly came to exert a centripetal force on the outside world, resulting in the creation of infrastructure networks. They gradually became dependent on an ever growing and increasingly complex infrastructural interaction for their primary necessities, a system whose growth was enabled by more and more effective technological control over the landscape, cities seeming to become detached from the landscape as their basic needs for safety, food, water and energy were secured by infrastructure (Timmermans, Woestenburg, Annema, et al, 2015).

Urban infrastructures in their current form are the result of the various stages of modern movements and industrial revolutions, which implied a transportation revolution, above and below ground (Fig. 1).

MAIN TECHNICAL INFRASTRUCTURE TYPOLOGIES	CHRONOLOGICAL and GEOGRAPHICAL EMERGENCE
water canals	1600-1700 (France)
railroads	1800-1830 (England)
sewer systems	1800-1870 (France)
electricity and telephone networks	1870-1890 (U.S.A.)
cyber infrastructure (IT)	1990-2000 (U.S.A.)

Figure 1: Chronological formation of urban infrastructures. Source: Author, according to Edwards (2003), Williams (2008).

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[73] For a comprehensive historical survey on the formation of modern urban infrastructure see Williams R. (2008), “Notes on the Underground: An essay on Technology, Society and the Imagination”, MIT Press.

[74] See Soja E. (2000), Post-Metropolis. Critical Studies of Cities and Regions, Blackwell publishers, Oxford; See also Childe G. (1936), Man Makes Himself, Watts and Co., London; Childe G. (1950) “The Urban Revolution”, in The Town Planning Review, Vol. 21 N. 1, pp.3-17

[75] A good European example of this was in Crete where, during the 3rd century BC, an elaborate infrastructure was constructed to import water and to export waste for use as manure on the farms.

Since 1875, in French, and since 1887, in English, the word infrastructure, as a derivation of the French term "*plate-form*"[76], has been used with a different meaning, signifying: "The installations that form the basis for any operation or system" (Online Etymology Dictionary. Douglas Harper, Historian).

After World War II, "infrastructure" re-emerged as in-house jargon within NATO, this time referring to fixed installations necessary for the operations of armed forces and to capital investments considered necessary to secure the security of Europe (Lewis, 2008).

During the 1970s, the term took yet another turn when it was adopted by urban planners in one of its modern civilian senses: it was used to refer to those massive capital investments (water, subways, roads, bridges, tunnels, schools, hospitals, etc.) necessary to a city's economy and the lives of its inhabitants and business enterprises. A 1927 edition of the Oxford dictionary actually mentioned the word in the context of "… the tunnels, bridges, culverts, and 'infrastructure work' of the French railroads."

At the end of the 1980s, the US National Research Council panel adopted the term "public works infrastructure", referring to:

«...both specific functional modes – highways, streets, roads, and bridges; mass transit; airports and airways; water supply and water resources; wastewater management; solid-waste treatment and disposal; electric power generation and transmission; telecommunications; and hazardous waste management – and the combined system these modal elements comprise. A comprehension of infrastructure spans not only these public works facilities, but also the operating procedures, management practices, and development policies that interact together with societal demand and the physical world to facilitate the transport of people and goods, provision of water for drinking and a variety of other uses, safe disposal of society's waste products, provision of energy where it is needed, and transmission of information within and between communities» (Infrastructure for the 21st Century,1987, National Academy Press, Washington, D.C.)

In 1996-97 the U.S. President Commission on Critical Infrastructure Protection[77] identified the fundamental functions and services of the American definition of infrastructure, which can be summarized as: transportation, oil and gas production and storage, electrical power lines, water supply, emergency and government services, banking and finance, information and communication technologies, public institutions including schools, post offices and prisons (Edwards, 2003). The Commission explained:

«By infrastructure … we mean a network of independent, mostly privately owned, man-made systems and processes that function collaboratively and synergistically to produce and distribute a continuous flow of essential goods

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[76] The corresponding term of "plate-form" in English is "subgrade"; Subgrades are commonly compacted before the construction of a road, pavement or railway track, and are sometimes stabilized by the addition of asphalt, lime, cement or other modifiers. The subgrade is the foundation of the pavement structure, on which the subbase is laid. In transport engineering, subgrade is the native material underneath a constructed road, pavement or railway (US: railroad) track; The term can also refer to imported material that has been used to build an embankment, it is also called "formation level". (See: The Idiots' Guide to Highways Maintenance, http://www.highwaysmaintenance.com/drainage.html).

[77] In July 1996, President Clinton established the Commission on Critical Infrastructure Protection (PCCIP), with a charter to designate critical infrastructures, to assess their vulnerabilities, to recommend a comprehensive national policy and implementation strategy for protecting those infrastructures from physical and cyber threats, and to propose statutory or regulatory actions to affect the recommended remedies.

and services» (President's Commission on Critical Infrastructure Protection, 1997).

In 2006, the Technical Committee on Sustainable Systems and Technology which focuses on infrastructure (PERSI, 2006), advanced the following definition:

«*Infrastructure is what shelters and supports most human activities – buildings of all types, communications, energy generation and distribution, green spaces, transportation of all modes, water resources, and waste treatment and management*» (PERSI, 2006).

In addition, a definition of **Sustainable Infrastructure** was also identified, which is: «*The set of constructed structures and natural features that protect and support the majority of human activities - buildings of all types, communications, power generation and distribution, green spaces, transport in all modes, water resources, and the treatment of waste and its management*» (PERSI, 2006)

In 2009 the American Society of Civil Engineers gave a similar, but more in-depth definition of the term:

«*The infrastructure supporting human activities includes complex and interrelated physical, social, ecological, economic, and technological systems such as transportation and energy production and distribution; water resources management; waste management; facilities supporting urban and rural communities; communications; sustainable resources development; and environmental protection*» (American Society of Civil Engineers, 2009).

Moreover, in 2017, The American Society of Civil Engineers published the "Infrastructure Report Card", which represents the organization's opinion on the condition of various infrastructures every 2–4 years. The organization graded 16 categories of infrastructure, namely: Aviation, Bridges, Dams, Drinking Water, Energy, Hazardous Waste, Inland Waterways, Levees, Parks & Recreation, Ports, Rail, Roads, Schools, Solid Waste, Transit and Wastewater.

It is noticeable that the word infrastructure has become a slippery and promiscuous term, often used to mean essentially any important, widely shared, human-constructed resource (Edwards, 2003, Williams, 2012). The new meaning of the word has relatively recent origins.

From a rapid survey of the main linguistic and online dictionaries, what clearly emerges is how varied and different the definitions and uses of the word infrastructure are:

Pronunciation: \ ˈin-frə-ˌstrək-chər, -(ˌ)frä-\ Function: noun. Date:1927

Infrastructure:

1: the underlying foundation or basic framework (as of a system or organization);

2: the permanent installations required for military purposes;

3: the system of public works of a country, state, or region; also: the resources (as personnel, buildings, or equipment) required for an activity; (Merriam-Webster's Learner's Dictionary)

«*Infrastructure means one or the series of structural elements that intermediate the relationships between the various components of a structure* » (Wikipedia.it)

«The term infrastructure is used to designate that set of capital goods that, although not directly used in the production process, provide a series of services essential for the functioning of the economic system: roads, railway lines, ports, schools, hospitals, etc. Even the term «social fixed capital» is often used to designate this set of goods and can therefore be considered a synonym of ‹infrastructure›. The term infrastructure includes the ‹networked› and the ‹punctual› ones: the first are systems that are widespread in the territory and characterized by a series of interconnected points. The economic significance and importance of these systems depend crucially on the number of people and / or sites connected to the network. [...] The punctual infrastructures (for example a hospital) have the characteristic of being useful as single units» (Italian Dictionary of Economics and Finance, Treccani, 2012)

For the purposes of economic analysis, it's important to distinguish between:

Basic Infrastructure[78]: constituted by the building structures that are used for the fulfilment of fundamental tasks for the existence of the State, such as the management of justice, legislative, executive and administrative activity in general. Military, ministerial and government buildings, military airports, prisons, police stations, etc. belong to this category of infrastructure. Although these structures are important for the life of any community, they are not the object of a particular study because they do not contribute directly to the economic development of the system.

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[78] Treccani.it

Economic Infrastructure [79]: characterized by production factors that flank the productive capital - mostly private property - contributing to the production of goods and services: examples of this type of infrastructure are road and rail networks, ports, pipelines, the methane pipelines, the dams and the reclamation works.

Social Infrastructure[80]: includes schools, hospitals, aqueducts, etc. - which instead contribute to determining the living conditions of the community, affecting aspects such as healthcare and the educational level of citizens. They are important not only because they increase the well-being of society, but also because indirectly, by acting on the quality of human capital, they increase the overall productivity of the system.

«*Infrastructure is an underlying base or foundation, especially for organization or a system and it comprehends the basic facilities, services, and installations needed for the functioning of a community or society*» (The American Heritage Dictionary)

«*Infrastructure, in general (as opposed to superstructure), is a structure or complex of elements that constitute the support base or in any case the underlying part of other structures; also in a figurative sense(for example a company). With specific meaning, infrastructure is the complex of facilities and installations necessary for the execution of railway services, airports, etc..* » (Repubblica.it, Hoepli Italian Dictionary, third edition)

Reading these sample definitions it is clear that, over time, the attempts to define infrastructure made by national agencies, provinces and states, municipalities, professional and trade organisations, the financial and academic communities, and, of course, dictionaries, have been very numerous. Inconsistencies and sector-specific biases abound, but some common threads run through the myriad of definitions; nearly all mention or imply interrelated systems, physical components and societal needs (Fulmer, 2009).

In the collective imagination, when it comes to infrastructure we are used to thinking about transport infrastructure; we immediately think of highways, bridges, cars, fuel and asphalt, or the infrastructures related to drinking water (reservoirs, reservoirs, wells, pipes), to purification plants and to the creation of energy (hydroelectric power plants, transmission lines). These founding systems of urban life are also called **"Grey Infrastructure".**

Moreover, there are two general types of ways to view infrastructure, hard or soft[81] (Kumar, 2005). **Hard Infrastructure** is a synonym of **Grey Infrastructure**, as it refers to the physical networks necessary for the functioning of a modern industry (Kumar, 2005, Hamutuk, 2011).

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[79] Ibid.

[80] Ibid.

[81] The concept was developed in India, after the debates undertaken in second half of the 1990s, about which part of the infrastructure sector needed to be in the private sector, and which part in the public sector. For a more comprehensive review of the Indian infrastructure development; See Kumar D. (2005).; A brief glossary of "hard" and "soft" infrastructure is reported in paragraph 2.5.

Soft Infrastructure[82], on the other hand, refers to all the institutions that maintain the economic, healthcare, social, and cultural standards of a country, or in other words, the set of material goods and services that are not involved in the production process, structures that, by analogy, translate into human capital formation, such as public education, especially the professional sector, and scientific research as an indispensable support for innovations technology, which is also called "Economic Infrastructure".[75]

The sum of **Hard Infrastructure** and **Soft Infrastructure** constitute the **Urban Infrastructure**, which is defined as: «*the network of public services necessary for urban development (urban scale). In a broader sense, in the economic language, all that set of public works, which is also given the name of fixed social capital (eg streets, aqueducts, sewers, sanitary and sanitary works), which form the basis of development economic-social status of a country and, by analogy, also those activities that translate into personal capital formation (for example, public education, especially professional education, or scientific research intended as support for technological innovations*» (Vocabolario Treccani della Lingua Italiana, 2017)

As can be noticed from the evolution of definitions and the increasing of typologies of infrastructures reported above, the twentieth and twenty-first century witnessed a "boom and bust" of infrastructure (White, Sheppard, 2010).

Estimates from the OECD suggest that annual global investment requirements by 2030 for telecommunications, road, rail, electricity (transmission and distribution) and water are likely to total around an average of 2.5% of world GDP[84]. For OECD countries the needs are mainly found in the maintenance and upgrade of the existing stock of infrastructure. Indeed, in EU countries, around 70% of public investment is spent on maintenance costs associated with past infrastructure investments (OECD, 2014). There is also some evidence that points towards under investment in recent years[85]. There is thus a clear global need for new economic infrastructure in the areas of energy, water, transportation, as well as in social infrastructure such as schools and hospitals (OECD, 2015). Future years of the twenty-first century will need the elaboration of applicable and functional solutions to address insufficient and ineffective infrastructures, but also how to position infrastructures that confront urgent issues: new build needs are to be found in assets meant to mitigate the effects of climate change, environmental degradation and sustenance inequality, along with new green energy modalities and meeting the needs of ageing societies (OECD, 2015).

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82. In Marxism, the term "infrastructure" is sometimes used as a synonym for "base" in the dialectic synthetic pair base and superstructure. However, the Marxist notion of "base" is broader than the non-Marxist use of the term "infrastructure", and some soft infrastructure, such as laws, governance, regulations, and standards, would be considered by Marxists to be part of the superstructure, not the base.

83. See paragraph 2.5

84. If electricity generation and other energy-related infrastructure investments in oil, gas and coal are included, the annual share rises to 3.5% of GDP (OECD, 2007). At the 2014 Meeting of Senior PPP Officials, Standard and Poor's estimated annual global funding needs for infrastructure at USD 3.4 trillion annually (OECD, 2015).

85. According to the reports of the OECD, countries as a whole, government spending on gross fixed capital formation as a share of total general government outlays fell from 9.5% in 1990 through 8% in the mid-1990s to approximately 7% in 2005 and 6.7% in 2011 (OECD, 2013). In addition, the global financial crisis has meant that governments and the private sector have been investing less. In the EU, for example, sub-national public investment declined by more than 20% over 2009-2012 (OECD, 2014).

Since the end of the last century, several disasters connected to the infrastructural network have occurred and have been increasing over time, simultaneously with the awareness of ecological hazards due to the effects of out-of-control urbanization and the obsolescence of technical infrastructure systems. In the last two decades, more and more experts have criticized the classic definitions of infrastructure, proposing others that are more compatible with the needs of contemporary society.

In the field of landscape and environmental planning and design different ideas were, and are currently being, proposed. The earliest of these "new infrastructures" is the **Green Infrastructure**.

The concept was born and spread progressively through the project initiatives launched in the United States in the second half of the 90s, and subsequently, through the project initiatives launched in the Anglo-Saxon countries, in the second half of the 2000s. The term was coined by two American environmental planners, Edward McMahon and Mark Benedict who chose the prefix "green" to emphasize the importance of the separation between the natural and artificial infrastructure in planning and development approaches, in other words to distinguish it from the "grey" ones (roads, sewers, utility lines) and the "social" ones (McMahon, Benedict, 2002).

The first definition of **Green Infrastructure** is the following:

«*It is a strategically planned and managed interconnected network of natural areas and other open spaces that preserve functions and values of natural ecosystems, keeping the air and water clean and providing a wide range of benefits for people and communities. Green Infrastructure is the ecological framework for environmental, social and economic health - in short, it is our natural ecological system necessary for survival*» (McMahon, Benedict, 2006, p.1)

Benedict and McMahon admitted that **Green infrastructure** was a new term, but not a new idea, and in fact they identified Frederick Law Olmsted as the inventor of green infrastructure, first Landscape Architect to propose and realize systems of green spaces in the city, being linked as a network in order to improve the quality of life in the urban environment (McMahon, Benedict, 2006).

Early visions and applications, which grew out of the historical greenways movement and held sway in the 1980s and early 1990s, saw *greenways* as corridors of various widths, linked together in a network (Fábos, 1995). Subsequent attempts were made to develop categories of greenways, such as urban-riparian corridors, recreational greenways, ecological corridors, scenic and historic routes and comprehensive networks (Little, 1990).

The authors, however, stated that the term means different things depending on the context in which it is used:

Green Infrastructure used as a noun: «*refers to an interconnected green space network (including natural areas and features public and private conservation lands, working lands with conservation values and other protected open spaces) that is planned and managed for its natural resource values and for the associated benefits it confers to the human population*» (McMahon, Benedict, 2006, p.3)

Green Infrastructure used as an adjective: «*describes a process that promotes systematic and strategic approach to land conservation at the national, state, regional and local scales, encouraging land-use planning and practices that are good for nature and four people*» (McMahon, Benedict, 2006, p.3)

Green Infrastructure as a concept: «*is the planning and management of a Green Infrastructure Network that can guide the creation of a system of open space hubs and links that support conservation and associated outdoor recreational and other human values, connect existing and future green space resources and «fill in» the gaps*» (McMahon, Benedict, 2006, p.3)

Therefore, Green Infrastructure as defined by McMahon and Benedict, is a comprehensive and strategic approach to the conservation of "wild nature" from the processes of expansion of urban settlements, a factor that explains why this practice has spread particularly in the United States of America (where there are still a great deal of areas which are unspoilt, or almost unspoilt, by the presence of man) and in UK (in view of the urgent need to safeguard the Greenbelt from pressing urban growth).

A Green Infrastructure can include a wide variety of ecosystems (native and restored) and landscape features including protected areas such as swamps, woods, streams, and natural habitats; public and private conservation areas, such as national and regional or state parks, nature reserves and ecological corridors; and productive areas such as forests, farms and other protected open spaces such as parks and greenways. These elements give life to the Green Infrastructure network, which connects ecosystems and landscapes in a system of hubs, links and sites (Fig. 2).

Its organization does not differ much from the European Ecological Network, where the core areas such as the hubs, the ecological corridors and the stepping stones are equivalent to the link, and the buffer zones are identified as the site (Fig.3).

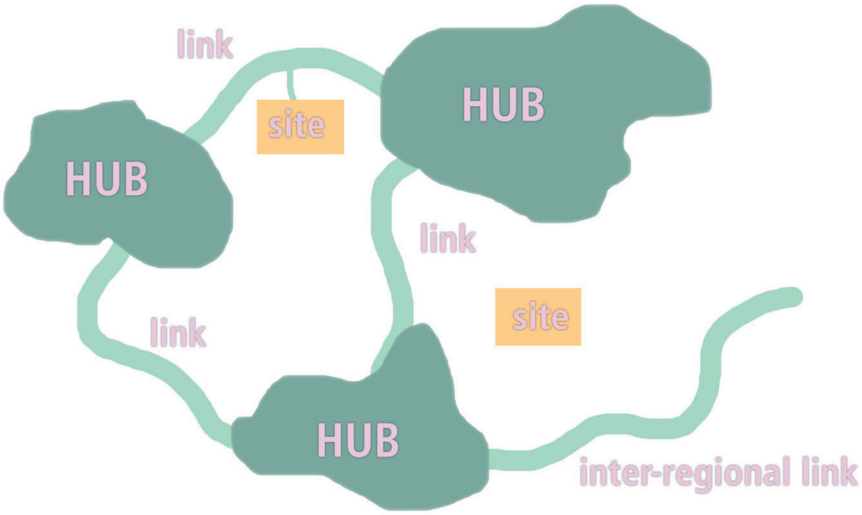

link
site
HUB
HUB
link
site
link
HUB
inter-regional link

Figure 2: Schematic representation of the operation of a Green Infrastructure. Source: Author, according to Maryland Department of Natural Resources and Benedict and McMahon (2002).

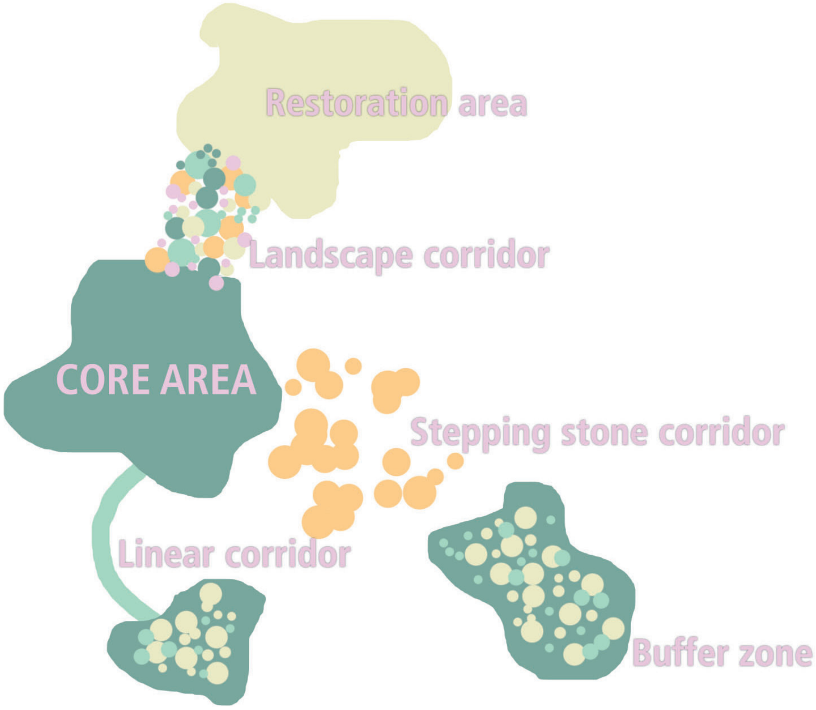

Restoration area
Landscape corridor
CORE AREA
Stepping stone corridor
Linear corridor
Buffer zone

Figure 3: Schematic representation of the operation of a European Ecological Network Source: Author, according to European Center for Nature Conservation (Alterra Rapport 1429, 2006).

In other words Green Infrastructure provides a "framework" to guide the future growth and development of the land through systematic and strategic conservation activities, but it is clear in the words of the authors that it regards "green" spaces in the sense of natural spaces or protected conservation lands with particular natural values. The adoption of this "framework" has been promoted as an approach to respond to major urban environmental and social challenges such as reducing the ecological footprint, improving human health and well-being and adapting to climate change. Various scientific initiatives and many experts in various fields have highlighted that Green Infrastructure has great potential to solve problems related to climate change and contemporary urbanization worldwide[86].

In 2006 the seminar "Green infrastructure planning: sustainable Cities in the twenty-first Century" was organized; the event was the first opportunity to discuss the guidelines for the planning of Green Infrastructures developed by a multidisciplinary British team, made up of experts from East Community Forest, Newcastle University and Northumbria University (Davies et al, 2006).

In March 2009, Peking University organized a symposium in China called "Greenways as Green Infrastructure", which had a major impact on the planning policies of the country.

In 2013 the UK Landscape Institute stated its position about Green Infrastructures: «*The role of green infrastructure in addressing the challenges of the 21st century cannot be underestimated. It is a natural service providing infrastructure that is often more cost effective, more resilient and more capable of meeting social, environmental and economic objectives than 'grey' infrastructure*» (Landscape Institute Position Statement, 2013).

The EU 2020 Biodiversity Strategy, adopted in 2011, addresses the main drivers of biodiversity loss, focusing on maintaining and enhancing ecosystem services and restoring degraded ecosystems by incorporating Green Infrastructure in spatial planning[87] and, in addition, the strategy relies on Member States to set 'priorities to restore and promote the use of green infrastructure' in order to achieve ecosystem restoration from sub-national to EU level.

Moreover, in 2015 the European Commission was asked to elaborate a strategy for a "trans-european network of green infrastructure" by 2017. In 2017, the board of the German Association of Landscape Architects (BDLA) declared that "green infrastructure" is the central future theme for landscape architecture, while the American Association of Landscape Architects defined G.I. as the "centrepiece of smart regional and metropolitan planning, ensuring communities have a liveable environment, with clean air and water, for generations to come" (www.asla.org/greeninfrastructure).

[86] E.g. "The Millennium Ecosystem Assessment" (Ecosystems and Human well-being 2005), and Salbitano, Borelli, et al (2016).

[87] *«By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems»* (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52011DC0244)

Although this strategy has been put into practice in different ways and in many cities around the world, to date there is no shared definition of the term. Various definitions of **Green Infrastructure** have been proposed since its emergence more than two decades ago, of which the following constitute a sample:

«*Green Infrastructure can be considered as all-natural, semi-natural and artificial networks of multifunctional ecological systems, within, around and between urban areas at every spatial scale*» (Tzoulas et al, 2007)

«*Green infrastructure is the physical environment within and between our cities, towns and villages. It is a network o multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resource management*» (Davies et al, 2007)

«*Green Infrastructure is management approaches and technologies that utilize, enhance and/or mimic the natural hydrologic cycle processes of infiltration, evapotranspiration and reuse. Green Infrastructure approaches currently in use include green roofs, trees and tree boxes, rain gardens, vegetated swales, pocket wetlands, infiltration planters, porous and permeable pavements, vegetated median strips, reforestation and revegetation, and protection and enhancement of riparian buffers and floodplains*» (Environmental Protection Agency, 2008)

«*Green Infrastructure is a strategically planned and delivered network comprising the broadest range of high-quality green spaces and other environmental features*» (Natural England, 2009)

«*Green Infrastructure are the connective features (physical and metaphorical) linking different environmental elements across the rural and urban landscape, thus providing multi-functional (ecological, economic and social) benefits for diverse populations*» (Mell, 2010).

«*Green Infrastructure is the network of natural and semi-natural areas, features and green spaces in rural and urban, and terrestrial, fresh water, coastal and marine areas, which together enhance ecosystem health resilience, contribute to biodiversity conservation and benefit human populations through the maintenance and enhancement of ecosystem services*» (Naumann et al, 2011)

«*Green Infrastructure is a network of green spaces - and features such as street trees and green roofs - that is planned, designed and managed to provide a range of benefits, including: recreation and amenity, healthy living, reducing flooding, improving air quality, cooling the urban environment, encouraging walking and cycling, and enhancing biodiversity and ecological resilience*» (Mayor of London, 2012)

«Green Infrastructure is the region's life support system – the network of natural environmental components and green and blue spaces that lies within and between the north west's cities, towns and villages which provides multiple social, economic and environmental benefits» (The North West Green Infrastructure Think Tank Partners[86], 2013)

«GI is the network of natural and seminatural features, green spaces, rivers and lakes that intersperse and connect villages, towns and cities. Individually, these elements are GI assets, and the roles that these assets play are GI functions. When appropriately planned, designed and managed, the assets and functions have the potential to deliver a wide range of benefits – from providing sustainable transport links to mitigating and adapting the effects of climate change» (Landscape Institute, 2013)

«Green Infrastructure can be broadly defined as a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings» (European Commission, 2013a)

«Green Infrastructure is the sum of an area's environmental assets, including stand-alone elements and strategically planned and deliberate networks of high-quality green spaces and other environmental features, including surfaces such as pavements, carparks, driveways, roads and buildings (exterior and interior) that incorporate biodiversity and promote ecosystem services» (Dover, 2015).

Lately, the term **Green Urban Infrastructure (G.U.I.)** has come into use while referring to the application of Green Infrastructure strategies in cities; The European Environment Agency[87], provides on its website, a section dedicated to the definition of G.U.I., accessible through a hypertext link named: "What is Green Urban infrastructure?"; By clicking on it, however, you are redirected to an additional definition of Green Infrastructure:

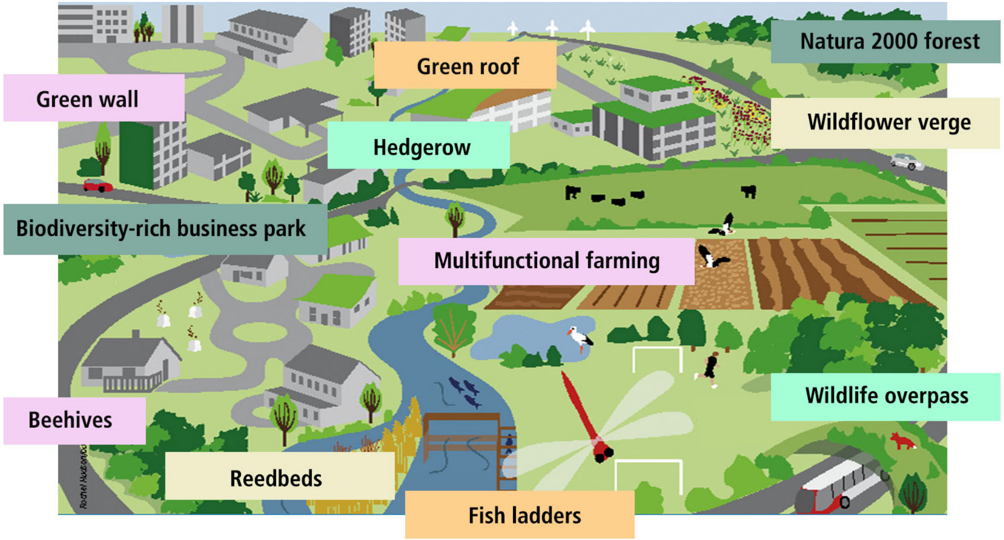
«Green Infrastructure (GI) is based on the principle that 'protecting and enhancing nature and natural processes […] are consciously integrated into spatial planning and territorial development'. Accordingly, the Green Infrastructure Strategy defines GI as 'a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services' in both rural and urban settings» (European Commission, 2013a).

No definition of G.U.I. has been provided by the European Commission, but a study conducted by the Italian Landscape Architect and Economist Maria Beatrice Andreucci (2013) proposed a definition of **Green Urban Infrastructure**:

88. The North West Green Infrastructure Think Tank Partners is formed by: CABE, Space, Cass Associates, Cure, Environment Agency, Forestry Commission, Government Office North West, Green Space North West, Groundwork, Natural Economy North West, Natural England, North West Regional Assembly, Red Rose Forest, TEP, The Mersey Forest, University of Salford.

89. https://www.eea.europa.eu/themes/sustainability-transitions/urban-environment/urban-green-infrastructure/urban-green-infrastructure

«We define as Urban Green Infrastructure the elements of biodiversity and organized systems attributable to the Natural Capital, of any valuable or degraded urban area, including individual technological devices leveraging biodiversity integrated into the built environment, such as, for example, green roofs and vegetated walls, permeable floors, Rain Gardens and other rainwater management collection systems to promote environmental protection and economic feasibility, well-being, equity and social inclusion through the provision of ecosystem services» (Andreucci, 2003)



Core areas	Both of high biodiversity value which act as hubs for G.I., such as protected areas like Natura 2000 and outside protected areas containing large healthy functioning ecosystems.
Restored areas	Restored habitats that help reconnect or enhance existing natural areas, such as as restored reedbed or wild flower meadow.
Linear corridors **Stepping stones**	Both natural features acting as wildlife corridors or stepping stones, such as small watercourses, ponds, hedgerows, woodland strips, and artificial features that enhance ecosystem services or assist wildlife movement like eco-ducts or eco-bridges, fish ladders of green roofs.
Buffer zones	Buffer zones that are managed sustainably and help improve the general ecological quality and permeability of the landscape to biodiversity, such as wildlife-friendly farming. Nevertheless, are considered buffer zones also the multicuntional zones where compatible land uses can join forces to create land management combinations that support multiple land uses in the same spatial area, e.g. food production and recreation.

Figure 4: Schematic representation of the list of potential components of a Green Infrastructure, contained in the description page of Green Urban Infrastructure of EEA and BISE websites. Source: Author according to EEA and BISE.

The above definition, albeit not universally shared, seems particularly close to the graphical representation of Green Infrastructure (Fig. 4) provided by the European Commission website and the BISE[107] .

A similar representation is the one referring to another name for the Green Urban Infrastructure, which is the **Green and Blue Grid**. The term derives from the Green Infrastructure strategy of London which is called the "All London Green Grid" "All London Green Grid"[91].

The **Green and Blue Grid** is the subject of the research conducted, in 2016, by the Dutch Landscape Architect Hiltrud Potz. In her book "Green-Blue Grids: Manual for Resilient Cities", the author does not provide a definition, but lists a series of benefits achievable simultaneously by the adoption of this planning strategy, which are: climate adaptation, less heat stress, more biodiversity, food production, better air quality, sustainable energy production, quality of life (Potz, 2016, p.34). Moreover, she affirms that: «*Green-blue grids can facilitate a variety of functions: cooling, biomass production, nature development, food production, recreation and attractive and safe routes for cyclists and pedestrians. The urban waste-water chain, as part of the grey infrastructure, can also produce energy, heat and resources. There are many advantages to having more green and blue spaces in towns and cities. Green-blue grids can benefit residents particularly at the district level. Green roofs, bioswales, parks, community gardens and natural playgrounds are all part of the circular city. They make the district healthier, more attractive and climate-resilient. People who live in a green environment are in general less stressed. Children can play outside, which can reduce the number of overweight children […] Not only at a city and district level can we work on the circular city, but also at the building level*» (Potz, 2006[92]).

Potz also published a graphical representation of how vegetation (green) and urban water (blue) can contribute to a circular city (Fig. 5).

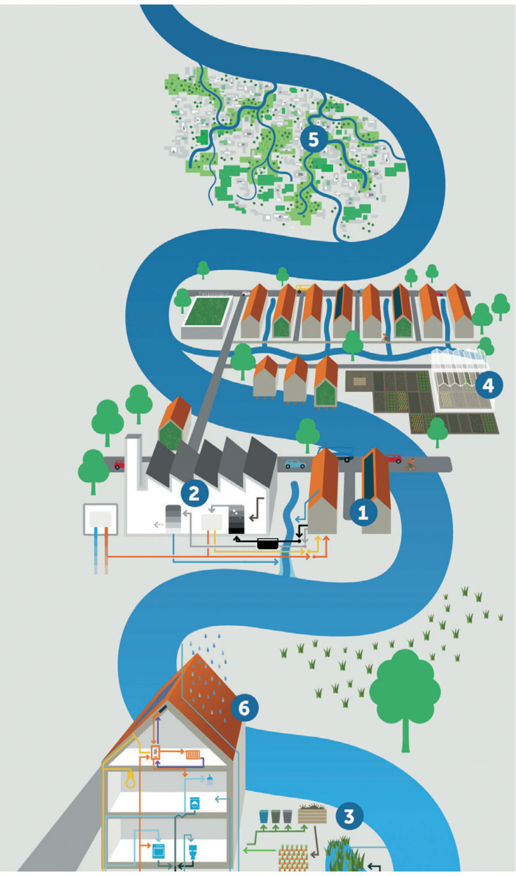


Figure 5: Schematic representation of "How urban water and vegetation can contribute to a circular city". Source: Atelier GROENBLAUW.com, published in Potz (2016).

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[90] Biodiversity Information System for Europe, https://biodiversity.europa.eu/topics/green-infrastructure

[91] See "Green infrastructure and open environments: the all london green grid" (Mayor of London, March 2012).

[92] https://www.urbangreenbluegrids.com/about/green-and-blue/

The image represents the benefits of **Green and Blue Grid** at multiple scale levels: at the regional scale (5), the presence of connected "green and blue arteries through the city" ensure more biodiversity, less particulate matter (PM) in the air, less paving and more room for surface water creating more options for retaining and storing water temporarily, more walking and cycling routes for recreation, a healthier environment and less heat stress; At the metropolitan scale (4) self-sufficiency can be achieved through urban agriculture and vegetable gardens, using locally-reclaimed fertilizer from the energy and raw materials factory. The "Grey Infrastructure" (2 and 1) should be based on local and sustainable energy production, using geo-thermal heat and taking advantage of heat from surface water to cool and heat buildings, or re-using residual heat from industries. Closing recycling loops are necessary to compost and reuse organic waste in order to use them for production of energy or to reuse phosphate, nitrogen and cellulose as raw materials from wastewaters; At the local scale (6 and 3) by disconnecting rainwater from the sewer systems, vegetable gardens and raingardens or bioswales will help to achieve sustainability of every private home and building (Potz, 2016).

The use of the prefixes "green" and "blue" associated to infrastructure is also common in describing a further strategy described as a "fundamental tool for the adaptation to climate change of contemporary cities" (O'Donnell, Woodhouse, Thorne, 2017, et al): The **Green and Blue Infrastructure**.

This term appears for the first time in the "**Blue-Green Cities**" research project, directed by Prof. Colin Thorne of the University of Nottingham (2013). The "Green and Blue Infrastructure", through the use of techniques of hydraulic engineering and landscape science, aims to recreate in the urban environment as natural a cycle of water as possible, contributing to the comfort of the city, bringing together water management and "Green Infrastructure", in order to provide resilient and adaptive measures to deal with future changes in climate, land use, water management and socio-economic activity in the city[92]. The design and use of the urban environment for water resource management, the demand for water (including rainwater collection) and the interaction between flooding and drought are key factors on which the **Green and Blue Infrastructure** acts:

«*The integration of water management with the provision of urban green spaces and the added value associated with the connection and interaction between blue and green assets are key concepts of a blue-green city. Blue-green cities generate a multitude of environmental, ecological, socio-cultural and economic benefits through integrated planning and management and can be key to the future resilience and sustainability of urban environments and processes*» (http://www.bluegreencities.ac.uk/)

93. http://www.bluegreencities.ac.uk/

The high importance attached to the (Urban) Green (and Blue) Infrastructure in the western world is comparable with the one gained by the **Ecological Infrastructure** in Asia, particularly in China, where the term was coined by the Landscape Architect and Professor Kongjan Yu[94]:

«*Ecological infrastructure can be understood as the necessary structure of a sustainable landscape (or ecosystem) in which the output of goods and services is maintained and the capacity of systems to deliver those same goods and services to future generations is not undermined. What makes the concept of ecological infrastructure a powerful tool for advancing ecological urbanism is its marriage with the understanding of ecosystem services. Four categories of services are commonly identified: provisioning, related to the production of food and clean water; regulating, related to the control of climate and disease, and the mediation of flood and drought; supporting, related to nutrient cycles and providing habitat for wild plant and animal species; and cultural, related to spiritual and recreational benefits*» (Yu, 2013)

In various interviews[95], the Chinese Landscape Architect has explained that: «*It is important to recognize that the conventional approach to urban development planning, based on population projections, grey infrastructure and architectural objects is unable to meet the challenges and needs of an ecological and sustainable urban form. The alternative urbanity that we advocate is the planning and design of ecological infrastructure, which is better to be laid out before urban and regional development planning […] For the sake of ecological service and cultural integrity of the land, ecological infrastructure needs to be safeguarded across multiple scales, landscape needs to be considered as the holistic totality of land, and landscape architecture as the planning, design and management of the holistic system of land and arrangement of elements on the land, including architectures, rivers, and cities and so on*» (Yu, 2013, 2015, 2018)

The success of this concept in China is mainly due to the incessant work that Kongjan Yu has undertaken by organizing conferences and theoretical workshops for the mayors and municipal technicians of the major cities in China: «In the past 18 years, *Turenscape and Peking University has promoted these ideas in over 200 cities across China at multiple scales*».

Although apparently similar to the (Urban) Green (and Blue) Infrastructure, the **Ecological Infrastructure** is not a framework to be applied as a solution to problems due to modern urbanization, but, on the contrary, it is functional if associated with a "reverse spatial planning method" which gives priority to preserving and planning non-urban development areas, defined as NPA (**Negative Planning Approach**)[96].

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[94] Professor Kongjian Yu is a celebrated world leader in ecological planning and design. He is the founder of Turenscape, founder and Dean of the College of Architecture and Landscape at Peking University and Visiting Professor of Landscape Architecture and Urban Planning and Design, Harvard University. Selected awards include: 8 ASLA Design and Planning Awards, 5 Human Habitat Awards, 2 World's Best Landscape Awards, 3 Excellence on the Waterfront Awards, the World Architecture Award, ULI Global Award for Excellence, 2 Commended for the Emerging Architectural Awards, and the National Gold Medal of Fine Arts. Professor Yu has published 25 books, over 250 papers and is Chief Editor of LA China.

[95] I personally interviewed to Kongjan Yu in 2015, during the cycle of international conferences "Open Session On Landscape" organized by the Architecture department of the University of Florence; The interviewapparead in the webzine "Network in Progress" (http://www.nipmagazine.it/), the full video is available online: https://www.youtube.com/watch?v=8Z-vf5Fr684

[96] See Li B., Huang Z. (2016).

«The conventional approach for economic centred urban development planning, failed to meet the challenges of swift urbanization and sustainability issues in China. The "negative approach" defines an urban growth pattern and urban form, through the identification and planning of Ecological Infrastructure, instead of reviewing through the projection of population and planning of civil infrastructure in the conventional approach» (Yu, 2008). More recently the Landscape Architect explained that: « "Negative Planning" is an advanced version of McHarg's "design with nature" idea, and that of Patrick Geddes, trying to solve the contemporary problems in China – rapid urbanism, fragile environment and unregulated environment, but this also has universal significance» (Yu, 2018).

The NPA was proposed to establish a rational and practical urban construction framework that provides progressive and resilient land use plans for cities (Yu, Li, Liu, 2002, 2005). Since it was put forward in 2002[97], it has drawn wide attention in academia and been extensively applied at various scales, ranging from national territory planning, urban planning, and rural planning to landscape ecological planning and tourism planning (Li, Huang, 2016). NPA emphasizes that urban planning and design should start from non-urban development land to establish "landscape security patterns" and build urban ecological infrastructure. A **Landscape Security Pattern** is composed of spatial elements and key locations including existing and potential ecological infrastructures that are critical to the horizontal ecological processes in the spatial layout and can be identified through the analysis and simulation of different landscape processes (Yu, 1996, 1999). In this regard, landscape is a process of controlling spatial layout by overcoming spatial resistance (Jiang, Xu, 2008); Security Patterns, at various levels, are determined by ecological processes. Security Patterns of different landscape processes are overlaid and integrated to identify critical elements and locations for maintaining ecological security (Li, Huang, 2016). In this context NPA is a planning concept, "landscape security pattern" is its methodology, while the Ecological Infrastructure is its strategy and results: all the three constitute the theoretical system of NPA (Yu, Li, 2003).

It follows that, generally speaking, the **Ecological Infrastructure** includes similar spatial structures to the ones related to the **Green Infrastructure**, such as: ecological corridors, networks and habitats; Both strategies (and their more recent derivations listed in this paragraph) aim to offer similar ecosystem services through ecological corridors such as rivers, valleys, green belts, and other linear ecological land uses (which are identifiable with the "link" of the Green Infrastructure represented in figure n. 2), patches (or hubs[98]) such as wetlands, forest parks and natural conservation areas, and sites which are small scale nodes such as gardens, residential yards and other "green" urban spaces.

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[97] See Yu K., Li D. H. (2002).

[98] See Weber, Sloan, Wolf (2006).

In parallel, the concept of **Green and Blue Infrastructure**, or **Green and Blue City**, is identifiable with the Chinese **Sponge City**: the concept, based on NPA, has been promoted by Kongjan Yu[99] and others, as a construction theory mainly focused on stormwater management techniques under the concept of low impact development, such as infiltration, retention, storage, purification, utilization and drainage, including also water sensitive urban design methods and rain water recycling techniques in the urban drainage system (Li, Huang, 2016).

Through the analysis of the listed definitions and observing the figures n. 2, n. 3, n. 4 and n.5, it will readily be noticed that, since the Green Infrastructure was theorized by Benedict and McMahon, the concept has undergone important evolutions in meaning.

First of all, the Green Infrastructure which firstly comprised only "natural green spaces" or "protected green areas", has now become urban, thus it involves the planning of the open spaces of the urban areas. Recent developments in research on "Green Infrastructure" have led to a breadth of interpretations of the concept, and later interpretations have broadened the notion to include not just linear corridors but all manner of physically interconnected 'green' spaces ranging from nature reserves and urban woodlands to designated cycle routes, channelled rivers and parklands (van der Velde, de Wit, 2015). "Green and Blue Infrastructure" or Grids, "Sponge City" and "Blue and Green City", go by different names around the world, but they all focus on the improvement of "green" open spaces interconnected with each other and on "Sustainable Urban Drainage Systems"[100], both on regional/metropolitan scale and local scale.

In all of these strategies linked to the sustainability of urban environments, it is noticeable a marked prevalence of attention "for the protectionist and safeguarding apparatus to the detriment of the transformative and innovative intrinsic power of the landscape project" (Cortesi, 2017), in other words, they all focus on the optimization of ecosystem services, an approach which is based on the functional value of nature, measuring it by calculating the components of our world and habitats as separate entities, attributing to them a price to better value them in the future (Weilacher, 2017).

In truth, almost all the definitions listed cite "ecosystem services" and "natural capital", therefore the capacity of resilience achievable through the adoption of these strategies is an essential condition not only for a better quality of life for humankind, but most of all for socio-economical development, emphasized in the long-term ecological vision of urban development (Fig. 6 and 7), which can create diverse direct and indirect benefits for socio-economic conditions. All of the strategies cited above hold a purely functional and economic way of envisioning our environment.

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[99] See Yu, Li, Yuan, et al (2015).

[100] For a comprehensive understanding of "Sustainable Urban Drainage Systems" see: CIA/CIRIA 2000, *Sustainable Urban Drainage Systems-Design manual for Scotland & Northern Ireland* (C521), CIRIA, London UK; CIRIA 2015, *The SuDS Manual* (C753), CIRIA, London UK, <http://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx> (08/2016); European Parliament & Council 2000, Water Framework Directive 2000/60/EC, *Establishing a framework for Community action in the field of water policy*, 23 October 2000; Greater London Authority (GLA) 2015a, *London Sustainable Drainage Action Plan*, consultation draft October 2015; Gibbons J. (2016), Urban rainwater. A liquid asset, in RiVista (2) 2016, pp. 54-67.

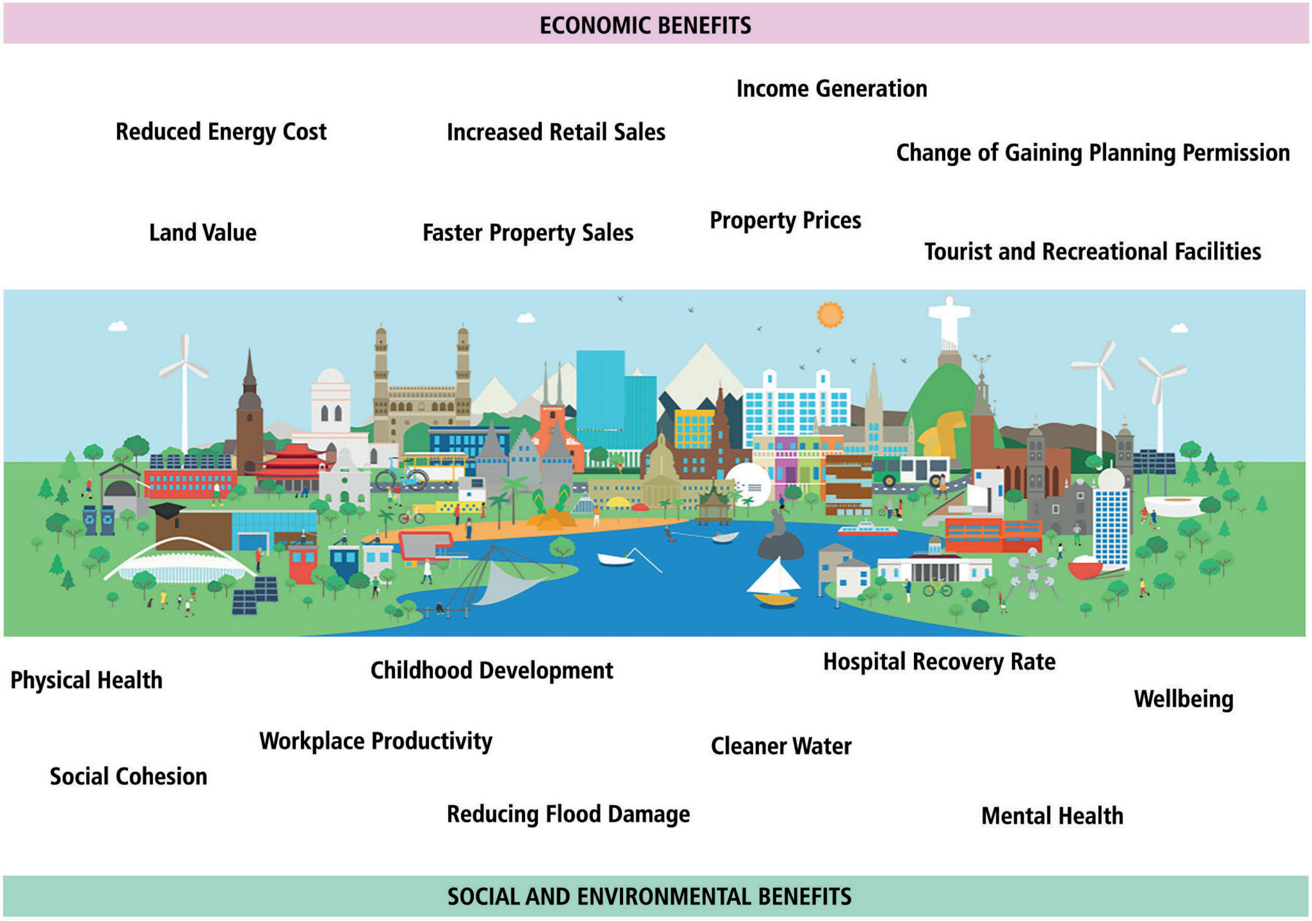
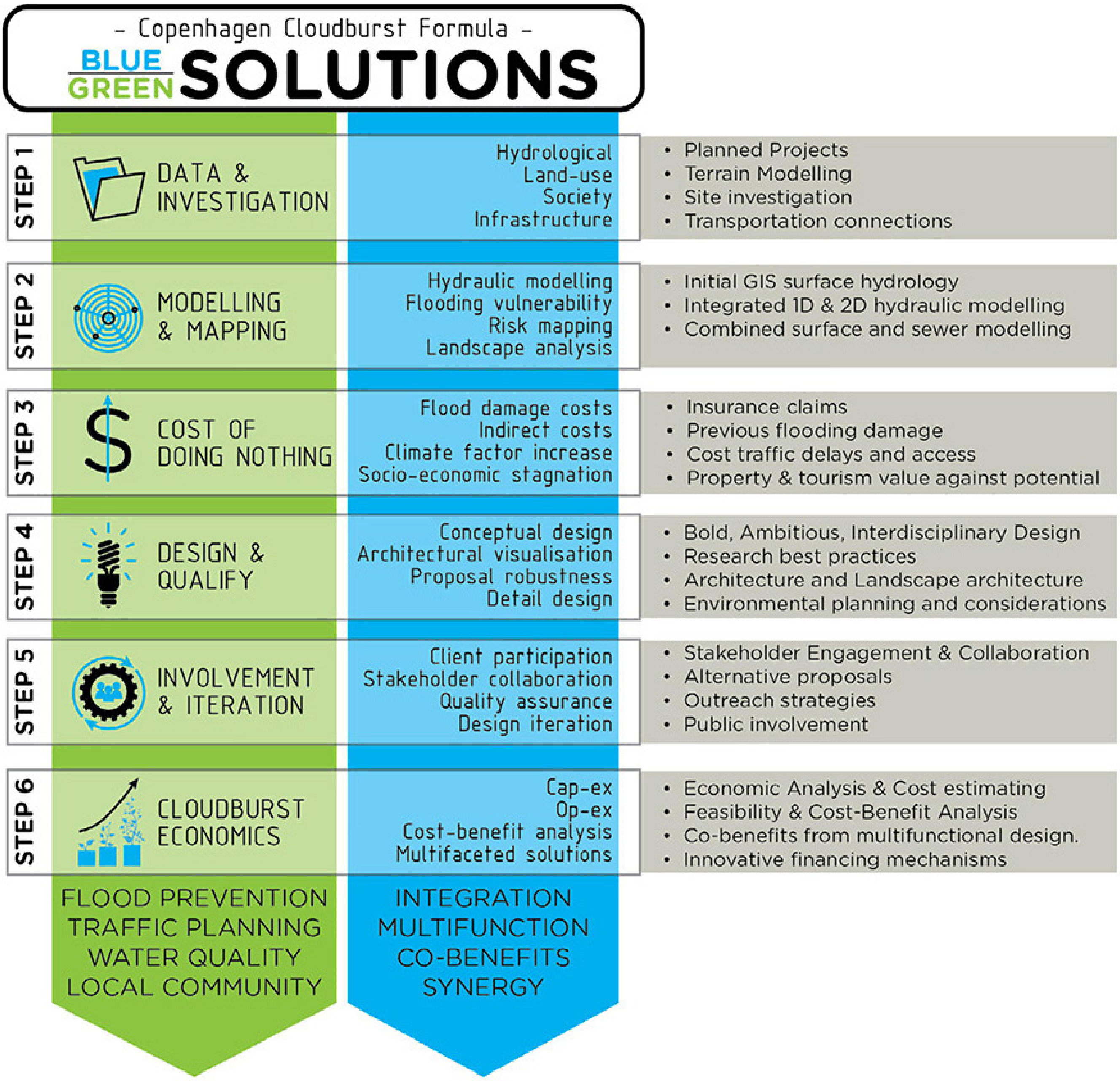

ECONOMIC BENEFITS
Income Generation
Reduced Energy Cost
Increased Retail Sales
Change of Gaining Planning Permission
Land Value
Faster Property Sales
Property Prices
Tourist and Recreational Facilities
Physical Health
Childhood Development
Hospital Recovery Rate
Wellbeing
Workplace Productivity
Cleaner Water
Social Cohesion
Reducing Flood Damage
Mental Health
SOCIAL AND ENVIRONMENTAL BENEFITS

Figure 6: "A selection of ecosystem service benefits of urban green infrastructure". Source: Author, acording to "Cities Alive: Rethinking Green Infrastructure", ARUP (2014), p. 11.

As recently declared by the German Landscape Ecologist Wolfgang Haber:

«The term "services" and the very idea that we utilize nature because we want it to deliver supply of services is principally very absurd [...] Everything has to be evaluated on an economic basis, even the feeling of happiness when looking at a beautiful landscape. And the questions about functions and purposes are always raised» (Haber, 2013, p.11).



– Copenhagen Cloudburst Formula –

BLUE GREEN SOLUTIONS

STEP 1	DATA & INVESTIGATION	Hydrological Land-use Society Infrastructure	• Planned Projects • Terrain Modelling • Site investigation • Transportation connections
STEP 2	MODELLING & MAPPING	Hydraulic modelling Flooding vulnerability Risk mapping Landscape analysis	• Initial GIS surface hydrology • Integrated 1D & 2D hydraulic modelling • Combined surface and sewer modelling
STEP 3	COST OF DOING NOTHING	Flood damage costs Indirect costs Climate factor increase Socio-economic stagnation	• Insurance claims • Previous flooding damage • Cost traffic delays and access • Property & tourism value against potential
STEP 4	DESIGN & QUALIFY	Conceptual design Architectural visualisation Proposal robustness Detail design	• Bold, Ambitious, Interdisciplinary Design • Research best practices • Architecture and Landscape architecture • Environmental planning and considerations
STEP 5	INVOLVEMENT & ITERATION	Client participation Stakeholder collaboration Quality assurance Design iteration	• Stakeholder Engagement & Collaboration • Alternative proposals • Outreach strategies • Public involvement
STEP 6	CLOUDBURST ECONOMICS	Cap-ex Op-ex Cost-benefit analysis Multifaceted solutions	• Economic Analysis & Cost estimating • Feasibility & Cost-Benefit Analysis • Co-benefits from multifunctional design. • Innovative financing mechanisms
	FLOOD PREVENTION TRAFFIC PLANNING WATER QUALITY LOCAL COMMUNITY	INTEGRATION MULTIFUNCTION CO-BENEFITS SYNERGY	

Figure 7: "Blue-Green" solution with reduced piping infrastructure, adopted by the Municipality of Copenhagen as climate adaptation plan, elaborated by Ramboll Studio and Ramboll Studio Dreiseitl; The strategy "has proven to be more investment-friendly than piped solutions and creates diverse direct and indirect benefits for socio-economic conditions" (Hvilshoj,Lund, Goring, LV, 2016). Source: ASLA.org, 2016 Awards

Haber is strongly concerned that this "transition to an economy of landscape"[101] will lead to the deletion of the essential qualities of the environment just because these qualities are not financially measurable, thus, as argued by Professor Udo Weilacher:

«*The step backwards towards a merely functionalistic planning profession, as established in the 1960s, suddenly seems to be very small for contemporary landscape architecture*» (Weilacher, 2017, p.1)

In terms of social benefit to urban communities, research and praxis have focussed on functional aspects such as sport and recreational amenity, and routing for connectivity, accessibility and health. The degree to which "Green infrastructure" offers urban communities spaces that generate and reflect personal and collective notions of nature has to date received little, or any, attention (van der Velde, de Wit, 2015). A further consideration to be made is that, except for the "Ecological Infrastructure" in which landscape is considered a process, none of the other listed strategies ever speaks of landscape or landscape design.

Landscape has been "removed" from the discussion and replaced with "green" and "blue" as the only possible colours representing "nature" in urban areas, thus leading to the risk of huge steps backwards form the "colour-neutral" understanding, clearly promoted by the Swiss landscape architect Dieter Kienast in the 1990s, that liberated Landscape Architecture from its fixation with a traditional and stereotypical self-image, finally opening new windows of cooperation with neighbouring disciplines such as architecture or urban planning (Weilacher, 2017, 2018).

In addition, for many years urban ecologists have been stressing the fact that it is impossible to secure the "natural life support system" of a city with just green or blue areas alone, but, on the contrary, the complex variety of all urban biotopes (be they green, grey, blue or of any other colour) have to be respected and developed (Corajoud, 2011,Weilacher, 2017).

Moreover, it is impossible not to notice how in public, academic and professional discourse, "Green Infrastructure" and its multiple derivations are used incorrectly to indicate any kind of transformation or urban redevelopment.

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[101] Andreucci M. B. (2017), p.19.

Just taking a quick look at the more recent publications concerning “Green Infrastructure” in its modern declinations, it is remarkable that many of them contain a series of case studies that include landscape design interventions (even much earlier ones than the implementation of GI strategies), whose meaning and benefits are associated and compared, in identical ways, to types of interventions such as the installation of photovoltaic systems, green roofs, bioswales, and so on.

This does not mean that a landscape architecture project cannot be a part of “Green Infrastructure”; quite the opposite, as they are certainly a necessary asset with which to achieve the sustainability of a city, enhance the quality of life of its inhabitants and improve and restore the ecological systems and processes in urban areas, but, a landscape project that deals with infrastructure cannot be, by itself, considered or named (Urban) Green (and Blue) Infrastructure.

From the perspective of planning and urban development, “Green Infrastructure” is seen as a network for the provision and management of water resources, storm water and flood prevention, or as a means to locate alternative infrastructures for commuting (van der Velde, de Wit, 2015).

In recreation planning, green infrastructure is envisaged as a spine or framework of recreational facilities with a focus on their accessibility and connectivity for urban populations (van der Velde, de Wit, 2015). In both cases, it is fundamental to remember and to underline the unequivocal fact that (Urban) Green (and Blue) Infrastructure, as well as Ecological Infrastructure, are not landscape design methodologies, but planning strategies, whose design is adapted to local context.

2.5 Short Glossary of "Hard" and "Soft" Infrastructure

"Grey Infrastructure" refers to the physical networks necessary for the functioning of a modern industry (Kumar, 2005, Hamutuk, 2011), and also goes by the name of **"Hard Infrastructure"**, includes a series of typologies of infrastructure which can be summarized as:

Airport Infrastructure: the set of services and facilities on the ground to facilitate air traffic.

Highway Infrastructure or Road Infrastructure[102]: the set of services and land facilities that are used to enable motor traffic, including bridges and tunnels.

Railway Infrastructure[103]:the set of services and land facilities that are used to enable railway traffic, including bridges and tunnels.

Port Infrastructure[104]: the set of structures and means designed for the rapid embarkation on the ship of goods leaving a country, and for the same quick landing of incoming goods.

Water Infrastructure[105] **or Blue Infrastructure**: Indicates the network of traditional artificial components or infrastructures built for urban water management. It consists of what is built to pump, divert, transport, store, handle, and provide safe drinking water. This infrastructure consists of a large number of groundwater wells, water surface outlets, dams, reservoirs, storage tanks, drinking water plants, pipes and aqueducts; it also includes purification plants and wastewater treatment plants, and plants for the creation of energy (hydroelectric power plants).

Energy Infrastructure[97]: the set of electric transmission and distribution lines and power grids, oil and gas machinery and mining.

Solid Waste Infrastructure[107]: the set of facilities necessary for the treatment and disposal of solid waste.

Communication Infrastructure[100]: the system of communications such as the internet, telephone (lines and cables), data, television and radio.

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102. Great Hoepli Italian Dictionary, third edition.

103. Ibid.

104. Ibid.

105. A first distinction must be made in the field of port infrastructure, subdivided into the "seaside" aspect, understood as the movement of ships in the stretch of water in front of the front of the docks and moorings, and in the "landside" aspect understood as the operation and efficiency of the plants that are located on the mainland, but which, thanks to their efficiency, also contribute in an essential way to determine the economy of the port; both these aspects therefore contribute to form part of the total cost attributable to port operations. (Aisre.it)

106. Waterenecyclopedia.com

107. Great Hoepli Italian Dictionary, third edition.

108. Ives M. C., Coelho J., Turner D., Hall J. (2014).

109. Great Hoepli Italian Dictionary, third edition.

"Soft Infrastructure" refers to all the institutions that maintain the economic, healthcare, social, and cultural standards of a country, or in other words, the set of material goods and services that are not involved in the production process, structures that, by analogy, translate into human capital formation, such as public education, especially the professional sector, and scientific research as an indispensable support for innovations technology, which is also called "**Economic Infrastructure"**, which includes:

Military Infrastructure[109]: including military bases, arms depots, training facilities, command centres, communication facilities, major weapons systems, fortifications, specialised arms manufacturing and strategic reserves.

Government Infrastructure[110]: The system of government and law enforcement, including the political, legislative, law enforcement, justice and penal systems, as well as specialised facilities (government offices, courthouses, prisons, etc.), and specialised systems for collecting, storing and disseminating data, laws and regulation, such as civil registration, business and company registries, land registration, and maintenance of other government databases.

Emergency services, such as police, fire protection, and ambulances, including specialised vehicles, buildings, communications and dispatching systems[111].

Manufacturing infrastructure[113]: includes industrial parks and special economic zones, mines and processing plants for basic materials used in industry, specialised energy, transportation and water infrastructure used only by industry, plus the public safety, zoning and environmental laws and regulations that govern and limit industrial activity, and standards organisations.

Major business logistics facilities and systems, including warehousing and shipping management systems[113].

The financial system, including the banking system, financial institutions, the payment system, exchanges, the money supply, financial regulations, as well as accounting standards and regulations[114].

Health Infrastructure[115]: including hospitals, healthcare systems, the financing of healthcare, including health insurance, the systems for regulation and testing of medications and medical procedures, the systems for training, inspection and professional discipline of doctors and other medical professionals, public health monitoring and regulations, as well as coordination of measures taken during public health emergencies such as epidemics.

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110. D.O.D. Dictionary of Military and Associated Terms, 2001 (rev. 2005)

111. Eberhard A. (2007).

112. Ibid

113. Hayes B. (2014).

114. Lyster C. (2016).

115. Kingombe C. (2011)

116. Pease B. (2014)

The educational and research system, including elementary and secondary schools, universities, specialised colleges, research institutions, the systems for financing and accrediting educational institutions[116].

Social welfare systems, including both government support and private charity for the poor, for people in distress or victims of abuse[117].

Tourism infrastructure[118]: comprehends both man-made and natural attractions, convention centres, hotels, restaurants, amusement parks, and other services that cater mainly to tourists and business travellers, as well as the systems for informing and attracting tourists, and travel insurance.

Cultural infrastructure[119]: is a term used to refer to facilities such as concert halls, museums, libraries, theatres, studios (film studios and recording studios), and specialised training facilities.

Sports and recreational infrastructure[120]: such as parks, sports facilities, the system of sports leagues and associations.

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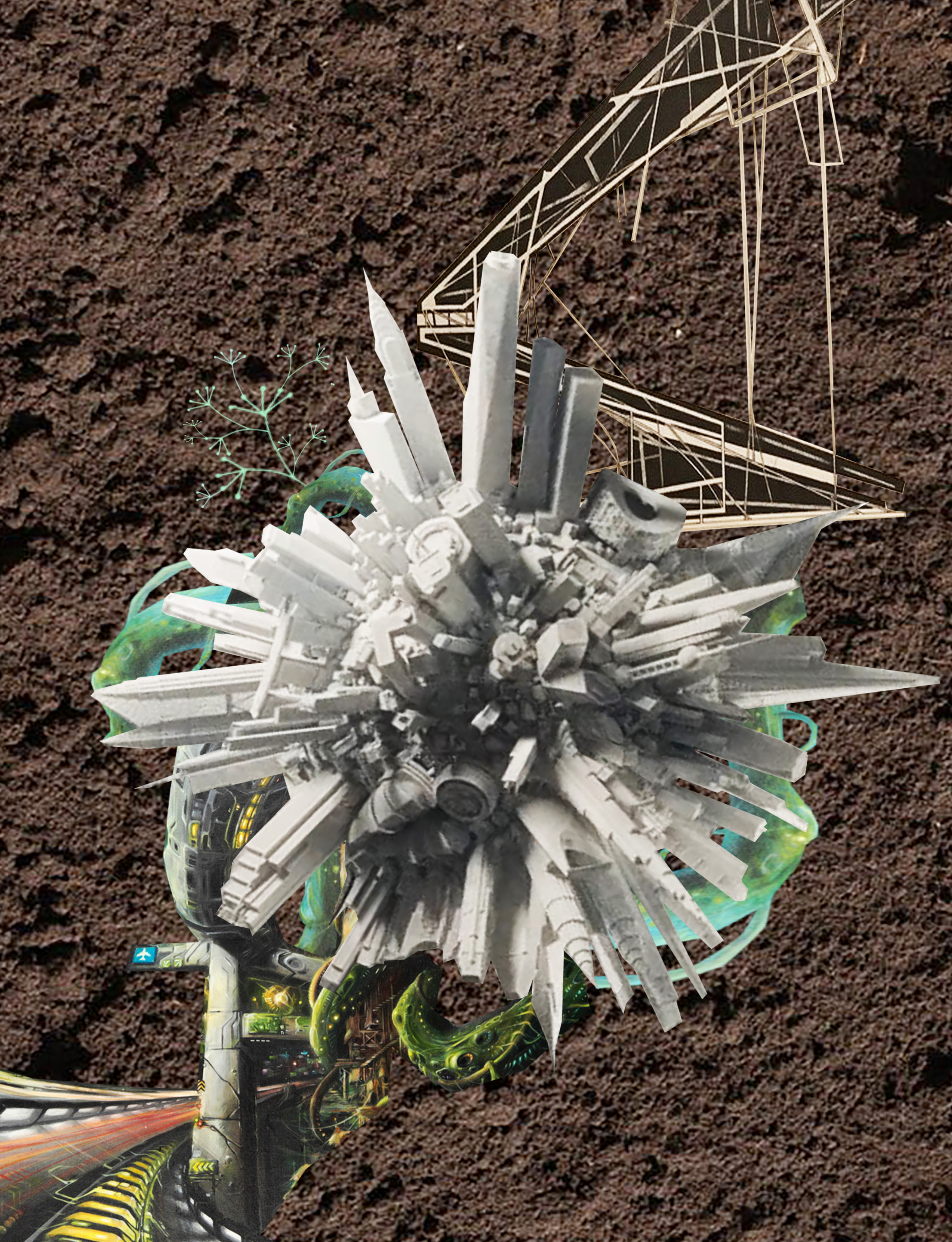
117. Ibid
118. Ibid
119. Huler S. (2010)
120. Ibid
121. Ibid



CHAPTER 3:
LANDSCAPE INFRASTRUCTURE

3.1 Landscape Infrastructure

«Shifts are taking place before our eyes. Landscape artists and architects need to give them a name and make them visible. Aesthetic expertise is needed to enable the transforming relations between humans and the rest of nature to break through public spaces» (Balmori, 2010, Point 6)

The first use of the term *Landscape Infrastructure* dates back to 2008, for such was the title of a public symposium held at the University of Toronto, conceived and organized by Pierre Bélanger, at that time an Associate Professor at its Faculty of Architecture, Landscape and Design.

Focusing on the relationship of reciprocity between landscape and infrastructure, the symposium, and the international exhibition that followed it, saw the gathering of many influential thinkers and practitioners from all over the world, such as Stan Allen, Julia Czerniak, Herbert Dreiseitl, Kristina Hill, Michael Jakob, Nina-Marie Lister, Kate Orff, Jane Wolff, David Fletcher, Ted Kesik, Robert Levit and Robert Wright. The symposium was organized in response to the *«unchallenged predominance of civil engineering and the growing inertia of urban planning»* (ASLA Honour Award, 2010), a condition originating from the massive transformation of the urban landscape that occurred with the advent of industrialization and mass mobility, whose long-term effects in terms of individually engineered structures and industrial systems were made visible in the second half of the twentieth century in depletion of resources, soil contamination, atmospheric pollution and the decay, in many cases, of the infrastructure itself.

As declared by Charles Waldheim, *«the challenges of our present urban conditions have little to do with lack of information; they have more to do with the political failures of a culture that has largely abandoned welfare state expectations of rational planning»* (Waldheim, 2016b, p.164); It follows that the deterministic equations governing the average behaviour of the elements of a complex system are in fact insufficient to deal with an urban system (Hoogstad, 2013).

«The decline of the landscape is the most eloquent symptom of the general failure of a capacity to understand, defend and innovate the beauty of our habitat, which requires a new and different attention to dimensions and speeds previously unknown. It is the state of mind of a global/local city that announces itself in the new millennium, a frightening power of human and material resources, a great magmatic energy that we must try to interpret» (Zagari, 2017, p.6)

The task of determining and delivering infrastructure had traditionally been allotted to engineers, one reason why the *«historic lack of engagement with infrastructure as a field of design stems from its dystopian and banal nature»* (Bélanger, 2012, p 281).

Therefore, having once acknowledged the «*overexertion of engineering and the inertia of urban planning*» (Bélanger, 2012, p. 276), it is now necessary to question modern, conventional and centralized infrastructures[121].

The discussion concerns the redefinition of the conventional role of infrastructure in urban areas in the future, with particular reference to the living landscapes of biophysical systems «*marginalized by the division between economy and ecology in large cities*» (ASLA Honour Award, 2010).

The 2008 symposium, through its re-examination of the historically divided, technocratic nature of engineered infrastructure, formulated a more synthetic vision of "Urban Infrastructure" as a landscape of artificial and natural elements which, along with global economic forces, unequivocally support the human habitat and are capable of evolution and change.

In this regard, it is important to underline a fundamental difference that substantially distinguishes "Landscape Infrastructure" from the planning strategies that respond to the various neologisms listed in paragraph 2.4 of this work: as stated by Pierre Bélanger himself (2016), the *koinè* is based on an understanding of landscape as defined by J.B. Jackson (1984), for whom it is a «*composition of man-made or modified spaces to serve as infrastructure or background for our collective existence*». With this in mind, the term infrastructure is here used with no hint of an economic return in terms of the provision of ecosystem services, but rather "to reposition the field of landscape as a complex, instrumental system of essential processes, resources and ecologies that underpin the contemporary urban realm, by reformulating the fundamental problematization of urbanization, the friction of political climates and anthropogenic flows as well as the collision of changing climates and environmental pressures, for the establishment of a new negotiated ground for alternative models and synergistic precedents for an era of unprecedented transformation" (ASLA, 2010, Bélanger, 2012).

This association of terms therefore arose with the intention of underlining the fact that landscape and infrastructure are today virtually indistinguishable and thus form a complex living system: «*The urban landscape is essentially the overlay between a city's natural systems – the water, trees, air quality, open space, and biodiversity – and its human systems – the sidewalks, bike lanes, fields, transit systems, infrastructure, etc. The two systems are intertwined to the point they are inseparable and combine to make up what we commonly refer to as the public realm*» (Hough, 2013).

122. Bélanger, 2009, 2012, 2013a, 2013b, 2015, 2016a, 2017.

Accepting Jackson's definition of landscape means that infrastructure is part and parcel of the work of Landscape Architects, an acknowledgment that consequently leads us to take responsibility for the landscape in a holistic sense, as already stated forty years earlier by the general secretary of the International Federation of Landscape Architects, Gustav Ammand[122] (Weilacher, 2016b, 2017c).

Moreover, since the matrix upon which our cities stand is essentially cultural and engineered, all aspects of contemporary urban life are mediated by large technological systems; «*the preconception of infrastructure as a closed, mechanical, engineered system needs to be radically rethought ecologically, as an open system of live media operating across different geographical, political and temporal scales*» (Bélanger, 2016a, p.191).

In 2009, the discussions on emerging practices, paradigms and technologies capable of reshaping the contemporary urban landscape were collected in a DVD collection (Fig.1) which was awarded the Professional Jury Award the following year (ASLA Professional Award, 2010) by the American Association of Landscape Architects, being commended as an «*exemplary resource for acquiring and disseminating knowledge in the field of Landscape Architecture*» (ASLA Professional Award Jury, 2010).

«*Usually a conference is there and people go home and forget about it. This is something that captures that knowledge and spreads the word to the profession; communicating anything of value from a symposium is almost impossible and this does it really well. An important resource and example of how to capture and distribute information from industry events*» (ASLA Professional Award Jury, 2010).

Pierre Bélanger (2009), re-examining a series of milestone events in the field of infrastructure in North America, questioned and criticized, in similar vein to colleagues such as Rosalind Williams or Gary Strang among others[124], the mono-functionality of modern infrastructure systems resulting from the monopoly of technocratic disciplines such as civil engineering and urban planning, arguing that in order to face the new global urban crisis and failures in the field of infrastructure it was urgently necessary to drastically redefine it by allowing the "new multidisciplinary sciences" such as Landscape Architecture to enter and actively collaborate in the design and re-design of infrastructure of the post-industrial era.

The conventional understanding of elements within the landscape deals with dwelling and transportation either as objects in the form of architecture or as a system in the form of infrastructure, considered lifeless technical devices.

[123] Ammand G. (1941), Das Landschaftsbild und die Dringlichkeit seiner Pflege und Gesaltung, In: Schweizerische Bauzeitung. N. 15/1941; pp. 172-174,

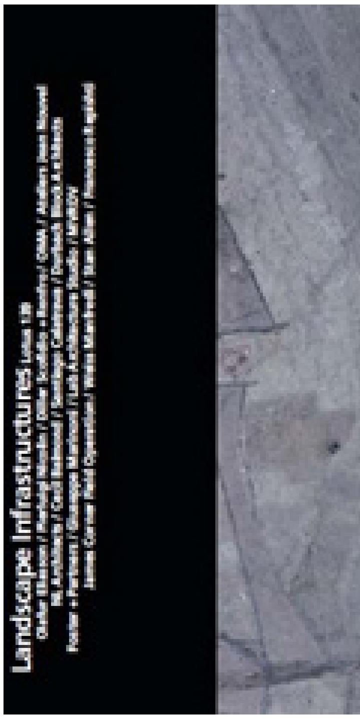
[124] See paragraph 2.3 of this research.

However, as new forms of landscapes that no longer fit any old idealized pattern have emerged[125], the aim of "landscape infrastructure" has become that of finding new ways of giving them identity, breaking with the tradition of turning them into lifeless images, and shifting from a strictly functional approach toward an aesthetic result, where the focus of attention must be on the characteristics of the site instead of on the plan[125] (Bélanger 2008, 2009, 2017, Hurkxkens 2015, Weilacher 2017c, et al).

In truth, the problem with the architectural and planning approaches to infrastructure is that «*they address landscape as just one of many components that make up a larger urban whole, an additive piece that may be needed, but is not required to make things work. Landscape architects, on the other hand, don't see it as a stand-alone thing; we understand that it is the underlying and unifying framework upon which everything is built. It is not about buildings and landscape, but buildings within landscape – an important distinction to recognize*» (Hough, 2013).

Landscape Infrastructures
Emerging practices, paradigms & technologies
DVD
Canada

Figure 1: DVD box containing the presentations of the speakers invited to the conference held in 2008 in Toronto, Canada. Source: asla.org



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125. See paragraph 2.2 of this research.

126. The French Philosopher and Architect Sebastien Marot advanced a similar discourse in his manifesto "Sub-Urbanism and The Art of Memory" (2003), where he argued that by adopting a landscape architectural perception, a new approach in urbanism (which he defined Sub-Urbanism) could arise, redirecting the attention to the Site as the "Ark of Memory" capable of renewing urban environments without erasing their face. Like Marot, the French Landscape Architect and Professor Michel Corajoud called in 2004 for a subjective experience of Landscape Architecture based on the reading in depth of sites, horizons and layers, linking them to their various contexts.

The theme of "Landscape Infrastructure", by allowing the repositioning of the agency of Landscape Architecture as the global discipline of choice in the reclamation of the discourse of infrastructure for designers, planners, engineers, scientists and policy makers, testifies to the fact that «*Landscape is becoming the main actor on the urban stage, not just a destination*» (Balmori, 2010, Point 22), and for this reason has attracted great attention worldwide.

In 2009, the international scientific journal *Lotus* published its first editorial dedicated exclusively to Landscape Infrastructure (Fig.2), cataloguing a series of interventions in an attempt to define more precisely the nature of these projects.

Through the analysis of the published projects, two categories characterized by different intentions can be distinguished: The first concerns the creation of new infrastructures with particular aesthetic intentions (Nicolin, 2009), such as Jean Nouvel's "Kilometro Rosso", the "Fourth Bridge" on the Canal Grande by Santiago Calatrava or the "Coimbra Footbridge" by AFAsociados and Ove Arup (Fig. 3).

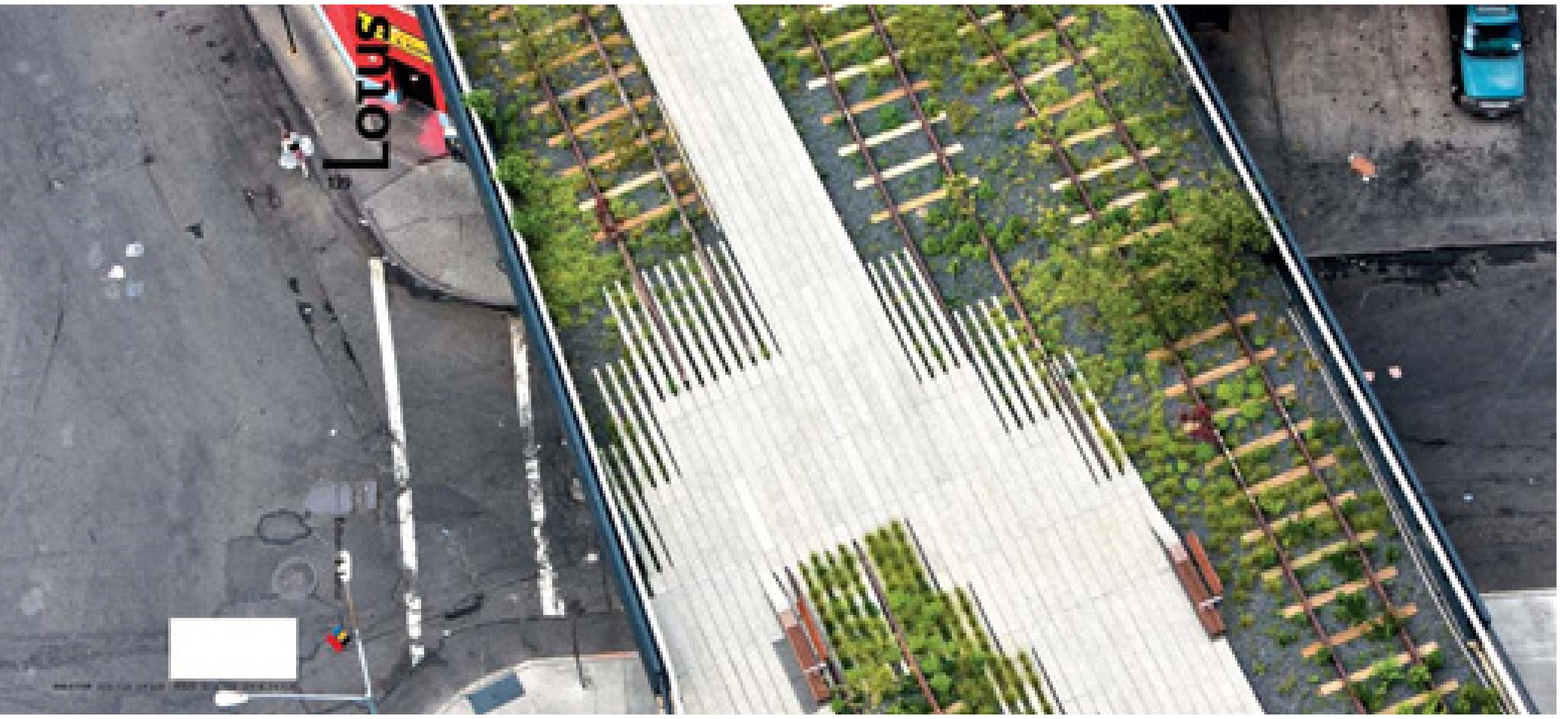

Figure 2: Cover of number 139 of the magazine "Lotus International", 2009.

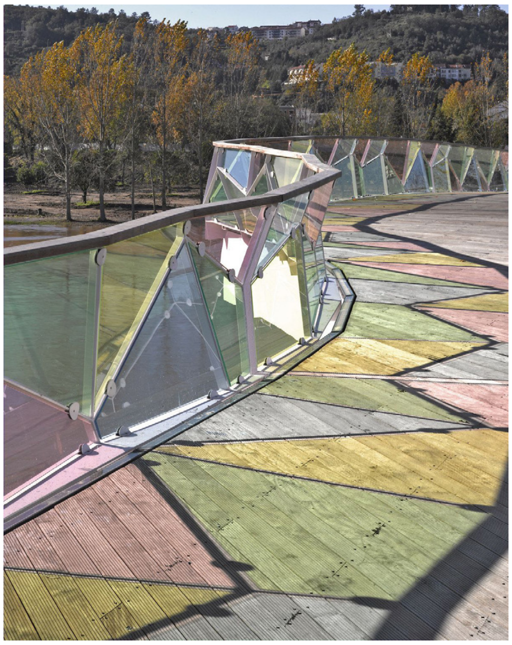

Figure 3: The "Pedro and Inês" footbridge over Mondego River, at Coimbra, is located in the centre of the City Park developed along the two banks of the river; This infrastructure was conceived to become a landmark for the city and to contribute to the quality of a new leisure area. It was designed by Adão da Fonseca, leading a team from AFAssociados, in collaboration with Cecil Balmond, leading the architectural team from Ove Arup. The bridge has a total length of 275m and is formed by a parabolic central arch with a span of 110m and two half lateral arches, in steel, supporting with total continuity a composite steel-concrete deck. Source: pinterest.com

The second category is linked to the redevelopment of mobility corridors in urban environments, such as the first section of the "New York Highline", designed by James Corner Field Operations with Diller Scofidio + Renfro and Piet Oudolf, the "McCormick Tribune Campus Center" built in Chicago by the studio OMA, or the less famous "A8erna" project realized by NL Architects between 2003 and 2006 (Fig.4).

These last three projects cited were all aimed at the reuse of a stretch of elevated road infrastructure, but through different strategies: The first one proposed the creation of a linear park configured as a set of pedestrian streets and ramps, built on a disused section of the elevated railway called "West Side Line", part of the wider "New York Central Railroad". The second one revitalized the non-urbanized space below the railway line that runs through the campus of the "Illinois Institute of Technology", centralizing, in addition to the functions of the urban infrastructure, also that of acquiring the main flows crossing the area, with the design of common and multi-functional spaces for students. The third one aimed to reconnect the two parts of the town of Koog, separated for over thirty years by the the M8 motorway, revitalizing the covered space below it through a chain of interventions and actions that created a new access corridor to the river Zaan, outlined in the presence of playgrounds, markets, a water sports pier and the restoration of public spaces surrounding the highway.

Therefore, the two categories of projects covered by the magazine Lotus International (2009) corresponded to two antithetical attitudes of understanding the relationship between nature and artifice.

The first of the two categories focussed on technical and mono-functional design, with an attitude oriented to the formal clarity of the design of infrastructures which assume the role of new urban "landmarks" operating substantial transformations in the territory, but which remain *«expressions of the areas of separate sciences, each one careful to produce and make rational its fragment of reality»* (Nicolin, 2009, p.20).

However, the second category outlines the emergence of a new reading of the traditional categories of urban space, in which the integration of civil infrastructures with public space increases the quality of the environment, giving landscape (and to the landscape sciences) a new role in shaping the contemporary city, demonstrating that «*the line between architecture and landscape can be porous*» (Balmori, 2010, Point 23).

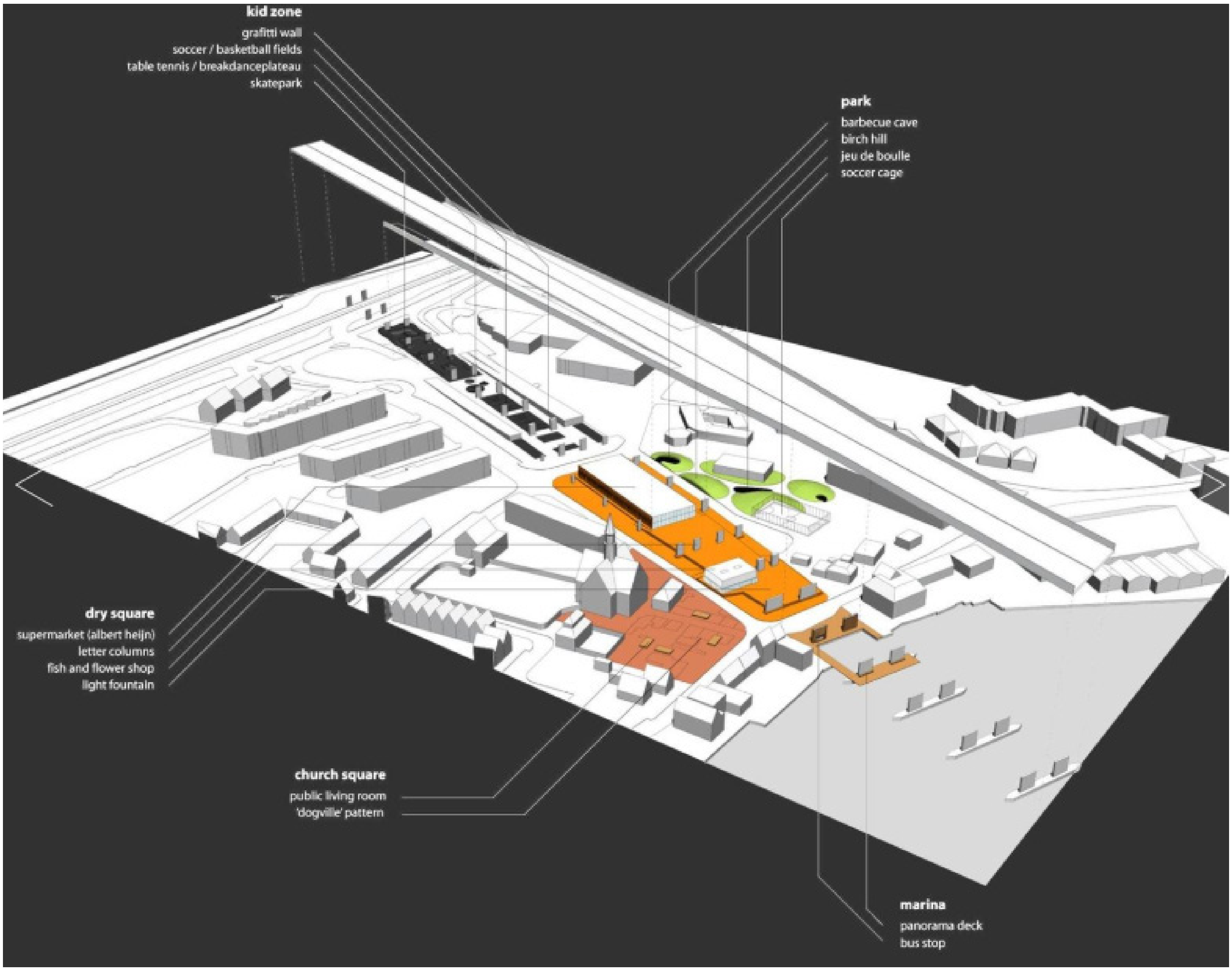
kid zone
grafitti wall
soccer / basketball fields
table tennis / breakdanceplateau
skatepark
park
barbecue cave
birch hill
jeu de boulle
soccer cage
dry square
supermarket (albert heijn)
letter columns
fish and flower shop
light fountain
church square
public living room
'dogville' pattern
marina
panorama deck
bus stop

Figure 4: Representative diagram of the recovery of the space below the A8 motorway, at Koog, Netherlands. Source: NL Architects.com

In both cases, though, the renewed interest in mobility reflects the need to interpret new problems of the metropolitan condition, a context in which infrastructures can become "an engine of renewal, both physical and cultural, a driving force that blows away the inertia in which the city and the traditional landscape, and their praise, are anchored" (Marinoni, 2008).

In 2012, with the aim of defining with even greater clarity the new possible methodologies and tools for the design of infrastructure under the renewed conception of urban landscape, Pierre Bélanger organized a conference entitled "Landscape Infrastructure: Systems and Strategies for Contemporary Urbanization", consisting of two days of study *«dedicated to exploring the future of infrastructure and urbanization beyond the dogma of civil engineering and transport planning»* (GSD Harvard , 2012).

The presentations and round tables were focused on the adoption of an ecological outlook able to provide reactive strategies that addressed contemporary global challenges, including climate change, population mobility and especially the importance of biophysical systems, which provide fundamental support for urban and industrial development, but are often overlooked by the pre-eminence of modern infrastructural systems (Bélanger, 2012, 2016, 2017). On this occasion, as in 2008, the international symposium guest speakers drew on a series of interconnected disciplines and practices[127], with most of the speakers being linked to the cultural trend of *Landscape Urbanism,* which repositions landscape as the primary system at the centre of all systems that determine environments.

Nevertheless, "The Landscape Urbanism Reader", published in 2006, contained many essays which suggested that landscape is capable of carrying and generating infrastructure, among others the one of Weller: *«landscape is the infrastructure to which all other infrastructure elements or networks are answerable»* (Weller, 2006, p. 79); But this does not necessarily mean that "Landscape Infrastructure" derives from *Landscape Urbanism*.

As stated by Stan Allen, *Landscape Infrastructure* is situated at the point of intersection between ecology, infrastructure, open space design and architecture, thus it shares in part the founding premise of *Landscape Urbanism* (Allen, 2014).

Yet, *«as promising as these ideas are in theory to date the realized projects of landscape urbanism have stayed within the conventional boundaries of landscape architecture Urban parks and waterfronts […] an expanded institutional definition is still required, one which would leverage architectural expertise in the design of systems and infrastructure: a shift from Landscape Urbanism to Landscape Infrastructure»* (Allen, 2014, p. 2).

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127. It must be pointed out that all the lectures of the many speakers summoned, in trying to redefine the role of infrastructure and landscape in contemporary urban environments, insisted on the absolute necessity of an interdisciplinary working method, in which the landscape assumes the role of system and strategy to prevent future economic-spatial challenges and infrastructure collapse, thus finally concretizing the plea of Gary Strang to "search for ways to allow the natural landscape and landscape of infrastructure, which occupy the same space, to coexist and perform natural functions" (Strang, 1996). See paragraph 2.3 of this research.

128. Waldheim explains that the first recorded testimonies of the professional title of Landscape Architect, in America, consist of letters that Olmsted and his father John Olmsted wrote to each other in April 1860, where father and son refer for the first time to the term "Landscape Architect", speaking about the commission to "lay out" the northern part of the island of Manhattan, which was entrusted to Olmsted and Vaux ; while the design of Central Park is the best known work of Olmsted, the title of Landscape Architect was conferred to him in association with the planning of the urban extension of the northern area of New York.

129. Professor William Cronon in his essay "Nature's Metropolis: Chicago and the Great West" (1991) claims that, in the context of the contemporary metropolis, "first" and "second" natures have been "melded together" via the connections of a capitalist market. In describing the evolution of the landscape of Chicago from the 1940s to the 1990s, he observes how, due to growing market demand, the spatial network of the infrastructural connections between the city itself and its hinterlands caused the grafting of a new order onto the *"first"* nature and how such a process "crucially depended on transforming natural material into tradable commodities, one of the many ways in which capital served to suppress and hide the reality of the very connections and processes on which it relied" (Cronon, 1991). Thus it created important anomalies in the production of urban spaces.

In truth, the conference of 2012 opened with a short speech by Charles Waldheim, who welcomed the packed audience of students and professionals, stating that the theme of "Landscape Infrastructure" had aroused great interest well before the birth of *Landscape Urbanism*, and that it was indeed of central importance for the formation of the Landscape Architecture discipline in the United States[128].

As Waldheim outlined in one of his most recent publications, *«in America the landscape architect's profession does not originate from the design of a park or garden, but as the professional figure responsible for developing the shape of the city»* (Waldheim, 2016 , p. 178). From this point of view the distinction between natural and artificial, between city and countryside, is no longer applicable.

On this question, in the last twenty years, some authors such as William Cronon[129], Rosalind Williams[130]have used the metaphor of the "second nature"[130] to better describe the effects of the paradigm shift inherent in the acceptance of infrastructural systems as a structuring part of the landscape.

More recently, Adriaan Geuze and Matthew Skjonsberg[1321], seeking to define the new theoretical framework of *Landscape Infrastructure*, have focused on the evolution of the concept of "second nature", in view of the fact that the "second nature" is contained both in the idea of Cicero and in that of John Dixon Hunt, as the one we *«shape, intentionally or otherwise, through the activity of civilization»* (Geuze, Skjonsberg, 2013, p. 34), or rather the cultural landscape and everything outside the wilderness; So in the historic process of colonization, the urbanization question is once again "rolled out across second nature" (Ibid.), but with a fundamental difference: this time *«second nature is not based, as in Olmsted's time, on a hermetic green structure, but rather on a nature having outgrown human hands, being full of character, and forming a magnetic field for an as yet unknown colonization»* (Geuze, Skjonsberg, 2013, p. 35). In other words, the authors declared that "abandoning the nineteenth century cliché of the city" and adopting this reformulated principle of "second nature": *«will lead to the creation of a new open-ended sustainable urban design approach based on the performative integration with the deep patterns of nature itself, particularly in the long-occupied areas where most existing metropoli are situated»* (Ibid.).

As a result, it is even clearer that it is no longer necessary to discuss whether infrastructure can actually generate landscapes, as happened in the past, because, in this light, the infrastructure is, in itself, a constituent part of the landscape (Koch, Neppl, Voigt, Weilacher, 2016).

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[130] In 1993, the science and technology historian Rosalind Williams published an article in which she analysed technological systems of connection and manufacturing systems as two entities belonging to two broadly different types of engineering practice (respectively mechanical and civil engineering) and corresponding to two broad types of engineering products: structures and machines. By this distinction she outlined two different ways of thinking about engineering, each one marked by a different relationship to nature: from the perspective of manufacturing systems nature is "denatured" because it is treated as a sociological construct, formed by a number of radically different technological entities, in which the language of biology can be used to describe: *«"inputs", "outputs", and "'flowthroughs", but these are used as metaphors in reference to a fictitious superorganism, the social system»* (Williams, 1993, p.380); from the perspective of technological systems of connection: *«in the creation of structures, nature is understood primarily as space, and the system as a means of organizing space»* (Williams, 1993, p.380).

[131] The Roman writer Cicero, in "De Natura Deorum" described the second nature as "alteram naturam": The "first nature" is the original un-constructed one, whereas the "second nature" is the one created by man, made of bridges, roads, harbours and fields. For an extensive discussion of the three natures see "Reading and Writing the Site" (Dixon Hunt, 1992), and "Greater Perfections: The practice of Garden Theories" (Dixon Hunt, 2000). See also Castells M. (1972), "The Urban Question: a Marxist Approach".

[132] See Geuze, Skjonsberg (2013).

Thus infrastructure constitutes a tool for Landscape Architects through which they can «*create meeting places where people can delight in unexpected forms and spaces, reinventing why and how they are to be appreciated*» (Balmori, 2010, p.113). The reconciliation between Landscape Architecture and Civil Engineering sought by many during the 1980s and 1990s[132] stems from an acknowledgement of the potential of dynamic landscape systems, which are no longer labelled "soft"[133] and ephemeral structures, but are rather seen as strong and thick, «*used to convey all the flows and materials, not necessarily as an aqueduct or a box, but as the actual medium and materials of landscape*» (Hill, 2012, p.49).From this point of view, landscape acquires the role of a massive, muscular and strong "superorganism" which shapes the world (Hill, 2012, Weilacher, 2017c, 2018).

The redefinition of the landscape as a complex living organism and no longer as a "green work of art" (Weilacher, 2017a), logically implies that one of the most important features of the landscape is the existence of complex networks. These structural networks, such as water systems, traffic systems, as well as green space networks and ecological living systems, are the components that ensure the liveability of today's landscape and are «*complementary and reinforce each other through a relationship of interdependence and mutual permeation*» (Weilacher, 2016b, p. 252).

Hence, as recently argued by Professor Udo Weilacher, the definition of "structure"[134] by Arnolf Luchinger on which the structuralist approach in architecture was based, that is «*A structure is a complete set of relationships in which the elements can change, but in such a way that these remain independent of the whole and retain their meaning. The whole is independent of its relationship to the elements. The relationships between the elements are more important than the elements themselves. The elements are interchangeable, but not the relationships*» (Luchinger, 1981), is particularly suitable for describing the functioning of the complex network structures that form the contemporary landscape.

This line of thought confirms both the hypothesis advanced by Alex Wall in the 1990s that an urban surface, "through the grafting of new tools and structures, can be transformed into a living connective tissue between fragments", bringing to the infrastructure the character of collective space, «*relevant for the vitality and experience of the contemporary metropolis*» (Wall, 1994, p.246), and the one advanced by the Spanish Landscape Architect Diana Balmori in her "Landscape Manifesto": «*Landscape – through new landscape elements – enters the city and modifies our way of being in it*» (Balmori, 2010, Point 8).

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[133] See paragraphs 2.2 and 2.3 of this research.

[134] See paragraph 2.5 of this research.

In this regard, Weilacher, in more than one occasion, has suggested to Landscape Architects to reconsider some of the theories of structuralism and adapt them to the contemporary expanded field of Landscape Architecture (Weilacher, 2016b, 2017b, 2017c) and has set out a set of 6 principles (Fig. 5).

SIX RECOMMENDATIONS BY STRUCTURALISTS

1. Respect the fundamental principles of human existence and the power of archetypes
2. Avoid a pure functionalistic, sectoral and strongly formal orientation in planning and design
3. Accept the existing and isochronal. That means consider historical and contemporary structures as equally valuable
4. Promote and reinforce the changeability, viability and versatility of structural networks
5. Create polyvalent spaces in order to allow the free adoption of structures
6. Emphasize communication as the structuring factor

Figure 5: The list of "6 recommendations from the structuralists" has been presented in 2017 in Florence, at the cycle of international conferences "Open Session On Landscape" in the lecture called "Between Landscape Architecture and Land Art" by Udo Weilacher; Moreover, the list has been presented at the University of Virginia in a lecture called "Landscape Structuralism: stabilizing living networks" and at the conference Landezine LIVE, in the lecture "Urban Landscape Systems: more than green infrastructure".

The **first** of the recommendations identified refers to the theory of archetypes as set out by Carl Gustav Jung[135], by which they manifest themselves in the collective unconscious through those automatic and ancestral responses that man continues to experience. Archetypes are part of collective knowledge, existing at a subconscious level, and, if used in a landscape architecture project, can facilitate the intuitive comprehension of a landscape, be they in the form of a landmark or shapes that can help people to better orientate themselves in space in a sort of pedagogical tale (Weilacher, 2017c). In fact, «*findings from Anthropology also show clearly that humans are only capable of negotiating new structures when they have a clear link to familiar cultural-historical patterns*» (Weilacher, Hopstock, 2018, p.96)

The **second** recommendation refers to the flexibility of spaces, which does not mean that a space should not be functional, but that designers and planners should always favour the interchangeability of the functions of the space designed, and, in doing so, it allows the application of the **fourth** principle indicated by Weilacher; designing landscapes that can change in order to survive and adapt to the evolving conditions of our society, thereby promoting the versatility of the space.

The **third** one wishes for an equal evaluation of the components of a space, a principle that can be applied, for example, in the reuse of existing infrastructure for different purposes, considering the importance and proper significance of the components of a landscape, also in relation to the fact that the relationship between the elements is more important than the single elements, and so every layer or stratification of a landscape should be respected and integrated in the contemporary urban fabric (Weilacher 2017b, 2017c).

The **fifth** recommendation has to do with the quality of open public spaces that should host many different uses, while the **sixth** one refers to communication in the sense of exchange of information and connections.

Weilacher's invitation to respect the six recommendations of the structuralists shown in figure 5 does not refer to the questionable results produced by the structuralist approach in the architectural field, but rather to the approach adopted by Peter Latz for the design of the *IBA Emscher Park* project[1366], an operation that has been cited by many eminent authors[1377] as one of the seminal moments in "Landscape Infrastructure" design.

Along with it, another ground-breaking example of this "new tendency" is the transformative operation of the *Fresh Kills* landfill site in New York (Fig. 6), conceived by James Corner Field Operations[138].

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[135] See Jung C. G. (1980), "*L'uomo e i suoi simboli*", Longanesi, Milan; Jung C. G. (1967), "*Gli archetipi dell'inconscio collettivo*", Bollati Boringhieri, Turin.

[136] See paragraph 2.3 of this research.

[137] The project has been cited in many publications regarding "Landscape Infrastructure" such as Nijhuis S., Jauslin D. (2015); Harrington S. (2016); Corner J. (2017).

[138] See Harrington, 2009, Bélanger, 2017, Corner 2004/2005, 2014, 2017, Weilacher 2017b, et al.

As suggested in the 6 principles outlined by Udo Weilacher, the project adopts a strategy consisting of a «*highly organized plan (spatial, programmatic or logistical) that is at the same time flexible and structurally capable of significant adaptation in response to changing circumstances […] a robust and evolving open system*» (Corner, 2014, p. 285) that, in order to grow and develop, must both persist and change, so that the design of its organizational structures must be sufficiently strong to withstand challenges while also flexible enough to morph and reorganize (Corner, 2004/2005, 2014).

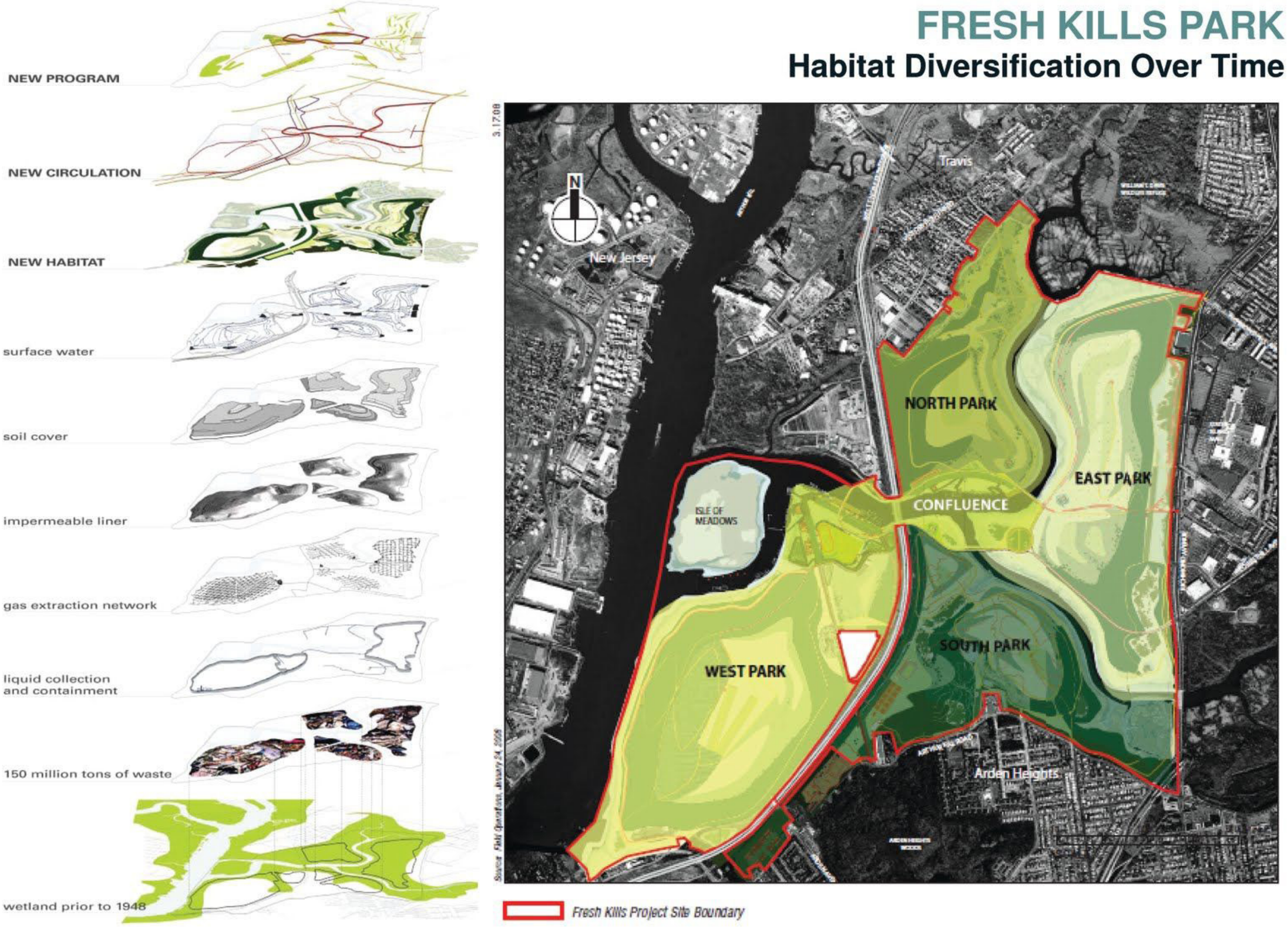
NEW PROGRAM
NEW CIRCULATION
NEW HABITAT
surface water
soil cover
impermeable liner
gas extraction network
liquid collection and containment
150 million tons of waste
wetland prior to 1948
FRESH KILLS PARK
Habitat Diversification Over Time
3.17.08
N
Travis
New Jersey
NORTH PARK
EAST PARK
CONFLUENCE
ISLE OF MEADOWS
WEST PARK
SOUTH PARK
Arden Heights
Fresh Kills Project Site Boundary

Figure 6: Fresh Kills Park (2001-present), map of habitat diversification over time and site layers. Source: recycledlandscapes.org

The competition for the remediation and reconstruction of Fresh Kills landfill on Staten Island, according to Waldheim (2016), constituted an early opening to Landscape Architects operating at the level of urban development and it is precisely starting from this type of operations[13919] that the city of New York *«began a decade of landscape-driven urban development projects of international significance»* (Waldheim, 2016, p. 166).

As can be clearly seen from Figure 6, the layers *«are wholly coordinated with the base conditions of the site, but at the same time the plan wholly erases and reconfigures the place towards new ends»* (Corner, 2017, p.130), transforming a closed landfill site, with no living soil or biodiversity, into a *«new thick ecologically engineered surface that will self-colonize and grow and adapt […] The layer stack shows the multiple engineered landscapes of the landfill – some that exist and must remain as part of the engineered layer, and some that can be imported and made to build the new soil structure and planting communities […] Time and agency are the key dynamics, deepening ecological overtime in the landscape medium as opposed to strictly urban planning or architectural techniques»* (Corner, 2017, p.130-131).

Both projects are indeed united by the fact that the designers did not make any differentiation between the "grey", "green" or "blue" structures, favouring the advent of a particular system over another, but rather, they were able to intelligently combine all the structures that make up the landscapes they dealt with. James Corner himself states that it is precisely the presence of layers belonging to different structures, natural and artificial, that make the landscape so "culturally thick" in terms of territorial, cultural, social and historical relations (Corner, 2017).

Proof that "Landscape Infrastructure" design draws some principles from architectural structuralism is the depiction of the layers in Figure 6, which uses structural models to portray the relationships among a set of variables that enable the observer to understand how these variables (or layers of different nature) are causally related to one another (Harrington, 2009).

This representation methodology strongly derives from the map overlay system (Fig. 7) developed by Ian McHarg[140], which enabled designers to imagine the intersection of various sources of information over a site by *«spatially collapsing it onto one surface – the map – that acting as a kind of cognitive prostheses, allowed for the correlation of patterns of opportunity and constraints among vastly different features»* (Harrington, 2009, p. 107).

An equivalent landscape understanding can be found in the practice of European Landscape Architecture both under the notion of "territory as a palimpsest" by André Corboz, for whom *«cultural (urban) geography in an ecological perspective ante litteram, made of the landscape context the history*

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139. Waldheim underlines how political support and initiatives are fundamental to initiate a new kind of urban development, in this case the newfound significance of landscape in the urban development was prompted also thanks to the Mayor of the city, at that time Michael Bloomberg. See Waldheim, 2016.

140. See Steiner, 2008, Morelli 2011, 2016a, 2016b, Corner, 2017, Celestini 2017b.

of humanity» (Corboz, 1983, 2001, p. 25), and in the stratifications of the territory that Christian Norberg-Schulz (1991) identified as the intangible phenomenon of a place that goes beyond its physical characteristics and includes the "environmental characteristics" and the "essence of the place", a geographical attribute that cannot be reduced to physical qualities, but that rather encompasses an existential dimension in the form of spirit.

In this view «*landscape is to be understood as a process and the site is defined through accumulated history*» (Berrizbeitia, 2007, p. 178), a concept that the Italian Landscape Architect Franco Zagari has paraphrased as: «*The landscape is one of the most eloquent palimpsests of any civilization, which contains in itself the genetic data of its time*» (Zagari, 2008).

Therefore, the development of the design practice of *Landscape Infrastructure* is an incentive for urban planners to focus their activity as transformers of the contemporary city through urban design and at the same time stimulates urban geographers to escape from mere cartographic logic and to develop a three-dimensional models of the territory.

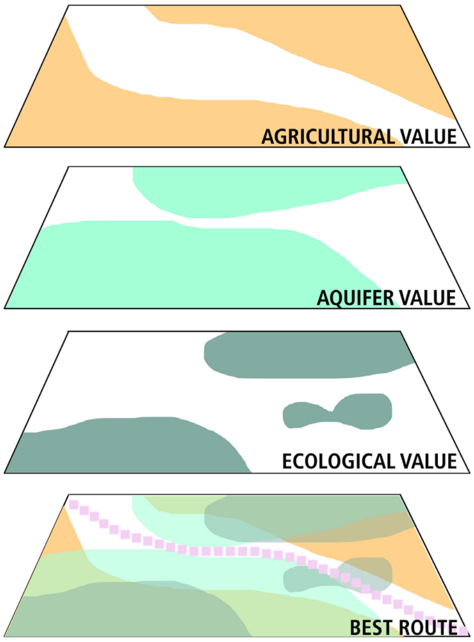

Figure 7: Representation of McHarg's map overlay system. Source: Author, according to McHarg (1969) Design with Nature.

As a matter of fact, the Italian geographer Franco Farinelli[141] notes that with the birth of this new dimension of open systems, the novelty is mainly due to the fact that the object of geography is once more mobile, and with it the mind of the geographer, no longer enslaved by adherence to a cartographic model of the world, in which all the elements making up the latter appear to be lifeless, and therefore immobile.

With reference to the method of "mapping overlay", the Swiss Landscape Architect and Professor Christophe Girot argues that even if it holds the merit of "itemizing information", making it available for a «*programmatic deductive decision-making process, it has the disadvantage of propagating a universal approach to landscape analysis to the detriment of other kinds of readings and inventions*» (Girot, 2017, p. 136).

Even though the method of approaching landscape design through layers has yielded the most significant projects of the last half century, Girot claims that considering that «*a landscape is as much about differences in language and poetic expressions as it is about the scientific assessment of a place*»

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[141] Extract from the lecture "Landscape and Project: A Possible Agenda for New Generations" held during the international conference cycle "Open Session on Landscape", January 31st 2017, organized by the University of Florence, DIDA; See also Farinelli (2005)

(Girot, 2017, p.136), the method betrays a lack of understanding of landscape as a body and as a cultural whole, so that topology[1422] (and the use of 3D cloud models of a site) *«would be a way to enter a project physically, knowingly and locally»* (Girot, 2017, p.137).

Despite this, it is undeniable that "structural" models of interpreting complex landscape systems are today topical in Economics[1433], Business and Management, as much as in Biology, Ecology, Urbanism and in the design of public spaces, because they are efficient ways of describing specific forms of organization, configurations and relational structures that are essential for constructing both resilient and adaptive capacities (Corner, 2004/2005).

In this regard, the sociologist Bruno Latour, in 2008, stated that the design agency "has now expanded from the details of everyday objects, to cities, landscapes, nations, cultures, bodies, genes and nature itself, which has a great need to be redesigned". Moreover, like Girot, Latour, alluding to the famous distinction between "objects" and "things", argues that contemporary designers must abandon the models of modernism by virtue of new methodologies of designing, or re-designing, capable of simulating and producing representations of space which invite one to develop new ways of understanding life (human and not human) and its designed milieu (Ponte, 2017).

Both in North America and in Europe, it is evident that this renewed understanding of the relational systems of landscape is the anchor for the renewal of the urban planning and design disciplines, especially with regard to the new challenges presented by spatial and environmental planning, hinging on the new awareness that *«all types of spaces are valuable and therefore worthy of designers' consideration»* (Mossop, 2006, p.171), thus diverting the focus of attention especially in the transformation of urban voids[1444] onto those neglected and socio-fleeting spaces that may occur in the form of *Drosscapes*[145], *Junkspaces*[145] or in other words *non-places*[1476], residual empty spaces. This way, open spaces can be *«built in neglected segments of existing urban infrastructure»* (SWAgroup, 2015), so that the residual and interstitial urban voids without any function can finally become the perfect terrain for the creation of new a kind of landscapes, or "superplaces"[147], through the use of mechanisms of strategic and poetic production, to face the "magmatic nebula" that makes up our current hyper-cities (Esteban Penela, 2007).

This attitude is confirmed by the most recent investigations conducted on the theme of *Landscape Infrastructure*.

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142. This concept is different to a purely geometric or topographical understanding of space which reduces a site's visible spatial form to the Euclidian concept of a concrete spatial entity based on three dimensions (Stokman, 2013, Bélanger, 2016a).

143. In 1979, the French Historian Fernand Braudel, wrote that «cultures […] are ways of ordering space just as economies are», but also declared that «The cultural map and the economic map cannot simply be superimposed without anomaly» (Braudel, [1979] 1982, p. 65). In this regard, Jason Moore (2015), in "Ecology and the Accumulation of Capital: A Brief Environmental History of Neoliberalism", explained this conceptualization much further in his critique of the historically flawed differentiation between environmentalism and industrial society by bluntly stating a new way of thinking whereby "capitalism is an ecological regime" (Moore, 2015, p. 4).

144. See Cortesi, 2005, Mossop, 2006.

145. See Berger (2007).

146. See Koolhass (2006).

147. See Augè (2009).

148. Translation of the Spanish word "Superlugares". See Esteban Penelas J. L. (2007).

In the academic field, there are many universities, both European and non-European, which have introduced scientific research and disciplinary programs on this topic, giving rise to numerous documents, books, studies and professional practices dedicated to the development of “hybrid performance infrastructures” applicable to different scales, in highly densified urban environments throughout the world[149].

For example, the landscape architecture undergraduate programme at the University of Technology in Sydney introduced landscape infrastructure as a subject into its curriculum in 2016 (Nelder, Kilbane, 2018), while the Harvard GSD, in 2003, introduced in its academic programme a seminar, taught by the Landscape Urbanist Elizabeth Mossop, entitled “Landscape Infrastructure and Urbanism”, dealing with the proposition that landscape is the appropriate model and medium through which to understand contemporary urbanism, with the aim to construct a theoretical position through a critical inquiry into contemporary ideas that deal with the interrelationships and oppositions between landscape theory and practice on the one hand and urban design theory and practice on the other[150].

More recently Professor Alistair McIntosh held a course which went by the name “Structures in Landscape Architecture”, which focused on structural shapes of landscape infrastructure such as canals, railroads, roads and highways that have helped shape the historic and contemporary territorial landscape, seeking to understand how a suggested design element is structurally organized and how this relates to the performative and expressive intent of a landscape design proposal. It is particularly significant that the course outcome was to provide each student with sufficient structural understanding to delineate a proposed landscape structure with sufficient clarity that it could be critically discussed with an architect and/or a civil, geotechnical or structural engineer (McIntosh, 2017).

A great deal of the scientific publications investigating the theme of “Landscape Infrastructure” share Jackson’s notion of landscape[151]. Delft University of Technology (TU Delft) was one of the first faculties to start a scientific research process, within the Department of Urbanism of the Faculty of Architecture and Built Environment, making “Landscape Infrastructure” one of the subjects of the Degree Lab in Landscape Architecture[152]. The result of this research has produced various publications, which explore the origins and the dimensions of “Landscape Infrastructure” design as a vector of natural and urban processes and as a concept of design useful to facilitate functional, social and ecological interactions, trying to redefine the infrastructural urban design scope as an interdisciplinary effort capable of establishing local identity through tangible relations with a place or a region (Nijhuis et al, 2012, 2013, 2015).

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[149] See Bélanger, 2016. 2017, Celestini, 2017, Hirsch, 2018, Lister 2018, et al.

[150] Mossop (2013) explained that for ability to deal with temporal change landscape is the appropriate model for contemporary processes of urbanization and the change and open-endedness of urban conditions. This understanding favours abandoning the classically defined and historically determined dichotomy of opposition between nature (the wild, the dangerous and the untamed) and the city (safety, order, and civility), that is embedded in much historical and contemporary landscape and urban design theory and practice.

[151] See Bélanger 2017, Koch, Neppl, Voigt, Weilacher et al, 2016.

[152] See Nijhuis, Juaslin, de Vries (2012/2013);

In 2015, in “Urban Landscape Infrastructures: Designing Operational Landscape Structures for the Built Environment”, Steffen Nijhuis and Daniel Jauslin, identified three possible main fields of application for the design of “Landscape Infrastructure”:

1 *Transport landscape infrastructures:* Concerning transport systems, including different methods, from the spatial design of rail and vehicle systems, to the design of ports and exchanger nodes, as well as energy supply, waste treatment and the telecommunications system; «*When considering these utilitarian systems as urban landscape infrastructures they become entities of multiple-use and integration where technical, aesthetic and social values blend […] Typical design operations in this context are the planning and design of transit landscapes, shared spaces (traffic/public space), multimodal nodes and their environments, transit-oriented development, harbour and brownfield transformation and the development of energy landscapes*» (Nijhuis, Jauslin, 2015, p.26), thus shaping conditions for urban development and offering opportunities for new types of public space.

2 The second field detected by the authors concerns the creation of interconnected networks of open spaces and goes by the name of *Green landscape infrastructures,* consisting of «*the design of urban landscape infrastructures that maintain and develop natural ecosystem values and provide associated social, economic and aesthetic benefits to humans as a set of interconnected green space networks. Useful for planning and design is the concept of land mosaics consisting of green patches, corridors and matrices […] Typical design operations include the planning and design of metropolitan park structures, development of agricultural urban landscapes, urban ecology and protection of heritage landscapes*» (Nijhuis, Jauslin, 2015, p.27).

3 The third field is about the design of *Water landscape infrastructures,* thus *Landscape Infrastructure* projects that focus on the management of water and riparian areas: «*Important issues here are coast and river management – including river modifications, seawalls and floodgates – as well as the use of beach nourishment, sand dune stabilisation, development of flood forests and coastal/estuarine wetlands to create new multifunctional landscapes. It includes the planning and design of land reclamations, major flood control systems (dikes, levees, major pumping stations and floodgates), drainage systems (storm sewers, ditches), major irrigation systems (fresh water reservoirs, irrigation canals), and also sewage collection and disposal of wastewater beyond their utilitarian use*» (Nijhuis, Jauslin, 2015, p.27).

Despite the fact that these categories identified by Stepphen Nijhuis and Daniel Jauslin are meant to «*provide lenses to a more comprehensive form of urban landscape architecture*» (Nijhuis, Jauslin, 2015, p.28), considering the three "fields of application", including both landscape transformation projects and territorial planning concepts and strategies, increases even more the confusion on the subject, taking steps away from the theoretical body that deals with this category of operational design.

What is rather clear, however, is that in all three situations described the emphasis is on the accessibility of spaces and incentives for the creation of public space in urban and extra-urban environments. Confirming what has been suggested by Bélanger on more than one occasion, these three "fields" of operations all focus on the interaction between landscape processes and typological-morphological aspects, facilitating aesthetic, functional, social and ecological relations between natural and human systems, using new models to interpret the landscape as an open system, thus also integrating concepts belonging to urban ecology[153].

Indeed, «*Today, when we talk about Landscape Infrastructure, we refer to accessible public spaces, the places of integration where the multiplicity and diversification of functions coexist*» (Cortesi, 2018, p.10)

What is essentially proposed through the design of *Landscape Infrastructure* is the compendium and the collaborative formulation of landscapes (Bélanger, 2017) which attempt to integrate environmental and social sciences in the practice of urban landscape design and planning, simultaneously expanding the professional practice of Landscape Architects into the design of infrastructures.

Within the ever-widening family of infrastructures, the *Landscape Infrastructure* design incorporates those of any colour, mediating them through a position of "cultural relativity"(Waldheim, 2016, p. 50), because it is based on the antithetical conception of the baseline principles of urban planning and civil engineering that form the functional architecture and regulatory framework that underlie the legislative governance and physical construction of cities today.

[153] See Bélanger, 2009, 2012, 2013a, 2013b, 2015, 2016a, 2017, Morelli 2011, Hagan , 2015, Corner 2017, Girot, Imhof, 2017, Reed 2010, Orff 2008, 2017, et al.

Pierre Bélanger (2012) summarized those principles as:

1 Standardization: that is the singularity of infrastructure as a linear and closed system, designed exclusively for efficiency and economy[154]; From this point of view, standards are therefore developed for purposes of maintenance and self-preservation as opposed to management and modernization (Bélanger, 2012, p.278);

2 Mono-functionality: or rather the singularity of land uses that leads to economic, ecological, and sometimes social segregation[155]. In fact, it has been amply demonstrated[156] that the excessive regulation of land use has further stifled economic development, regardless its original intention, contributed to patterns of low-density urban development (Bélanger, 2012, p.278);

3 Permanence: standardized infrastructures and mono-functional land uses are inflexible to change, demonstrating a considerable level of fragility towards unexpected hazards, accidents, and disasters; Through the illusion of safety and certainty created by specialization and standardization, centralized infrastructures and dense aggregations, such as the reliance on one specific type of energy source or water distribution system for example, often expose larger concentrations of the urban population to greater risk (Bélanger, 2012, p.278).

The ten-year debate underway on *Landscape Infrastructure* forces Landscape Architecture to re-consider systems and processes previously not associated with the discipline, because in this design field infrastructural systems and processes become the means to support new types of landscapes and new understandings of how man structures his habitat in the Anthropocene Era, thus creating greater connectivity *«for people in places, community in community, nature in the city»* (Hung, 2013, p.19) and contributing to the improvement of the quality of urban life. Nevertheless, *Landscape Infrastructure* design and theory contributes to the ongoing development of Landscape Architecture by generating continued discourse and new practices that reimagine infrastructure for the advancement of our culture (Aquino, 2013, Nelder, Kilbane, 2018).

Among the numerous professional firms that have dealt with this subject in recent years, the SWA group, with offices in the United States of America, China and the Middle East, tried to define more precisely what is meant with the term "Landscape Infrastructure" in their recent publication "Landscape Infrastructure: Case Studies by SWA", outcome of the "Infrastructure Research Initiative at SWA" (IRIS), and winner of the ASLA 2012 Professional Award. The initiative was started in 2007 to further experiment with and research designed landscapes, planned spaces, and conventional grey infrastructure in order to expand conventional performance parameters.

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[154] Bélanger explains that the normalization of dynamic systems and externalization of other dynamics or wastes and organic systems are effectively reduced to use-value functions, utility efficiencies, or mechanical operations, for example, more than 30 percent of freshwater is lost in piping systems through conveyance (Bélanger, 2012).

[155] The set of biophysical and socio-economic services intrinsically depend upon their interconnectivity to function, but through the adoption of mono-functional land regulations these dynamic systems are parcelled and closed off (Bélanger, 2012).

[156] See Bachis, 2010.

Findings concluded that a redefinition of infrastructure was called for as infrastructure was experiencing a paradigm shift where multiple uses and ecological health was increasingly vital. Exemplary projects required expanded expertise beyond planners and engineers to fully realize the benefits to cultural and natural systems. As clarified by Pierre Bélanger[157], Ying-Yu Hung, member of SWA group, identifies *Landscape Infrastructure* as an "operative design category", underlining in this way, that it is a design practice, and therefore substantially different from the planning strategies that go by the name of "coloured" infrastructure[158].

Since the "operational design category" defined as *Landscape Infrastructure* is characterized by «*the consideration of the relationships between interconnected and interdependent systems that make up the new paradigm of landscape*» (Hung, 2013, p.14), it is possible to question planning's preferred position in advance of the design disciplines[159], especially in light of the fact that, nowadays, «*in many instances landscape design strategies precede planning*» (Waldheim, 2016b, p.165).

SWA group, identified *Landscape Infrastructure* as projects characterized by high performance values, that use aggregated elements to mitigate negative impacts. Their design aims to create networked structure that connects different landscapes also through incremental processes that allow for flexibility over time[160], thus complying with a design «*methodology that expands the performance parameters of a designed landscape to a multi-functional, high performance system, including those systems originally ascribed to traditional infrastructure*» (SWAgroup, 2015). Nevertheless, according to SWAgroup, this design approach helps to create an iconic identity for a city based on the city's latent natural and cultural features.

Although no detailed description of the "methodology" of *Landscape Infrastructure* design is provided, SWAgroup underlined how the approach to infrastructure belonging to this new design category differs significantly from the traditional one, both in "hard" and "soft" infrastructure and in the field of urban design (Fig.8).

The short comparison of the diverse approaches to infrastructure in Figure 8 sums up, quite eloquently, the shifts caused by *Landscape Infrastructure* design.

Stemming from this assessment and the analysis of the latest research published on the topic, it is possible to delineate several processes and practices on which the *Landscape Infrastructure* project must be contingent:

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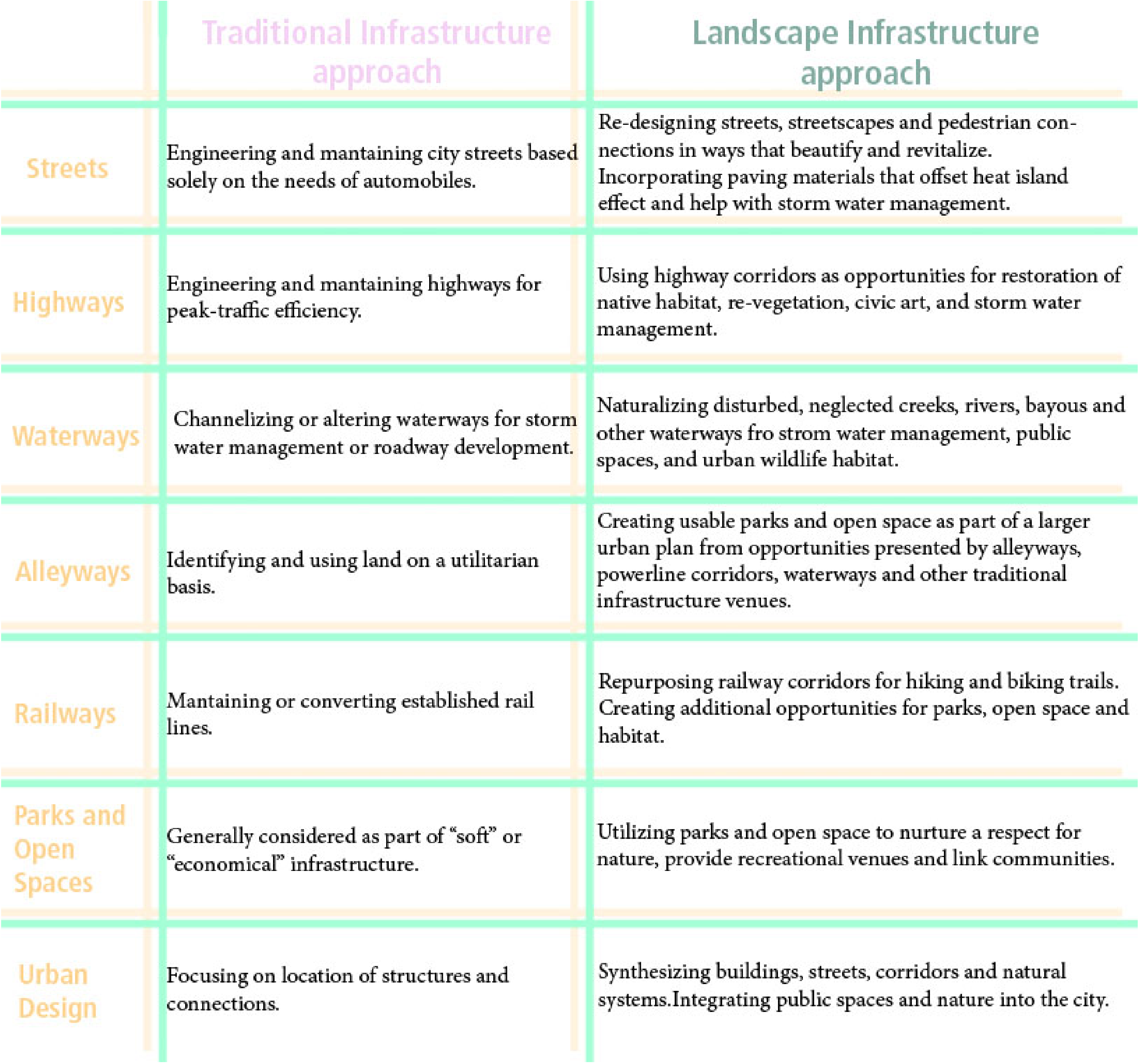
[157] See Bélanger (2012), p. 290.

[158] A possible reason for the diffusion of the many neologisms reported in paragraph 2.4 of this research, can be found in one of the most recent essay of Charles Waldheim (2016b) where he affirms that: «*For many landscape architects trained in the shadow of the 1960s who identify as environmental advocates, this has been disorienting and confusing turn of events. Many of those landscape architects who identified as advocates for nature have been surprised to learn that landscape has a newfound relevance for discussions of the city through design agency rather than through public process and rational planning […] Not surprisingly any of those leading landscape architects and urbanists trained in this way exhibits a tendency to combine several seemingly contradictory uses of ecology. […] This conflation of ecology as design strategy with ecology as natural science is source of much confusion in these discussions for urban designers, planners and environmentalists*» (Waldheim, 2016b, p.165).

[159] As Waldheim reminds us «*Landscape's newfound relevance for the question of urbanism, rather than originating in the longstanding tradition of environmentally informed regional and urban planning, has much more to do with landscape's recent rapprochement with design culture*» (Waldheim, 2016b, p.165).

[160] See Aquino, Hung, Kerrigan, Lagedrost, Sandoval, 2011



	Traditional Infrastructure approach	Landscape Infrastructure approach
Streets	Engineering and mantaining city streets based solely on the needs of automobiles.	Re-designing streets, streetscapes and pedestrian connections in ways that beautify and revitalize. Incorporating paving materials that offset heat island effect and help with storm water management.
Highways	Engineering and mantaining highways for peak-traffic efficiency.	Using highway corridors as opportunities for restoration of native habitat, re-vegetation, civic art, and storm water management.
Waterways	Channelizing or altering waterways for storm water management or roadway development.	Naturalizing disturbed, neglected creeks, rivers, bayous and other waterways fro strom water management, public spaces, and urban wildlife habitat.
Alleyways	Identifying and using land on a utilitarian basis.	Creating usable parks and open space as part of a larger urban plan from opportunities presented by alleyways, powerline corridors, waterways and other traditional infrastructure venues.
Railways	Mantaining or converting established rail lines.	Repurposing railway corridors for hiking and biking trails. Creating additional opportunities for parks, open space and habitat.
Parks and Open Spaces	Generally considered as part of "soft" or "economical" infrastructure.	Utilizing parks and open space to nurture a respect for nature, provide recreational venues and link communities.
Urban Design	Focusing on location of structures and connections.	Synthesizing buildings, streets, corridors and natural systems.Integrating public spaces and nature into the city.

Figure 8: Schematic comparison of the different approaches to infrastructure. Source: Author, according to SWAgroup (2015).

1

Flexibility, Adaptability and Prefiguration

Both the land use classification and the functions attributed by the project to a given space must be flexible, adaptable and prefigure future uses (Bélanger, 2013a, 2013b). This means that, contrary to the traditional approach to infrastructure, in the landscape infrastructure project performance is neverset in stone: its design must adopt "flexible and more porous formats of construction and maintenance that privilege ecological systems" (Bélanger, 2013b), thus ensuring adaptability and resilience (Nelder, Kilbane, 2018). This practice includes the "structuralist's recommendations" nos. 2 and 4 suggested by Udo Weilacher (2017b, 2017c).

The emergence of a landscape is, in fact, triggered by differences and imbalances in the initial conditions (Allen, 2014). For these reasons the design of a piece of *Landscape Infrastructure «must be open and anticipatory […] because you don't get emergence without carefully designed initial conditions»* (Allen, 2014), which are necessary to "sow the seeds of future possibility, setting the stage for both uncertainty and promise" (Ibid.).

In this way the design of *Landscape Infrastructure* "differs from merely formal interest in single surface construction. It is more strategic, emphasizing means over ends, and operational logic over compositional design" (Ibid.).

2

Synergies of Hard and Soft Infrastructure

The design of *Landscape Infrastructure* must reintegrate the ecological flows with engineered infrastructure through the reclamation of biophysical processes, in order to generate multifunctionality and inter-operability of the structures, thus fostering the formation of "hybridized morphologies" (Lister, 2007, Bélanger, 2013b).

This approach also stimulates the equal consideration of the value of structures belonging to different periods as suggested by recommendation no.3 after Weilacher, both with a view to exploiting the existence of engineering infrastructures whose operation can be modified to co-operate with the functioning of new ecological engineering structures, and producing designs that relate our cities to their history, diversity or ambiguity, thus re-using, if and where possible, existing infrastructure for different purposes, embracing and integrating change in the design (Lister, 2007). In this regard, the French Architect and Urbanist Alexandre Chemetoff (2009) pointed out that in the new ecological perspective, arising in the twenty-first century, sustainability is automatically perceived to be the more expensive solution. To contrast this perception he sets out the case for the adoption of an "ecology of memory", which consists of "an attitude, not a universal solution" for which the project budget informs the design programme, and, if possible, recycles existing structures (or and infrastructures) for diverse purposes.

Thus this attitude applies a sort of "economy of means" (Chemetoff, 2009) that can on the one hand make the most of the budget for a project (also taking into account in the design the future maintenance costs), but on the other hand does not impoverish the cultural depth of a place but rather through the reading and rereading of its stratifications produces projects which are even more meaningful and connected to the identity of the cities in which they are located. Apart from the obvious economic implications, «*modest investment and control at strategic moments during the design process may yield greater richness and complexity in the end*» (Hung, 2013, p.15).

3

Interdisciplinarity and Cross-Collaborations

The complexity of landscape and infrastructure generate the potential for interdisciplinary partnerships (Strang, 1996, Bélanger, 2013b, Nijhuis et al, 2012, 2013, 2015, Allen 2014, Weilacher 2017c, Cortesi 2018, et al). Since the design of *Landscape Infrastructure* implies responsibilities shared across a vast network of professional liabilities, it is desirable that the boundaries between the public and private jurisdictions grow weaker and weaker, thus opening new possibilities for strategic project partnerships and new financial mechanisms "that can join owners, users, stakeholders and regulators over time" (Bélanger, 2013b).

The fact that interdisciplinarity is essential for the realization of *Landscape Infrastructure* projects implies that the exchange of information between the disciplines related to the production of the city is a fundamental requirement to transform the built environment in the future, hence confirming the necessity of emphasizing communication as a structuring factor (Weilacher, 2017b, 2017c, recommendation no.6).

As noticed by the American Landscape Architect Anita Berrizbeitia (2007), defining the significant shifts in design methodology, when going from compositional modernism to a process-based ecological approach, stated that among the major changes we can identify the fact that «*the dynamic nature of the material is to be found and evolved out of systems already there, instead of superimposing new ones*» (Berritzbeitia, 2007, p.178), thus the focus shifted «*from creating balance, regularity and hierarchy to facilitate connectivity, dynamics and new perceptions*» (Ibid.). This can also mean that these types of landscape design must absolutely take into account all the different stratifications (or cultural layers) of a place, giving them newfound relevance through the development of pedagogical aspects of the project, «*as means to educate the public about the role of nature in the urban context [...] the same could be done about Landscape Architecture as environmental art, as a medium through which artists and designers reveal the ephemeral forces of nature by visually recording these subtle changes over time*» (Hung, 2013, p.15).

4

Multipilicity of speeds and Connectivity

The reprogramming of urban surfaces must accommodate diverse modes of mobility by way of the separation of different speeds of movements (Bélanger, 2013b).

As infrastructure of mobility will evolve, and in the light of the reports concerning the environmental and climatic crisis to which our planet is subjected, it is necessary to favour the use of public transport to the detriment of the private car as long as it will be a source of pollution (Hung, Aquino, 2013, SWAgroup, 2015), therefore the *Landscape Infrastructure* project must both support the creation of new connective mobility structures, preferring pedestrian or bicycle lanes (SWAgroup, 2015), and configure the space in ways in which it can accommodate different speeds, wisely separated, so that they do not "disturb" one another[161].

Moreover, as underlined by Stan Allen «*if conventional engineering design of infrastructure is based on linear systems and respects the principles of separation of movement and the minimization of conflict, one valuable lesson from landscape is the potential of connections made not through lines but through expansive surface conditions. These surfaces have the capacity to multiply forms of connectivity […] This suggests an idea of site as a continuous matrix, differentiated locally as movement, building, infrastructure or open space*» (Allen, 2014).

Another factor of extreme importance is that public streets are one of the most valuable infrastructure assets a city has (Loos, van Vliet, 2016), thus all street design should include careful design treatments that must be easily understandable for all the possible users (pedestrians as much as cyclists and motorists); Nevertheless, infrastructure such as roads «*are required to perform multiple functions: they must fulfill the requirements of public space and they must be connected to other functioning urban systems of public transport, pedestrian movement, water management, economic development, public facilities and ecological systems*» (Mossop, 2006, p. 163)[162].

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161. For example, it will no longer be possible to design a cycle lane on the same carriageway designed for car traffic, as has been done up to now.

162. The multiplicity of speeds must not be intended only referring to means of transports, but also to the use of ecologically-engineered design solutions for the management of rainwater, which in turn can take different operating speeds; for example a landscaped curb extension can slowly capture and infiltrate stormwater within a planted area or sub-surface stone bed, while landscape plantings within the same curb extension quickly take up some of the stormwater through their root systems, lightening the remaining quantity of water to be disposed of through the pipes.

5

Decentralization and Multifunctionality through Different Scales

Landscape Infrastructure projects must lead to «*an optimized condition in which the city and its infrastructure are one and the same*» (Hung, 2013, p. 17). Since traditional infrastructure was conceived as a centralized mono-functional system, *Landscape Infrastructure* must decentralize today's infrastructure system allowing for localised, multifunctional solutions (Hung, 2013, Nelder, Kilbane, 2018). This, besides confirming the validity and pertinence of Weilacher's fifth recommendation (2017b, 2017c), also means that stormwater runoff, for example, must be contrasted with localised stormwater management, as well as that energy supply should rely on local-scale renewable energy generation[163]. «*Landscape offers architecture new models for thinking about the relationship between program and site. In the first instance, there is a promise that on an open field, anything can happen: sports, festivals, demonstrations, fairs, festivals, concerts or picnics, as well as any number of informal, unscripted events […] The field needs to be "irrigated with potential", to use Rem Koolhaas' suggestive phrase. That is to say, infrastructure creates concentrations of density that in turn trigger concentrations of activity*» (Allen, 2014). In other words, these and other multifunctional variations to vital systems can become a catalyst for urban revival through the augmentation of open space, habitat creation, community revival, and transformation of urban blights into urban destinations (Hung, 2013). Moreover, decentralization also implies the shift of resource extraction places into a closer relationship with the spaces of consumption (Bélanger, 2013b), thus in these cases multifunctionality consists of a twofold meaning: on one hand the productive infrastructural landscapes can be transformed into public spaces that include many different functions[164], thus gaining the potential to become attractive for the public, instead of "restricted access" areas; on the other hand, the new, desired multifunctionality of infrastructure at local scale, can be also used to re-organize systems at regional scale, promoting the creation, over time, of a bigger and sustainable network of connectivity, «*operating across different scales magnitudes and borders, with regional, continental and global capabilities*» (Bélanger, 2013b, p. 25), simply because ecologies don't respect borders (Allen, 2014).

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[163] For example rail corridors can be transformed into recreational trails, promoting ecological connectivity, social and health benefits and sustainable local transport options.

[164] To better explain this concept, Pierre Bélanger (2013b) uses the example of the project of "Svartengi Geothermal Power Station", in Iceland, where surplus water from the plants fill up the Blue Lagoon, a popular bathing resort and one of Iceland's main tourist attractions. Another famous project that transformed an urban blight into a tourist attraction is the "Highline" of New York, carried out by Diller Scofidio and Renfro.

3.2 Facets of Significance [Infrastructure as Landscape, Landscape as Infrastructure]

The field of *Landscape Infrastructure* design makes recognition of the structure and dynamics of the blank slate that is landscape a fundamental aspect of the new nuances contained in the contemporary notion of infrastructure.

As illustrated in the previous paragraph, this category of operational design draws its theoretical roots from diverse disciplinary fields: «*the "systems approach" seems to be winning*» (Geuze, 2017, p. 260), meaning the understanding of landscape as an open system integrates concepts belonging to urban ecology while at the same time landscape is acknowledged as being a truly cognitive system whose conceptual dimension goes beyond the traditional techniques and design of vegetation, ecological and soil systems (Corner, 1999) and aspires to structure the city for the better by bringing together the concepts of "landscape as a product of engineering" and "landscape as sedimented memory".

Without doubt, it is a project category that contains an inclusive dimension, capable of accommodating different sensitivities and disciplinary approaches relating to the various themes and challenges that the new character of urban complexity imposes (Celestini, 2017a), establishing a negotiated ground for «*alternative models and synergistic precedents for an era of unprecedented transformation*» (Bélanger, 2016a, p.193).

Therefore *Landscape Infrastructure* constitutes an interdisciplinary and trans-disciplinary design methodology, in which the different disciplines re-establish the constructive elements of a project in the form of a common language.

In the last twenty years and within this open and systemic vision, several authors have highlighted how the tautological understanding of infrastructure and landscape opens up the field of reflection to two different facets of meaning identified by the chiasmus of the two terms.

The first to advance this hypothesis was the American architect Gary Strang, who, in 1996, titled his essay "Landscape As Infrastructure [Infrastructure as Landscape, Landscape as Infrastructure]" with the intention of underlining how the hybridization of the two concepts could hide a double significance. In his most recent publications, Pierre Bélanger (2016a, 2017) has himself claimed that the compound word "Landscape Infrastructure" holds a "fundamental millennial conundrum" which can be explored with two reciprocal questions:

"**Is infrastructure landscape?**" and conversely "**Is landscape infrastructure?**".

Regarding the question "**Is infrastructure landscape?**", it is important to remember as historical precedence, that, at the end of the nineteenth century, the authoritarian government of Napoleon III, together with Baron Haussmann, achieved the spectacular transformation of Paris based on a systemic approach to the theme of green in which the parks were typologically and hierarchically organized in terms of size, range of influence and performance (Choay, 1992), pervading all the urban space in every detail "up to the curb of the sidewalk, the grids that surround the base of the trees, the gates that enclose the parks, kiosks to shelters" (Secchi, 2000).

«*The new networks created are hinged accurately into the social and physical fabric of the city, designed to give unity and transform the entire operational space of Paris*» (Haussmann, cited in Choay, 1969, p.16).

During the industrial revolution in Europe, parks and green spaces were regarded as important infrastructure for the achievement of urban hygiene status[165], while, at the end of the nineteenth century, the increasing use of automobiles and the vast urbanisation in Northern America initiated the development of metropolitan parks and parkways[166]. It was indeed in that moment that green spaces started to be considered as "green infrastructure" for the city and routes as "flow landscapes" where travelling was connected to the scenic experience of the natural environment[167], ideas which, between the end of the nineteenth and the beginning of the twentieth century, exerted great influence on metropolitan park planning and highway design in Northwest Europe[168].

Another particular specialisation in this field was developed by Peter Latz with the Duisburg Nord project, which is widely considered[169] to be one of the first successful attempts to imagine infrastructure as a type of landscape. Along with the conversion of disused industrial plants into hybrid systems, from this moment onwards many authors have tried to give an answer to this question by exploring transport infrastructure as a set of positive elements in the urban landscape, because through their interconnectivity they can be used as an alternative material model of urban organization.

The conversion of infrastructural corridors of movement (for example railroad corridors) into linear parks and other new landscape forms represents the «*beginning of a new landscape agenda*» (Balmori, 2010, p.30), where infrastructure is treated as an interdisciplinary landscape design brief where «*high visibility, multiple alliances and public support*» become critical factors in the creation of «*new landscape genres that portray our present*» (Balmori, 2010, p.33).

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165. See Chadwick, 1966, Nijhuis, Jauslin, 2015, Bernieri, 2017.

166. See Schuyler, 1986, Zapatka, 1995, Dalby, 2002, Morelli, 2005, Nijhuis, Jauslin, 2015.

167. See Morelli, 2005, Dümpelmann, 2005, Balmori, 2010, Van Winden, 2015, Nijhuis, Jauslin, 2015.

168. Gary Strang (1996), in order to reverse the effects of mono-functional utilitarian design, suggested developing the existing potential of infrastructure systems to create "new layers of urban landmarks, spaces and connections", allowing the deformation of the rigid geometry of infrastructure in order to incorporate, rather than suppress, biological networks.

169. See Schroder, 2002, Spens, 2003, Shannon, Smets, 2010, Sijmons, 2014a, Braae, 2015, Nijhuis, Jauslin, 2015, Corner, 2017..

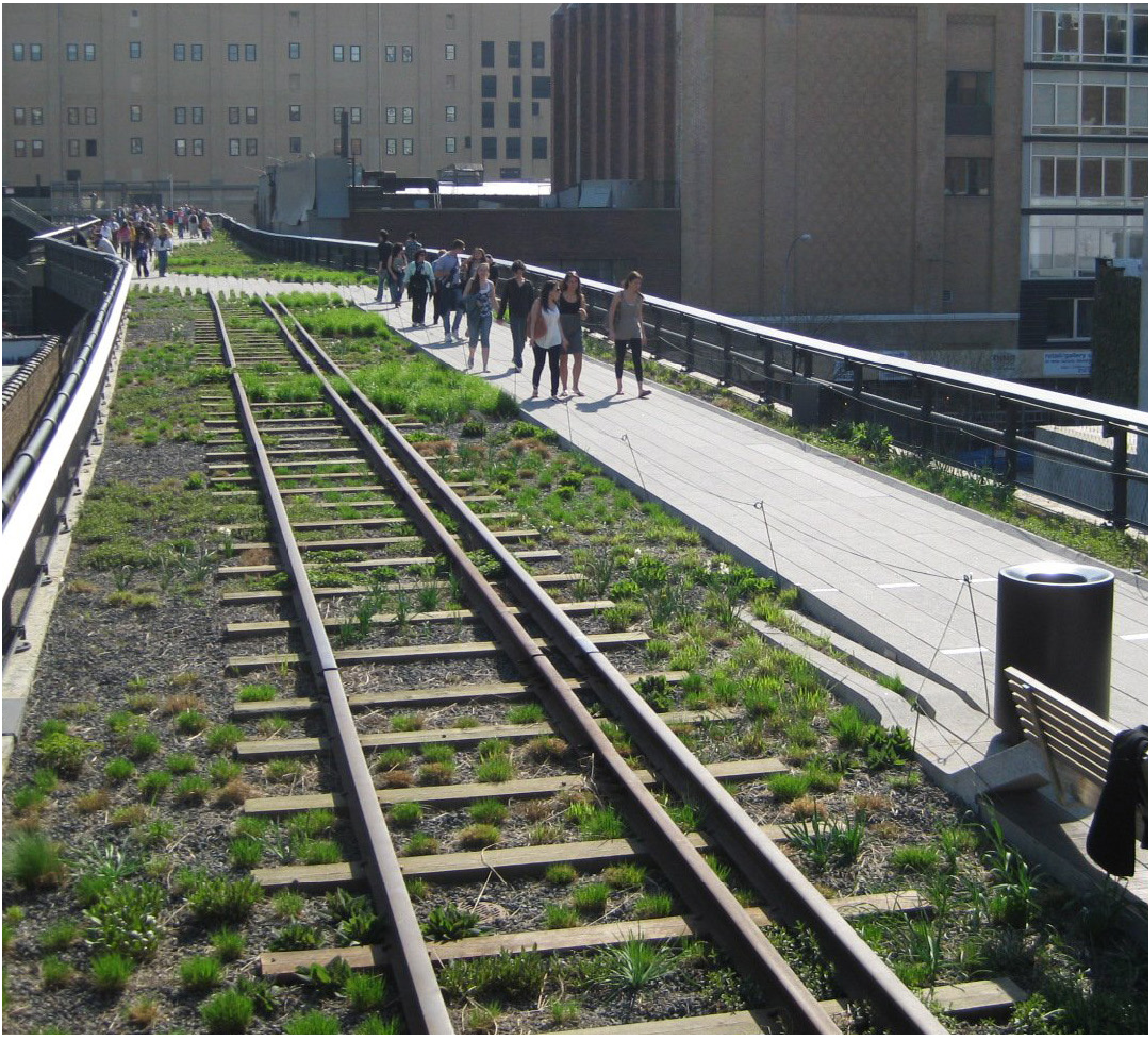
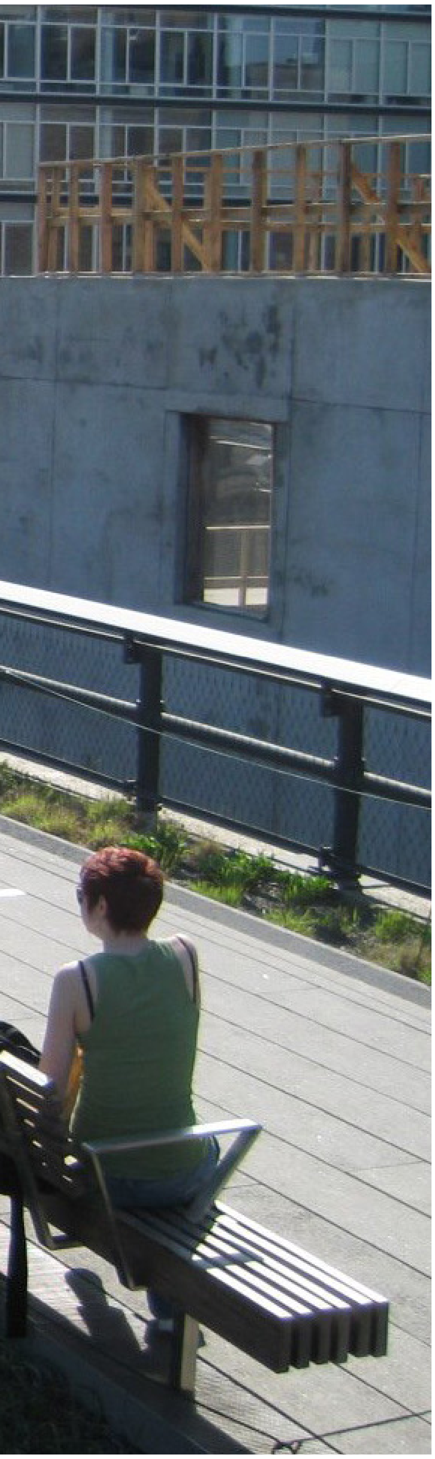


Figure 1: View of the first section of the High Line of New York. Source: ©NYgo.com



The practical application of this approach is the same that is found in the category of *Landscape Infrastructure* projects identified in Lotus in 2008[170], which contained projects that implied the reuse of a stretch of elevated transport infrastructure through diverse approaches, such as the A8erna project by NL Architects[171], or the most famous Part 1 of "High Line" of New York (Fig.1 and 1b).

The same approach can be identified in SWAGroup's most recent research[173] concerning *Landscape Infrastructure*, where different classes of interventions are examined through case-study projects carried out at the same practice: the project for "Buffalo Bayou Park" (Fig. 2), in Houston, Texas, achieves an important urban transformation through the regeneration of Transport and Water Infrastructure (Buoro, 2018).

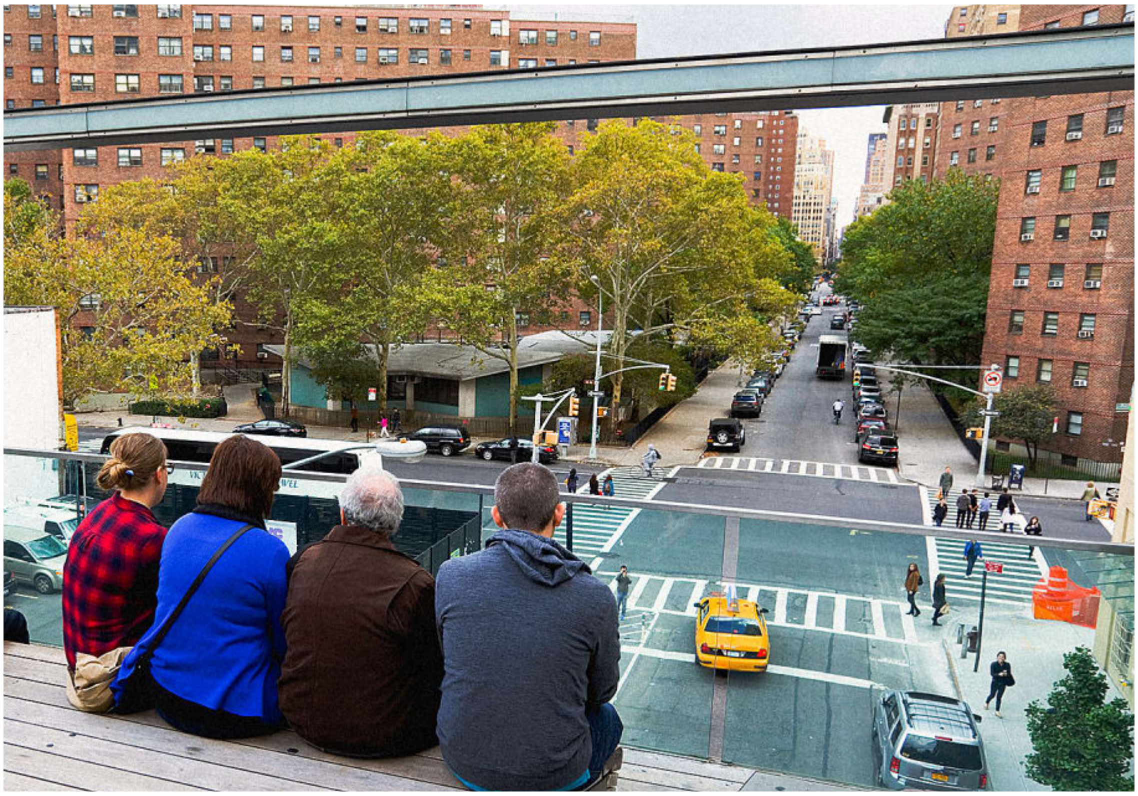


Figure 1b: One of thw viewpoints of the High Line; Source: © Paul Seheult

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[170] See paragraph 3.1.

[171] See figure 4 of paragraph 3.1.

[172] See Aquino, Hung, 2013.

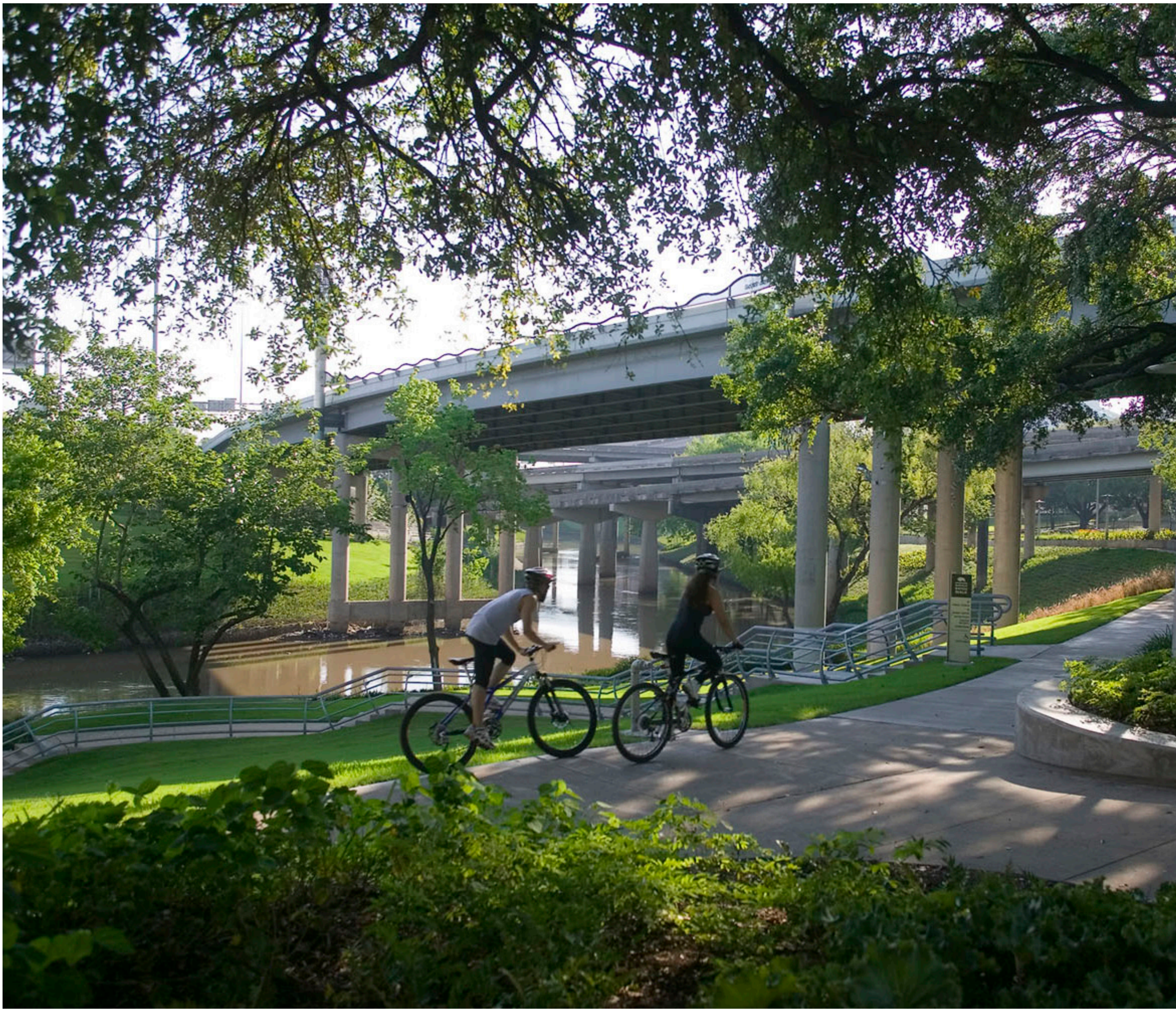

Figure 2: The new Buffalo Bayou Park (2006-2015) creates new connections with the surrounding districts, making it possible to cross the north bayou on foot by bike or by kayak, contributing to the reduction of car traffic. Source: © Tom Fox, Via swagroup.com

The project developed under the guidance of SWAgroup was completed in 2015 and sees the redesign of the central area of Houston Bayou in a linear park of about 37 kilometres, incorporating 16 kilometres of pedestrian and cycle paths, introducing a series of interesting opportunities under the highway to encourage use of the park for fun, sports and recreational activities.

In this project the intricate skein of motorway lanes above the river was read by the designers as an opportunity for the creation of about 650,000 square meters of new public space, which contains a wealth of urban ecological services and promotes enhanced pedestrian accessibility via connections with the surrounding neighbourhoods.

Although the ecological approach is of considerable importance in terms of stabilization techniques for the riverbed and the re-naturalization of the meanders of the Bayou, offering greater resilience against floods as well as a more pleasant environment, the intervention puts strong emphasis on the reading of the infrastructural elements of landscape as new types of public spaces, which originate from the *«continuity and integrity of the infrastructural elements that are combined with the environmental conditions necessary to support public activities»* (Wall, 1999, p.240)[174].

Through the interweaving of processes and flows, existing systems and in situ spaces (often in conflict with each other) a constructed, active and functional landscape is created, making a niche for species forced out of their original environment (Balmori, 2010), guaranteeing security and allowing for a greater level of interaction (Bélanger, 2009, 2010, 2013, Hung, 2013).

173. During the series of international conferences on Landscape Urbanism, organized by the Architectural Society of London in 2010, Alex Wall, during a re-reading of "Programming the Urban Surface", underlined how the consideration of infrastructure as a type of landscape can influence the emergence of urban connective fabrics and activate new functions and activities, as for example the Bureau des Paysages in Paris did, in the mid-nineties, with the design of the boulevards with tramlines profiled as public spaces and tree-lined avenues and other green areas along their tracks.

Even though some of these projects can be considered "modern" versions of the Paris's Promenade Plantée[174], the kind of *Landscape Infrastructure* projects that can be listed in this category are more than what they first appear (Balmori, 2010), because they do not develop only a "green corridor" but a "thick edge" (Balmori, 2010, Waldheim, 2016, Corner, 2017): «*they are geographically highly specific and irreproducible outside of context. They are materially thick, in terms of geology, soils, hydrology, layers of foundation and construction. They are temporally thick, in terms of complex interactive ecological processes […] I would argue that this approach is more a considered combination of the site species, the hybrid overlay and the clonal agent […] the primary functions of the layers are primarily conceived to transform. The emphasis is upon surface articulation and its thicker construction as an amalgam to produce new effects New geometries and techniques produce new formats with new potentials that may have sufficient agency to grow, breed and support new life and activities*» (Corner, 2017, pp. 125, 134). .

In regard to the question "**Is landscape infrastructure?**", the answer is commonly related to the conception of goal-oriented strategies and approaches, where landscape is treated as an operative field that defines and sustains urban development and its ecological and economic processes are employed as formative design tools for the planning and management of legislative processes and community interests in its wake (Garvin, 2005, Saunders, 2007, Kaliski, 2007, Waldheim, 2016), a conception through which the landscape is often reduced to a set of essential systems that support cities and regions (Nijhuis, Jauslin, 2015).

In 2006, the Landscape Urbanist Elizabeth Mossop wrote in "Landscape of Infrastructure"[175] that: «*If we think of landscape as an infrastructure which underlies other urban systems, rather than equating it with nature or ecology, we have a much more workable conceptual framework for designing urban systems. This is particularly apt where those systems no longer function in a core/periphery model but as a matrix. This framework of landscape infrastructure should provide the most permanent layer of urban development to preserve the viability of natural systems and regional cultures*» (Mossop, 2006, p. 176).

When these principles are incorporated into the field of landscape design, the generative potential for the understanding of landscape as infrastructure becomes all the greater where the ecological systems underlying the urban condition have been highly altered or destroyed by the effective intrusion of artificial infrastructural systems. The inversion of this effect is then researched in new forms of administration of the land and its systems aiming to create hybrid interactions of flows, thus investigating the possibility of integrating landscape and engineering techniques within the design of coherent urban systems (Castro, Ramirez, Rico, 2013).

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[174] Also known as the "Coulée verte René-Dumont", designed by Philippe Mathieux e Jacques Vergely (1984-2000.

[175] See Mossop E. (2006).

«We must put the twenty-first-century city in nature rather than put nature in the city. To put a city in nature will mean using engineered systems that function as those in nature and deriving form from them» (Balmori, 2010, Point 25).

In her bestselling book "Next Generation Infrastructure: principles for Post-Industrial Public Works", Professor Hillary Brown, taking after Strang[176] in the late 1990s, argued that in contrast to the physical and jurisdictional disaggregation of contemporary infrastructure (Brown, 2011), designers should rediscover and recreate the physical and symbolic relationships with ecological systems, drawing inspiration from historical precedents of "experiences of multifunctional pre-industrial infrastructure in ancient civilizations" (Brown, 2014).

Indeed, the infrastructural capacity of landscape has been known and used for centuries, as evidenced by examples coming from all over the world: the Asian terraced landscapes, the Dutch polders, the Mexican *chinampas* or the complex system of dams and canals which operated according to the natural hydrological cycles of the Nile, used in Egypt to support agricultural productivity and soil fertility (Viazovska, 2016).

These approaches recall the work of Baron Haussmann who, with his plan for the transformation of Paris (1852 -1870), enabled incremental and rapid development of a regional market of food production through the re-planning of the sewage system (Fig. 3). Waste contained in the sewers was re-used as natural fertilizers through the design of performance flows that made it possible to channel the waste directly into large farms producing about 50% of the city's required food intake (Barles, 2007), thus constituting a genuine primogenial example of "urban metabolism"(Sijmons, 2014b).

In 2018, during the international symposium "Urban Landscapes in High Density Cities"[177], Professor Nina-Marie Lister explained that the understanding of "landscape itself as a critical infrastructure" is undoubtedly the basis through which territorial planning strategies such as "Blue & Green Infrastructure" operate, connecting Green (vegetation) and Blue (water) infrastructures, yet, beyond the ecosystem services, this understanding "offers new agency for a resilient future through biophilic urban design" (Lister N. M., 2018).

Similarly to Lister, Diana Balmori[178] declared that contrary to the nineteenth-century engineering approaches to constructions, the new approach consists of "working with a flexible system" through which Landscape Architects *«can reveal the forces of nature underlying cities, creating a new urban identity for them»* (Balmori, 2010, p. 105).

[176] *«Designers can generate meaningful new architectural, urban and regional forms by integrating the works of the estranged disciplines of architecture, civil and structural engineering, landscape architecture and biology […] Water treatment plants should be designed to accommodate visitors and to demonstrate appropriate site design and water use. Sewage plants are magnificent sources of nutrients, which could be collected and expressed in landscapes that could rival the great gardens of the Renaissance»* (Strang, 1996, p.14)

[177] The International symposium was held at the Polytechnic University of Turin, in February 2018 and hosted speakers such as: Herbert Dreiseitl, Christophe Girot, Alison Hirsch, Annalisa Metta, Wolfgang Wende.

[178] See Balmori D. (2010).

For example, in the case of the transformation of areas where land meets water (such as ports or banks rivers), it is "critical to put [in] the natural functions of water that were ignored before", thus designing and constructing with a view to imitating the changes in the life cycles and dynamics of flows, making ecological processes visible and "giving urban dwellers a new opportunity to reconnect with nature" (Ibid.).

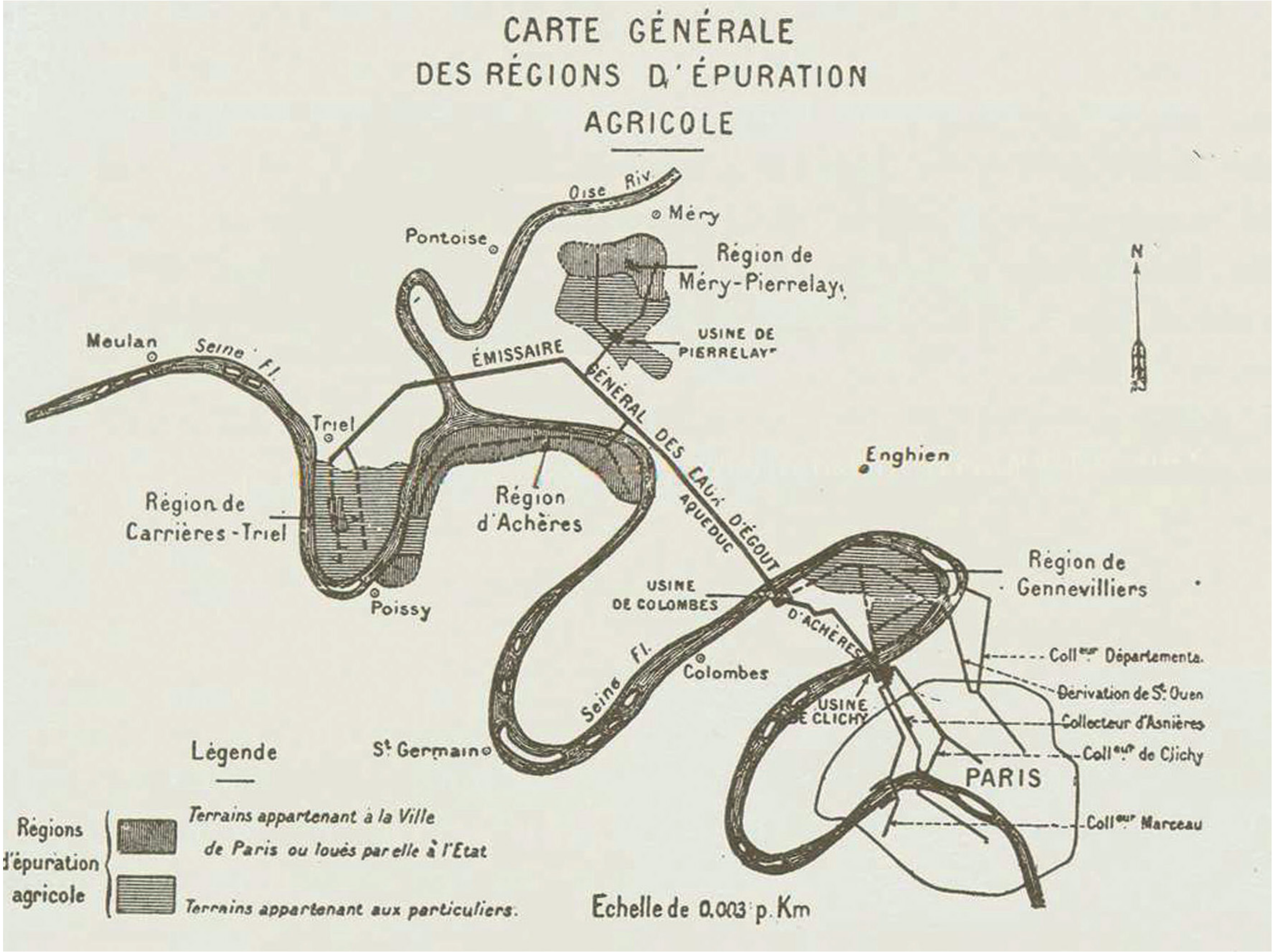
CARTE GÉNÉRALE
DES RÉGIONS D'ÉPURATION
AGRICOLE
Oise Riv.
Méry
Pontoise
Région de
Méry-Pierrelaye
USINE DE
PIERRELAYE
Meulan
Seine Fl.
ÉMISSAIRE GÉNÉRAL DES EAUX D'ÉGOUT
AQUEDUC D'ACHÈRES
Triel
Région de
Carrières-Triel
Région
d'Achères
Poissy
Enghien
N
USINE
DE COLOMBES
Région de
Gennevilliers
Colombes
Seine Fl.
USINE
DE CLICHY
Coll^eur Départementa.
Dérivation de S^t Ouen
Collecteur d'Asnières
Coll^eur de Clichy
PARIS
Coll^eur Marceau
S^t Germain
Légende
Régions
d'épuration
agricole
Terrains appartenant à la Ville
de Paris ou loués par elle à l'Etat
Terrains appartenant aux particuliers.
Echelle de 0,003 p. Km

Figure 3: Paris main sewer system and sewage farms at the beginning of the 20th century (Gerards, 1907).Source: Barles (2007).

Therefore, understanding "landscape as infrastructure" implies the search for a balanced interaction between infrastructural systems and natural systems, using ecology as an integrative discipline of the various systemic components, for the creation of new public spaces which are "projective ecologies" (Reed, Lister, 2013, Bélanger, 2017), in other words, a *«hybrid of nature and culture, capable of creating surprising and unprecedented collaborations»* (Reed, Lister, 2013, p.19).

A recent *Landscape Infrastructure* project which clearly exemplifies the conception of landscape as infrastructure is the "Garraf Park"[179] of Vall d'En Joan (in the municipalities of Begues and Gavà, in the county of Baix Llobregat, in the Municipal borders of the City of Barcelona), whose first completed section (Zone 4) was built by the agronomist and engineer Teresa Galì-Izard and Batlle Y Roig Arquitectes (Fig.4).

The operational field is the Vall D'En Joan, a 60-hectare cleft in the heart of the Garraf Natural Park, one of the protected forest parks of Catalonia, used since 1974 to 2006 as an illegal landfill site for solid urban waste, which Barcelona Metropolitan Government wanted to close and integrate with the natural landscape of the surroundings, transforming the new dump into a public space (Enttat de Med Ambent de Area Metropotana de Barceona, 2007).

The multidisciplinary technical team that carried out the restoration brought knowledge to this single intervention from several different disciplines (environmental engineering, geology, landscape architecture and agronomy) to create this new place and drew up the project through a set of transformative interventions: sealing the former landfill with a technological scheme compatible with the noticeable slope of the valley and introducing vegetation species suitable for the new soil and compatible with the surrounding habitat, thus enabling the spontaneous repopulation of the local fauna and flora.

In order to achieve these objectives, invasive and highly waterproof structures typical of environmental engineering were rejected out of hand in favour of more sustainable technologies, using the traditional technique of agricultural terracing used by the local shepherds and peasants, thus restoring local identity to the place. The restyling of the land was carried out through the creation of a system of terraces connected by paths that, in addition to solving the problem of the steep slope of the valley, are used to regulate the flow of meteoric water, tackling the problems resulting from washouts, and aiming to avoid the infiltration of lixiviates into the aquifer[180].

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[179] The project, started in 2002, continues to be the winner of several awards such as the Prize for the Best European Public Urban Space 2004, the WAF2008 Energy, Waste and Recycling Award and more recently The International Architecture Award 2014. Category "Landscape Architecture Work".

[180] Galì-Izard, 2016, Open Session on Landscape 2016, DIDA, Florence

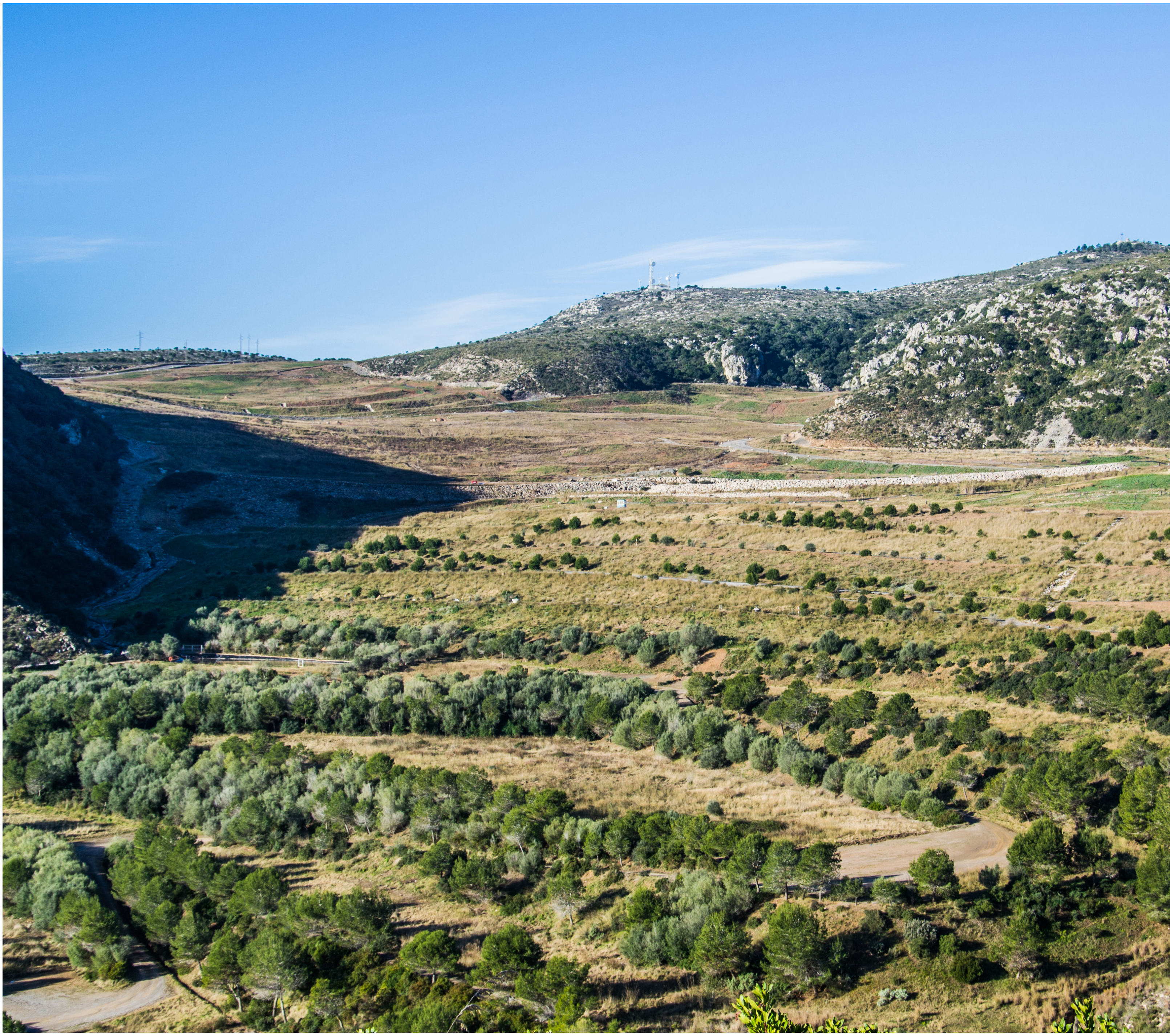
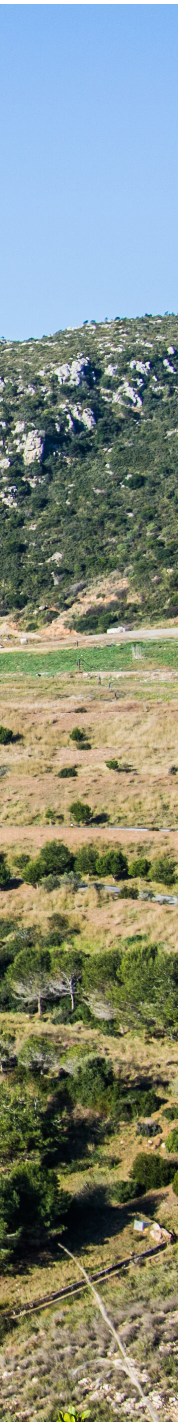


Figure 4: View of the former Val D'En Joan landfill in 2018; In the foreground the section of the park already completed (Zone 4) can be seen, while in the background the areas still undergoing transformation can be seen. Source: Author, February 2018.



Proof that this project meets the criteria to be considered *Landscape Infrastructure* is the fact that the project works both on a superficial level (through the process of re-naturalization of vegetation which follows a time schedule), and on the underground level where 26.6 million tons of solid waste are transformed by a plant (which annually recovers about 38.5 million cubic meters of biogas from anaerobic fermentation of the residual organic fraction) producing 61.6 GWh of electricity[181], planned for run out not before 2050. Teresa Galì Izard, stated that "designing a landscape means designing a "machine" , that is an infrastructure that allows you to change the resources of a place by creating a system of resources that can generate a multipilicity of contexts"[182]. Nevertheless, when completed and opened to the public, the project will give rise to a landscape that is both a place of resource aggregation and public congregation (Brown, 2018).

"Pierre Bélanger, in light of the acknowledgement of the two facets of meaning that *Landscape Infrastructure* design holds, advanced two possible answers to the questions arising through the chiasmus of the two terms:

Seeing **Infrastructure as Landscape** implies «*considering the non-biologic, non-dynamic and non-adaptive material of infrastructure as a constructed landscape and lived experience*» (Bélanger, 2016a, p.193). Conceiving infrastructure as landscape enriches infrastructure by engaging the social and imaginative dimensions, while the ecological dimensions means it takes on the role of bearers of new functions and biodiversity, implying the idea of a place designed as a result of mixed knowledge and perceptions and «*highlighting the significant propensity to the pedestrianization of public spaces*» (Cortesi, 2018, p.10).

On the other hand, seeing **Landscape as Infrastructure** implies the consideration of «*non-mechanical, non-linear and non-stable media of living systems as infrastructure*» (Bélanger, 2016a, p.193), as effective means of shaping the urban environment and regenerating deteriorated landscapes through processes of restoration of ecological processes and integration of the contemporary infrastructure into biophysical systems, reclaiming «*natural processes in public space*» (Cortesi, 2018, p. 10). In this way, landscape becomes a productive mechanism capable of enhancing and generating urban ecological systems, spaces and morphologies; «*the land no longer exists as a landscape feature, but as an architectural design driver for topographical urban infrastructure*» (Castro, Ramirez, Rico, 2013, p.85).

[181] The annual estimated energy needs of the entire metropolitan city of Barcelona

[182] Interview available at : https://www.landscapefirst.it/rubriche/interviews-on-landscape/intervista-a-gali-izard-e-daniela-colafranceschi/. Realised by Marta Buoro in May 2016.

Regarding these two lines of thought in the field of *Landscape Infrastructure* design, Charles Waldheim stated that "infrastructure as landscape" is an approach that probably extends directly «*from the critical architectural discourse comprising urban landscape projects designed through various automatic methods yielding highly sculpted horizontal surfaces […] representing a clear extension of the neo avant-gardist architectural project*» (Waldheim, 2016a, p. 37).

On the other hand, the design of "landscape as infrastructure" «*invokes the indeterminacy and self-regulation ascribed to natural systems and attempts to transfer these qualities to the instruments of urban collectivity. Typically this involves the employment of ecological models and natural metaphors to describe an urban landscape capable of adapting itself over time to rapidly changing conditions*» (Waldheim, 2016a, p.37).

In addition, James Corner recently argued that these two facets of significance of *Landscape Infrastructure* design stem from two separate Landscape Architecture approaches. "Infrastructure as landscape" derives from «*the typically European concern for the thickness of sites, place and locale, and their parallel concern for the thin design layer as carrying primarily representational content*» (Corner, 2017, p. 134), while "landscape as infrastructure" drew its origins from the «*US based Landscape Urbanist approach that laces the emphasis on the transformative and catalytic effects of that thin layer, especially ecologically in depth and dynamic. The strength of the former is the deep respect accorded to site and place – how it deepens culture through memory, hope and desire; whereas the strength of the latter is the emphasis upon performance – how it deepens through work and productivity, through what it effectively instigates, breeds and produces*» (Corner, 2017, p. 134).

When all is said and done, the infrastructural performances of the landscape in the projects belonging to both lines of thought become the distinctive cultural characteristics on which to base (or rediscover) the *genius loci* of the new landscapes created.

The conceptual background for all the urban interventions listed above is associated both with the implementation of modern infrastructure and with the much broader field of the complex relationship between landscape, infrastructure and sense of place as one of the crucial subjects of discussion of contemporary public space and urban landscape (Stipcic, 2014). In this way the role of designers is essential in reading the stratifications of a place and interpreting the different symbolic dimensions of landscapes in ways which can be readily understood, as well as formulating new aesthetic forms with the use of ecological design.

Such awareness leads us on to the main questions which this research will strive to answer:

By which methodologies and techniques does the Landscape Infrastructure project give rise to highly stratified and consolidated urban environments such as those in Europe?

Are there techniques, tools and design methods that unite and/or differentiate the two types? If so, which ones?

What processes must be activated to ensure that the action of landscape transformation and/or recovery enriches the identifying factors of the place?

What processes and planning strategies trigger and are triggered by the two design types?

3.3 Selection of Case Studies

The subject of the study is the emerging practice of landscape design, which aims to provide operational solutions using an interdisciplinary approach and a systemic vision of the functioning of the urban environment, going by the name of *Landscape Infrastructure*.

The aim of the investigation is to give an answer to the following question:
With which processes and operational tools can interventions of urban transformation attributable to the design typology of Landscape Infrastructure generate new landscape identities through the interaction of the various infrastructural (urban), cultural and environmental components?

In order to provide answers to this question the method of "multiple, instrumental" case studies has been chosen, meaning that the selected projects are deliberately different from one another to enable exploration of the differences both within and between the cases.

Sampling approach

The sampling of the case studies is of *purposiv*e type (Swaffield, 2011), seeking out the data expected to be most helpful in addressing the research question. The research makes use of the processes and practices reported in paragraph 3.1 of this work as the sampling method for the case studies. The *Landscape Infrastructure* projects taken into consideration for the selection had to be contingent on the following points[183]:

1 Flexibility, Adaptability and Prefiguration:
Consisting of an increase in land uses; promoting and reinforcing the viability and versatility of space, possibly encouraging the creation of new public spaces; adopting flexible and porous formats of construction that favour ecological systems; installing localised sustainable urban drainage system solutions and management, as well as favouring local-scale renewable energy generation; enhancing biodiversity and the restoration of native habitats; providing a detailed maintenance program over time for the future maintenance of the project; structuring a program of possible future implementations of the project.

2 Synergies of Hard and Soft Infrastructure:
Consisting of the reintegration of ecological flows with engineered infrastructure through the reclamation of biophysical processes; considering historical and contemporary structures as equally valuable stimulating their co-existence; re-using existing structures and resources to maximise a return on the budget and reinforce the identity of a place.

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[183] See paragraph 3.1 of this chapter.

3 Interdisciplinarity and Cross-collaborations:
Consisting of the adoption of an interdisciplinary method of design; emphasizing communication as the structuring factor of the project through public participation processes and developing pedagogical aspects of the project; creation of new "zero impact" economic and commercial activities; reducing social and environmental degradation; favouring the creation of new forms of collaboration between public and private stakeholders.

4 Multiplicity of Speeds and Connectivity:
Consisting of the accommodation of diverse modes of mobility by way of separation of different speeds of movements; enhancing the connections with public transport systems and cycle paths; creating pedestrian connections and open spaces.

5 Decentralization and Multifunctionality through different scales:
Consisting of the creation and/or restoration of links with other open spaces; favouring the multifunctional use of the infrastructural object of transformation; improving the ecological networks forming part of Urban Green (and Blue) Infrastructure or triggering its creation and adoption; favouring the mitigation of the effects of climate change.

In addition, having ascertained in paragraph 3.2 that in the field of the design of *Landscape Infrastructure* two facets of meaning are recognizable, the projects considered for the selection of the case studies must pertain to two different categories of *Landscape Infrastructure* projects, namely:

a) **Infrastructure as Landscape (I.a.L.)** as the category of *Landscape Infrastructure* projects that consider the *non-biologic, non-dynamic and non-adaptive material of infrastructure as a constructed landscape and lived experience.* The projects taken into consideration for this category will be chosen because they consist of interventions related to the management of transport and movement flows, increasing pedestrian and car-free mobility together with the creation of a significant amount of new public space, and increasing local biodiversity.

b) **Landscape as Infrastructure (L.a.I.)** as the category of *Landscape Infrastructure* projects that consider the *non-mechanical, non-linear and non-stable media of living systems as infrastructure.* The projects taken into consideration for this category will be chosen because they consist of interventions related to the regeneration of deteriorated landscapes through processes of restoration of ecological processes and integration of the contemporary infrastructure with biophysical systems, , together with the creation of new land morphologies and public spaces.

This interpretive strategy for the two different *Landscape Infrastructure Typologies* sits between the objectivist and subjectivist positions, placing itself in the broad spectrum of *Design Research*[184], in which the research and the project exchange knowledge, as the survey is conducted on the "finished product", with the aim of enriching the theory and identifying the methods and design tools of *Landscape Infrastructure*, making it the object of the study as well as the research method.

Further criteria for sampling of the case studies are:

The geographical location: **Europe**
European cities, owing to their historical origins and size, are made up of a generally more compact and highly stratified structure, both from the cultural point of view and from that of the physical infrastructural components. Therefore, in the context of this research, this choice will facilitate the emergence of significant aspects related to design techniques and tools of interpretation, reading and transformation of very complex and stratified environments over time, in relation above all to their identity factor.

The period of realization: **the last 15 years (2003-2018)**
All the projects taken into consideration must have already been completed, placing the investigation on the spectrum of *Design Research* (Swaffield, 2011).

Scale: **urban scale;** all the projects taken into consideration (Fig.1) relate to urban and peri-urban environments (within the administrative boundaries of a European city).

The projects identified for the sampling process for the *Landscape Infrastructure* typology of **I.a.L**. are:

- **Hafen City Public Spaces** (2002-2014, Hamburg, Germany)
  Carried out by: Miralles Tagliabue EMBT, WES & Partner Landschaftsarchitekten, Körting Ingenieure, WTM Ingenieure.
- **Madrid Rio** (2006-2011, Madrid, Spain)
  Carried out by: Burgos & Garrido arquitectos, Porras La Casta arquitectos, Rubio A.Sala arquitectos, West 8
- **Sishane Park** (2010-2014, Sishane, Beyoglu-Istanbul, Turkey)
  Carried out by: SANAlarc, Arzu Nuhoğlu
- **Barranco de Santos** (2002-2010, Santa Cruz de Tenerife, Spain)
  Carried out by: Palerm & Tabares De Nava Arquitectos **François Mitterand Strip** (2012-2015, Rennes, France)
  Carried out by: Mutabilis Paysage et Urbanisme, Y ingegnierie, Agence ON
- **Rambla de Sants** (2002-2017, Barcelona, Spain), Carried out by: Sergi Godia and Ana Molino.

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[184] Frayling (1993), Lunenfeld (2003), Steenbergen (2008), Deming, Swaffield (2011).

The projects identified for the sampling process for the Landscape Infrastructure typology of L.a.I. are:

- **Queen Elizabeth Olympic Park** (2008-2012, London, England) Carried out by: Hargreaves Associates, LDA Design, Sarah Price, Peter Shepard, Nigel Dunnet and James Hitchmough.
- **Chemin de l'Ile Park** (2003-2006, Nanterre, France) Carried out by: Mutabilis Paysage et Urbanisme, Guillaume Geoffroy Dechaume, Gilles Clément, Chemetov et Huidobro C+H+ Architecture, Atelier Cépage, Mizrahi.
- **Laasby Sea Park** (2013-2016, Laasby, Denmark) Carried out by: LABLAND architects ApS, EnviDan A/S, Viggo Madsen A/S
- **Walthamstow Wetlands** (2013-2017, London, England) Carried out by: Kinnear Landscape Architects, Witherford Watson Mann architect
- **Park of The Docks** (2010-2013, Saint Ouen, France) Carried out by: Agence Ter, BERIM, Coup d'Éclat, ISL.
- **Presq'Ile Rollet Park** (2009- 2013, Petit-Quévilly et Rouen, Seine-Maritime, France) Carried out by: Atelier Jacqueline Osty, ATTICA, EGIS, BURGEAP, Michel Boulcourt.

After identifying the projects suitable for the analysis, in support of this phase, the matrix in Figure 2 has been used to select multiple instrumental case studies, thus subdividing them by *Landscape Infrastructure* typology, a technique "which is considered particularly helpful to compare and learn across projects" (Francis, 2001). Each of the projects taken into consideration have been assigned scores relative to each of the items shown in the axis of the ordinates of the matrix.

In order to demonstrate the substantial difference between a Landscape Infrastructure project and the most commonly called "green urban infrastructure" planning strategy and at the same time to verify that the design practice object of this reasearch can give life or stimulate the creation of sustainable large-scale urban strategies, it has been considered necessary, for both categories of investigation (Infrastructure as Landscape, Landscape as Infrastructure), to select on one hand projects that after their realization triggered further sustainable large scale planning strategies, and on the other hand projects that were already an integral part of sustainable transformation strategies that affects the metropolitan scale.

With the on-site visit of the projects and through the analysis and study of the documents related to the projects taken into consideration it was possible to attribute a score, referring to the 5 principles a Landscape Infrastructure project must be contingent, identified in paragraph 3.1 of this research. Further criteria on which the selection of the case studies was based are the state of management and conservation of the interventions after their realization, the complete opening to public of the areas of intervention, decisive factor for the observations made during the visit to the project areas.

The score is shown through a maximum of three points to a minimum of one point. The projects with the highest total score are the ones selected for the investigation.

Data Collection

A total of four different *Landscape Infrastructure* projects were selected, two of which are considered relevant in the context of **Infrastructure as Landscape** (Madrid Rio, François Mitterand Strip) and two others in the context of **Landscape as Infrastructure** (Chemin de l'Ile Park, Walthamstow Wetlands). Each case study is analysed with reference to an "observable canvas" (reported at p. 130 of this paragraph) structured in the form of a dossier, containing the data necessary to obtain the required information. The areas of investigation listed in the dossiers are structured in such a way as to provide information regarding the application solutions used and the emerging aspects related to the governance of the territories being transformed, as well as highlighting which tools and methods informed the design process and the desired synergistic interrelationship between abiotic and biotic infrastructure.

The results of the survey are reported in narrative form, describing the identity and character of the new landscapes, dividing the information obtained into sections referring both to the grammatical aspects of the project, as a meaningful source of information about the reading of the complex landscape that was object of the design, and to the poetical and pedagogical ones. Each analysis dossier contains, together with the narration, photographs, plans and other graphic material, which form an integral part of the case study investigation. In support of each of the dossiers, semi-structured interviews were carried out with the designers who guided these transformative processes, in order to outline more precisely which principles guided the methodological process behind each of the projects in analysis.

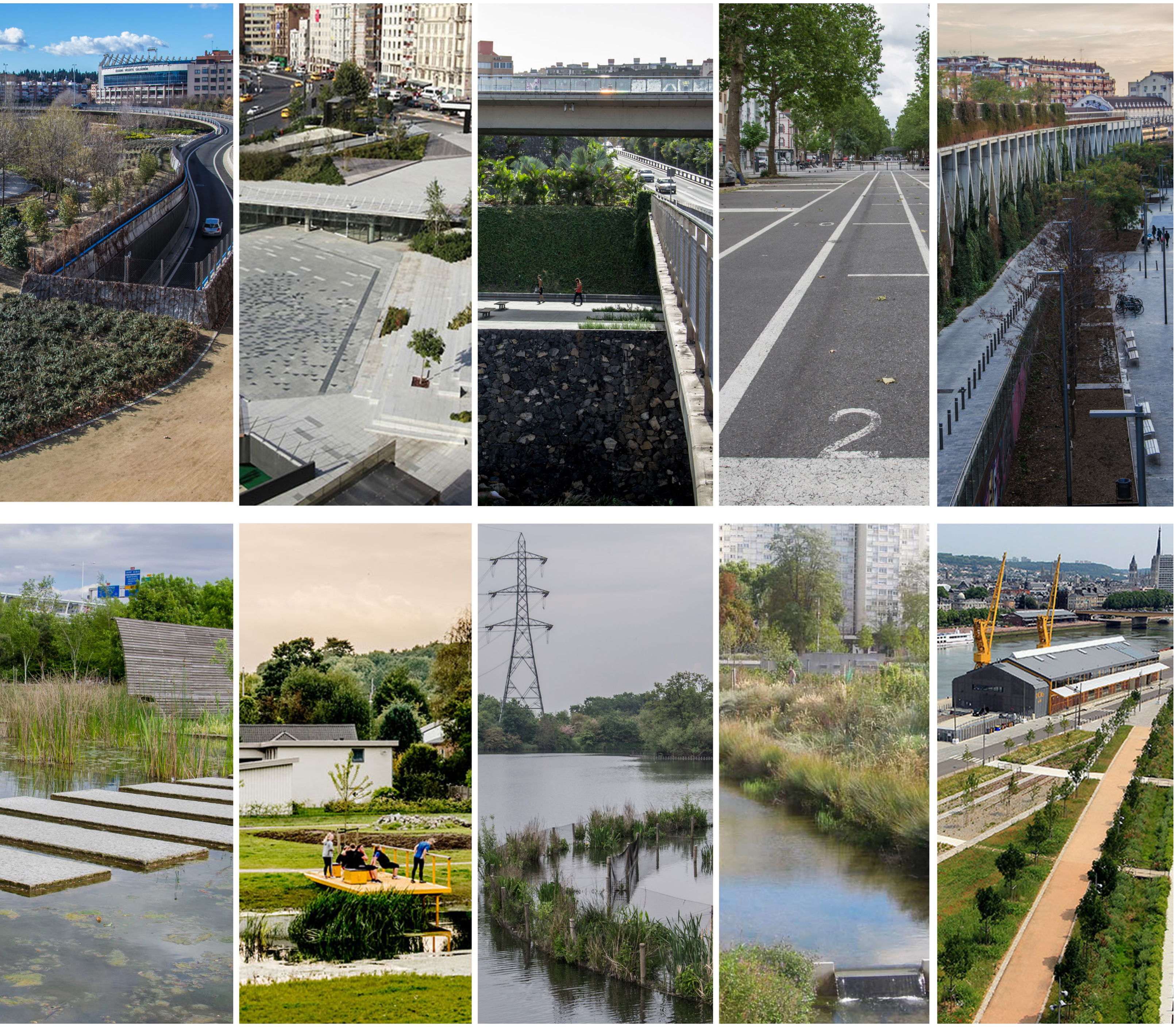
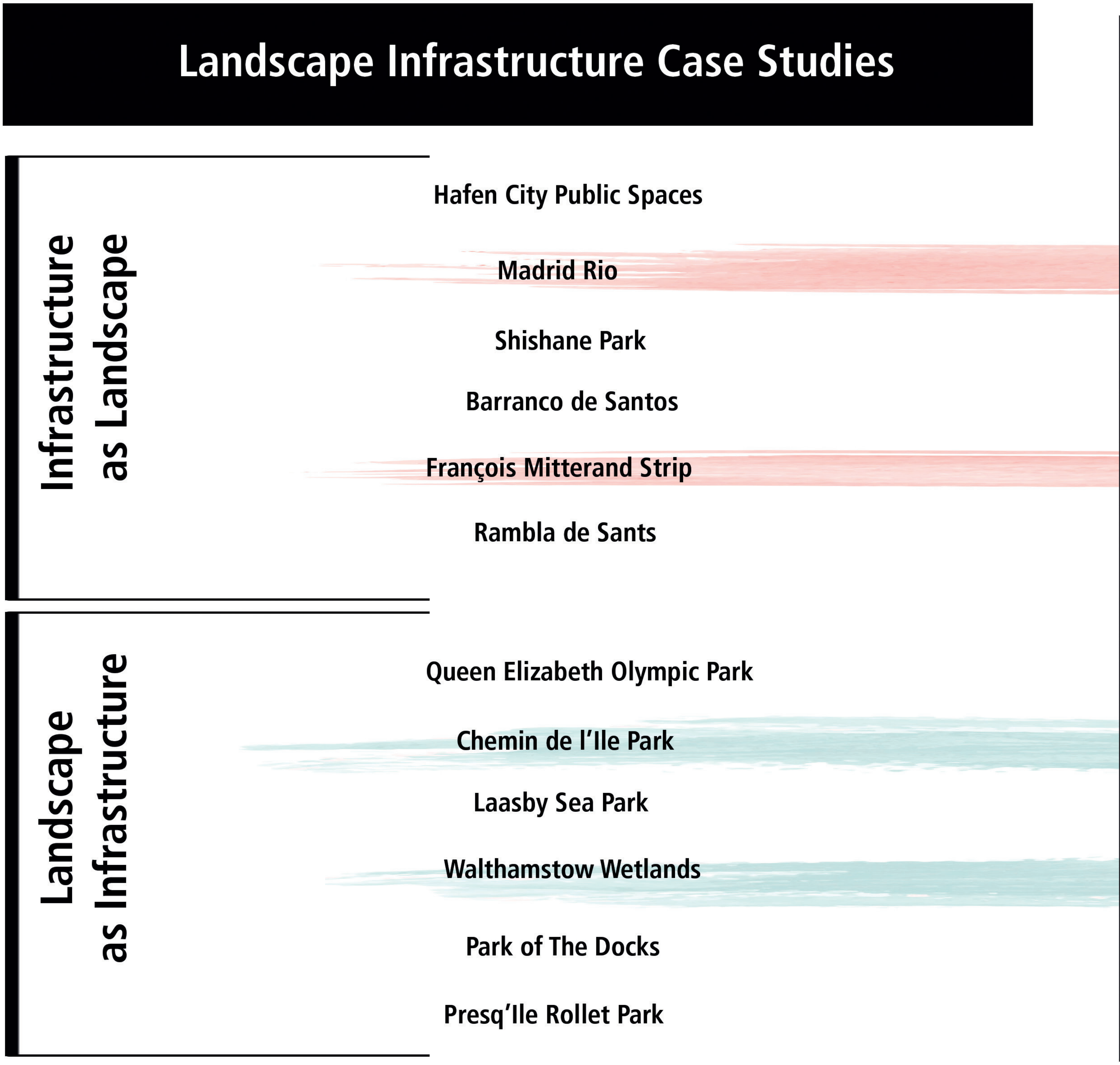


Figure 1: Top: images of the projects selected for the context of Infrastructure as Landscape. Bottom: images of the projects selected for the context of Landscape as Infrastructure. The order of the images corresponds to the list in the text.



Landscape Infrastructure Case Studies

Infrastructure as Landscape

- Hafen City Public Spaces
- Madrid Rio
- Shishane Park
- Barranco de Santos
- François Mitterand Strip
- Rambla de Sants

Landscape as Infrastructure

- Queen Elizabeth Olympic Park
- Chemin de l'Ile Park
- Laasby Sea Park
- Walthamstow Wetlands
- Park of The Docks
- Presq'Ile Rollet Park

Figure 2: Matrix evaluation for the selection of case studies; The projects underlined in green are the case studies selected for the investigation

Flexibility Adaptability Prefiguration	Synergies of Hard and Soft Infrastructure	Interdisciplinarity Cross-collaborations	Multiplicity of Speeds Connectivity	Decentralization Multifunctionality
●●	●	●●	●●	●
●●●	●●●	●●●	●●●	●●●
●●	●	●	●●	●
●	●●	●	●●	●
●●●	●●	●●●	●●●	●●
●	●●	●●	●●	●●
●●●	●●●	●●●	●●	●●●
●●●	●●●	●●●	●●●	●●●
●●	●●	●●	●●	●●
●●●	●●●	●●●	●●●	●●●
●●	●●	●●	●●	●
●●●	●●●	●●●	●●	●●

CASE STUDY DOSSIER

Name of the project

Project location

Period of Design /Planned Construction /Completion

Costs: Initial budget? Final cost? If there are any differences, why?

Scale: Project scale? Dimension of structural elements? Amount of site coverage and impervious surface?

Role of key participants: Landscape architect? Other professionals? Client? Users? What is the nature of the team? Who leads the team? Their role in beginning of project? How has this changed during course of project?

Consultants

Method of assigningment of the project: Competition? Direct commissioning? Tender?

Site analysis

Historical and cultural context

Design process, development and decision making: Political process? Decision making process? Design process? Implementation Process? Who influences a project's decisions and outcomes? Why? How does project come together? What are the key objectives (social, ecological, aesthetic, structural)? Do the objectives change during the course of the realization of the project? If so, how?

Problem definition and response: What problem(s) is the project trying to solve? Was it solved? If so, how? If not, why not? Were other problems solved?

Program elements: How was program developed? Who developed it? Was it modified during course of project?

Maintenance and management: Problems of management and maintenance? Maintenance costs? Perception of project by space managers?

Plans, Pictures and site visit: How does the project look like? How does it work?

Perception and meaning: How was the place perceived e before and after the operation?

Environmental sensitivity and ecological impact: How does the environment benefits from this project? Contribution to sustainability?

Infrastructure: Underlying challenges of site? Technology constraints? Use of hard grey infrastructure?

Meaning and uniqueness of the project: Unique constraints, how were they tackled? What services does the project provide to the community? Social impact? multifunctionality and adaptability?

Theoretical underpinning: Why project was done? Question(s) it is trying to answer? Problem(s) it is trying to solve?

Outside critiques: By awards jury? Experts? Users? Review committees? Design critics? Journalistic reporting? Has there been any controversy associated with the project?

Interview with the authors

The questions to be answered by analysing the case studies are the following:

By which methodologies and techniques does the Landscape Infrastructure project give rise to highly stratified and consolidated urban environments such as those in Europe?

What paradigmatic meanings underlie the two types?

Are there techniques, tools and design methods that unite and or differentiate the two types? If so, which ones?

What processes must be activated to ensure that the action of landscape transformation and/or recovery enriches the identifying factors of the place?

What processes and planning strategies trigger and are triggered by the two design types?

Does Landscape Infrastructure design derive from the strategic planning of Green Infrastructure or vice versa?

3.4 INFRASTRUCTURE AS LANDSCAPE

Case Studies

Madrid Rio

François Mitterand Strip

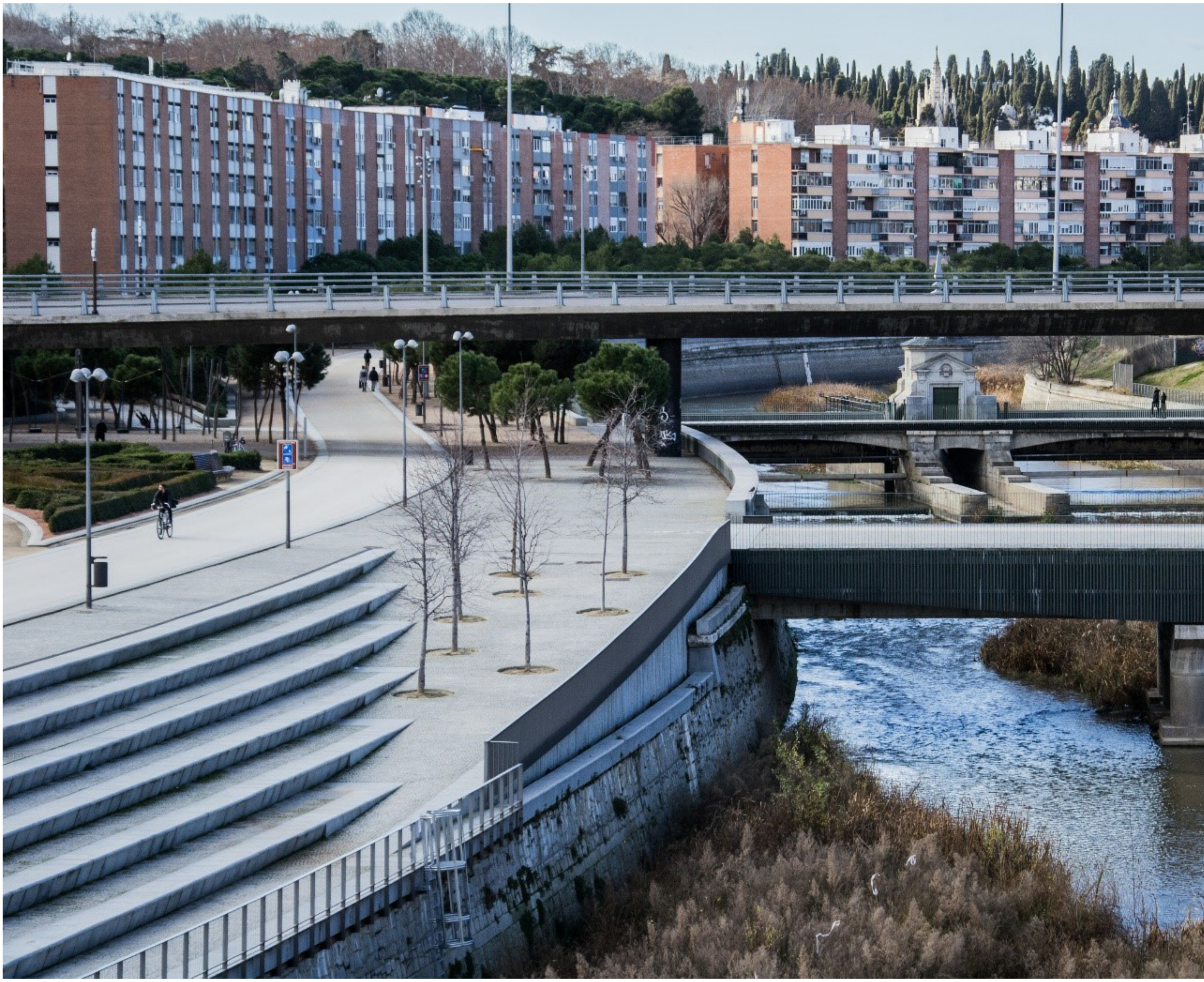


Figure 1: View of Madrid Rio. Source: Author, January 2018.

MADRID RIO

PROJECT DATA

Location:

Madrid, Spain.

Client:

Ayuntamento de Madrid.

Cost:

Estimate for the work on the surface: € 400 million

Final cost: € 4,000 million

Design Period:

2003 publication of the "Plan de Reabilitacion del Entorno del rio Manzanares".

2006-2008 development of the

"Plan Especial"

2006-2011 elaboration of urbanization projects (drafts drawn up: 39)

Construction Period:

2004-2007 Realization of the "Calle30" project;

2005 two-stage ideas competition organized by the Municipality of Madrid;

2006 -2011 completion of works;

Scale:

Masterplan: 70.000 ha

Plan Especial del Rio Manzanares,

Madrid Rio:

Total surface: 138 ha

(50 ha above the tunnels)

Park Surface: 118 ha

Length of the Park: 6.70 km

Other Surfaces: 10 ha

Length of the Tunnels: 30 km

Length of Pedestrian and Cycle paths: 10km

Newly created Bridges and Footbridges: 12

Reclaimed Dams: 7

Reclaimed Bridges: 1

Restored Bridges: 5

Expanded Bridges: 2

Planted Trees: 33.500

Planted Bushes: 460.000

Newly created sports facilities: 8

Restored Sports Facilities: 2

Play areas: 15

"Bio-health" circuits: 2

Newly created Ornamental Fountains: 24

Restored Fountains: 1

Newly created Buildings: 12

Neighborhoods affected by the project: Moncloa-Aravaca, La Latina, Centro, Arganzuela, Carabanchel, Usera.

Designers:

Burgos & Garrido Arquitectos,

Porras La Casta Arquitectos,

Rubio & Álvarez-Sala Arquitectos,

West8 Urban Design & Landscape Architecture.

Director of Design Teams:

Ginés Garrido.

Architectural Project Manager: Javier Malo de Molina;

Madrid Design Team:

two groups of 37 and 31 members

Landscape Project Manager: Christian Dobrick;

Rotterdam Design Team:

19 members

Consultants: 28 companies

Construction companies: 44

SITE ANALYSIS

Geographical Context

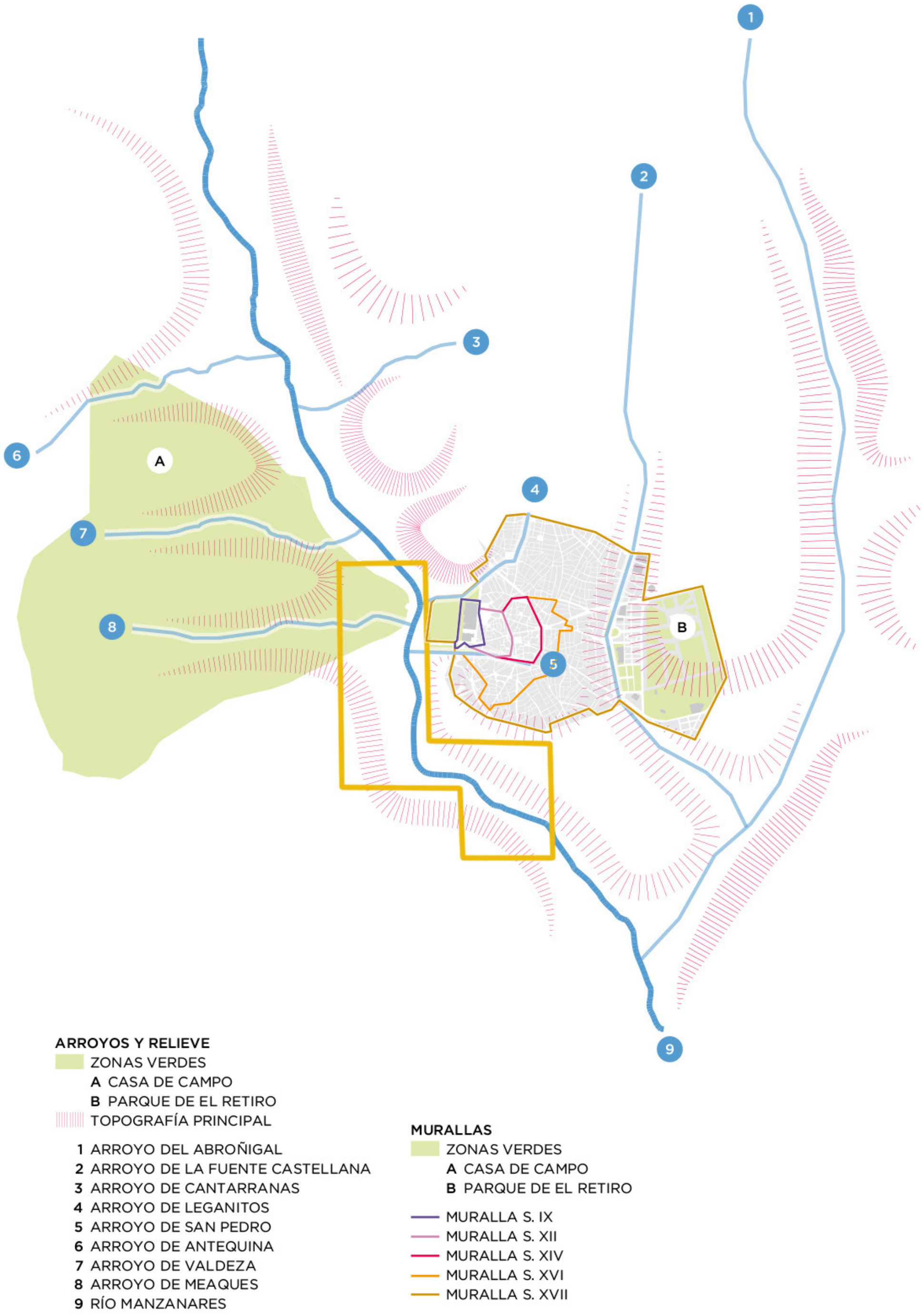
The project area is located south-west of the city of Madrid and affects the river Manzanares for about a tenth of its longitude (Fig.2). The river runs through the region of Madrid for 69 km, rising on the Guadarrama mountain range at 2,258 m asl and flowing into the Jarama river, in the south of Madrid province, at 527 meters above sea level, crossing "all the landmarks in the geography of Madrid" (Burgos, Garrido, Porras-Isla, 2014).

The segment of the river subject to transformation once collected numerous tributaries that influenced the configuration of the city and its infrastructures, facilitating their positioning in the flat areas of its bed. The Manzanares flows between the two highest elevations of the urban area of Madrid and has an asymmetrical section: to the west the slope is much more gentle, while to the east it is much steeper and characterized by escarpments dug out by seasonal streams due to its typically Mediterranean nature; it has low water flows for most of the year (1,200 l/s), but is characterized by sporadic heavy flooding events.

Outside the city, the Manzanares River intersects with protected areas from its spring up to the Prado dam and from its lower basin to the confluence with the Jarama River. The southern section of its flow collects water from the mountains, thus functioning as a drainage system for the surrounding areas (Saez Chamorro, 2012). From an ecological and environmental point of view, as soon as the river reaches urbanized settlements and as the land becomes less permeable, a strong loss of biodiversity and high rates of pollution are visible (Enguita Puebla, 1999).

Historical Context

From the philological point of view, Madrid means "Mother of Waters", deriving from the Latin term matricem, evolving into matric in Andalusian and then into macrit in Mozarabic (L. Fernandez-Galliano, 2014).Due to the strategic position of the reliefs, surrounded by watercourses, the area along the waterway was the most suitable one for the first human settlements after the Paleolithic period. In the ninth century, on one of the escarpments to the east of the flow of the Manzanares, the Arab fortress "Mayrit" was built (Fig. 2). According to the Spanish Historian Fernando Chueca Goitia, the structure of Madrid is typical of that of a coastal city, where the coast (or the border of growth) consists of the banks of the river Manzanares (Enguita Puebla, 1999). The river was also an important factor in the defence of the city during the civil war, acting as a protective barrier for the population (Saez Chamorro, 2012).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A
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ARROYOS Y RELIEVE
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A CASA DE CAMPO
B PARQUE DE EL RETIRO
TOPOGRAFÍA PRINCIPAL
1 ARROYO DEL ABROÑIGAL
2 ARROYO DE LA FUENTE CASTELLANA
3 ARROYO DE CANTARRANAS
4 ARROYO DE LEGANITOS
5 ARROYO DE SAN PEDRO
6 ARROYO DE ANTEQUINA
7 ARROYO DE VALDEZA
8 ARROYO DE MEAQUES
9 RÍO MANZANARES
MURALLAS
🟩 ZONAS VERDES
A CASA DE CAMPO
B PARQUE DE EL RETIRO
MURALLA S. IX
MURALLA S. XII
MURALLA S. XIV
MURALLA S. XVI
MURALLA S. XVII

Figure 2: Analysis of hydrography, reliefs and graphic representation of the expansion of the city walls over the centuries; Legend: green areas are represented in green (A Casa de Campos, B Retiro Park), the historic centre of Madrid is represented in grey, the main topography in red, the project area of the competition for ideas in orange, and the Manzanares river and its tributaries are represented in blue. The orange perimenter represents the project area; Other coloured lines represent the expansion over centurires of the city of Madrid Source: Courtesy of the Authors of the project .

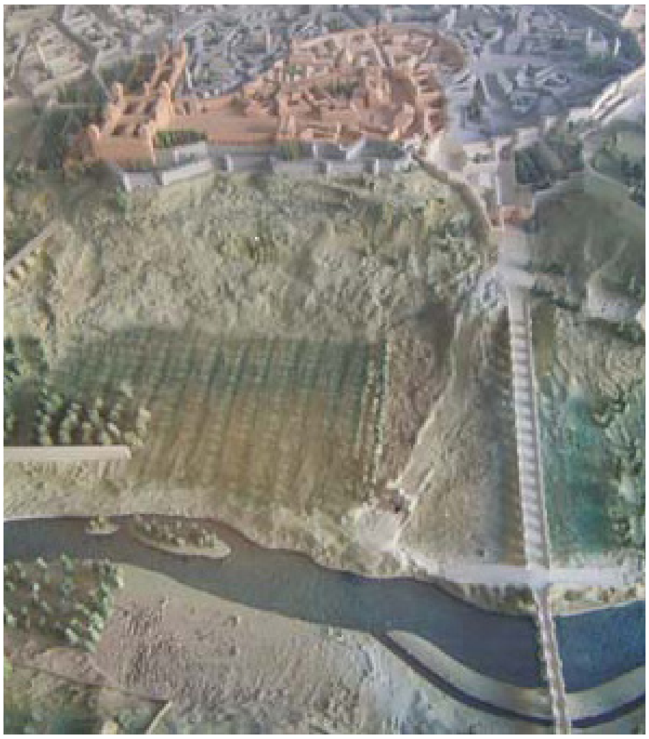


Figure 3b: Model depicting the urbandevelopment of Madrid from the ninth to the nineteenth century, in red is noticeable the Islamic bridgehouse "Mayrit" (IX century) and the subsequent expansion (in grey) in the opposite direction to the course of the Manzanares River can be seen; Source: Author, picture taken at the exhibition "Las Murallas de Madrid", held in San Isidro Museum, Madrid, August 2014.

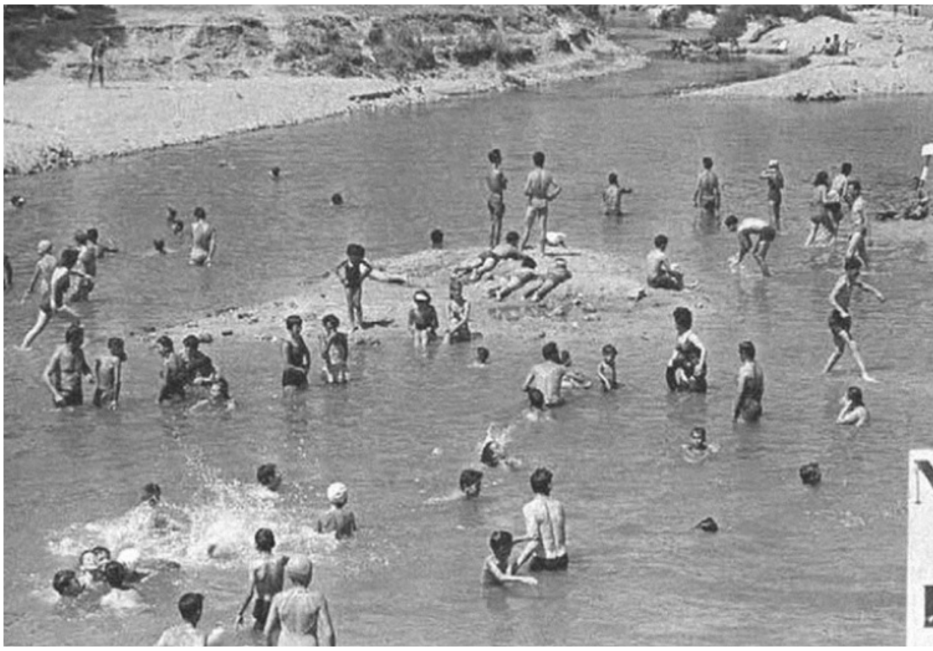


Figure 4: People bathing in the Manzanares river, "Public Laundry in Calle Galileo", 1925. Source: Madrid Antiguo.com

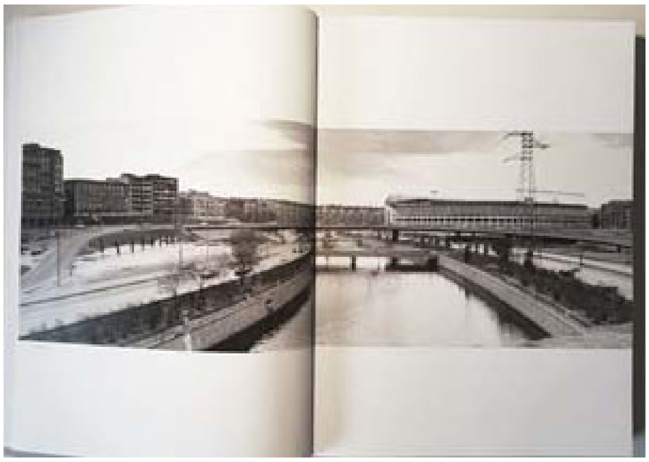


Figure 5: The river Manzanares and the M30, in the area of the "Vicente Calderon" stadium in 1989. Source: Burgos, Garrido, Porras-Isla, 2014.

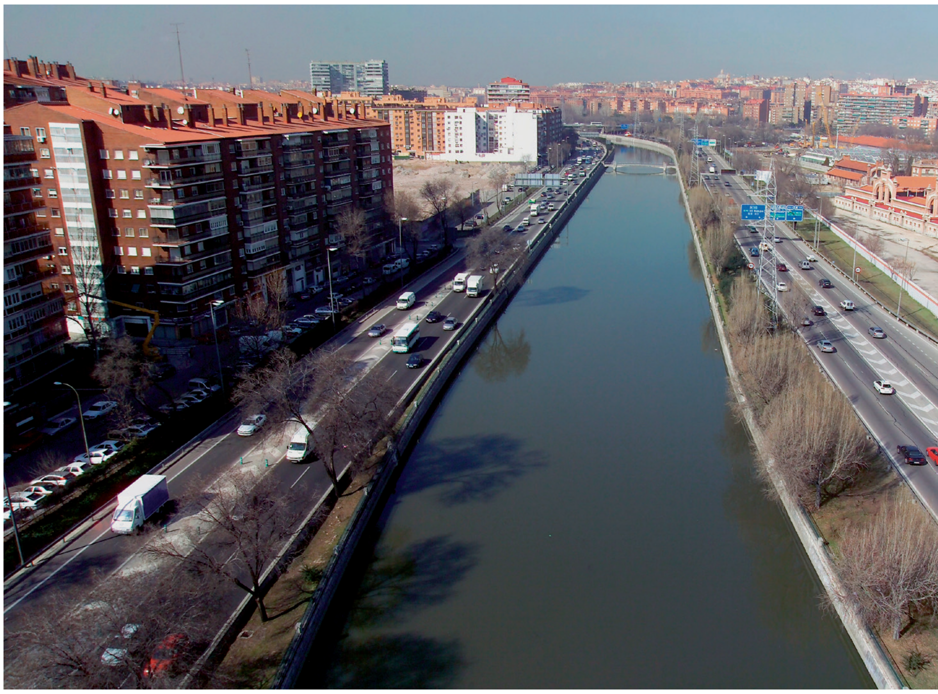
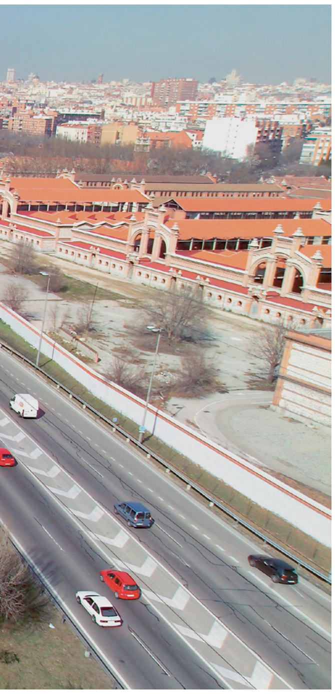


Figure 5a: View of the motorway heading north and of the "Matadero" on its eastern edge, the picture was taken at the beginning of 2000s. Source: ©Madrid City Council.

O BAÑARSE
ZONA
PELIGROSA



The importance of the waterway for urban development is marked by the presence of historical bridges such as the Puente de Segovia (1582), the oldest in Madrid, the Puente de Toledo (1684) and the Puente del Rey (1816). Over the centuries, the city grew increasingly in the opposite direction to the course of the Manzanares river. Only from the time of the Second Industrial Revolution, with the Castro Ordering Plan of 1845 and the subsequent demolition of the city walls along the northern bank of the river due to the creation of a circular railway line on its east bank that would guarantee connectivity, did a chaotic process of construction, especially of productive buildings begin (Burgos, Garrido, Porras-Isla, 2014).

Between 1914 and 1925 (Fig.4) the first works of canalization of the Manzanares river were carried out with the aim of creating flood defences, and from that moment several unrealised schemes were put forward which focused on the recovery of the Manzanares banks as a linear park integrated with the railway infrastructure. In 1925, Balbuena proposed the creation of an American Parkway-style linear park along the river banks. The Urban Planner Bidagor, in 1941, suggested that the Manzanares should take on the characteristics of a "green core", a centre of synthesis of, and connection to, the regional landscape of Madrid.

In 1943, following the Plan drawn up by the Engineer Carlos Mendoza, further works of canalization and regulation of the water flow of the urban stretch of the river were carried out, allowing for parcellation and construction along its banks (Fig. 5). Industrial development and the siting of businesses and offices in the city centre in place of the residential fabric followed a huge residential sprawl of urban suburbs (Fig. 5a and 5b), especially in areas along the river, which, in a short time, became an *«alien canal to the city»* (Burgos, Garrido, Porras-Isla, 2014, p.28). With the approval of the Plan for the Madrid Arterial Network, in 1974, work began on the construction of the M30 motorway in the south-western area of the city, positioning the road axes above the river bed and its streams (Fig. 5c). The creation of the motorway marks a turning point in the history of the river by fencing off its banks as an area exclusive to road traffic, making pedestrian communication between the two sides of the Manzanares river virtually impossible.

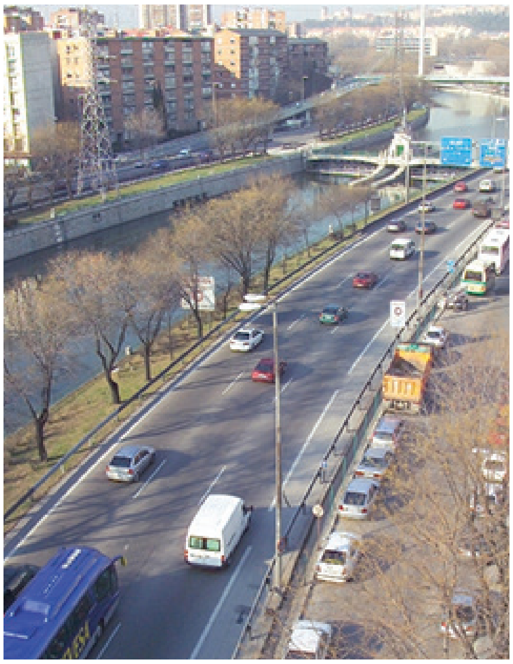


Figure 5b: View of the M30 heading south, passing the Dam n. 6 on the Manzanares river. Source: ©Madrid City Council.

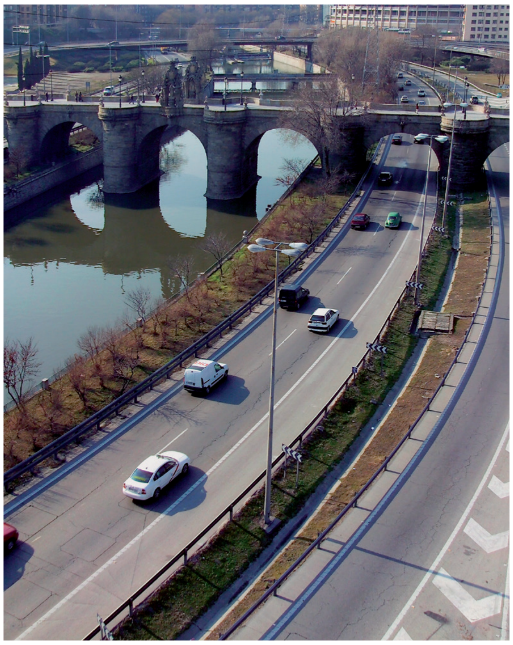


Figure 5c: Aerial view of the passage of the M30 under the Toledo Bridge before the intervention. Source: ©Madrid City Council.

In the last century, further urban development had a negative impact on the environment of the Manzanares basin, causing changes in land use around the river for urban services (*Grupo de Investigacion del Parque Lineal*).

The river went back to being a physical barrier, but this time between two radically different urban conditions: in the east the consolidated "central almond"[185], in the west the poorest neighbourhoods of the city, outside the ring road, with problems of "instability" related to a high crime rate and lack of entrepreneurial activity (Ramos, 2011).

Soon, due to the growth of the city and the increase in private transport, the motorway network became obsolete, being characterized by intense traffic jams and an incremental increase in accident rates in addition to the serious problems from the hydrogeological, environmental, point of view (Brown et al., 2009).

DESIGN, DEVELOPMENT AND DECISION-MAKING PROCESS

The great political consensus obtained by the municipal administration played a fundamental role in the realization of the Madrid Rio project, as the Planning Strategy (PGOUM 97) in force in 2003 (Fig. 6) did not foresee any possibility for implementation of the main uses for the area, with the sole exception of a "non-binding condition the possible modification of the road network, in some sectors of the M30, to eliminate negative impacts" (PGOUM 97); a decidedly ambiguous delineation of permitted transformative works.

The 2003-2007 legislature of the *Ayuntamiento de Madrid*, led by the presidency of Esperanza Aguirre (President of the Autonomous Community of Madrid) and the Mayor Roberto Ruiz Gallardon, published the "Plan de Rehabilitacion del Entorno del Rio Manzanares" in 2003, undertaking an ambitious project divided into two phases:

the first regarding the renewal of the ring road through the creation of 97 km of new carriageways and the burial of part of the M30 highway in a tunnel, going by the name of "by-pass sur", one of the longest of its kind in Europe and in the world (Bullivant, 2012); the second related to a competition for schemes for the transformation of the urban surface, whose winners were to be in charge of drafting and implementing the "Special Plan for the Rio Manzanares" published in 2008.

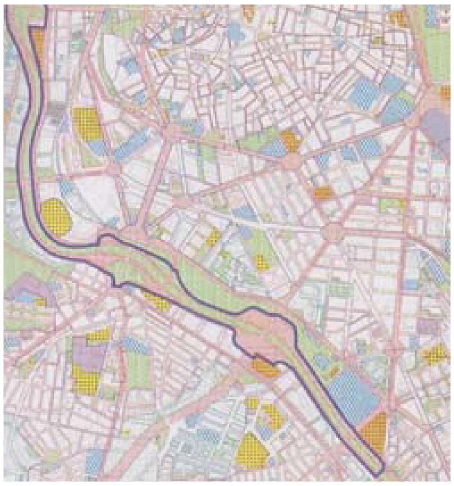


Figure 6: Extract from APR.02.10, "Margenes del Rio Manzanares"; In red are represented the areas dedicated to primary circulation, in green are represented the open spaces. Source: PGOUM, 1997.

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[185] The consolidated urban core of Madrid is often referred to as an "almond" because of its shape.

Key objectives of the "Calle 30" project

In order to limit the negative impact of the motorway on the Manzanares River and surrounding neighbourhoods the "Calle30" project was drawn up and included in the "Plan de Reforma y Gestion Integral de la M30" (Ayuntamento de Madrid, 2005). The project involved the burial, at 5 meters of depth, of part of the M30 highway (a total of 30 km of tunnels, of which 6.70 km along the Manzanares river) on both sides of the river, in addition to the renewal of the system of rainwater tanks and collectors along its course, completely replacing the ancient and inadequate water system (Burgos, Garrido, Porras-Isla, 2014), with the aim of drastically reducing atmospheric and acoustic pollution and the number of vehicles that circulated every day on this section of the bypass (Esbjorn, 2013).

Definition and Response to Problems

The first problem to be noticed was that of the management and ownership of the M30 highway, which in Spain, like any infrastructure of its kind, was managed by the *Ministerio de Fomento* (Ministry of Development).

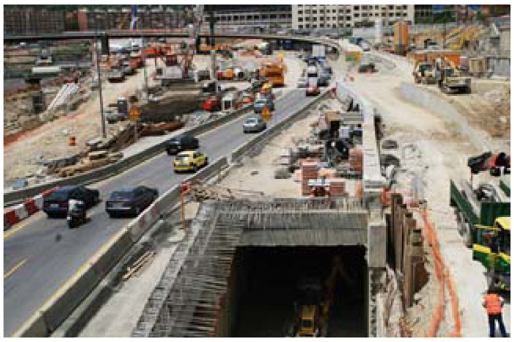


Figure 7: The construction works of the M30 tunnels close to the "Vicente Calderon" stadium, 2006. Source: Reuters, Elconfidencial.net

With the aim of speeding up the administrative procedures to carry out the work of urban transformation in the shortest possible time and eliminate the need to approve environmental reports that would have made it impossible to carry out the works (Burgos, Garrido, Porras-Isla, 2014, p. 50), the *Ayuntamento de Madrid* transferred responsibility for the M30 highway from the Ministry of Development to the Municipality of Madrid. With this action the highway took on the official status of a road (*calle*), thus allowing the City Council to start work in that same year. The operation was planned *«to be carried out using the all at once method»* (Burgos, Garrido, Porras-Isla, 2014, p. 50), thus without interrupting surface traffic, using 4,500 workers, with 8-hour shifts so that the works were not interrupted until the burial of the motorway was completed (Fig.7 and 8).

The Calle30 project was implemented with municipal funds (80%) and through private financing (20%); the amortization of the debt acquired was achieved using tax revenues and with the proceeds from road services. Although many technical aspects of the infrastructural axis were improved, increasing safety and significantly reducing noise and surface pollution, the operation did not in itself represent a change in the mobility model for Madrid. Nevertheless, thanks to this translation operation of the underground mobility system, the river was completely freed up for the first time in 40 years, along with almost 8,000,000,000 square meters of new open spaces (Presentación del Plan Especial Río Manzanares, 23/01/2008).

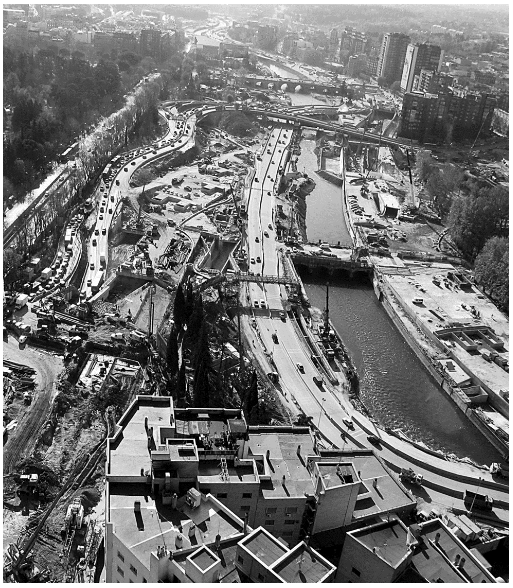


Figure 8: Aerial view of the construction of the tunnels. Source: Courtesy of the authors of the project.

“Manzanares’ Linear Park” Competition

In 2005, the Municipality of Madrid organized a two-stage ideas competition for the urbanization of the of the Manzanares Riverside, establishing a working area greater than that envisaged by the Planning Area APR.02.10; the creation of a linear park was to be localized in the area between the south node of the M30 and the “Puente de los Franceses”. The basic objectives of the competition consisted of four groups of fundamental operations:

1 The treatment of the free surface space resulting from the burial of the highway through the recovery of the riverbanks, in order to increase urban quality by creating continuity between the riversides and expanding the green areas and their connections with the existing network; interconnecting the neighbourhoods affected by the transformation while regenerating the urban plot; enhancing the urban historical, monumental and landscape elements and the river as an axis of articulation for the areas along its path.

2 The study of the system of existing equipment, trying to: create a meeting space that enhances the surface of water; optimize and expand the Matadero and Fruit Market endowment systems; implement the uses of the margins of the river with recreational and sports activities, modifying the routes if necessary; create pedestrian and cycle paths and connect them to existing networks; evaluate the need to change the position of potentially problematic infrastructure services and study the opportunities for transformation of use of significant buildings; enhance the cultural offer of the historic centre; improve the accessibility of the south-west neighbourhoods.

3 The reorganization of surface traffic, even in the perimeter areas, through the containment of the use of private means of transport in favour of public transport and pedestrians; creation of access solutions to tunnels and external auxiliary elements, such as ventilation systems and emergency exits; the study of negative impacts near monuments or green areas; possible introduction of new means of local public transport.

4 Consideration of any opportunities for finding tie-ins with the 2016 Olympic Project; articulation of the elements created in the new system of open spaces; development of viable maintenance and redevelopment measures linked to the rest of the proposal.

The two phases of the competition were structured as follows: the first was international and open to all professionals related to architecture, engineering and urban planning, and ended in July 2005 with the selection by the jury of two proposals, respectively the one by Josè María Ezquiaga and the one by *M-Río arquitectos*, team directed by Ginés Garrido.

The firms that created these two proposals joined those invited to participate in the second phase, which saw the participation of professionals with proven experience in the planning and implementation of major urban regeneration projects, both nationally and internationally, such as: Peter Eisenman + James Coner Field Operations, New York; Norman Foster, London; Jacques Herzog e Pierre de Meuron, Basel; Rem Koolhas, Rotterdam; Josè Antonio Martinez Lapena e Elias Torres, Barcelona; Juan Navarro Baldweg, Madrid; Dominique Perrault, Paris; Kazujo Sejima e Rue Nishizawa, Tokyo.

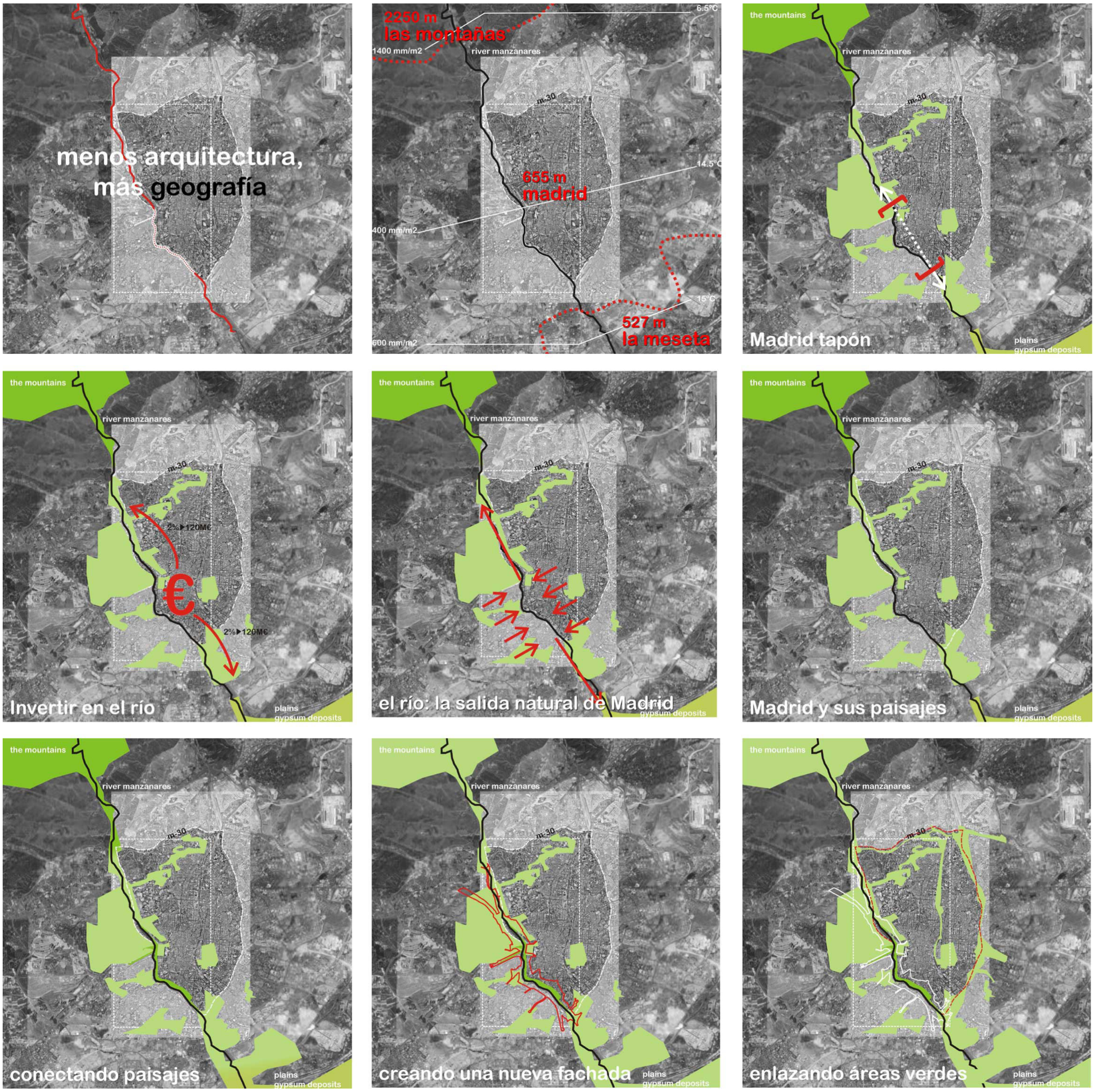
On November 28th of 2005, the jury proclaimed the winning project of the competition: Madrid Rio, developed by the joint venture going by the name of *Mrio arquitectos*, formed, at the time, by the Burgos & Garrido, Porras La Casta, Rubio & Alvarez -Sala studios with West 8 Landscape Architecture & Urbanism, firm that participated in the design phase of the project as a consultant[186]. Their proposal focused in particular on the management of environmental quality and the creation of new public spaces and links within the city (Area de Gobierno de Urbanismo y Vivienda 2009, Sharif, 2012, Perini 2017).

The jury gave the prize to the project for "their ideas regarding the connection of the project scope with the city, the articulation of the system of green areas and new uses of the spaces; the landscape, environmental and cultural proposal. The response to problems of access and mobility and its technical, economic, functional and social feasibility" (Plan Especial Río Manzanares, 2008). In addition it was recognized that the design pre-proposal was strengthened by "an in-depth study of mobility, complete with new ways of access to the river all along its course, proposing the creation of a green façade and putting forward pedestrian walkways as a way of facilitating connections with a new large park whose theme is the water" (Ibid.).

Bearing the slogan "Menos Arquitectura, Mas Geografia" (Fig. 9), the project proposal elaborated by *Mrio arquitectos* was judged as the most practically feasible[161]. Moreover, in regard to the competition, the landscape project manager Christian Dobrick declared that "many of the competition proposals were in some sense unrealistic, some placed the accent on the realization of specific architecture, others were based on the extensive use of canal water, when for most of the year the canal is almost completely dry" (Kucharek, 2010).

186. Interview with Fernando de Porras-Isla-Fernàandez, 2018.

187. Ibid.


menos arquitectura,
más geografía
2250 m
las montañas
1400 mm/m2
6.5°C
river manzanares
m-30
14.5°C
655 m
madrid
400 mm/m2
15°C
527 m
la meseta
600 mm/m2
the mountains
river manzanares
m-30
Madrid tapón
plains
gypsum deposits
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Invertir en el río
plains
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river manzanares
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el río: la salida natural de Madrid
gypsum deposits
the mountains
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Madrid y sus paisajes
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m-30
creando una nueva fachada
plains
gypsum deposits
the mountains
river manzanares
m-30
enlazando áreas verdes
plains
gypsum deposits

Figure 9: Extract of the "Plan Especial" of the Manzanares River, developed by Francisco Burgos, Ginés Garrido, Arantxa La Casta, Fernando Porras-Isla, Carlos Rubio and Enrique Álvarez Sala, West 8. Source: Courtesy of the authors of the project.

Key objectives of the "Madrid Rio" project

The winning project by *Mrio Arquitectos* stands out strongly from the other competition design proposals because its understanding of the new scenario, emerging from the burial of the M30 motorway, transcended some aspects of the mobility and rehabilitation of the neighbourhoods at the local level, laying the foundations for a large-scale proposal.

«*The guiding principle was to consider the city as one of the many events that follow one another along the river Manzanares, and therefore the project proposal acts starting from the geographical sphere that negotiates with a biological continuum, thus considering the river as a vector that cannot be segregated according to the old rural-urban binomial*» (Burgos, Garrido, Porras-Isla, 2014, pag.63).

The first work carried out by *Mrio Arquitectos* for their project was an excursion along the river, starting from its spring on the *Sierra de Guadarrama* until its confluence with the river Jarama (Fig. 10). Over the following months, they drew up a representative diagram of "incidents, events and structures" pertinent to its course, such as: the development and the artificiality of the riverside; topography; aquatic, public and sporting surface spaces; the accessibility of the banks; the vegetation; the existing historical-cultural paths and their state of conservation; cycling and equestrian routes; the nucleuses and the urban environments along the river (Fig. 10a).

It was this study of the land along the 69 km course of the Manzanares that made it possible to acquire the necessary information to draw up both the large-scale project and the project proposal related to the 120 hectares of the land included in the competition for ideas[188]: «*It is essential to consider the whole unit as the object of study and scope of the proposal. Any other delimitation seems to lack of vision, proving to be almost blind in front of a promising reality*» (Mrio arquitectos, 2005, Competition table n.1).

The design team saw the competition as "an opportunity to connect the city with the surrounding landscape" (Bindels, 2009). Thus the designers set themselves the goal of devising a new system able to make the river accessible throughout its path so as to connect the geographical and geological structure of the river with the built-up fabric of the city, in time achieving a relationship of continuity between compact urban fabric and natural space[189].

The project is therefore conceived as "a broad but flexible landscape strategy" (Dobrick, Kucharek, 2010). According to the authors «*only by acquiring large scale proportions does the transformation operation of the consolidated urban fabric cease to be contingent and turn itself into a structure capable of transmuting the territory, assuming a vertebral function for the urban fabric*» (Burgos, Garrido, Porras-Isla, 2014, p.10).

[188] Interview with Ginés Garrido, 2018.

[189] Ibid.

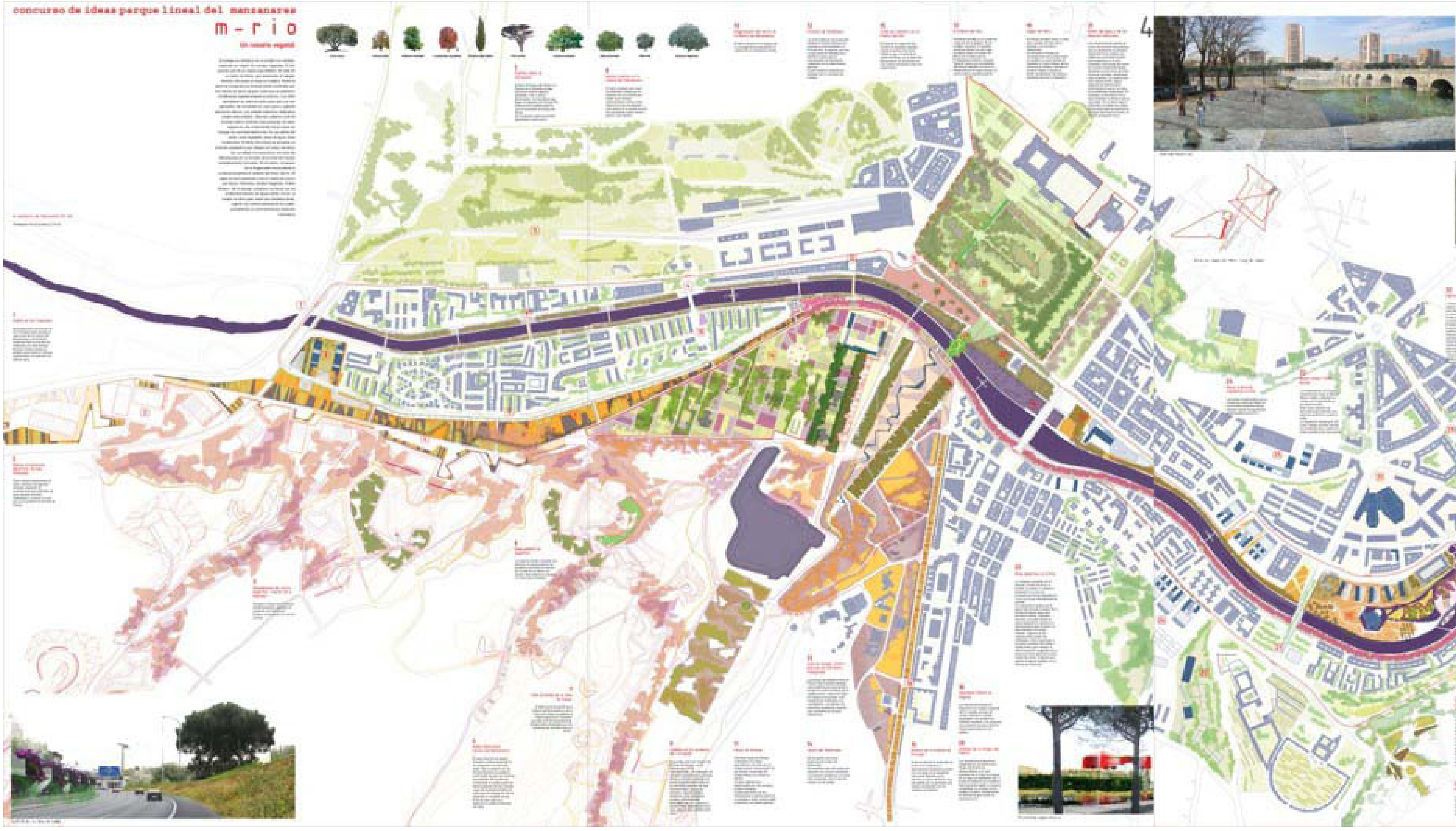
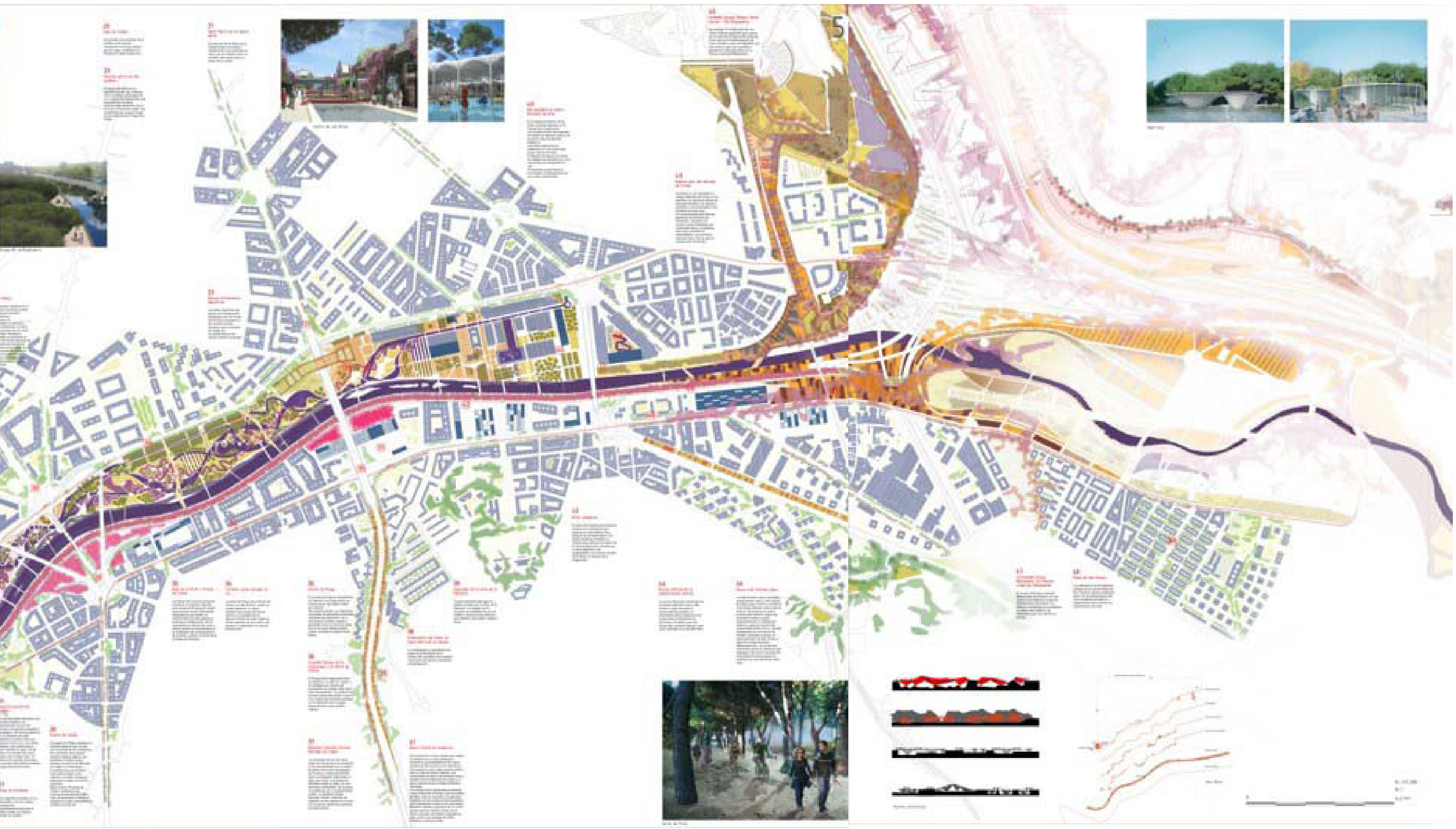

concurso de ideas parque lineal del manzanares
m-rio
un rosario vegetal
4

Figure 10a: Competition table n. 4 and 5., submitted by the authors of the project. Source: Courtesy of the authors of the project.



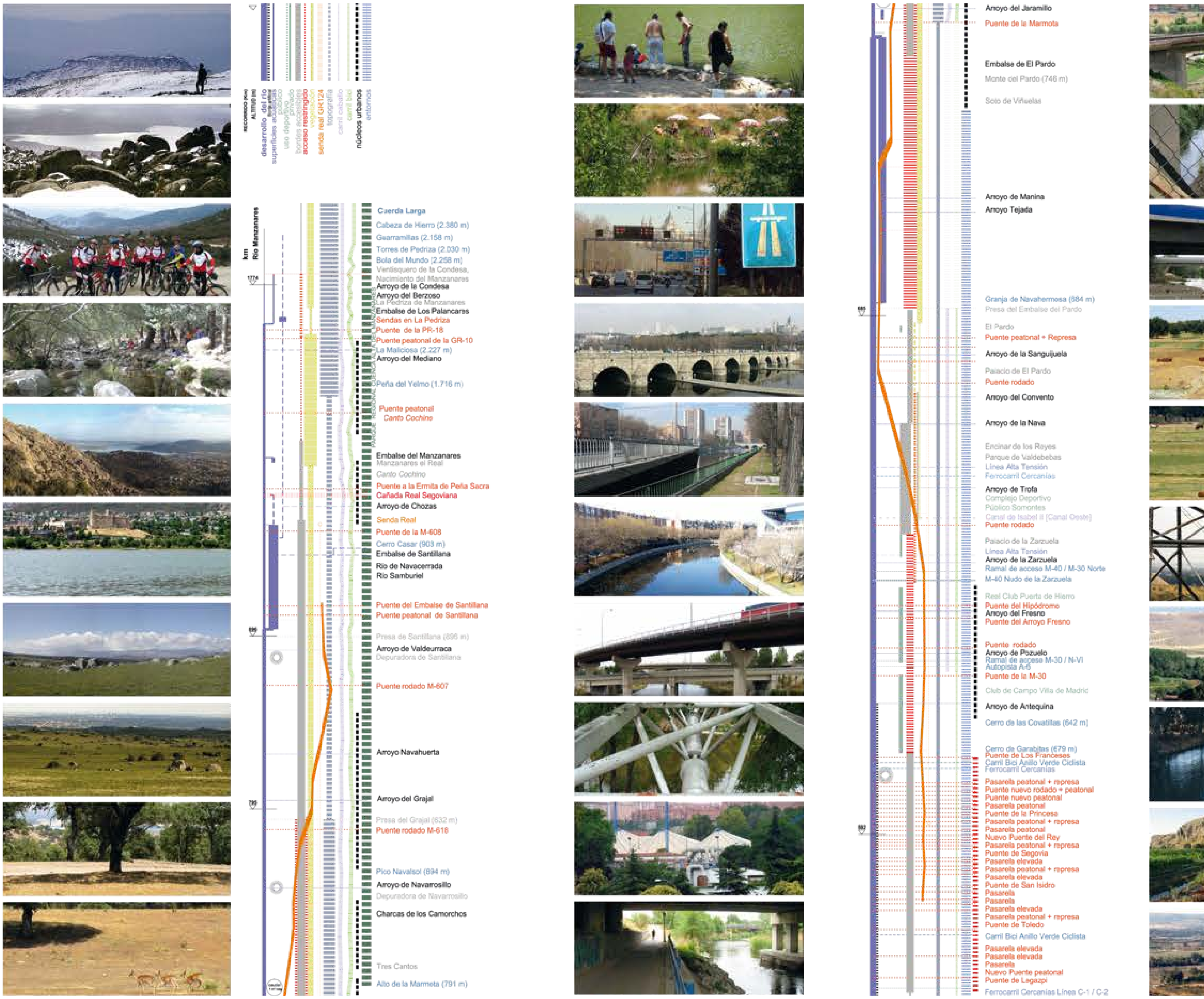
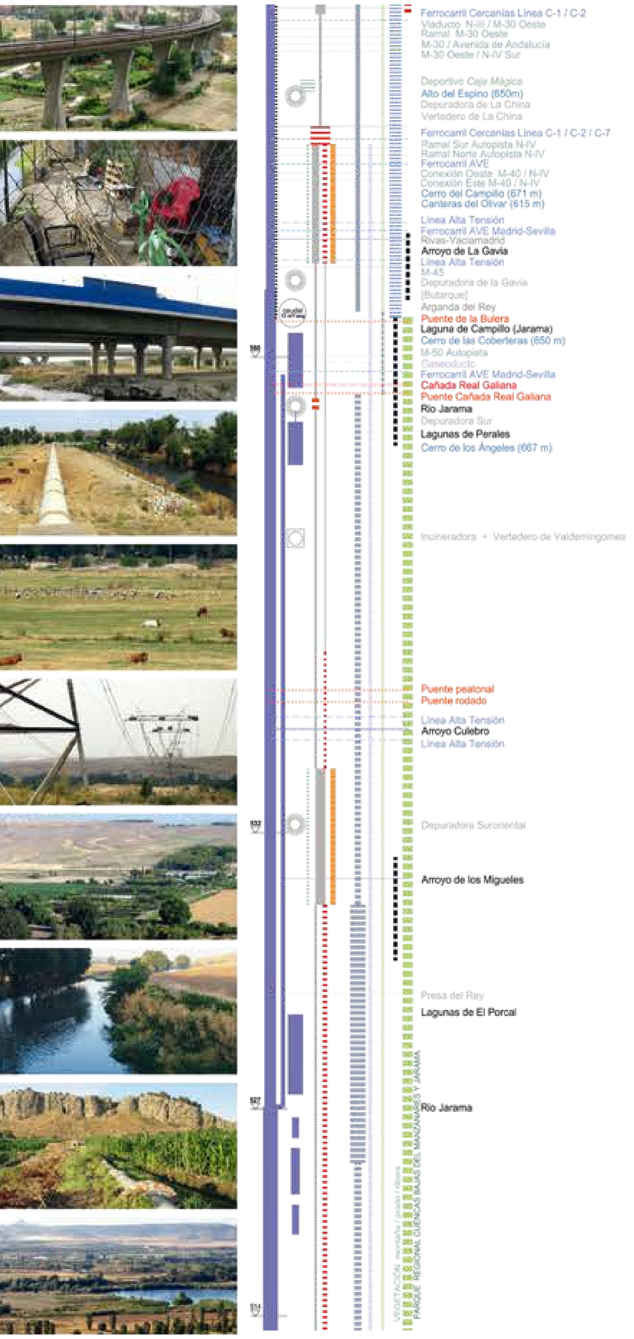

RECORRIDO (Km)
ALTITUD (m)
desarrollo del río
superficies acuáticas
público
uso deportivo
privado
bordes accesibles
acceso restringido
vegetación
senda real GR124
topografía
carril caballo
carril bici
núcleos urbanos
entornos
km
Río Manzanares
1774
PARQUE REGIONAL CUENCA ALTA DEL MANZANARES
Cuerda Larga
Cabeza de Hierro (2.380 m)
Guarramillas (2.158 m)
Torres de Pedriza (2.030 m)
Bola del Mundo (2.258 m)
Ventisquero de la Condesa,
Nacimiento del Manzanares
Arroyo de la Condesa
Arroyo del Berzoso
La Pedriza de Manzanares
Embalse de Los Palancares
Sendas en La Pedriza
Puente de la PR-18
Puente peatonal de la GR-10
La Maliciosa (2.227 m)
Arroyo del Mediano
Peña del Yelmo (1.716 m)
Puente peatonal
Canto Cochino
Embalse del Manzanares
Manzanares el Real
Canto Cochino
Puente a la Ermita de Peña Sacra
Cañada Real Segoviana
Arroyo de Chozas
Senda Real
Puente de la M-608
Cerro Casar (903 m)
Embalse de Santillana
Río de Navacerrada
Río Samburiel
Puente del Embalse de Santillana
Puente peatonal de Santillana
Presa de Santillana (896 m)
Arroyo de Valdeurraca
Depuradora de Santillana
Puente rodado M-607
Arroyo Navahuerta
Arroyo del Grajal
Presa del Grajal (632 m)
Puente rodado M-618
Pico Navalsol (894 m)
Arroyo de Navarrosillo
Depuradora de Navarrosillo
Charcas de los Camorchos
Tres Cantos
Alto de la Marmota (791 m)
Arroyo del Jaramillo
Puente de la Marmota
Embalse de El Pardo
Monte del Pardo (746 m)
Soto de Viñuelas
Arroyo de Manina
Arroyo Tejada
Granja de Navahermosa (684 m)
Presa del Embalse del Pardo
El Pardo
Puente peatonal + Represa
Arroyo de la Sanguijuela
Palacio de El Pardo
Puente rodado
Arroyo del Convento
Arroyo de la Nava
Encinar de los Reyes
Parque de Valdebebas
Línea Alta Tensión
Ferrocarril Cercanías
Arroyo de Trofa
Complejo Deportivo
Público Somontes
Canal de Isabel II [Canal Oeste]
Puente rodado
Palacio de la Zarzuela
Línea Alta Tensión
Arroyo de la Zarzuela
Ramal de acceso M-40 / M-30 Norte
M-40 Nudo de la Zarzuela
Real Club Puerta de Hierro
Puente del Hipódromo
Arroyo del Fresno
Puente del Arroyo Fresno
Puente rodado
Arroyo de Pozuelo
Ramal de acceso M-30 / N-VI
Autopista A-6
Puente de la M-30
Club de Campo Villa de Madrid
Arroyo de Antequina
Cerro de las Covatillas (642 m)
Cerro de Garabitas (679 m)
Puente de Los Franceses
Carril Bici Anillo Verde Ciclista
Ferrocarril Cercanías
Pasarela peatonal + represa
Puente nuevo rodado + peatonal
Puente nuevo peatonal
Pasarela peatonal
Puente de la Princesa
Pasarela peatonal + represa
Pasarela peatonal
Nuevo Puente del Rey
Pasarela peatonal + represa
Puente de Segovia
Pasarela elevada
Pasarela peatonal + represa
Pasarela elevada
Puente de San Isidro
Pasarela
Pasarela
Pasarela elevada
Pasarela peatonal + represa
Puente de Toledo
Carril Bici Anillo Verde Ciclista
Pasarela elevada
Pasarela elevada
Pasarela
Nuevo Puente peatonal
Puente de Legazpi
Ferrocarril Cercanías Línea C-1 / C-2

Figure 10: Representative diagram of the "accidents, events and structures" of the Manzanares course. Source: Courtesy of the authors of the project.


Ferrocarril Cercanías Línea C-1 / C-2
Viaducto N-III / M-30 Oeste
Ramal M-30 Oeste
M-30 / Avenida de Andalucía
M-30 Oeste / N-IV Sur
Deportivo Caja Mágica
Alto del Espino (650m)
Depuradora de La China
Vertedero de La China
Ferrocarril Cercanías Línea C-1 / C-2 / C-7
Ramal Sur Autopista N-IV
Ramal Norte Autopista N-IV
Ferrocarril AVE
Conexión Oeste M-40 / N-IV
Conexión Este M-40 / N-IV
Cerro del Campillo (671 m)
Canteras del Olivar (615 m)
Línea Alta Tensión
Ferrocarril AVE Madrid-Sevilla
Rivas-Vaciamadrid
Arroyo de La Gavia
Línea Alta Tensión
M-45
Depuradora de la Gavia
(Butarque)
Arganda del Rey
Puente de la Bulera
Laguna de Campillo (Jarama)
Cerro de las Coberteras (650 m)
M-50 Autopista
Gaseoducto
Ferrocarril AVE Madrid-Sevilla
Cañada Real Galiana
Puente Cañada Real Galiana
Río Jarama
Depuradora Sur
Lagunas de Perales
Cerro de los Ángeles (667 m)
Incineradora + Vertedero de Valdemingomez
Puente peatonal
Puente rodado
Línea Alta Tensión
Arroyo Culebro
Línea Alta Tensión
Depuradora Suroriental
Arroyo de los Migueles
Presa del Rey
Lagunas de El Porcal
Río Jarama
VEGETACIÓN montaña / prado / ribera
PARQUE REGIONAL CUENCAS BAJAS DEL MANZANARES Y JARAMA

For these reasons, the proposal includes two design dimensions: the **large scale** and the **micro-scale** (Porras-Isla-Fernàndez, 2018) both dimensions taking on three identifiable common themes:

1 Continuity: connecting disconnected areas in the form of a network that, being related to the urban fabric, constitutes a new continuous public space;

2 Traces and Geographical Imprints: revealing the latent natural structure present in the deep geographical imprints erased by the passage of the road infrastructures;

3 Infrastructure: favouring the conversion and the transversal connection in addition to the longitudinal one and generating multifunctional spaces.

The strategic dimension of the large scale is found in the Territorial Plan (Fig. 11).The Territorial Plan proposal consists in the recovery of the river Manzanares in its entirety, establishing a new relationship of total continuity with the landscapes it passes through; it includes about 70,000 ha of land over and above the area in question on which the authors put forward a series of interventions to be carried out over a period of fifteen years, such as reforestation operations and solutions of continuity and practicability (for example the creation of *Green Corridors* which have the aim of interconnecting forests, natural parks and rural and urban areas favouring the creation of new cycling and pedestrian routes). In addition, the plan includes the development of new public transport systems.

The final purpose is the creation of a work of *Green Infrastructure*[190] for which the Manzanares river constitutes the *link*[190] of its structure, in other words the fundamental element of continuity that can connect the natural parks north of Madrid with those to the south of the city.

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[190] See paragraph 2.4 of this research

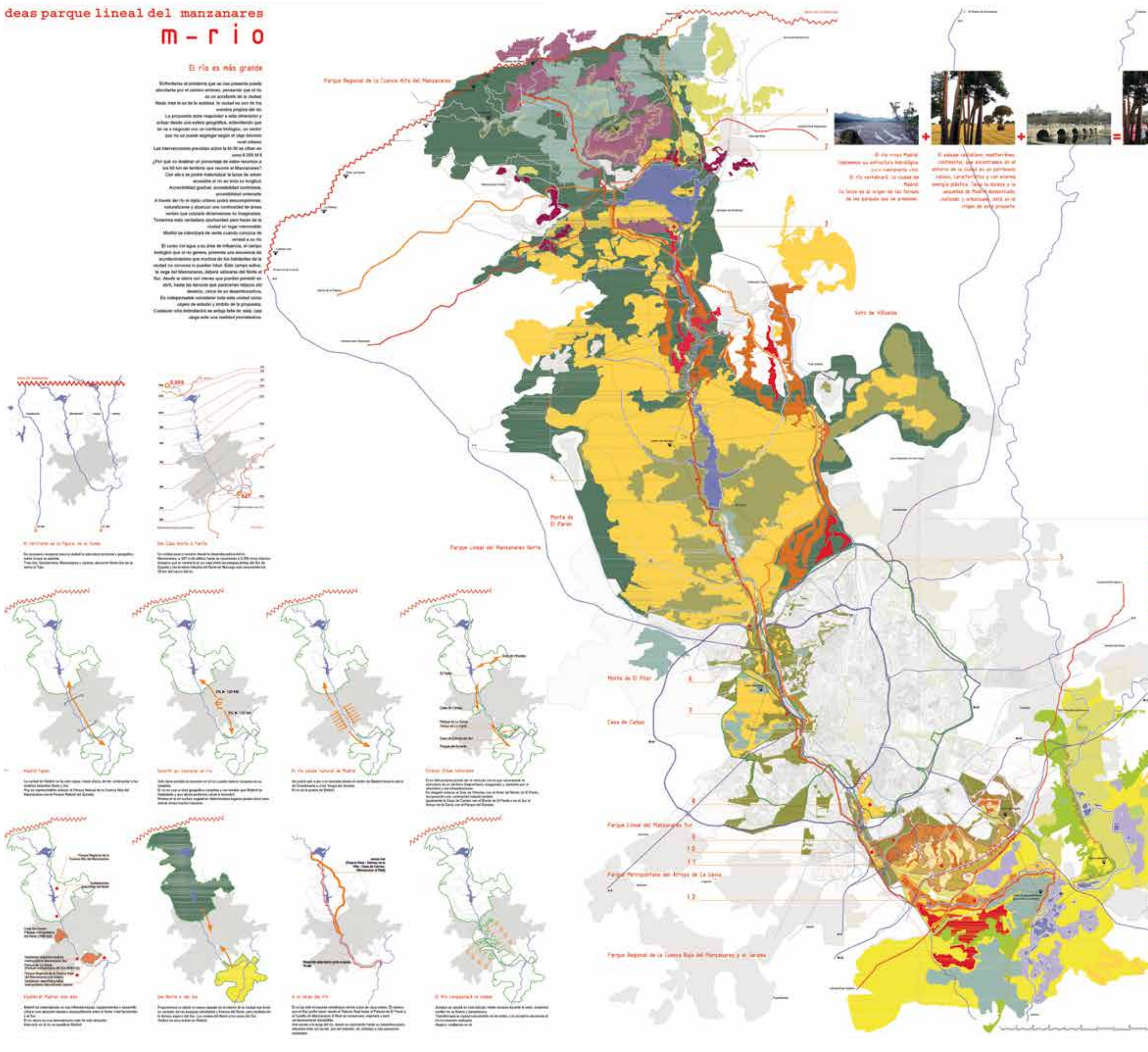

deas parque lineal del manzanares
m-rio
El río es más grande
Parque Regional de la Cuenca Alta del Manzanares
Soto de Viñuelas
Monte de El Pardo
Parque Lineal del Manzanares Norte
Monte de El Pilar
Casa de Campo
Parque Lineal del Manzanares Sur
Parque Metropolitano del Arroyo de La Gavia
Parque Regional de la Cuenca Baja del Manzanares y el Jarama

Figure 11: Extract of the competition tables (Table 1), Territorial Plan. Source: Courtesy of the authors of the project.

The micro-scale dimension of the project is that of the area between the south node of the M30 and the "Puente de los Franceses" which constitutes the linear park going by the name of Madrid Rio (Fig. 12).

The project proposal presented in the competition of ideas takes the motto "Fabricar un Paisaje" (making a landscape), because it is «*capable both of incorporating the characteristics of the network of landscapes that the river Manzanares connects, and of generating new relations of proximity between the consolidated city and the natural environment*» (Burgos, Garrido, Porras-Isla, 2014, p.63).

This type of approach strongly confirms the "cultural relativity" that underlies the concept of *Landscape Infrastructure* for which «*Landscape becomes the bearer of infrastructures in all its forms, but at the same time it is a tool for understanding the complex interactions between nature and culture*» (Waldheim, 2016, p. 50). According to the authors of the project «*the proposal confirms the role of the river canal as a powerful structure of relationship between the city and the external territory, which, however, for the first time, is thought of as a continuous open space to be covered on foot without the interference of cars*» (Garrido, Porras-Isla, 2014, p. 95). Thus, the project comes from the combination of the nature embodied in the river and the fabric of the consolidated city, giving life to a new entity, capable of suturing the urban fabric: a continuous public space supported by the river on which to build new connections and transversal connections.

Program Elements

The short memo accompanying the competition tables describes the project using the metaphor of a «*rosary of plant beads*» (Burgos, Garrido, Porras-Isla, 2014, p.63), thus inevitably evoking Olmsted's "Emerald Necklace". The thread that unites this rosary is constituted by the "Salon de Pinos" (living room of pines), which accompanies the right bank of the river.

To the north is located «*a new landscape complementing the Campo del Moro with its monumental reflections on the other side of the Manzanares*» (Burgos, Garrido, Porras-Isla, 2014, p.63); in the centre is located the Park of the Arganzuela which recalls the fluvial character of the territory and makes its way south through the various transport infrastructures, connecting the new parks of the city.

The project is structured around the creation of these 3 fundamental landscape entities, through which a total of 6 different landscapes have been developed.

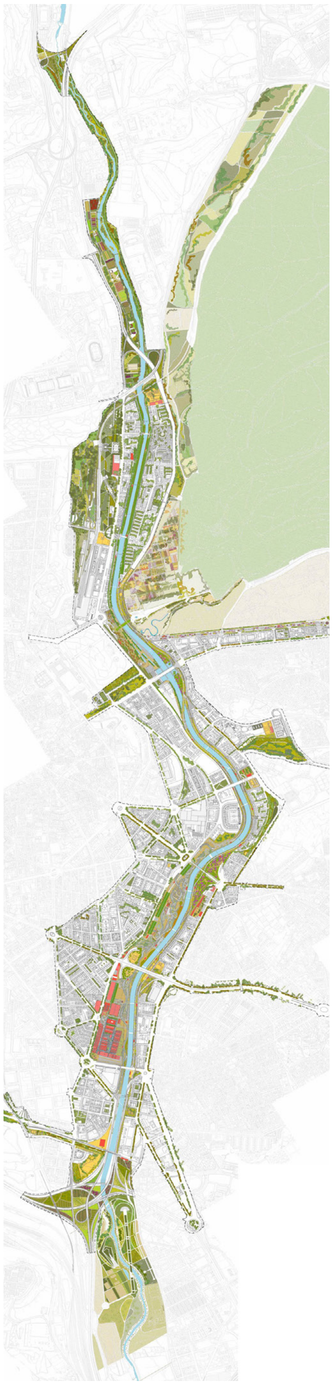


Figure 12: Plan of the project approved in the "Plan Especial Río Manzanares" (2008).Source: Area de Gobierno de Urbanismo y Vivienda.

The common strategy that unites the interventions, converting them into a single organism, is visible from two very different but complementary aspects: the first is to ensure that the new structure responds effectively to the needs of the urban fabric, even anticipating future shortcomings; the second is the use of a "readable language" (Burgos, Garrido, Porras-Isla, 2014) capable of giving coherence to the reclaimed space, endowing it with a distinctive character that arises from the overlapping of its structural, constructive and formal resources, which emerged from the study of the natural and anthropic territory of the Manzanares. (Burgos, Garrido, Porras-Isla, 2014, p.114).

Design Process

The tunnels and the construction of the park above them were realised under different organizational systems. The *Calle30* project followed the same organizational models tested by the *Comunidad de Madrid* in the expansion of the underground network built between 1996 and 2002, thus subdividing the project into seven parts carried out by seven different companies and managing to finish the work in less than four years (2004-2007). On the other hand, work on the project for the linear park of the Manzanares river was carried out through two different organizational systems, one of an "organic" kind (Fig.13) and one of a "rhythmic" nature.

The Organic System

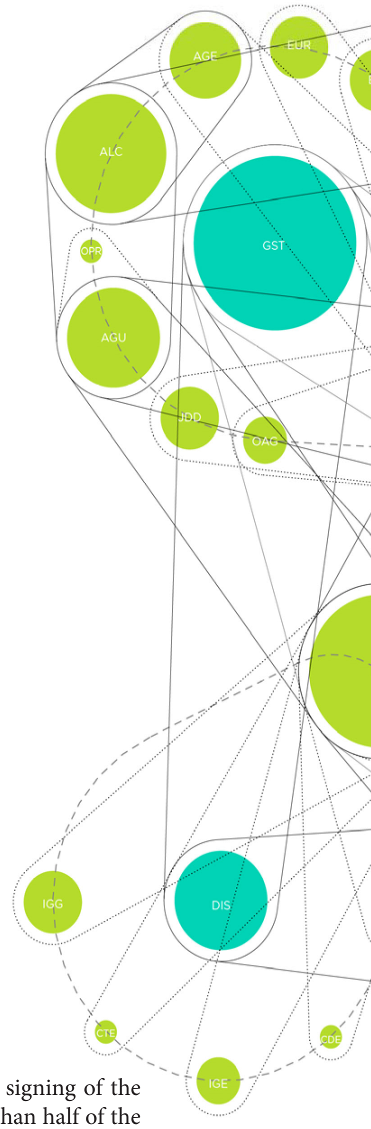
This organizational system was related to the complicated process of mediation undertaken in order to modify the project proposal for the competition, thus incorporating within it the requests of the citizens, of the Municipality and of all the government departments related to the public realm. The system was formed by three executive teams:

1. **Municipal Technicians' Team:** consisting of 51 members, almost exclusively municipal officials, both from the municipal organization responsible for tunnel construction and from other existing departments, comprising eight supervisory companies and four companies specialized in safety coordination in work processes.

2. **Independent Design Team:** formed by the group of winning firms of the competition, consisting exclusively of landscape architects and architects[191].

3. **Team of Construction Companies:** after the adaptation of the proposal, the two teams respectively responsible for the management and design of the work, directed the various construction companies, commissioning from them the construction of the projects within the time and costs established.

ORGANIC SYSTEM



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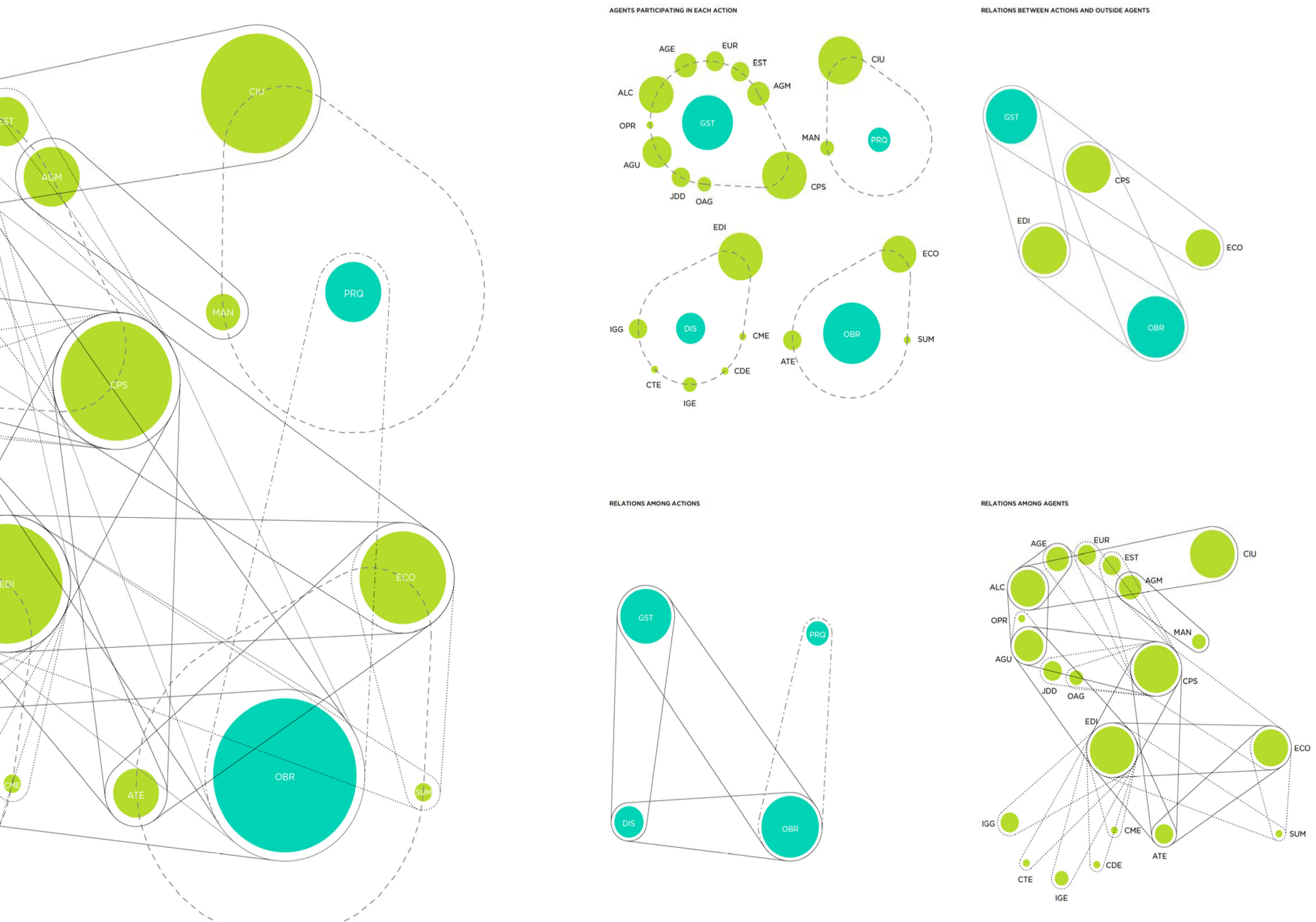
[191] At the time of the signing of the construction contract, more than half of the tunnels had already been built, therefore the design team had to be assisted by external consultants, appointed by the same studios to test the maximum load resistance of the tunnels in order to be able to plant the maximum number of trees possible on their surface. Another fundamental part of the consultation activity was linked to the analysis of existing installations and the maintenance of urban services during construction, as well as the aspects related to the selection and transplantation of vegetation in the new habitat (Interview with Fernando de Porras-Isla-Fernàndez, 2018).


CIU
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CPS
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ECO
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ATE
OBR
SUM
AGENTS PARTICIPATING IN EACH ACTION
AGE
EUR
EST
ALC
AGM
OPR
GST
CIU
MAN
PRQ
AGU
JDD
OAG
CPS
EDI
ECO
IGG
DIS
CME
ATE
OBR
SUM
CTE
CDE
IGE
RELATIONS BETWEEN ACTIONS AND OUTSIDE AGENTS
GST
CPS
EDI
ECO
OBR
RELATIONS AMONG ACTIONS
GST
PRQ
DIS
OBR
RELATIONS AMONG AGENTS
AGE
EUR
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CIU
ALC
AGM
OPR
MAN
AGU
CPS
JDD
OAG
EDI
ECO
IGG
CME
SUM
ATE
CTE
CDE
IGE

PROJECT ACTIONS

GST MANAGEMENT
DIS DESIGN
OBR CONSTRUCTION WORK
PRQ PARK USE

PROCESS ACTIONS

ALC MAYOR'S OFFICE
AGU DEPARTMENT OF TOWN PLANNING AND HOUSING (URBAN PLANNING COUNCIL)
AGE DEPARTMENT OF ECONOMICS, REVENUE, AND PUBLIC ADMINISTRATION
AGM DEPARTMENT OF THE ENVIRONMENT
CPS GENERAL COORDINATION OF SPECIFIC PROJECTS
OPR PRESS OFFICE
OAG OTHER GOVERNMENT DEPARTMENTS
JDD DISTRICT COMMITTEES
EST GENERAL ADMINISTRATION OF THE STATE
EUR EUROPEAN UNION
EDI DESIGN TEAM
IGG GENERAL ENGINEERING
IGE SPECIFIC ENGINEERING
CTE OUTSIDE TECHNICAL ADVISORS
CME OUTSIDE ENVIRONMENTAL ADVISORS
CDE OUTSIDE DESIGN ADVISORS
ECO CONSTRUCTION COMPANIES
ATE OUTSIDE TECHNICAL ASSISTANCE
SUM SUPPLIERS
CIU CITIZENRY
MAN PARK MAINTENANCE CONCESSION

- ● ACTIONS
- ● AGENTS
- ◌ LINK BETWEEN ACTIONS AND AGENTS
- ◌ MAIN AGENT ASSOCIATED WITH EACH ACTION
- — RELATION BETWEEN ACTIONS AND OUTSIDE AGENTS

RELATIONS AMONG ACTIONS

- — IMMEDIATE RELATION
- -- DELAYED RELATION

RELATIONS AMONG AGENTS

- — PERMANENT RELATION
- ···· INTERMITTENT RELATION

Figure 13: Diagram of the "organic system" of mediation actions for the project. Source: Courtesy of the authors of the project.

After the public consultation procedure, which saw broad participation from citizens, the project was definitively approved on June 25th of 2008, delimiting an area of action of 6.9 million square meters, 1.9 million of which were open spaces and almost half a million hectares of games and sports facilities (Área de Gobierno de Urbanismo y Vivienda, Memoria de gestion, 2010).

The Rhythmic System

The rhythmic system (Fig. 14) refers to the management of the construction phases of the project. Time was the factor around which the project implementation system was structured, a process that was defined by the authors themselves as «*indefinite a priori, complex and changeable*» (Burgos, Garrido, Porras-Isla, 2014, p.302).

The fundamental timings were dictated by politics: in order to finalize the urban transformation process it was essential to carry out the work as quickly as possible, therefore within the following four years when the statistics indicated the possible re-election of Mayor Gallardon and his municipal council.

To this end, the calendar of surface works was divided into two stages:

2006- 2007

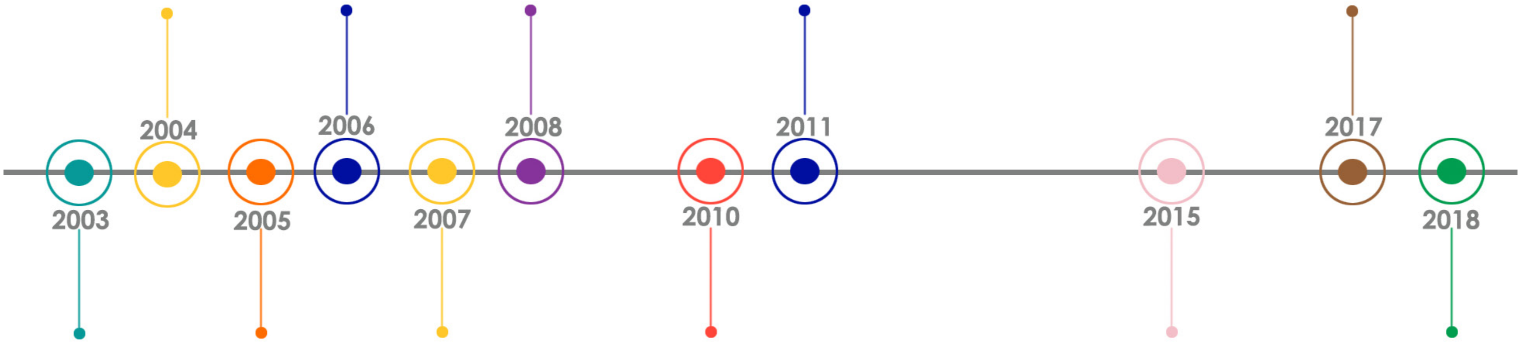
The initial operations of the first execution phase were «*dedicated to the production of images that could give social visibility to the project and to adapt the winning proposal to some unitary parameters and the problems emerging from the construction of the tunnels and the "invisible" infrastructural networks*» (Burgos, Garrido, Porras-Isla, 2014, p.302).

In this year four projects were completed, for a total coverage of 13.4 ha of surface area. Moreover, this period was necessary to finalize the necessary agreements among the architects responsible for the project (Burgos & Garrido, Porras La Casta, Rubio & Alvarez -Sala) and all the councillors and consultants external to the project team.

2007-2011

At the beginning of 2008, when new political stability was achieved with the re-election of the Mayor and the councillor responsible for the work, it was possible to carry out 75 projects for a total area of 125.4 ha. To facilitate the construction of the park in this second phase, when the economic crisis had reached Spain, the projects were subdivided into many micro-projects.

«The pace of writing the documents had to undergo a strong acceleration, converting this second phase of the construction process into a sum of "micro-deadlines", organized in such a way as to obtain the realization of the overall project within the "macro-timing" of the duration of the municipal government» (Burgos, Garrido, Porras-Isla, 2014, p.302).



Beginning of the construction works of the Calle 30 project

Beginnning of the construction works of the Madrid Rio project

Publication of the *Plan Especial.*

Completion of the work of realization of Madrid Rio.The project wins the International Award for Urbanism and Landscape of the Council if Architects and Planners of Madrid.

Madrid Rio project winsThe American Architecture Prize for the category Public Space. The two-stage ideas competition for the *Remodelacion de la Plaza de Espana* is announced.

Publication of the *Plan de Rehabilitacion del Entorno del Rio Manzanares*

Announcement of the two-stage ideas competition for the construction of the "linear park" of the Manzanares river in the area between the south node of the M30 and the "Puente de los Franceses".

Completion of the tunnels of the *Calle30* project.

Publication of the *Plan de Rehabilitacion del Entorno del Rio Manzanares.*

Publication of the new project for the creation of the Linear Park of the Manzanares river, extension Madrid Rio - Getafe. Madrid Rio wins the12th Veronica Rudge Green Prize in Urban Design category.

The firm Porras La Casta arquitectos wins the competition for "Plaza d'Espana" with the project "Welcome Mother Nature...Goodbye Mr Ford!",extracted from the Plan Especial of the Madrid Rio project.

Figure 14: Timeline of the phases of construction and implementation of the Madrid Rio project. Source: Author

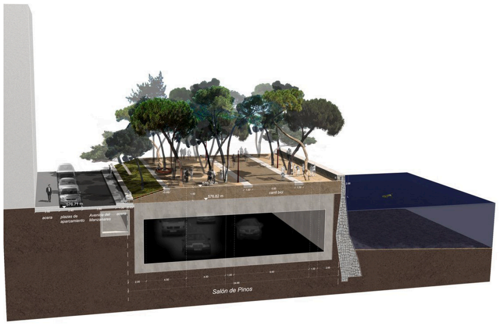


Figure 15: Salon de Pinos, Madrid Rio. The section shows the relationship between the surface design and the sliding tunnels of the M30 motorway. Source: Courtesy of the authors of the project.

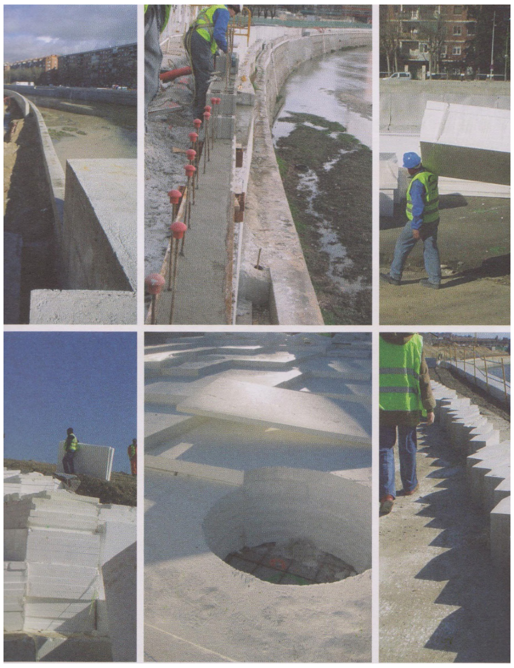


Figure 15b: The construction of the artificial topography made of Forexpan, with the holes for the planting of the trees (2006). Source: Courtesy of the authors of the project.

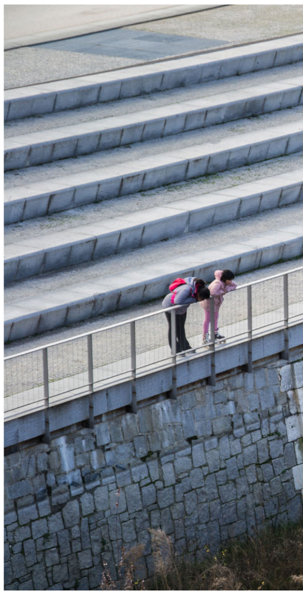
Technical Solutions

«*The project materializes itself through the establishment of generic systems and rules, automatically applicable formulas that depend on the different physical situations with which the project comes into contact while interacting with the context*» (Burgos, Garrido, Porras-Isla, 2014, p.304).

The fundamental problem that occurred during work on the project was that of managing the difference between the rigid geometries of the infrastructural systems built underground and the soft geometries of the surface spaces intended as fragments of artificial nature[168]. The search for a solution to these problems was addressed through the use of two typical project sections:

The section below ground: Was designed to provide unitary resolution to three main issues, specifically: «*the limited bearing capacity of the plates covering the tunnels; the management of the irrigation and outflow network and their reuse and drainage; the survival of plant species, both from a biological and structural point of view*» (Burgos, Garrido, Porras-Isla, 2014, p. 304). The technical solution adopted (Fig. 15) consists of the creation of a single section formed by layers containing the waterproofing, drainage system, lightening and soil structure with the triple function of nourishing the plants, oxygenation of the root body and filtration. One of the most used materials is the Forexpan[192] used to build the artificial topography that made the tree used to build the artificial topography that made tree plantation possible alongside the integration of multiple emerging elements related to the functioning of the tunnel.

The section above ground: Was designed with the task of establishing the boundaries between spaces of different nature, through the development of a catalogue of materials and systems for delimiting spaces that could be applied in a unitary and systematic manner throughout the park (Fig. 16 and 17). «*Besides the vegetation, the main material used is granite, used to form the edges of the paths and the different areas of the park, chosen for its excellent handling qualities and its durability, as well as for its symbolic meaning being the dominant stone of the Madrid geography*» (Burgos, Garrido, Porras-Isla, 2014, p.304).



[192] Ibid.

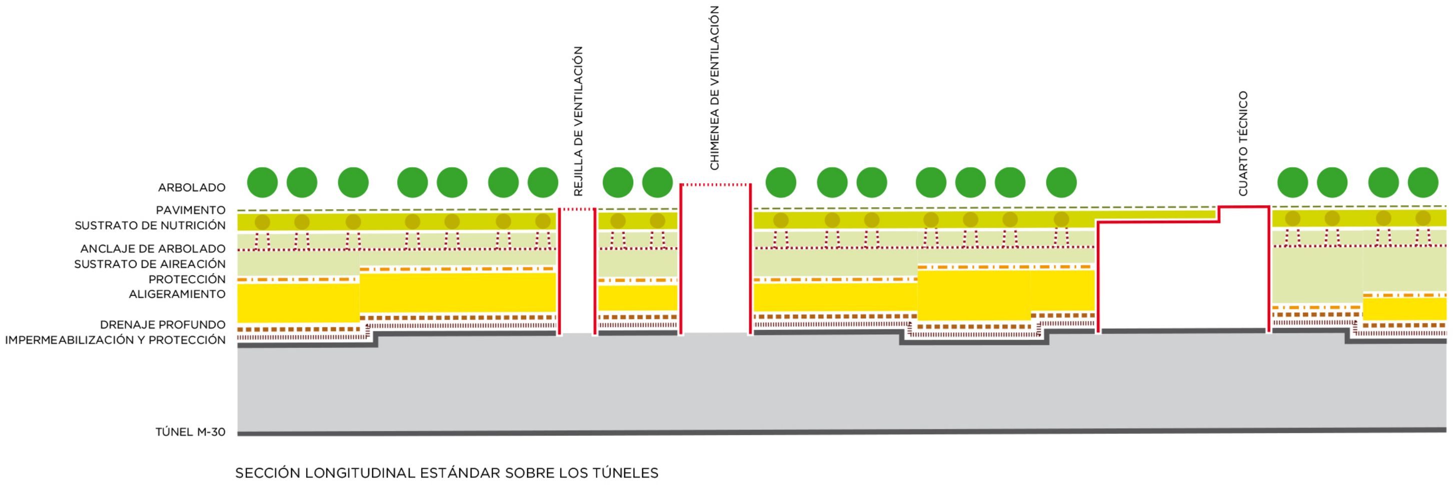

REJILLA DE VENTILACIÓN
CHIMENEA DE VENTILACIÓN
CUARTO TÉCNICO
ARBOLADO
PAVIMENTO
SUSTRATO DE NUTRICIÓN
ANCLAJE DE ARBOLADO
SUSTRATO DE AIREACIÓN
PROTECCIÓN
ALIGERAMIENTO
DRENAJE PROFUNDO
IMPERMEABILIZACIÓN Y PROTECCIÓN
TÚNEL M-30
SECCIÓN LONGITUDINAL ESTÁNDAR SOBRE LOS TÚNELES

Figure 16: Standard longitudinal section above the tunnels. Source: Courtesy of the authors of the project.

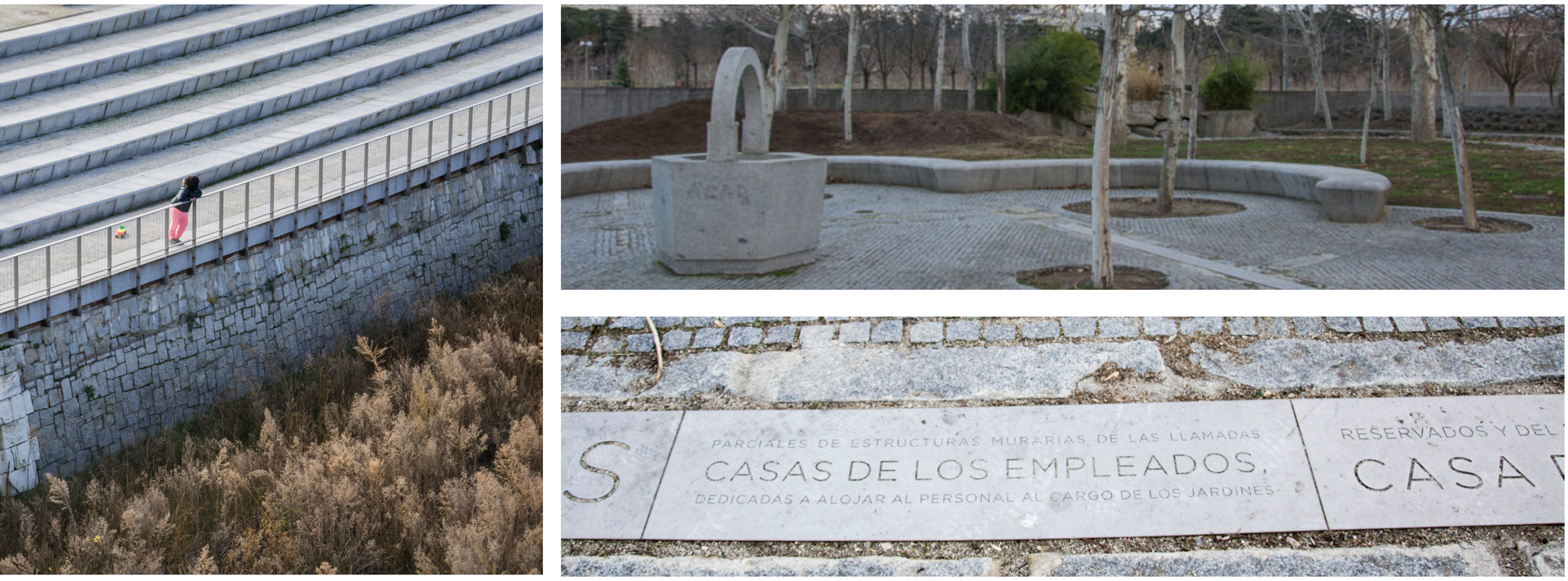

PARCIALES DE ESTRUCTURAS MURARIAS DE LAS LLAMADAS
CASAS DE LOS EMPLEADOS,
DEDICADAS A ALOJAR AL PERSONAL AL CARGO DE LOS JARDINES
RESERVADOS Y DEL
CASA

Figure 17: Left: granite stairways adjacent to the Puente de Toledo. Top and Bottom right: the use of granite for flooring and chairs at the "Huerta de la Partida". Source: Author, May 2018.

GRAMMAR, POETICS AND PERCEPTION OF THE SITE

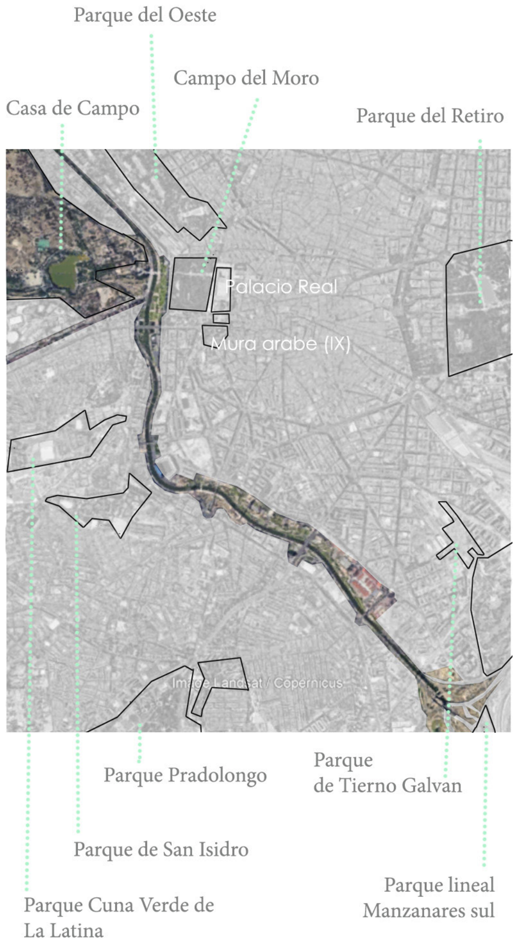


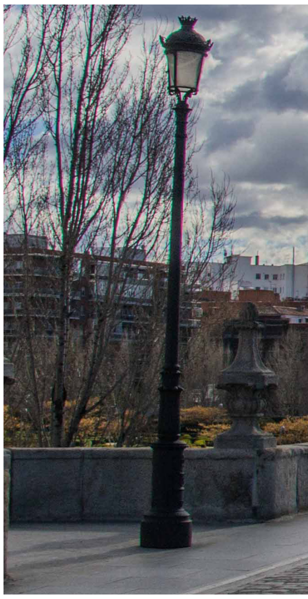
Figure 18: Madrid Rio, satellite view 2018. In white the city of Madrid, the black outline indicates the urban parks that the project connects. Source: Author.

When visiting Madrid Rio it is immediately obvious that the new system of relationships structured by the project has given rise to a continuity between many different identities. Throughout its extension the park (average width 25 meters), connects the south-east neighbourhoods with the city centre (GoMadrid, 2015) and several urban parks (Fig. 18): the Casa de Campo (1,500 ha), Parque de Oeste (64 ha), Campo del Moro (21 ha), Cuña Verde de Latina (68 ha), Parque de San Isidro (25 ha), Parque del Manzanares South (335 ha), and the Parque del Manzanares North (865 ha). Once the implementation phase of the redevelopment of the surrounding and of the river is completed, Madrid Rio will be part of a "green corridor" that extends from El Pardo to Getafe, constituting a unique environmental infrastructure for the city (Ayuntamento de Madrid, 2015).

The project connects the banks of the river and the city districts (Fig.19), both through the restoration of the historical bridges that cross the Manzanares, such as the Puente de Segovia, the Puente del Rey and the Puente de Toledo, and via the construction of eleven new catwalks (GoMadrid, 2015).

The new transversal connections have become urban icons with very different characteristics, from the three-way pedestrian walkway that forms a "Y" on the river to the helical bridge designed by the French architect and designer Perrault to the two "Shell Bridges" designed by Mrio arquitectos (Fig. 20b), famous for its interior garden covered by a thin layer of cement that the Spanish artist Daniel Canogar decorated with mosaics depicting some of the most picturesque residents of the area, thereby paying homage to local identity, (Jewell, 2011). In addition, there are about thirty crossings and cycle paths (Fig. 20) favouring a high degree of permeability between the two sides of Madrid Rio (Perini et al, 2017).

If the M30 represented a real barrier, a physical border between the central nucleus of the capital and the districts outside the ring of communication that surrounds it (Perrone, Gorelli, 2012), today the Manzanares canal has become not only a central element of the city , but also the connecting door between the built-up zone and outlying areas that still retain a natural character[193].



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[193] See Burgos & Garrido Arquitectos et al., 2014.

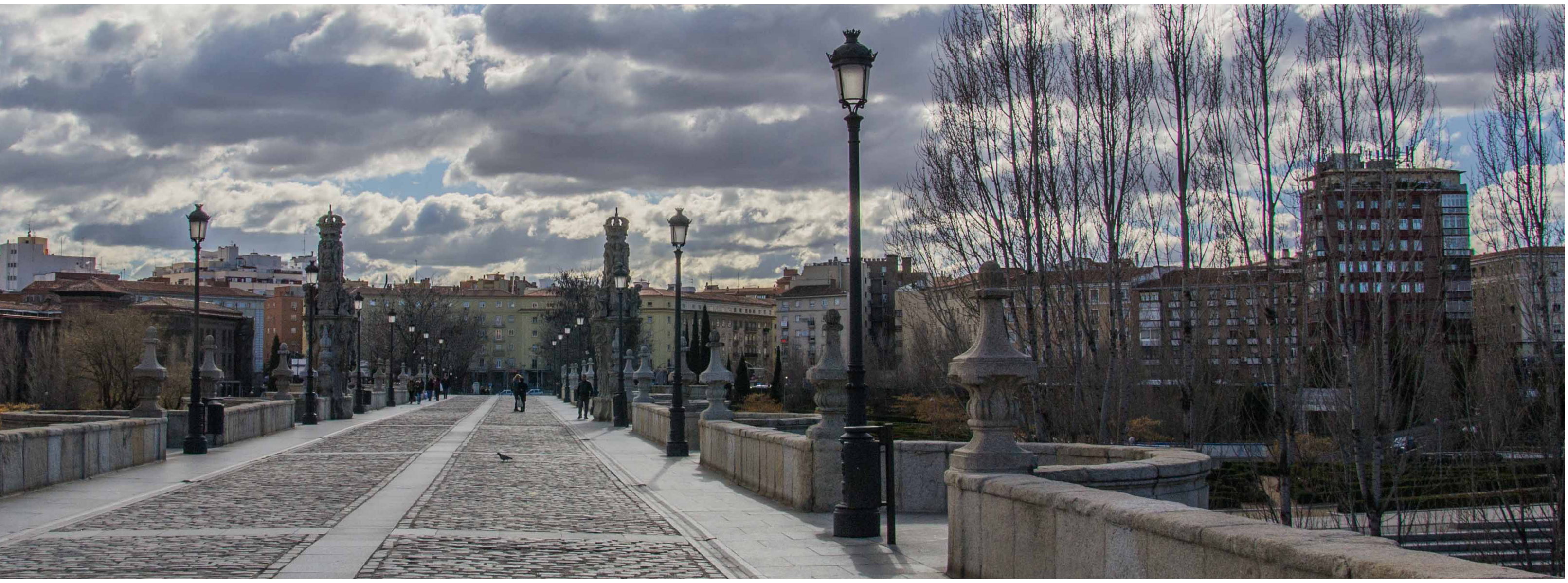

Figure 19: View of the restored Toledo Bridge, now constituting an east-west pedestrian anc cycle connection for the city. Source: Author, February 2018.

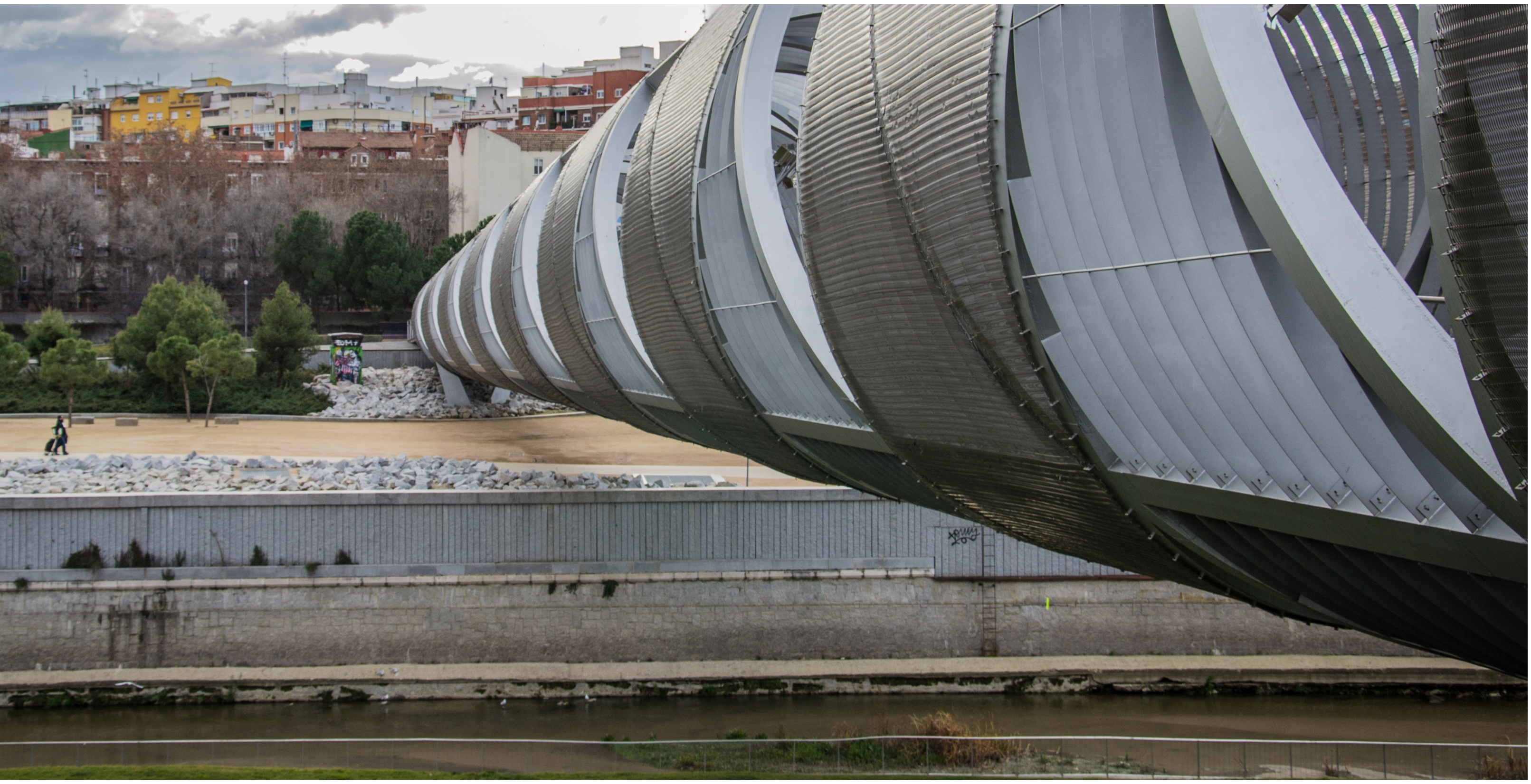

Figure 20: The new helicoidal pedestrian and cycle bridge-path. Source: Author, February 2018.

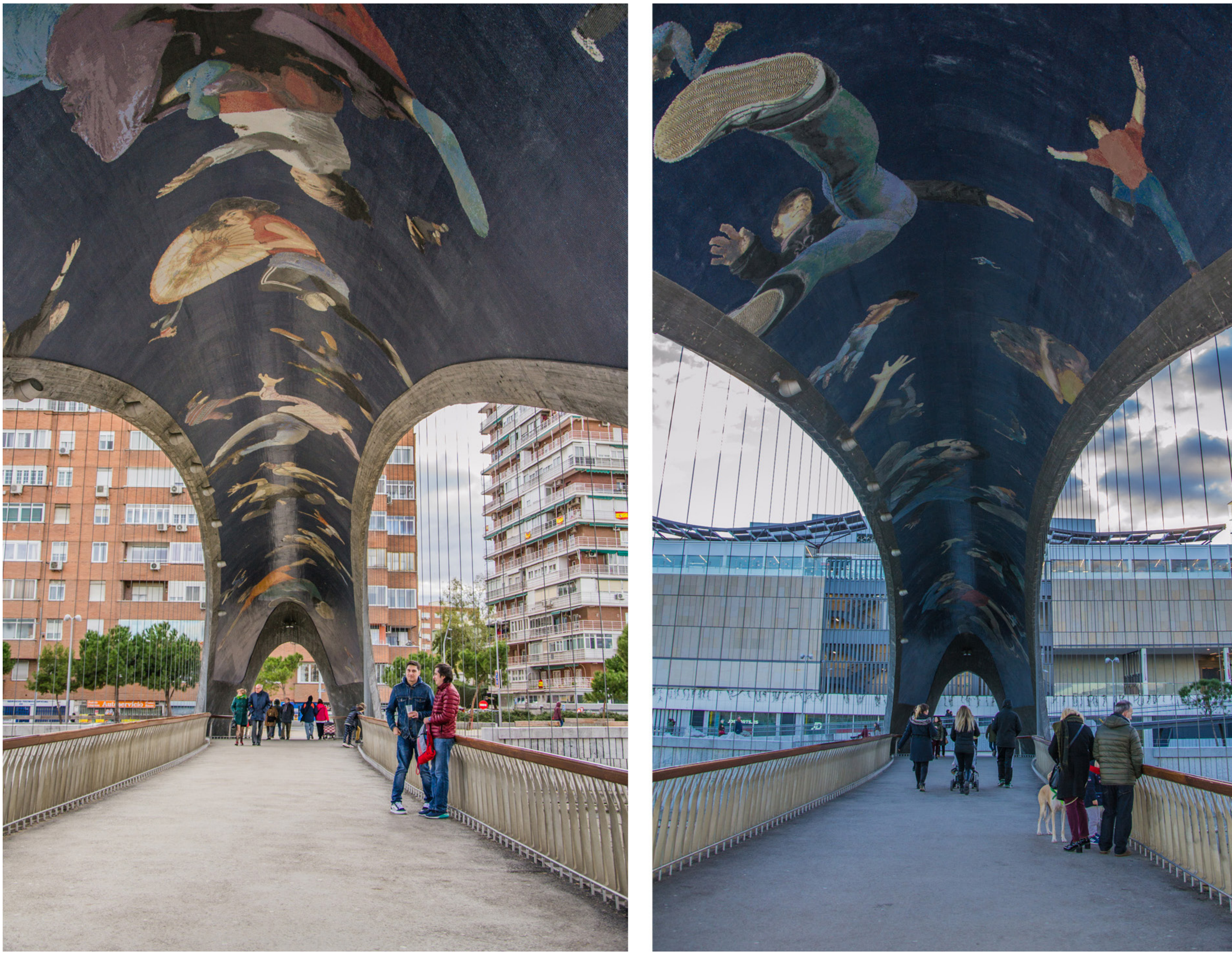

Figure 20b: The "Shell Bridges" linking the Matadero to the western part of the Spanish capital. Source: Author, February 2018.

According to the designers, «*the plots able to offer this consistency have been discovered among the multiple data that the territory offers, data that come from both the natural environment and the landscape transformed by man*» (Burgos, Garrido, Porras-Isla, 2014, p.114).

The river, origin of the city, is once more a destination frequented by thousands of people every day. The itineraries of the park have an eminently longitudinal character and form a series of uninterrupted paths for pedestrians and cyclists along the entire urban stretch of river transit.

Nowadays, «*three speeds are superimposed in the park: hidden underground, that of cars, on the surface the slow and imperceptible, but constant, growth of vegetation, and finally between the two emerge the multiple speeds of visitors walking*» (Burgos, Garrido, Porras-Isla , 2014, p. 95).

The unitary project is composed of six landscapes (Fig. 21), six different visions arising from the knowledge of all the landscapes that the river flows through, constituting a "cultural infrastructure", which deploys precise visions in the park of the Madrid landscape and as a consequence of the identity of this land[194], adapting to the urban environment with which they interface.

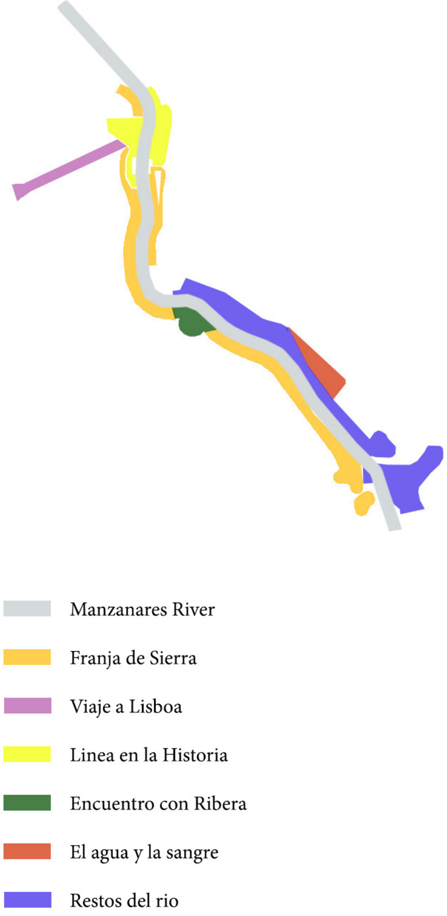

Figure 21: Representative schematization of the six landscapes that make up Madrid Rio. Source: Author.

The transition between these landscapes always occurs in a natural and almost imperceptible way, since the connecting structures do not alternate when one moves from one environment to another and the overlapping mechanisms of communication interconnect.

Each of these environments has been designed with a sort of "vocabulary of references" that are inspired by reality, a unifying language that on various occasions adopts specific characters, dialoguing with the surrounding area (Burgos, Garrido, Porras-Isla, 2014).

The park is dotted with referential elements, used by designers as parameters or figurative resources of the illusions contained in the projects:

Granite

The main geological component of the Guadarrama mountain range is the stone material used throughout the park in different ways: large rocks, transported from the mountains are scattered throughout the park (Fig. 22), while the horizontal and vertical coverings, as well as the seats, are made of the same material industrially worked.

Vegetation

The park is made up of a dense and ecologically rich vegetal structure (Fig. 23), which is visually continuous and thus unites the artificial urban landscapes implanted on a substratum which is for the most inert (Perini, 2017).

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[194] Interview with Gìnes Garrido, 2018.

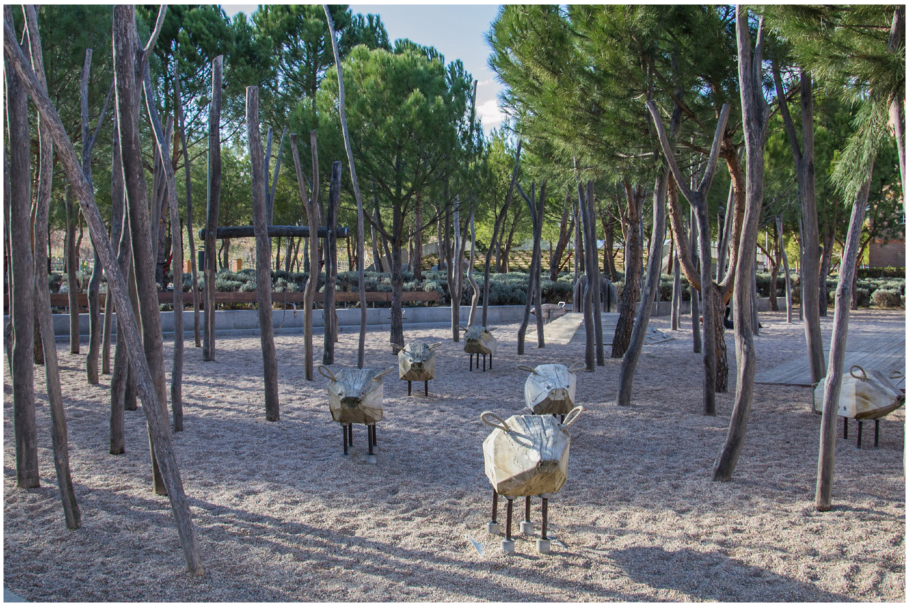


Figure 23: Play area inside the "Salon de Pinos" unfolding on and between structures built with the trunks found in the river bed during the construction of the park. Source: Author, January 2018.

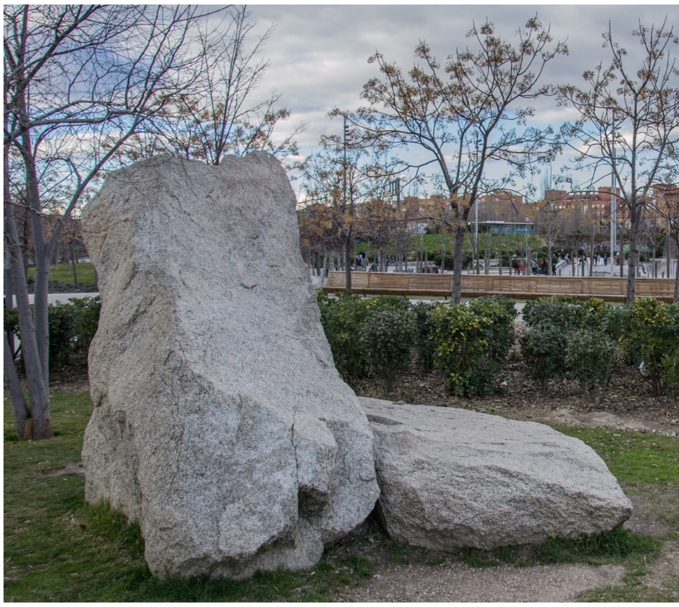


Figure 22: Granite boulders at the Arganzuela Park, Madrid Rio. Source: Author, January 2018.

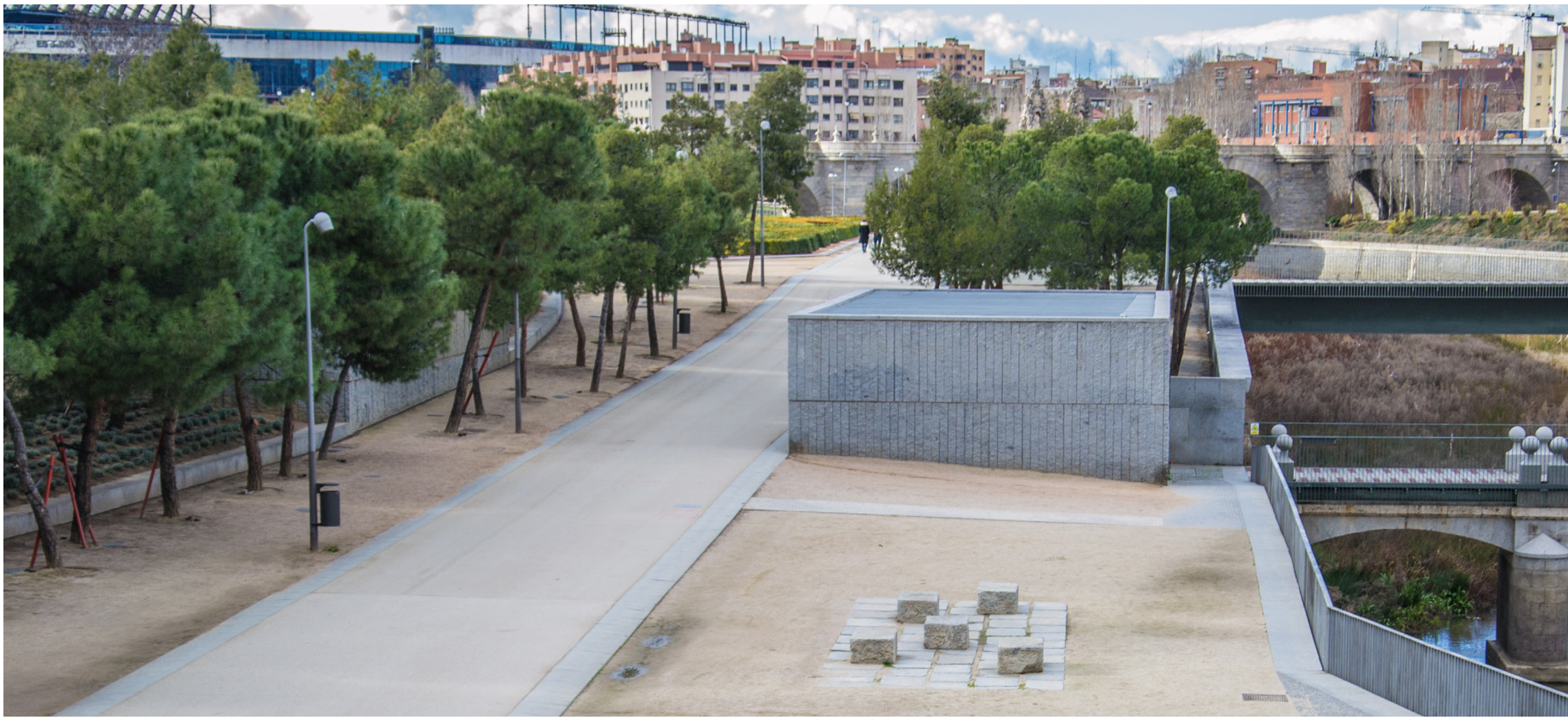
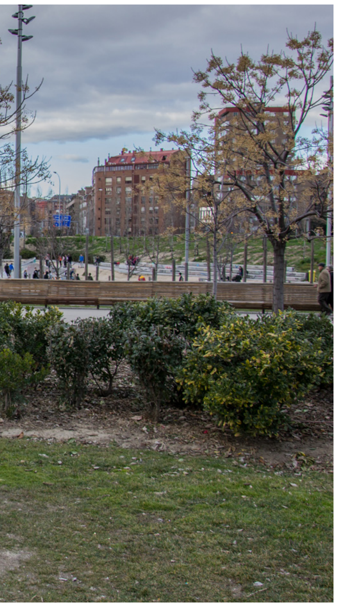
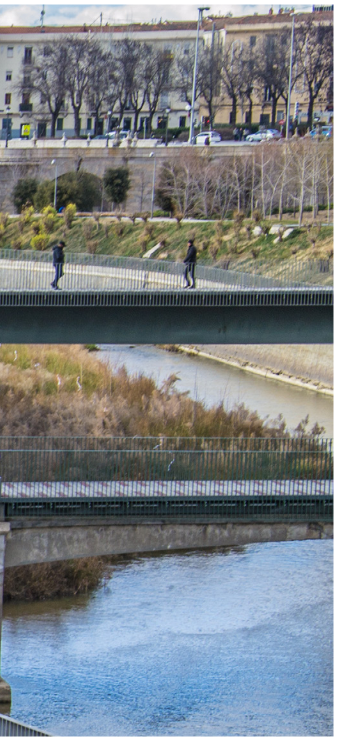


Figure 24: View of the Salon de Pinos photographed by the Dam 7; On the bank of the river, blocks of granite make up games and seats. Source: Author, January 2018.





The plant associations form symbiotic groups similar to those that naturally arise on the banks of the Manzanares[195].

Sediments and Remains of the River

The materials and the sediments carried by the river flow, such as trunks and river gravel, are present throughout the project and become useful mechanisms for games and physical exercise, suitable for all ages thanks to a variety of designs (Fig.24).

LANDSCAPE N. 1: Franja de Sierra

The constant linear condition of the canal has given the designers an opportunity to incorporate a powerful element of continuity, the river being the line from which the spatial continuum of the landscape on which most of the park is structured. The landscape of the *Franja de Sierra* (mountain strip), contains the essence of the geography of the northern region of Madrid province, reduced to its primordial elements: vegetation, rock and water[196].

On the west bank, where urban growth has been most rapid, the urban front is close to the water and leaves very little free space near the waterway, the structure that connects all the areas of the park is planted: the "Salon de Pinos", whose name «*derives from the Spanish word "salon" also used to mention linear public spaces that in the past were mostly dedicated to strolling*» (Burgos, Garrido, Porras-Isla, 2014, p. 122). This linear green space is located in a narrow area with only 40 m between buildings and river. Furthermore, the underlying tunnel determines a reduced substrate thickness, for these reasons specimens of *Pinus pinaster*, *Pinus halepensis* and *Pinus nigra* were selected (País, 2011; Área de Gobierno de Urbanismo y Vivienda, 2009, Perini 2017). The pinewood (Fig. 25) is formed by the combination of two main and autonomous elements that are permanently interlaced along the river: on one side the wooded belt, on the other side a granite paved belt that allows longitudinal accessibility throughout, accompanied by the constant repetition of details that determine an immediately legible identity.

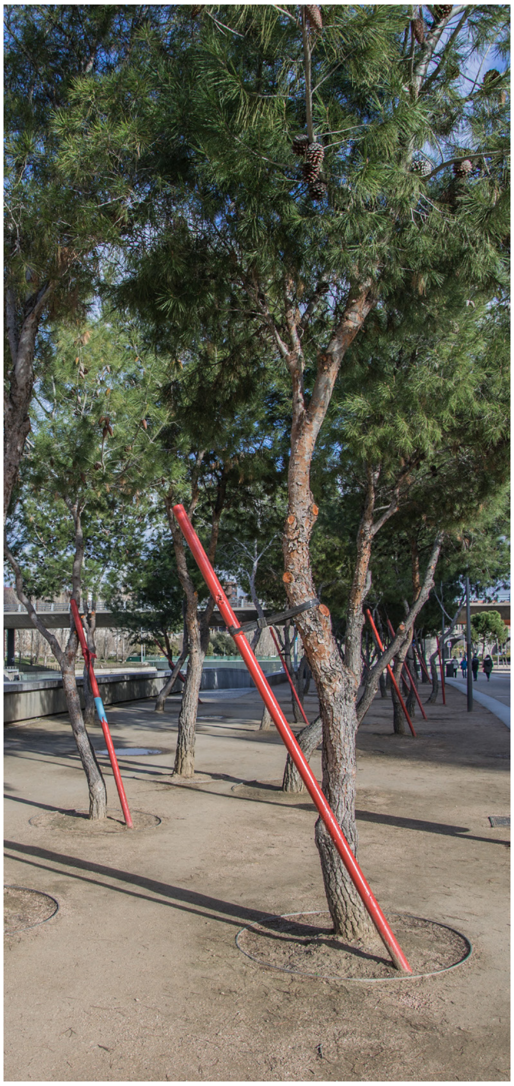


Figure 25: The newly planted Pinus along the "Salon de Pinos", the red supports are designed to enhance the visual continuity of the linear landscape going by the name of "Franja de Sierra". Source: Author, January 2018.

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[195] See Burgos, Garrido, Porras-Isla, 2014.

[196] Ibid

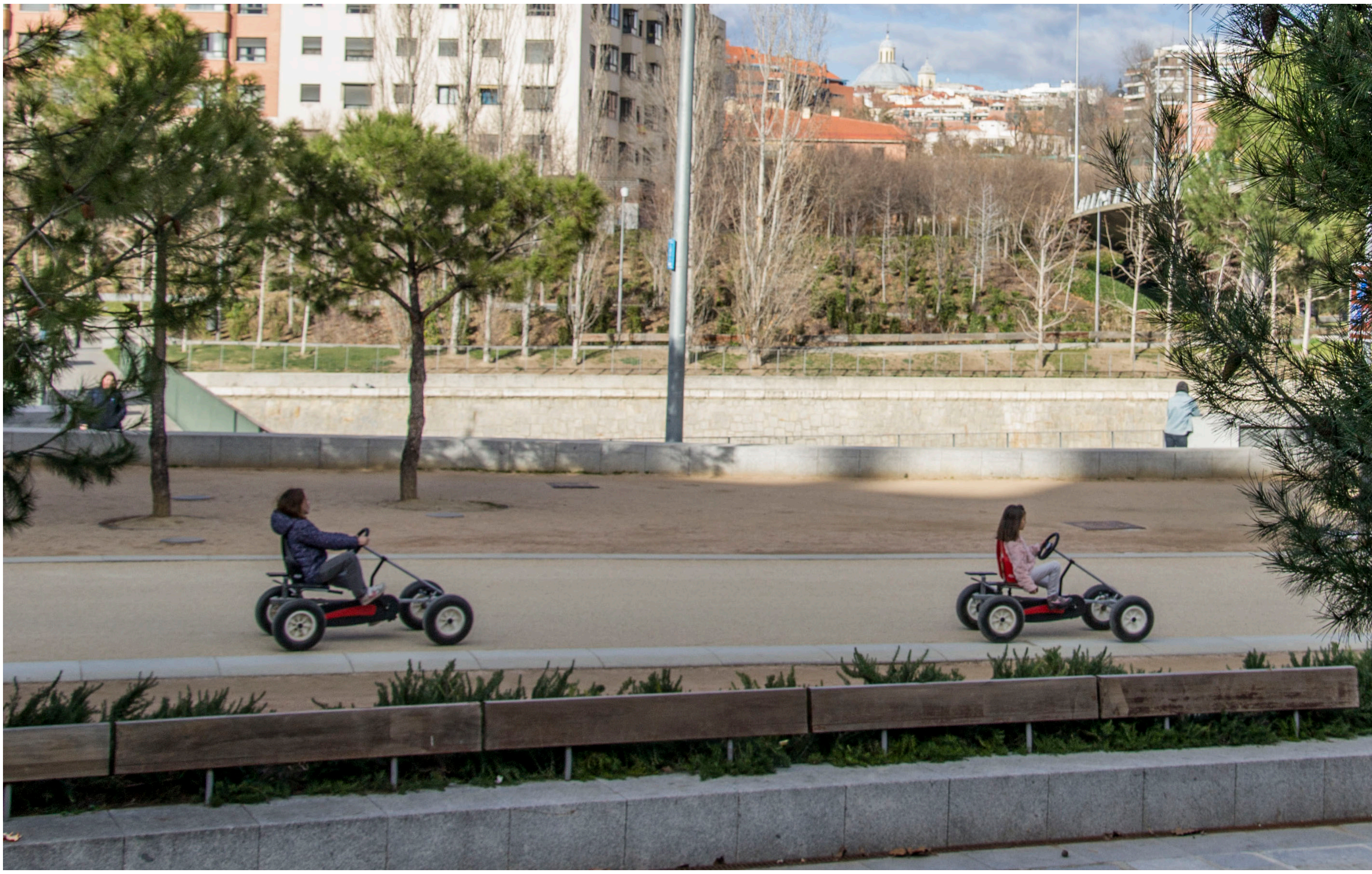


Figure 26: Children race through the Salon de Pinos on quadricycles. Source: Author, January 2018.

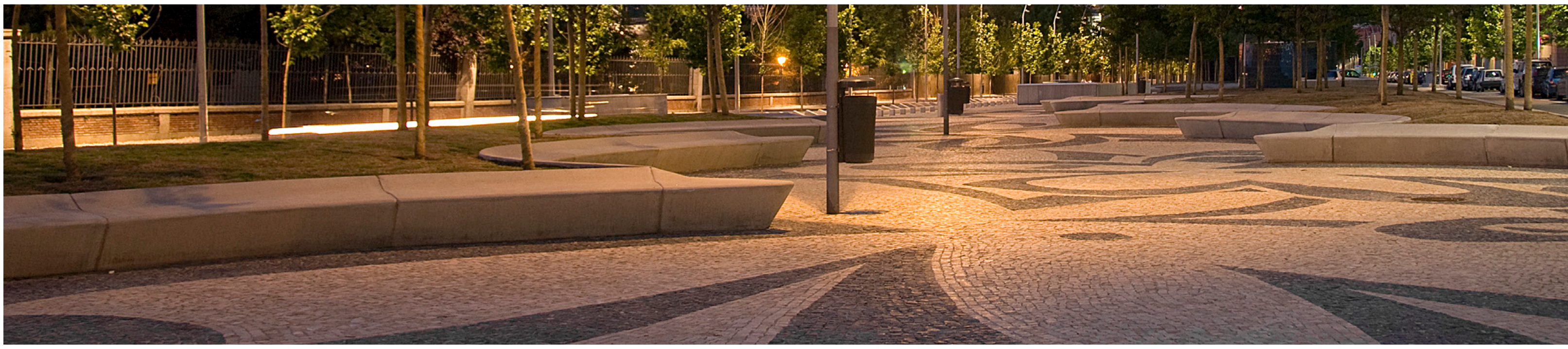


Figure 27: Night view of Avenida de Portugal, detail of the pavings and seats inspired by shapes of the cherry blossom. Source: Author, January 2018.

The *Salon de Pinos* is today a dynamic axis of north-south connection in which the main activity carried out is strolling, cycling or one of the many other non-polluting means of transport which can be rented along its routes (Fig. 26).

LANDSCAPE N. 2: Viaje a Lisboa

In the neighbourhood of *La Latina*, the *Salon de Pinos* encounters the landscape of the *Avenida de Portugal*, which with the construction of the *M30* had become an impassable six-lane frontier of automobile flows of considerable speed. As part of the large infrastructural works used to bury the highway that ran parallel to the river, traffic was buried also under the Avenue of Portugal (Fig. 27), revealing a new public space of almost two km in length and 45 meters in width, which became an opportunity to strengthen, through the project, the relationship between the *Casa de Campo*, an ancient royal hunting reserve, and the populous districts south-west of the capital (Burgos, Garrido, Porras-Isla, 2014).

The project transformed the *Avenida de Portugal* into a recognizable space and a narrative landscape of the history of the conception of the Avenue. The new public space surmounting the six carriageways of underground traffic traces along its route the ancient path connecting Madrid and the Atlantic Ocean, and for this reason is built with the materials that would be present in an imaginary journey from Madrid to Lisbon.

The paving begins to change at the intersection with the *Salon de Pinos*; as around the trees there are the islands of cobblestones with rounded shapes (Fig. 28) that gradually turn into borders with contours that follow the petals of a cherry blossom (Fig. 29). At the entrance to the Avenue,«*the plant transition marks the beginning of the landscape narrative that is based exclusively on three essential units that complement each other: the paving, the trees and the treatment of the volumes that emerge on the surface*» (Burgos, Garrido, Porras-Isla, 2014, p. 159).

The fundamental inspiration for the construction of this landscape was the powerful image of the Jerte Valley at the time when the cherry trees are blossoming (Ibid.).

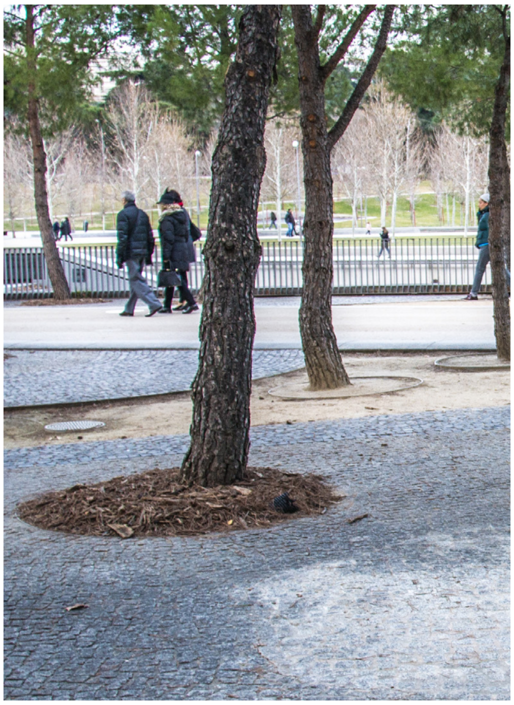


Figure 28: Detail of the transition of the paving shapes at the intersection between Salon de Pinos and Avenida de Portugal. Source: Author, January 2018.

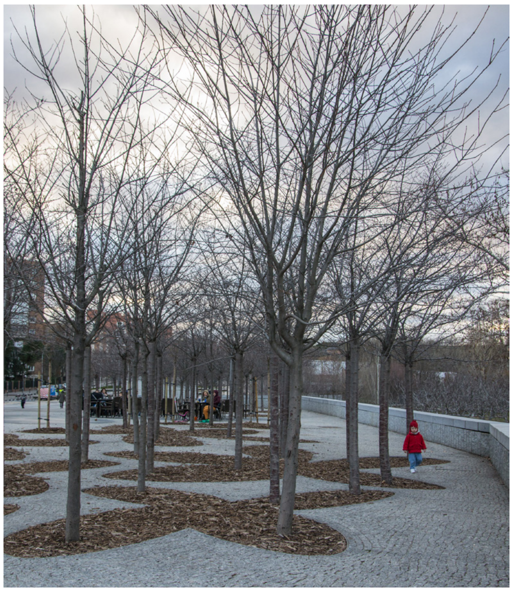


Figure 29: The design of the paving imitating the forms of the shapes of cherry blossom. Source: Author, January 2018.

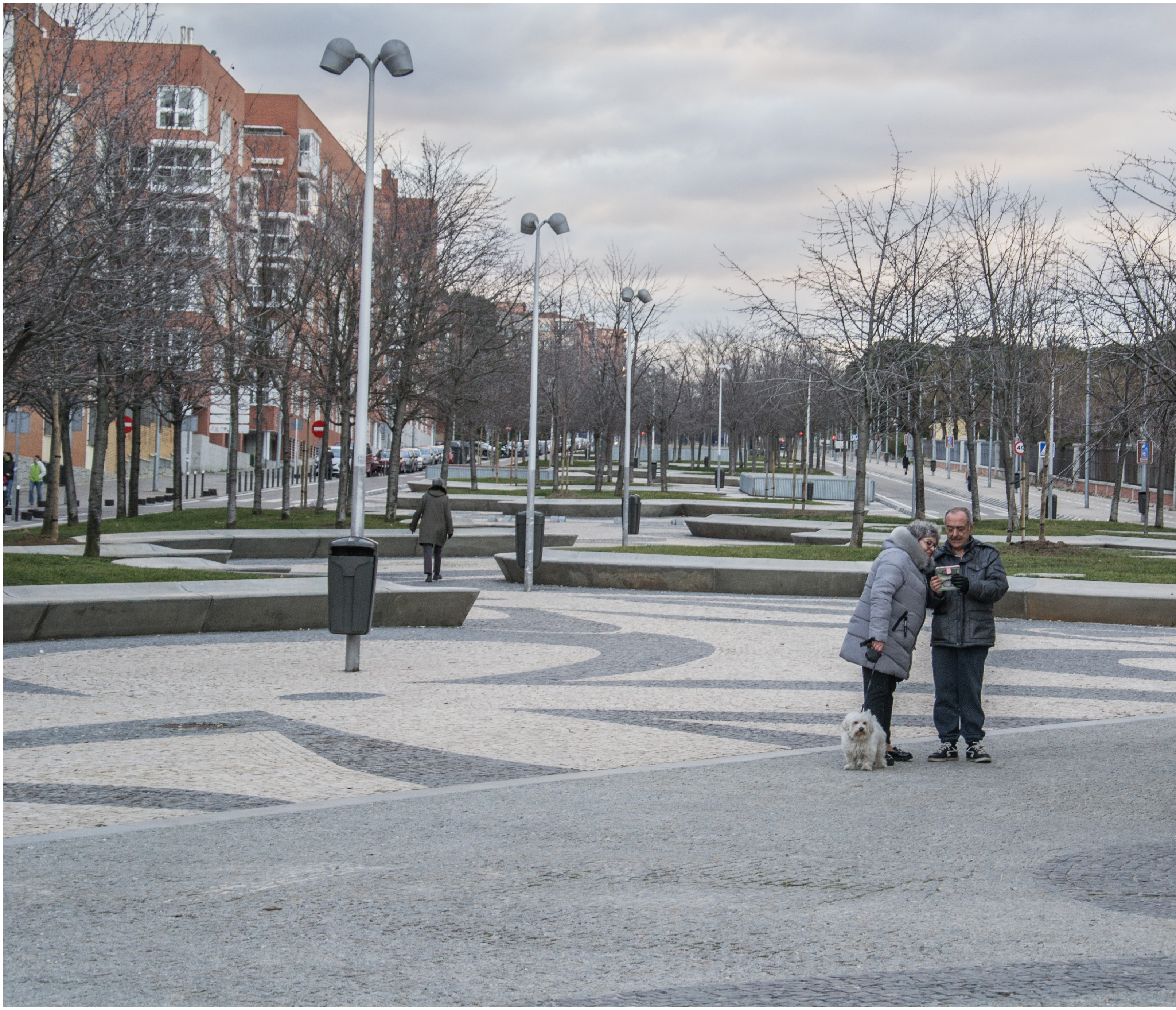
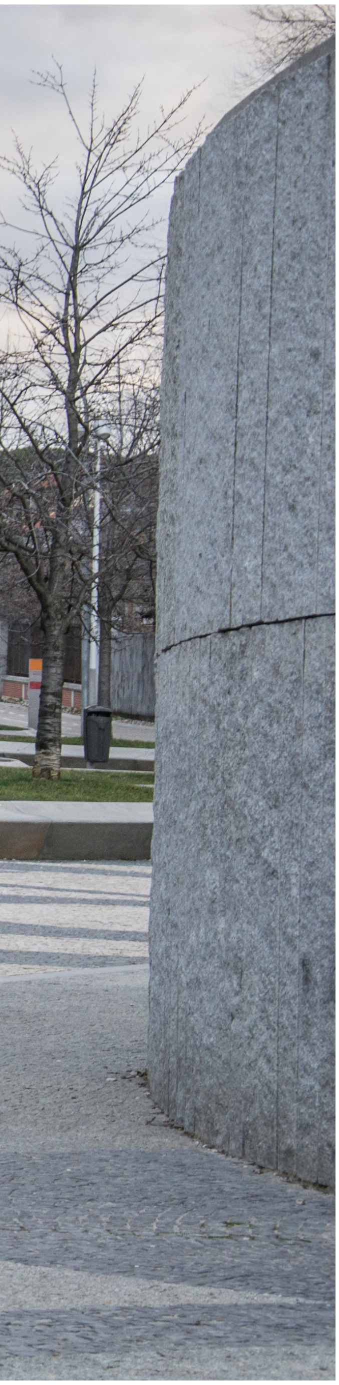


Figure 30: Avenida de Portugal, detail of the black and white cobblestone paving inspired by the Portuguese "Calçada" paving, on the right the granite cover of one of the underground parking exit. Source: Author, January 2018.



The shape of the flowers sculpts the design of the *calçada* paving, which is made of small stone quadrangular elements not larger than 10 x 10 cm, typical of the streets of Lisbon, giving the surface a specific and unmistakable lustre. Moreover, Portuguese ceramics were proposed as an ideal material to cover the emerging elements of greater volume (Fig.30).

The project initially envisaged the use of *Azulejos*, typical tiles of the Portuguese tradition with a characteristic blue colour, used for covering emerging surface volumes. After the opening of the park, the tiles were replaced by a granite cover, more resistant and less prone to vandalism.

LANDSCAPE N. 3: Linea en la Historia

This landscape is characterized by the many historical traces of the evolution of this part of the city. The transport infrastructures and the river Manzanares had progressively been fragmenting «*the continuum formed by the various pieces that are chained in time, from the ancient Alcazar up to the Casa de Campo*» (Burgos, Garrido, Porras-Isla, 2014, p. 168).

The existing elevation differences enable the vision of the historical layers as if they were a panorama, the various elements following each other in an east-west direction (Fig. 31). Perpendicular to the river, 140 meters above sea level, the Royal Palace is built on the remains of the old *Alcazar* of the Habsburgs.

On the level below, is the *Campo del Moro*, a tree-lined hill that approaches the river. To the west lies the promenade of the "Virgen del Puerto", a road placed on an artificial elevation created as part of the urbanization of the area at the end of the 18th century in order to preserve the royal garden from river floods.

The aim of the intervention was to create a new direct link between the city centre and the *Casa de Campo*, whose access at the time had been forbidden to pedestrians for decades. The transformation included the treatment of topography as a first-order conceptual mechanism clearly differentiated in each area (Burgos, Garrido, Porras-Isla, 2014).

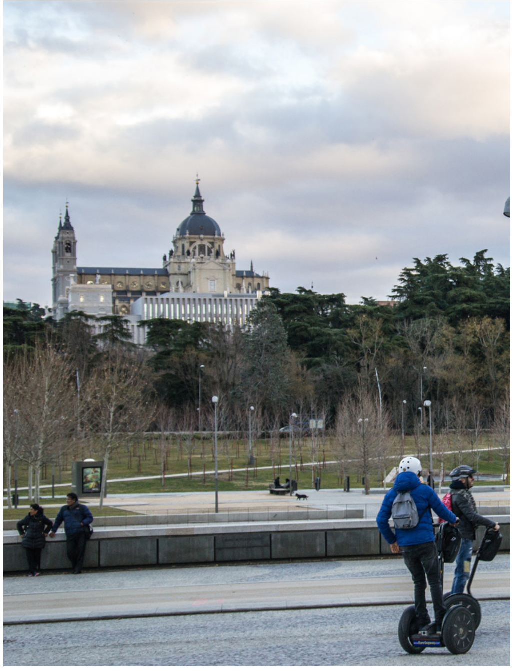


Figure 31: View of the Palacio Real from the "Salon de Pinos". Source: Author, January 2018.

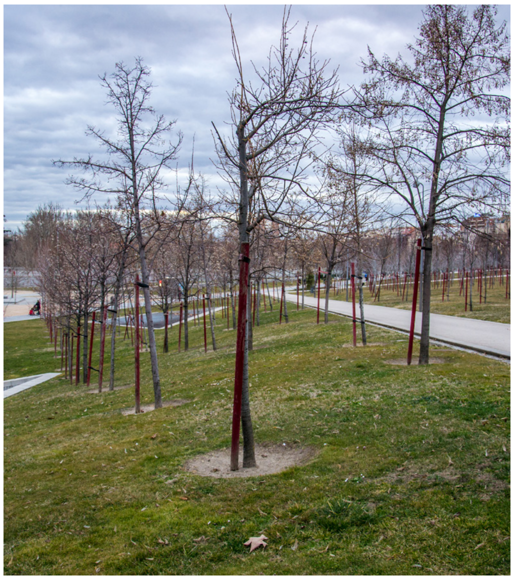


Figure 32: "Jardines de la Virgen del Puerto", the inclined plane is due to the exiting underlying tunnels, the ground inclination allowed to easily incorporate the geometry of the tunnels into the topography. Source: Author, January 2018.

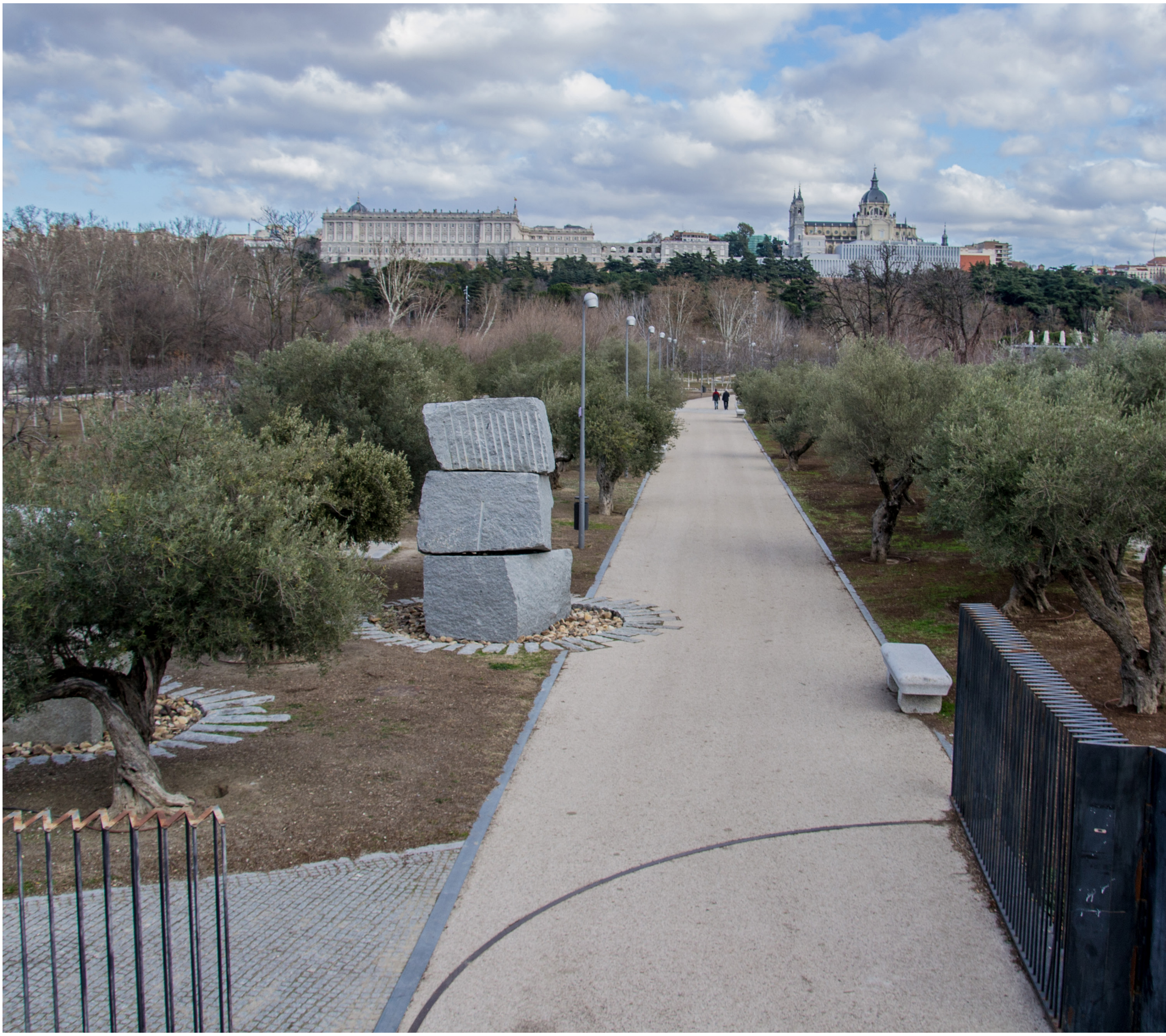


Figure 34: View of the “Huerta de la Partida” from the belvedere, in the background the Royal Palace and the Almudena Cathedral. Source: Author, January 2018.

The slope next to *Campo del Moro* is a unique inclined plane that meets the flat area adjacent to the Manzanares to reveal an open space around the Hermitage of the *Virgen del Puerto*.

On the opposite side there is the platform that precedes the *Casa de Campo*, whose relief, modelled by a topography of soft curves, allows almost all the technical elements of the tunnels to be integrated in a natural way without constituting, in any way, an obstacle to the continuity of space (Fig. 32).

The monumental entrance to the *Casa de Campo* has been restored and surrounded by trees of the species that can be found in the most natural field of the *Campo del Moro*, among which *Ginko biloba*, *Cercis siliquastrum*, *Quercus rubra* (Fig. 33).

On the western edge, on the side of the *Casa de Campo*, the "Huerta de la Partida" (Fig. 33c), a place particularly involved in the motorway burial work, has been rehabilitated in its entirety.

The accumulation of earth and debris, which exceeded 15 m in height, was reused to give rise to a new topography that rises gently away from the river, culminating in a lookout where, in 1572, the painter Antoon Van Den Wijngaerde[197] depicted the first view of the city of Madrid (Fig. 34).

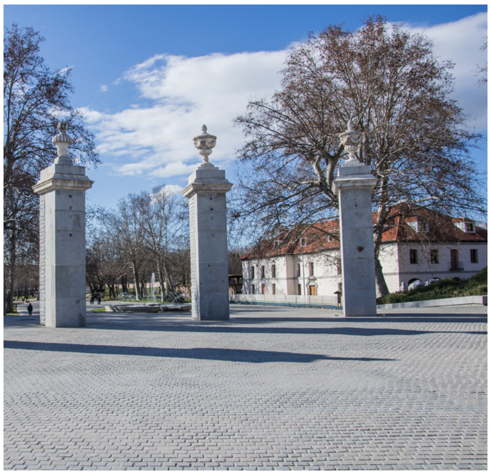


Figure 33: Entrance to the Casa de Campo. Source: Author, January 2018

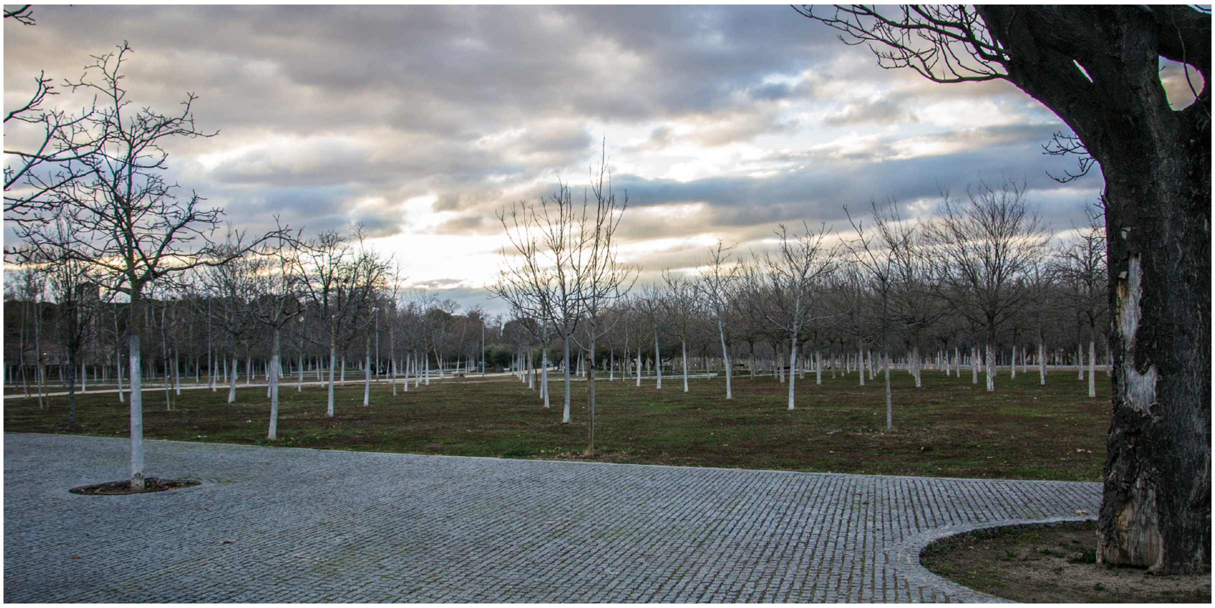


Figure 33b: View of the "Huerta de la Partida". Source: Author, January 2018.

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[197] Interview with Fernando de Porras-Isla-Fernàndez, 2018.

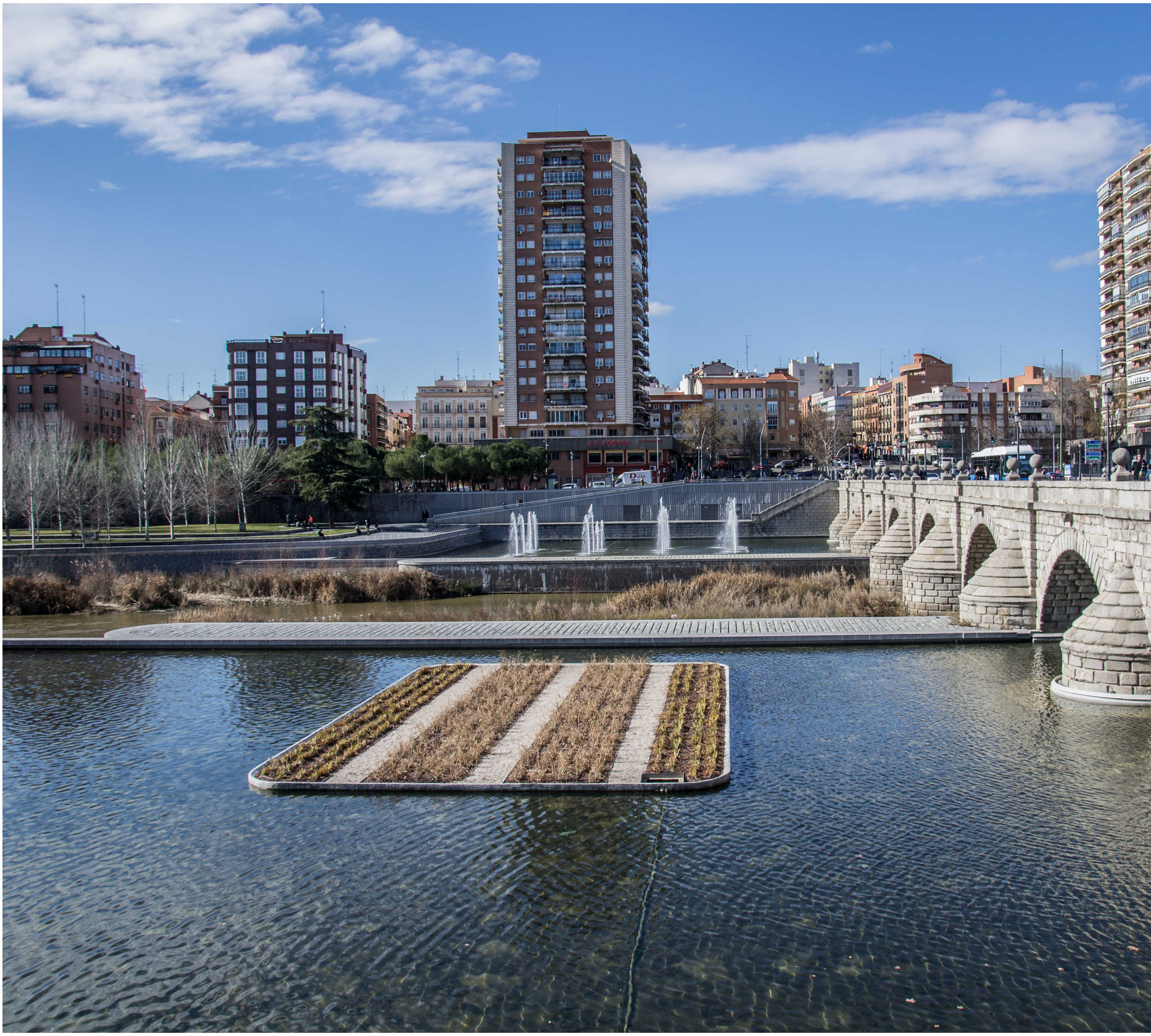


Figure 36: View of Segovia Bridge and of the platform of lilies, in the background the fountain and adjacent meadow planted with poplar trees are located. Source: Author, January 2018.

The surface is uniformly populated by plantations of fruit trees of various species, arranged in a regular pattern. The linear fountains of granite on the eastern edge, which recover the longitudinal presence of the water in allusion to the pools used by the washerwomen until the beginning of the twentieth century, and the furrows of stones following the course of the ancient streams that branch off throughout Madrid Rio (Fig.35), lead the visitor to the Segovia Bridge.

The environment around the bridge is made up of gardens that, as they approach the river, change their vegetation, welcoming specimens of *Populus alba*, *Populus tremula* and *Populus canescens*.

The gardens are alternated with stairways that lead to terraces reaching the river generating a spectacular reflection of the arches of the bridge. Below the bridge two monumental fountains emerge, covered with floating *Lotus* flowers and two platforms where particular species of aquatic lilies are grown (Fig.36).

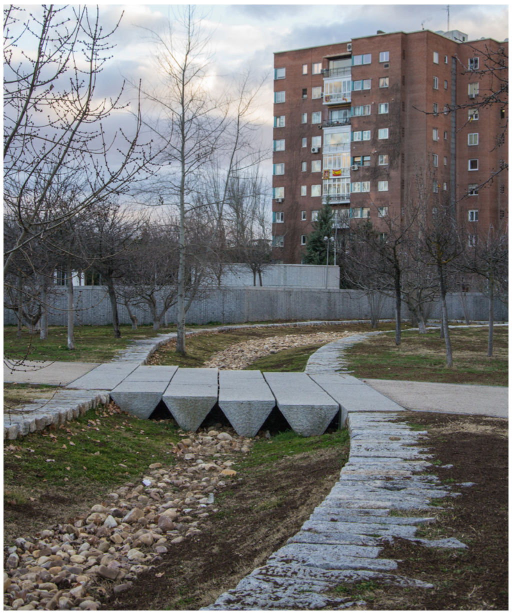


Figure 35: Detail of the gravel ditch that remarks the course of one of the streams that flowed inside the "Huerta de la Partida". Source: Author, January 2018.

LANDSCAPE N. 4: Encuentro con Ribera

The "meeting with the river banks" takes place in the geometric centre of the six landscapes that make up Madrid Rio, where the river Manzanares changes the orientation of its original layout with an angle of 120 °.

The main structural element of the area is the Toledo Bridge (Fig. 37), the only baroque style bridge in the city, which was built for the will of King Felipe V, the first ruler of Spain belonging to the Bourbon family.

The bridge and New Royal Palace once formed part of a series of interventions along the course of the Manzanares which connected the old gate and the river and were conceived as a series of large tree-lined paths, as «*the result of a baroque understanding of the river landscape inherited from the experiments carried out at the end of the seventeenth century in Versailles*» (Burgos, Garrido, Porras-Isla, 2014, p. 191).

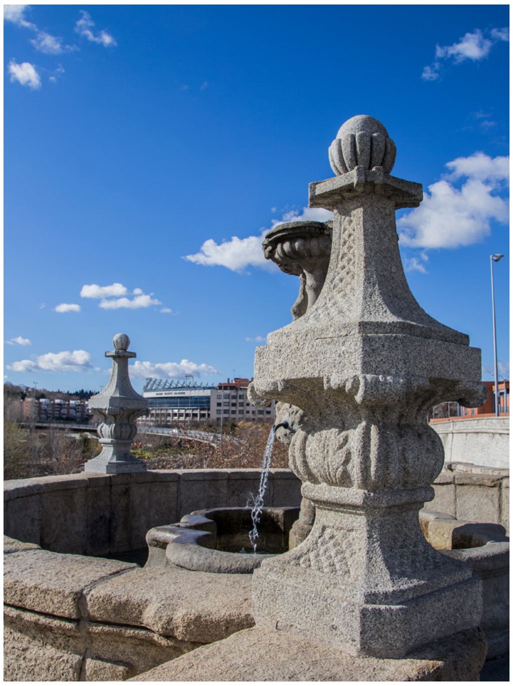


Figure 37: Detail of the restored ornaments of the Toledo Bridge. Source: Author, January 2018.

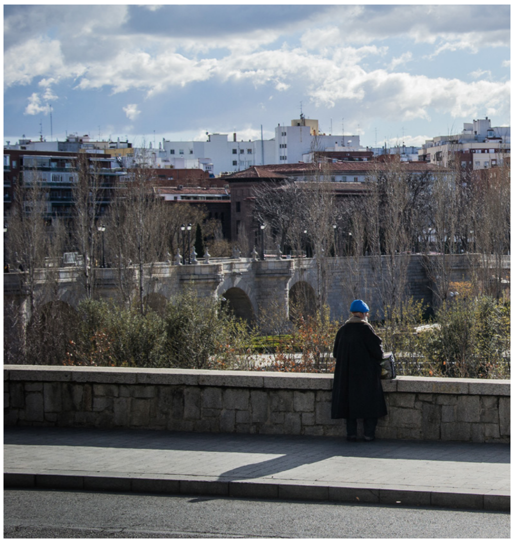


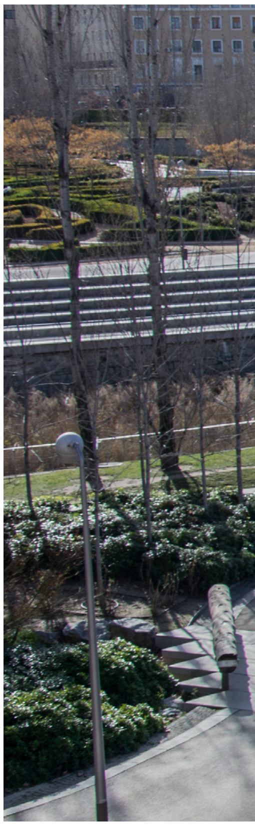
Figure 37b: View of the landscape of "Encuentro con Ribera" on the left the Toledo Bridge connecting the eastern and western sides. Source: Author, January 2018.

The landscape that was developed (Fig. 37b) on the void created by the burial of the M30 motorway that, until 2004, flowed under its arches, in addition to the enhancement of the baroque bridge, had the task of integrating all the infrastructural elements that cross this area[198].

The most important technical aspects are those related to the integration of the various services and infrastructures running in the subsoil, combining the two most important nodes of the M30, among which the only section that could not be buried[199] (Fig. 38).

> «*These multiple conditions and the limitation of the maximum permissible loads on the slabs that cover the tunnels, give rise to a complex stratification that in itself can be considered an invisible landscape*» (Burgos, Garrido, Porras-Isla, 2014, p. 192).

Once more, the designers took inspiration from the character of the local landscape, so that the meeting with the fluvial landscape is mediated by the restored Toledo Bridge, which acquires the new role of lookout over the Manzanares river (Fig.39).



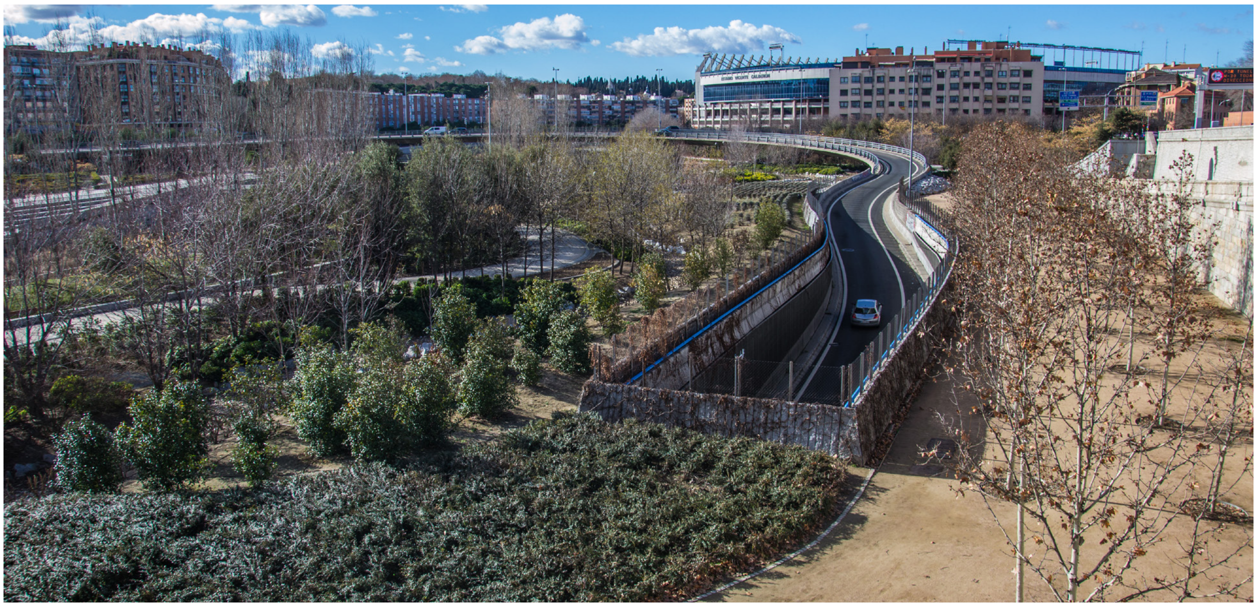


Figure 38: View from the Toledo Bridge of the only unburied section of the M30 in the Madrid Rio park; In the background the Vicente Calderon stadium. Source: Author, January 2018.

[198] Interview with Fernando de Porras-Isla-Fernàndez, 2018.

[199] Ibid.

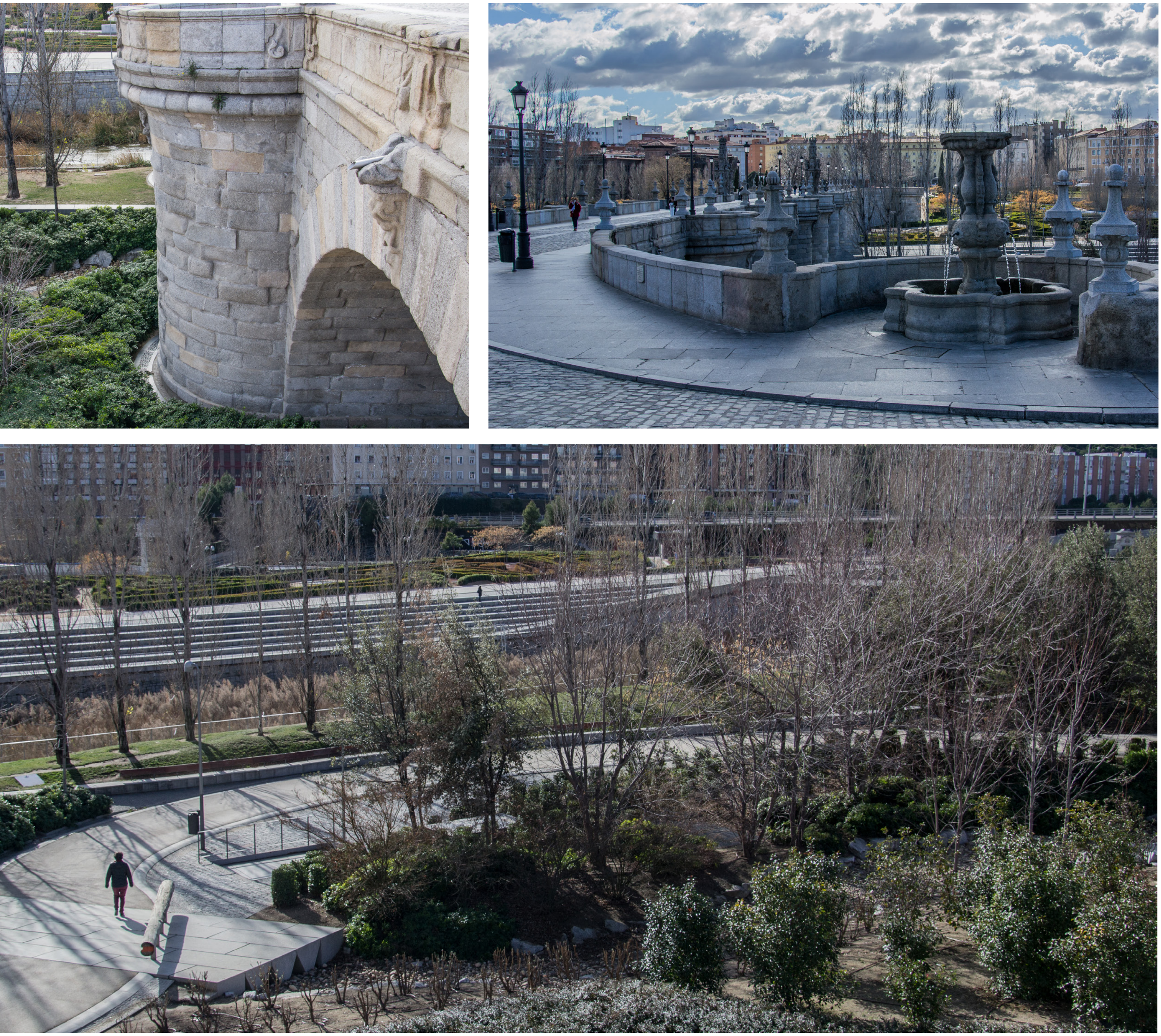


Figure 39: Top: details of the restoration of the structure of the Toledo Bridge; Bottom: view of the landscape below the bridge. Source: Author, January 2018.

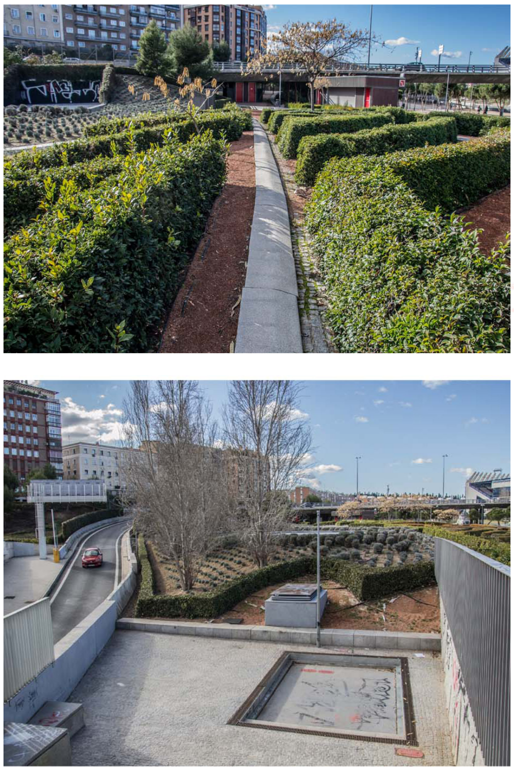


Figure 41: Top: detail of the granite curbs of the geometric gardens; Bottom: one of the safety exits of the M30 tunnels. Source: Author, January 2018.

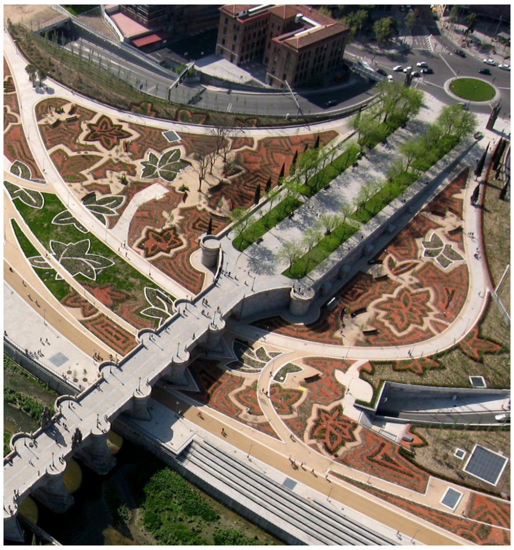


Figure 41b: Aerial view of the parterre and the Toledo Bridge. Source: Courtesy of the authors.

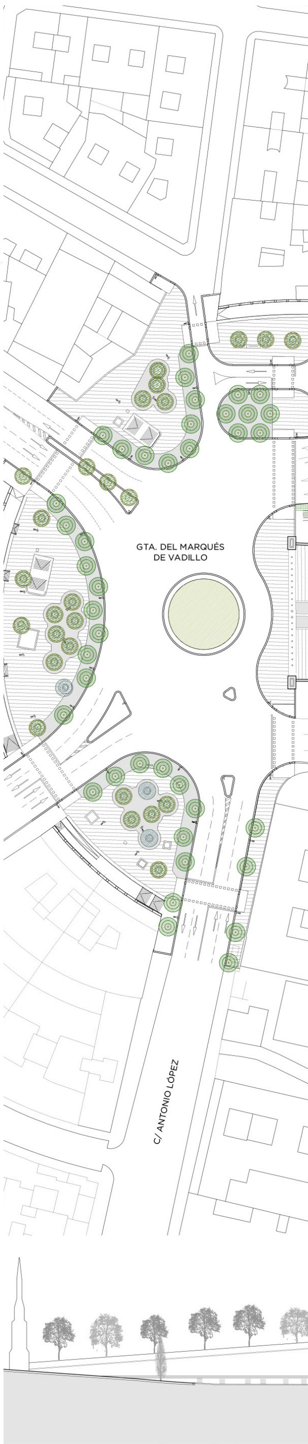
Both requirements have been addressed through the conception of a new topography that adapts to the surface by integrating all the existing infrastructures, allowing the creation of a completely accessible space, above which pedestrian and cyclist paths cross each other as per the geometry of the subsoil.

«The shapes of the space were softened with the creation of gardens able to incorporate a figurative language around the bridge» (Burgos, Garrido, Porras-Isla, 2014, p. 191).

The connection between the consolidated urban fabric of Madrid and the Manzanares river is noticeable when observing the shapes of the garden, inspired by numerous geometric gardens made with the topiary of Madrid. The design of the vegetal parterre (Fig. 40) is the result of an analysis of the geometry of the city's historic gardens, which were adapted according to the surfaces that can be stepped on.The walkable surfaces consist of the granite that extends along the promenade beside the river and in the main paths that connect the garden with the squares and streets of the adjacent urban fabric, acting as a sort of guideline in the park.

The floral forms of the flowerbeds of *Viburnum tinus*, *Ligustrum japonicum* and *Buxus sempervirens*, are defined by stone curbs that, by making it possible to easily reach every point of the surface where the technical areas are located, facilitate the maintenance of the park, as well as connecting the emergency exits with the pedestrian paths of the park (Fig.41).

The surfaces that cannot be walked on are covered with soil and gravel of reused bricks, whose intense colour helps to clearly define the geometry of the garden lending grandeur to the structure of the Toledo's Bridge (Fig. 41b and 42).



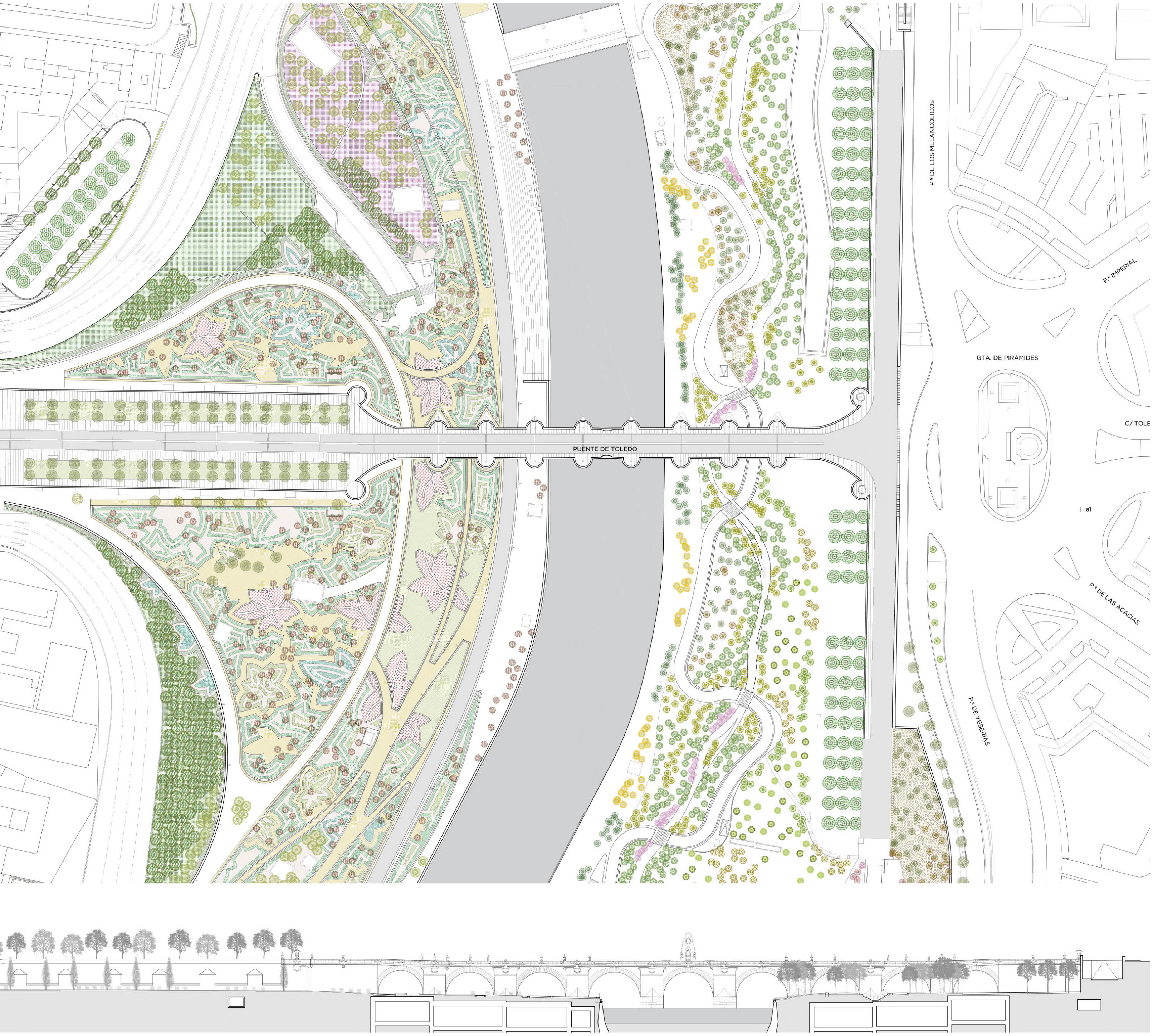

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Figure 40: Extract from the project plan; On the left bank the vegetable parterre, on the right of the bridge the Park of the Arganzuela. Source: Courtesy of the Authors of the project.

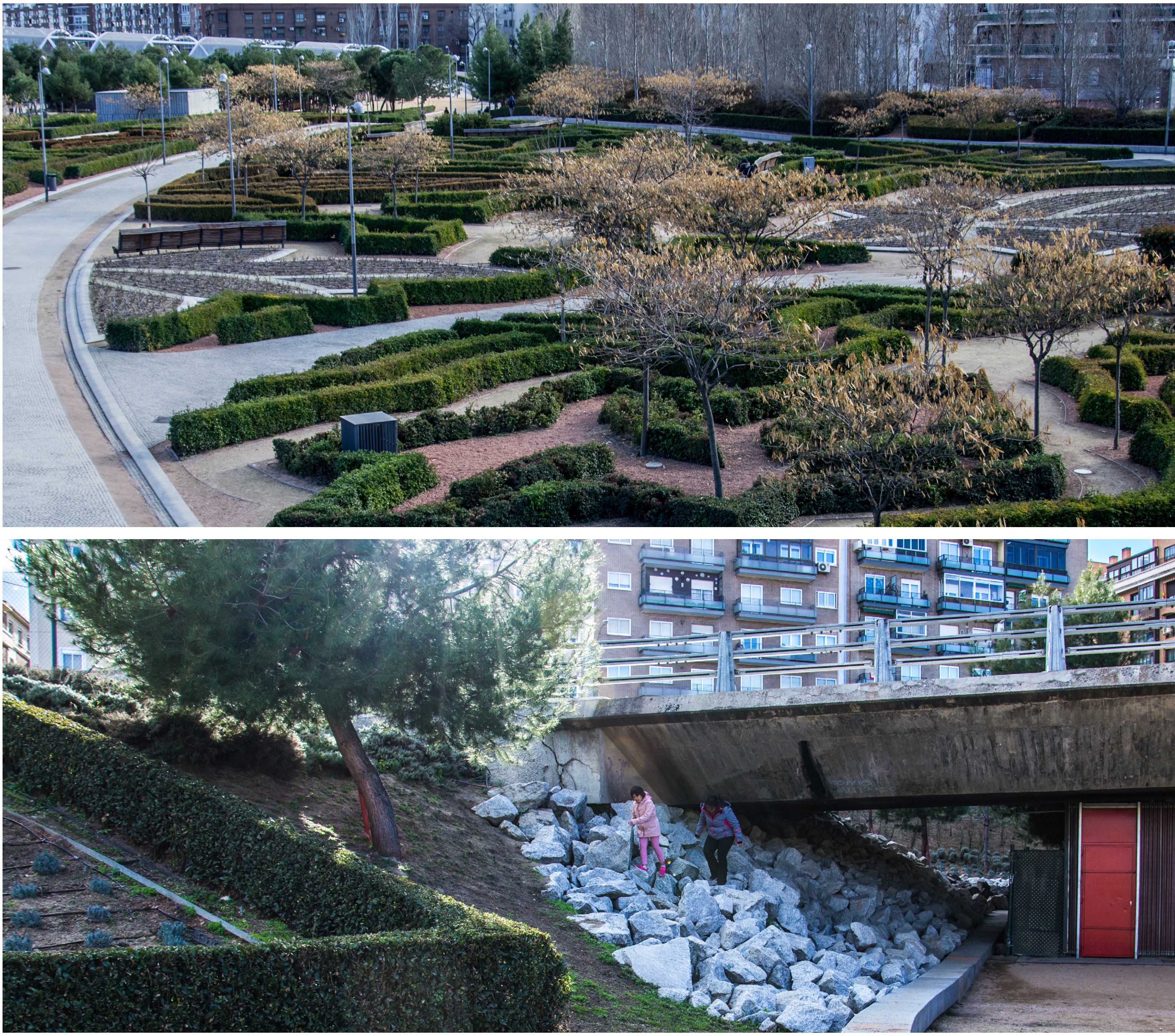


Figure 42: Top: view of the geometric gardens from the Toledo Bridge; Bottom: detail of the landscape transition between the geometric gardens and the Salon de Pinos, granit raised structure to favour the flow of rainwater. Source: Author, January 2018.

e boulders were inserted under the

LANDSCAPE N. 5: Restos del Rio

The integration of the infrastructures that cross this area, not only involved the "invisible landscape", but also the innovative reuse of the arches of the elevated sections of the highway (Fig. 43 and 44) which define the contours of the geometric gardens and simultaneously act as a border of transition between the *Salon de Pinos*, north of the Bridge, and the *Arganzuela* park located on the eastern side of the Toledo Bridge.

The park gradually transforms into a landscape with softer forms that evokes, with its materials, its vegetation and the restored ruts of the streams, the character of the bed of the Manzanares river (Fig. 45).

The Arganzuela park has an extension of almost 30 ha and constitutes the most extensive park bank of the entire Madrid Rio project, entering a very densely populated area of the city. The name derives from the park created in the early 1960s and which occupied part of the area before the transformation intervention.

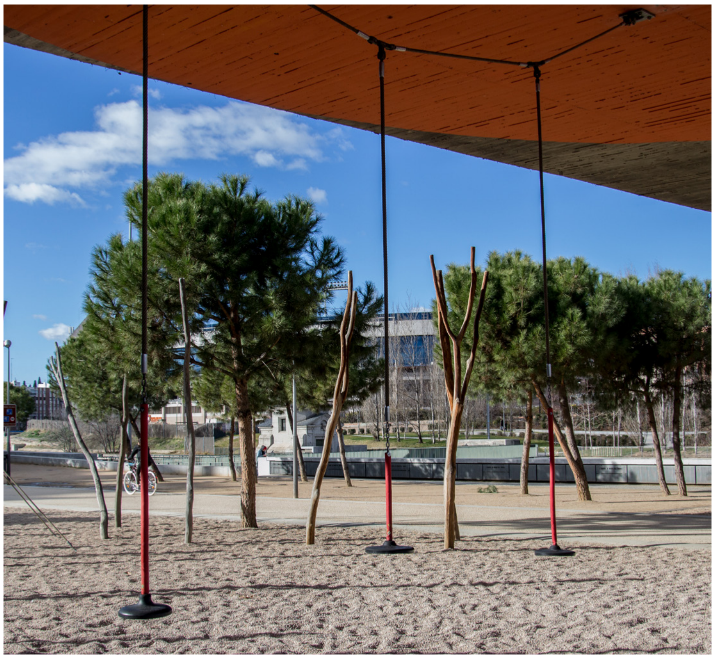


Figure 44: Play area under an elevated interchange of the motorway. Source: Author, January 2018.

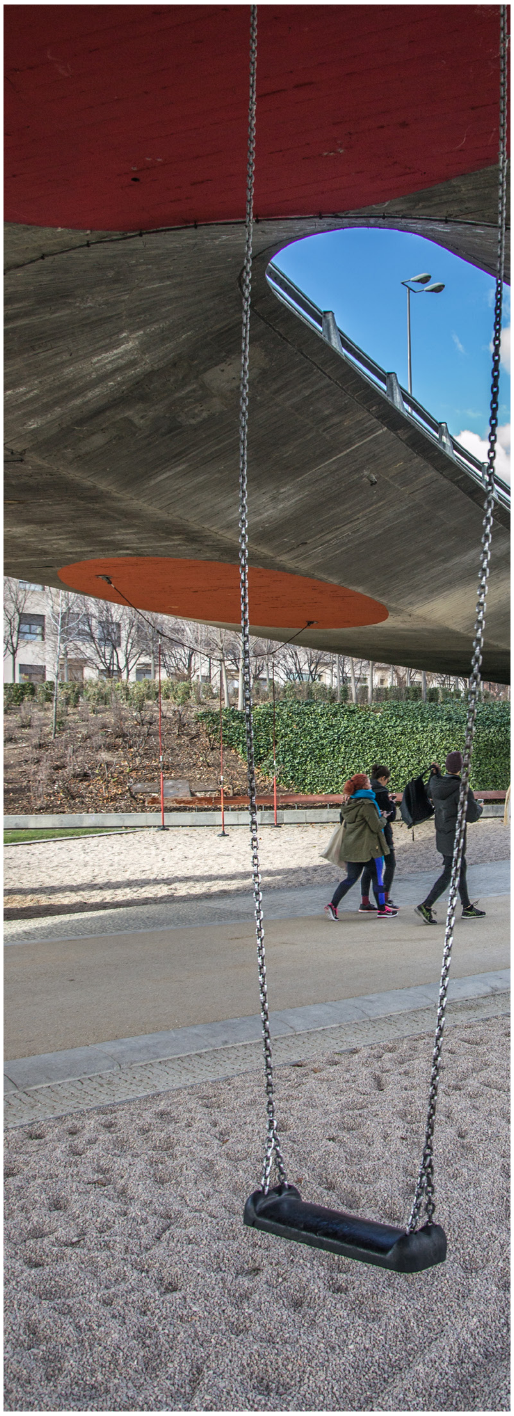


Figure 43: Play area under an elevated interchange of the motorway. Source: Author, January 2018.

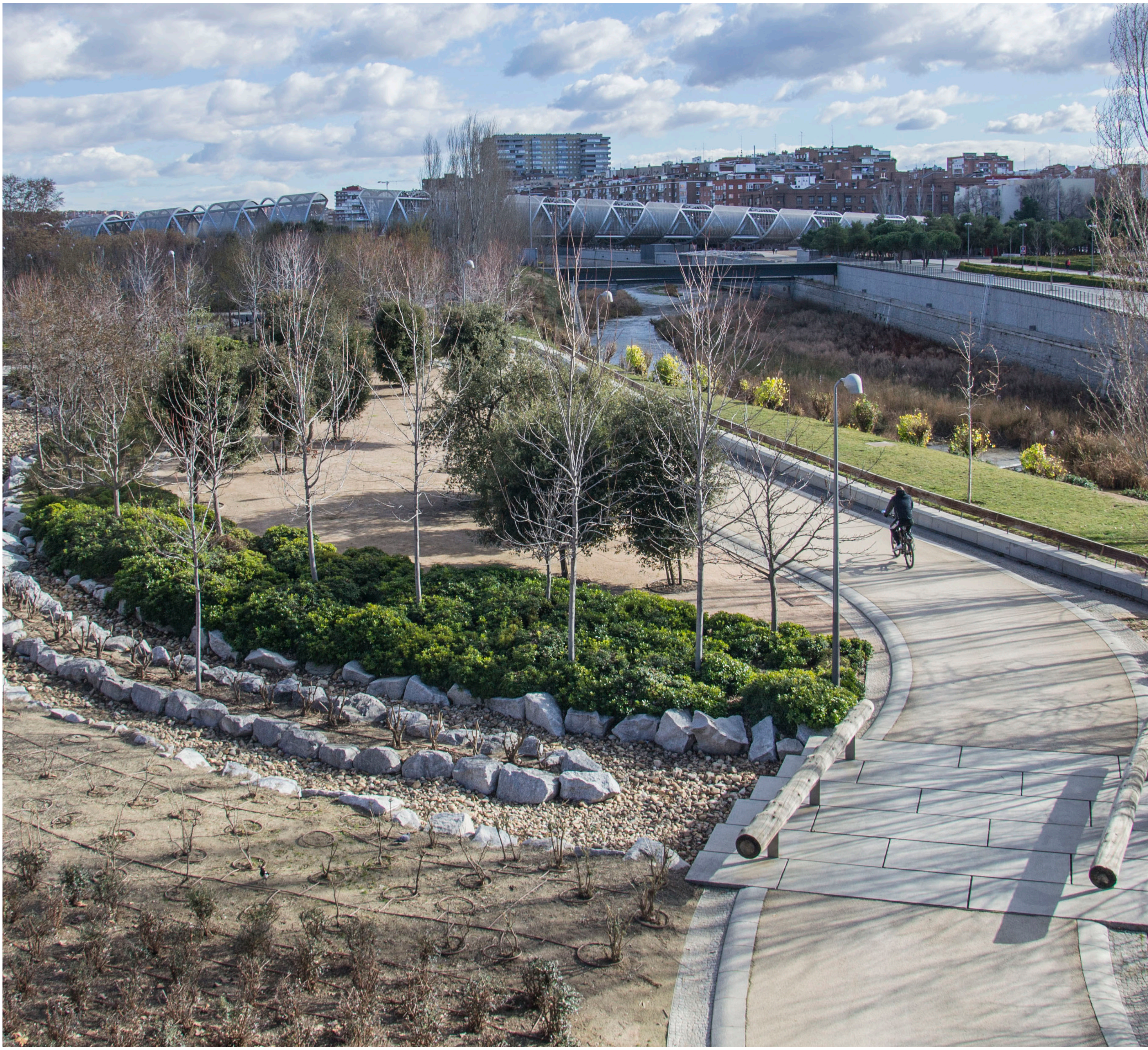
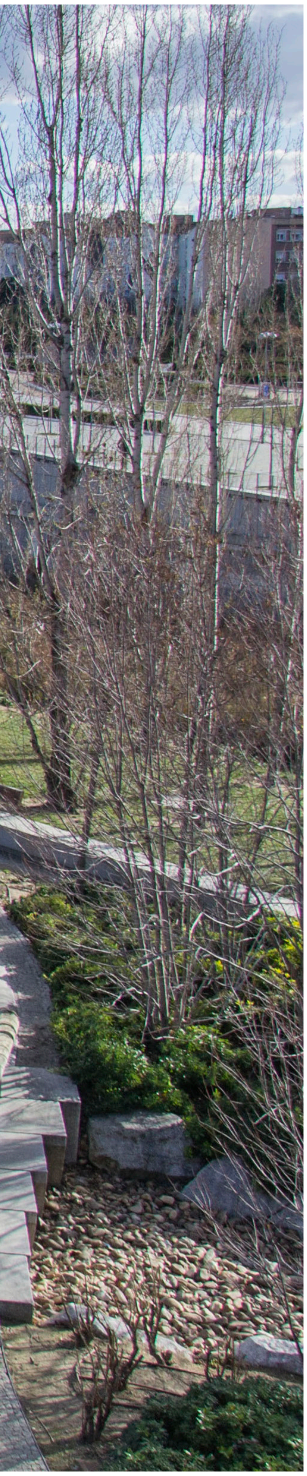


Figure 45: View of the Arganzuela Park, in the background the Helicoidal Bridge. Source: Author, January 2018.



The designers were able to recover about a third of the original trees, which can still be recognized by their size.

«*The idea of building a landscape with the remains of the river bed as figurative material was the basis that supported the design of its structure and the different parts in which it is articulated, thus meeting the functional needs of the residents*» (Burgos, Garrido, Porras-Isla, 2014, page 209).

The landscape of the river bank retains the dual character of urban park (Fig.46) and is now heavily used by local residents. It is consistently configured with the surrounding environments thanks to topography and vegetation that radically modify the space articulating it towards the final section of the project (Fig. 47). The paths are developed along the north-western and the south-western axis and are connected transversally to the city; between them run bridges and walkways (Fig. 48).

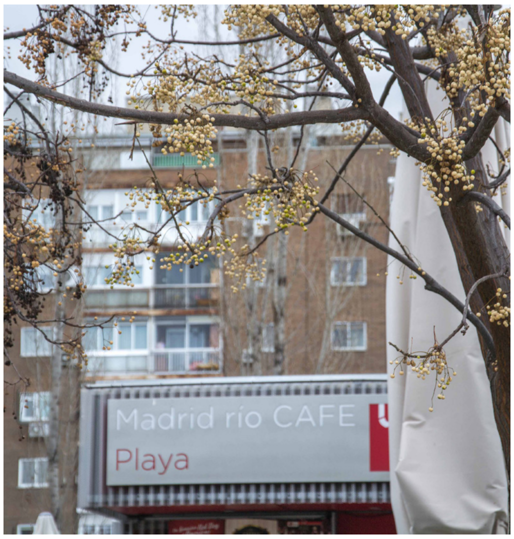


Figure 46: Detail of one of the many kiosks scattered around the park. Source: Author, January 2018.

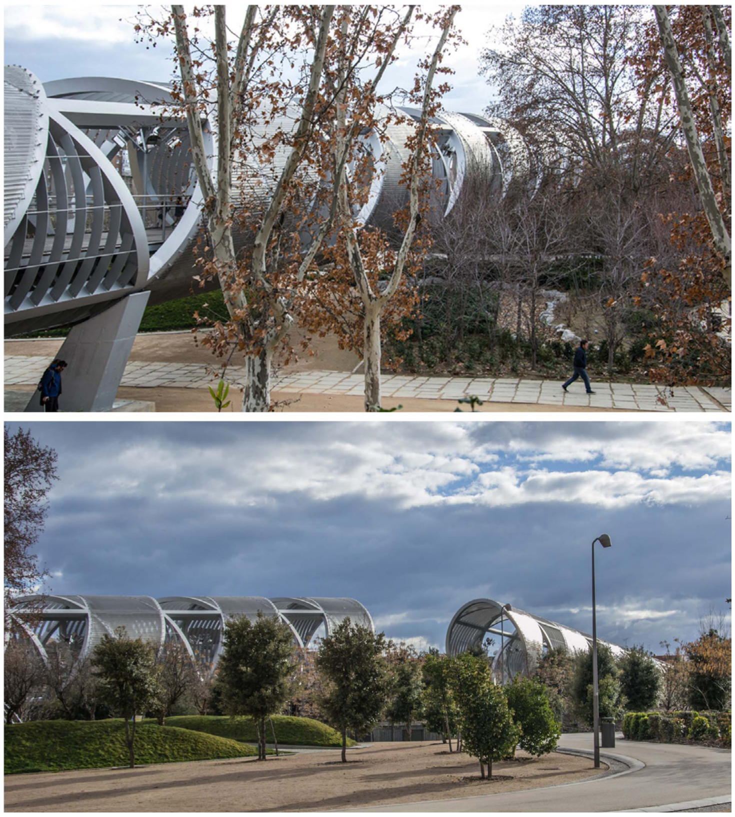


Figure 48: Views of the Helicoidal Bridge. Source: Author, January 2018

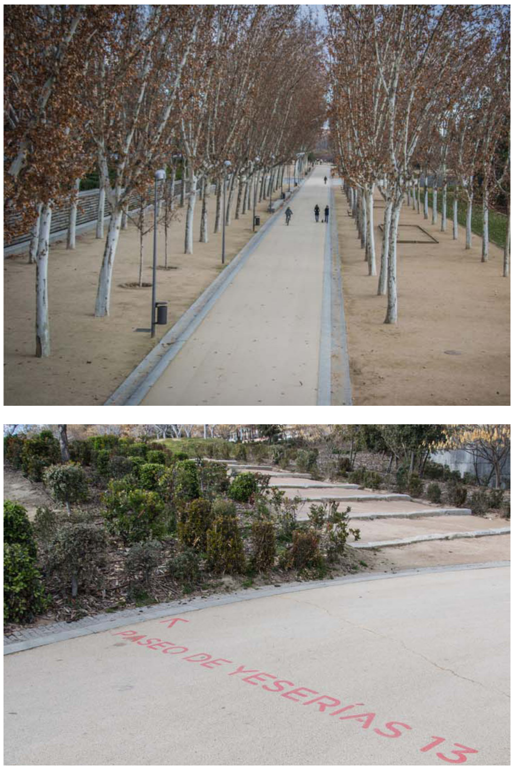


Figure 47: View and details of the pedestrian and cycle pathss of the Arganzuela Park. Source: Author, January 2018.

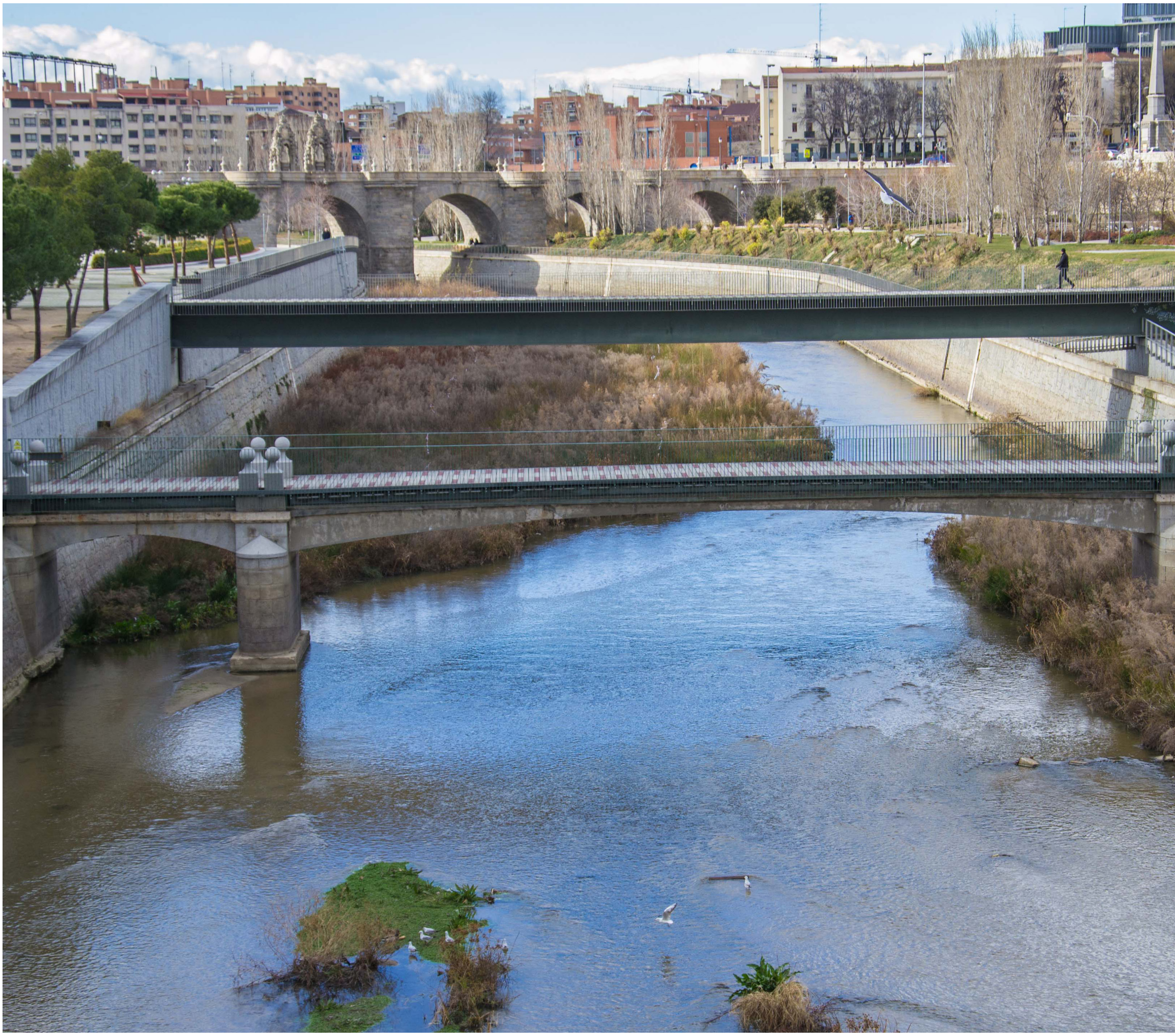


Figure 49: Vie of the Manzanares river crossed by the new pedestrian paths, in the background the Toledo Bridge. Source: Author, January 2018.

The widest path in the park maintains a relatively constant altitude, guiding the visitor through a changing topography that diverges into secondary routes that reach areas suitable for slower movement which recall the course of the river with the presence of springs and whirlpools of water (Fig. 50).

They are placed at the centre of "green rooms" which isolate users from the noise of the city and the screams of children playing in areas dedicated to them which are designed with extreme care, using the same language.

In addition to the cycle and pedestrian paths there are a series of facilities planned in the park which can be grouped into three major groups: sport, play and water (Fig. 51 and 52).

In addition to the ten ornamental fountains that offer an interesting visual and sound water experience, on the large lawn that runs along the eastern bank of the river there are three paved ovals which form a sort of riverside beach during the warmer seasons (Fig. 53). These oval spaces offer refreshments and are fun elements for children who clamoured for the creation of a beach during their very own competition for ideas organized during the design competition stage by the Municipality of Madrid (Perini, 2017).

The park includes several bowling greens, a soccer field, a skate park, a river boating centre and a climbing centre; the play areas follow the guidelines of the system developed for the "Salon de Pinos" that includes an artificial hill from which eight slides and a zip-line descend.

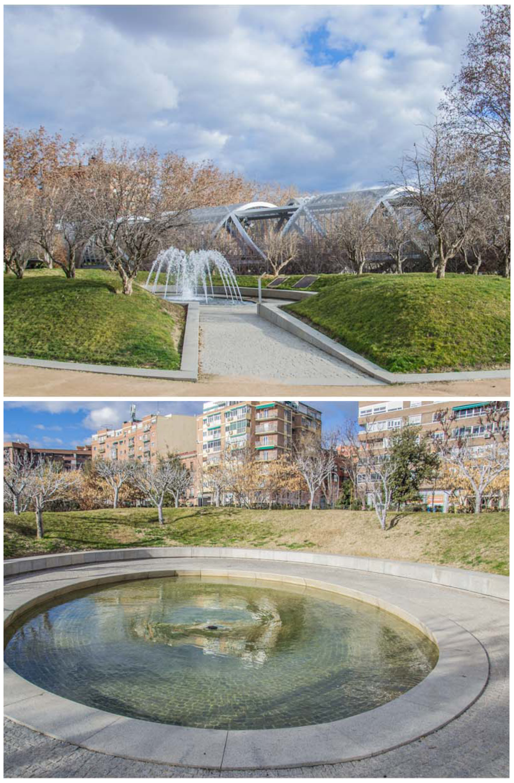


Figure 50: Views of the water games of the park. Source: Author, January 2018.

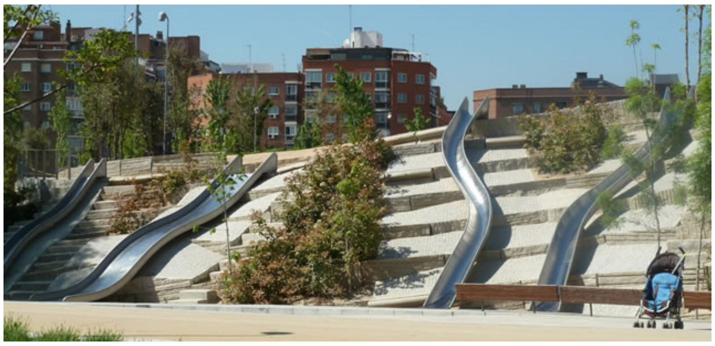


Figure 52: View of a play area of the Arganzuela Park. Source: Author, January 2018.

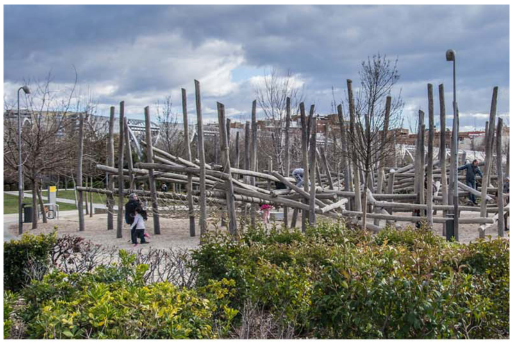


Figure 51: View of a play area of the Arganzuela Park. Source: Author, January 2018.

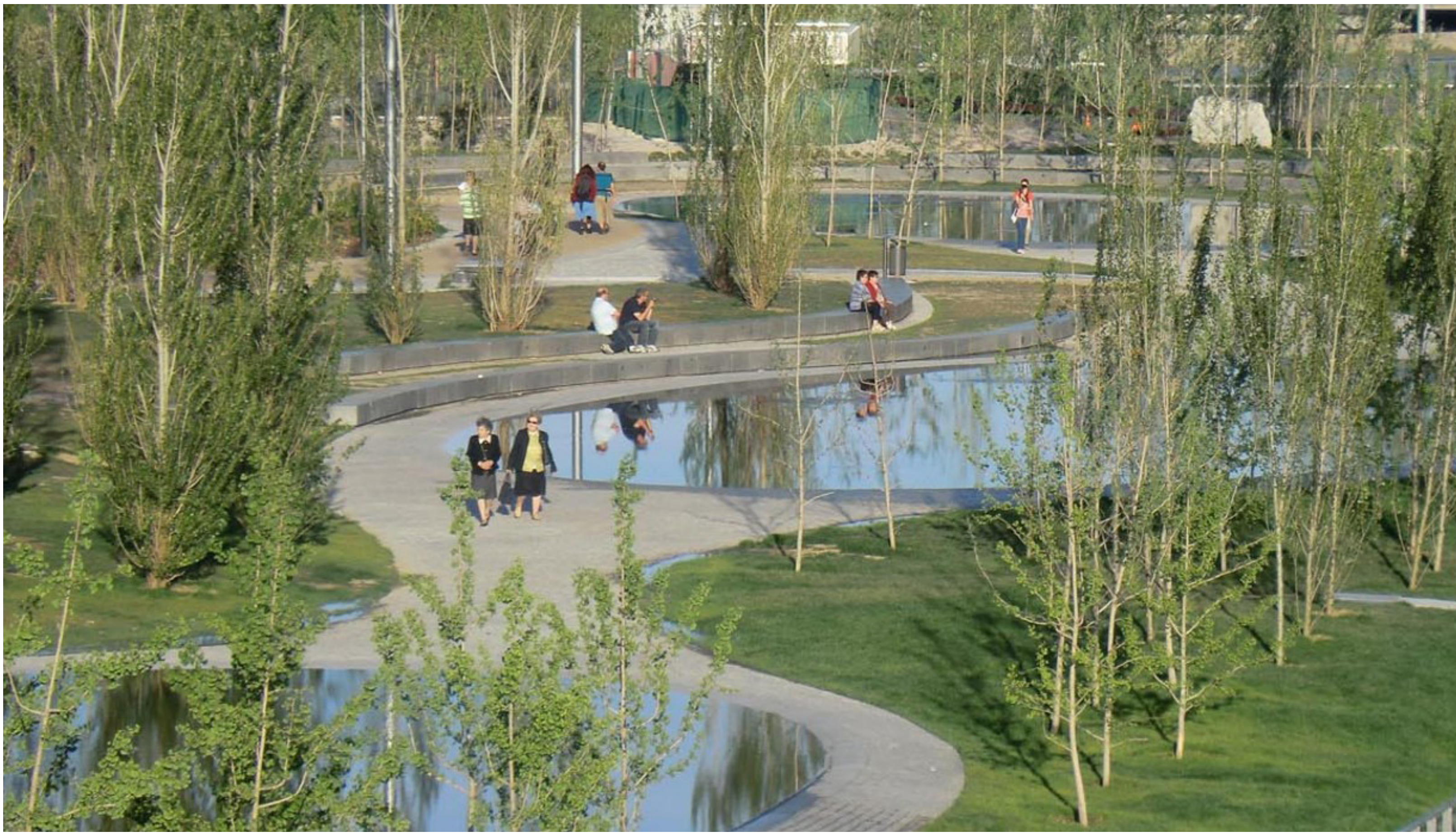


Figure 53: View of the three oval squares that make up “Madrid Rio beach”. Source: Courtesy of the authors.

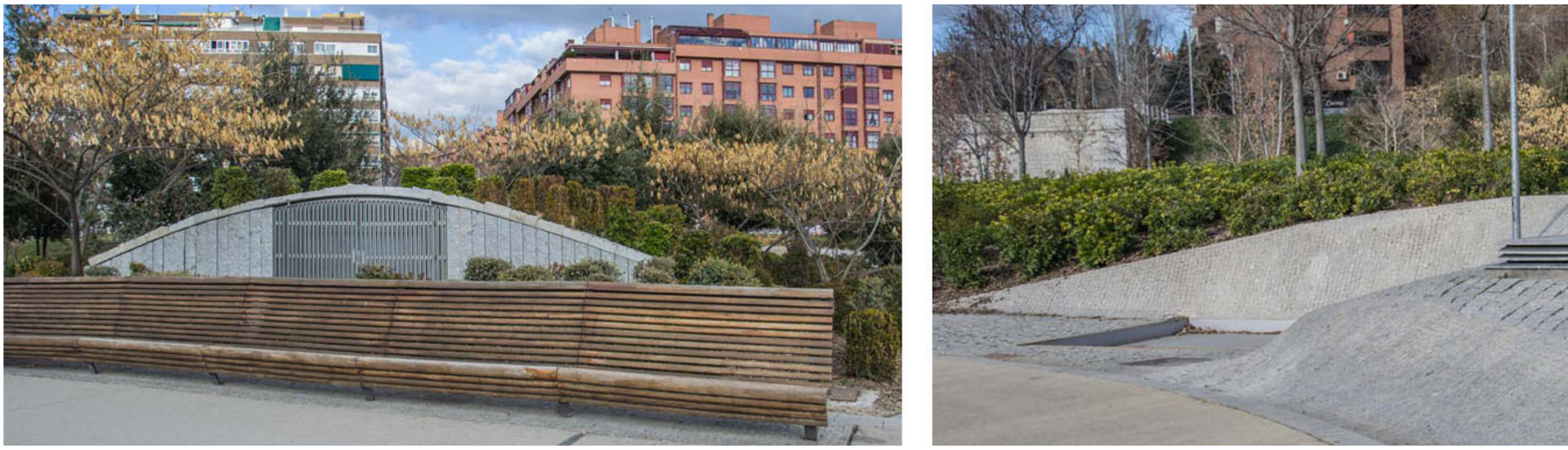


Figure 54: Two emergency exits of the highway tunnels in the park of the Arganzuela. Source: Author, January 2018.

The undulated topography of the park made it possible to accommodate the safety exits of the tunnels and access to the underground technical rooms along the main and secondary routes, taking different forms depending on the landscape they encounter on the surface (Fig. 54).

LANDSCAPE N. 6: El Agua y la Sangre

The water of the river and fountains (Fig. 55) is the element that leads to the totally restored space of the ancient "Matadero" of Madrid, the only point where Madrid Rio incorporates pre-existing buildings. The municipal slaughterhouse was made up of more than 40 buildings of different sizes, which ceased to function in the 1970s and finally closed in 1996. Since then, until 2006, this structure remained in disuse.

The intervention in this sector has succeeded in enhancing the architectural value of the buildings by integrating it into the park *«as if it was a sort of still life»* (Burgos, Garrido, Porras-Isla, 2014, p. 239).

A series of closures, both permeable and movable, limit the boundaries of the new *Matadero* (Fig. 56).

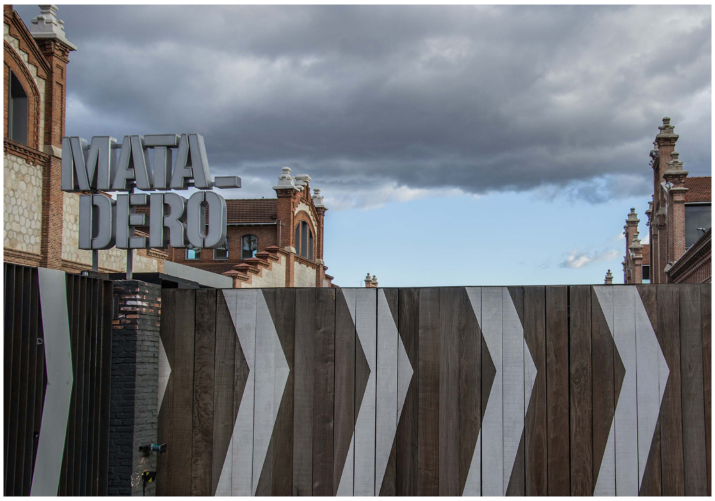


Figure 56: View of one of the Matadero entrances. Source: Author, January 2018.

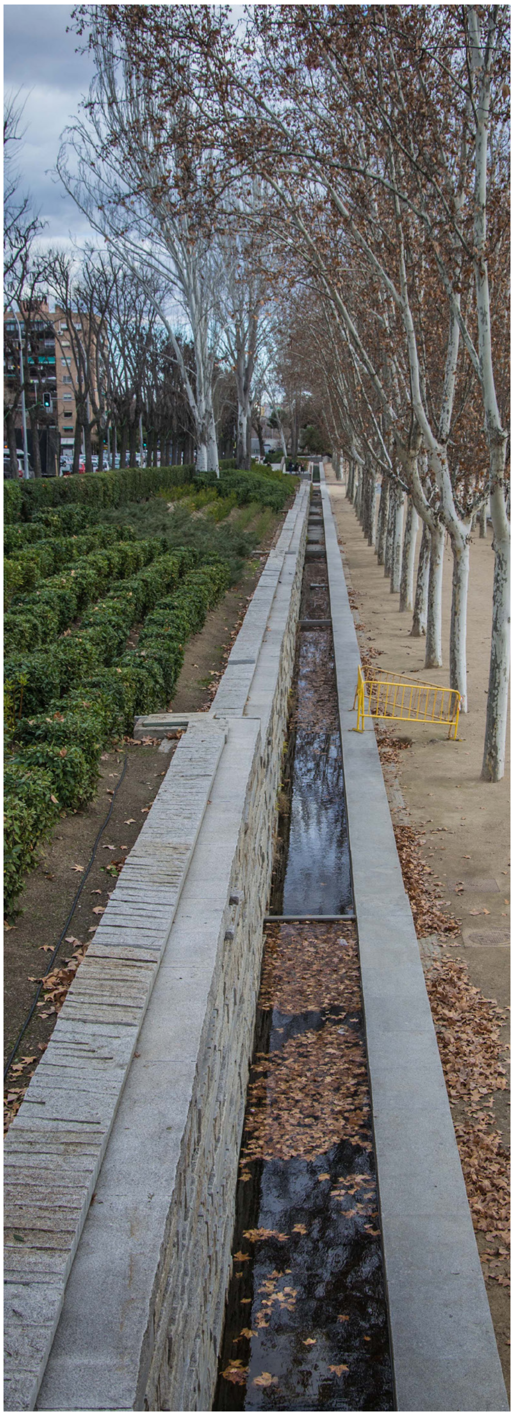


Figure 55: The water linear fountain located beside the path leading to the "Matadero". Source: Author, January 2018.

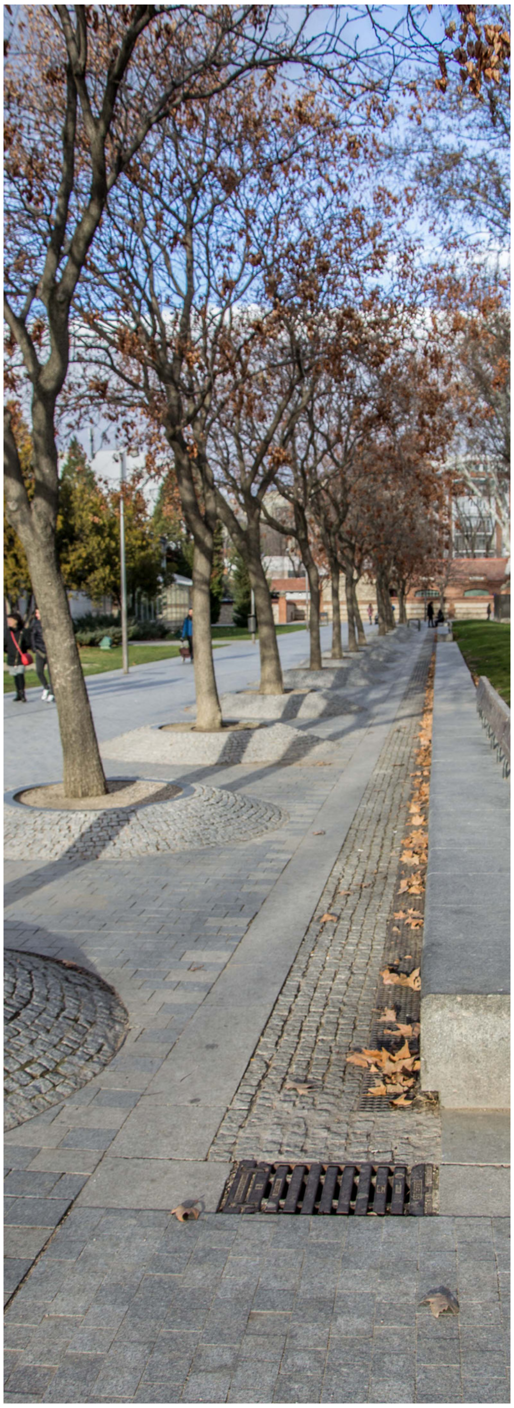


Figure 57: Detail of the promenade located along the north perimeter of the Matadero complex. Source: Author, January 2018.

The outer borders of these closures are surrounded by a slope of vegetation that becomes denser towards the river, thereby generating a series of open and transit spaces that blend in with the rest of the park (Fig. 57).

The Matadero interior is built with only two materials: concrete and granite that offer a uniform colour range.

The flat concrete surface was designed by the authors of the project to «*highlight the metaphysical character of the whole, as if it were a place out of time when the ancient buildings slowly awaken from deep sleep*» (Burgos, Garrido, Porras-Isla, 2014, p. 239).

The supporting surface under the buildings is a unitary element on which, however, several profiled points are arranged to transform it into a blanket of different consistencies (Fig. 58).

The different zones that form the continuous concrete floor are specialized according to their relationship with the access to the buildings or with the main flows of the enclosures; «*each format of the flooring corresponds to the nature, frequency and weight of the traffic that must be supported*» (Burgos, Garrido, Porras-Isla, 2014, p. 239).

The buildings were reused thanks to architectural redevelopment actions: each of them was the subject of a specific project, conceived by several architects who gave them a new use, transforming these containers only on the inside (Fig.59).

It was decided to completely eliminate any type of conduit or cable uniting the design of all the buildings, thus recovering the clean shape of each building. It was necessary to create an underground system of technological connections, opting for the centralization of the most important structures in a building dedicated exclusively to the housing of all the main power generation and supply systems.

The air conditioning systems of all the reclaimed spaces are under the flooring, taking advantage of « *the accessible underground galleries that connect the central structure with each of the buildings*» (Burgos, Garrido, Porras-Isla, 2014, p. 240).

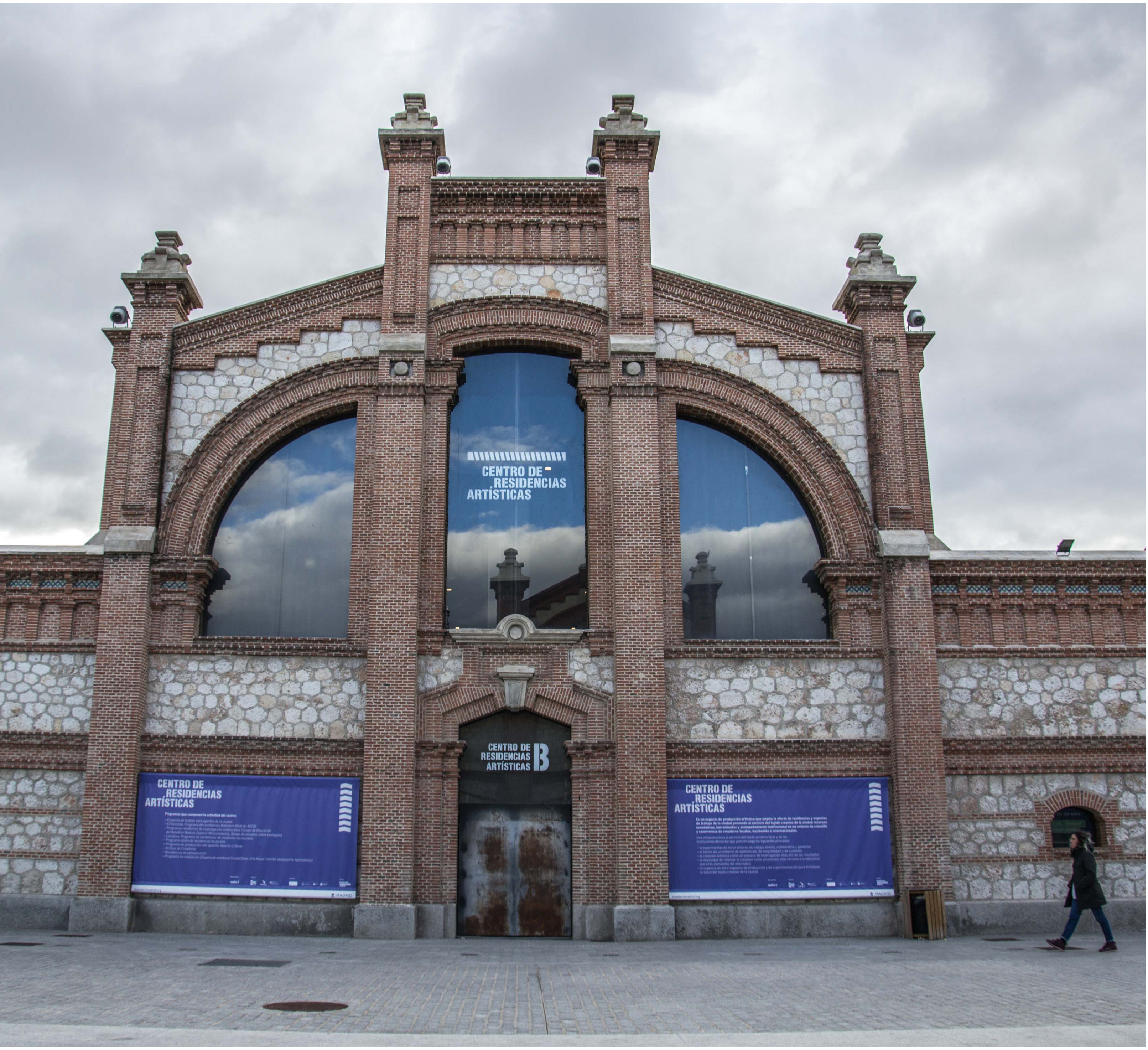

CENTRO DE RESIDENCIAS ARTÍSTICAS
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Figure 58: View of the façade of one of the main buildings of the Matadero. Source: Author, January 2018.

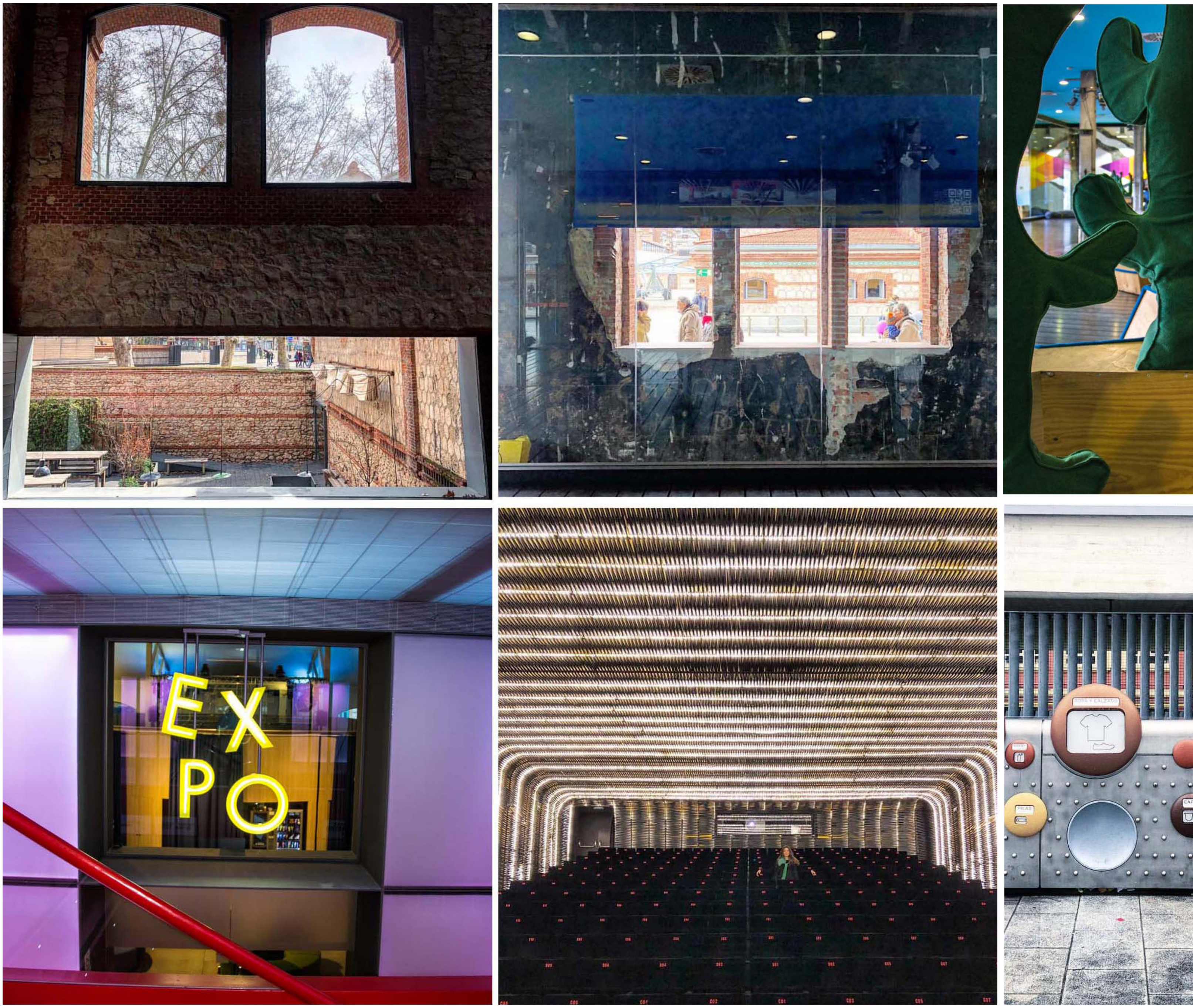


Figure 59: Top left the interior of the building 17e (Arch. Arturo Franco, Fabrice van Teeslar); Top middle: the view from the outside of the "Central de Diseno", part of the "Central de Instalaciones"; Top Right: a room of the "Central de Instalaciones de Matadero" (Burgos & Garrido, Porras La Casta, Rubio & Alvarez-Sala, West 8); Bottom left: the inside of the building 14 (Ensamble studio); Bottom middle: the 17f- cinema (ch + qs arquitectos); Bottom right: a waste recollection point for recycling. Source: Author, January 2018.

The success of the reopening to the public of this complex, according to the designers, was guaranteed by its position, at the centre of two very densely populated neighbourhoods whose inhabitants have made it the centre where many of the local associations do their work (Fig. 60).

The intensification of uses is accompanied by a series of activities planned by the designers together with the Municipality, open to all visitors, every day of the week, such as spaces for co-working (Fig. 61), a state-of-the-art public library, a film library with free daily shows, as well as a "plant repository" and a lively program of exhibitions and workshops .

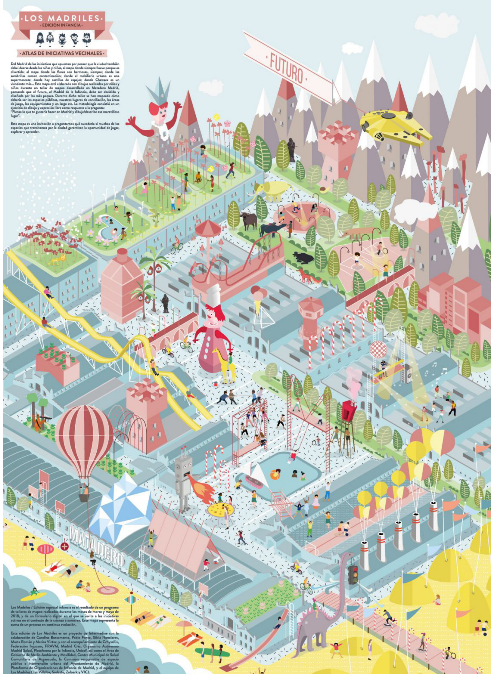
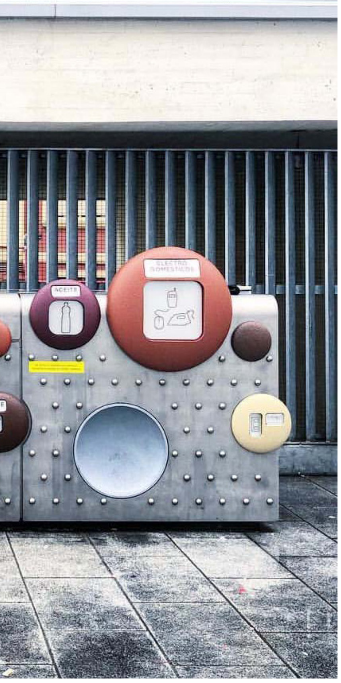


Figure 60: Poster of one of the neighborhood initiatives organized within the Matadero by the LosMadriles association



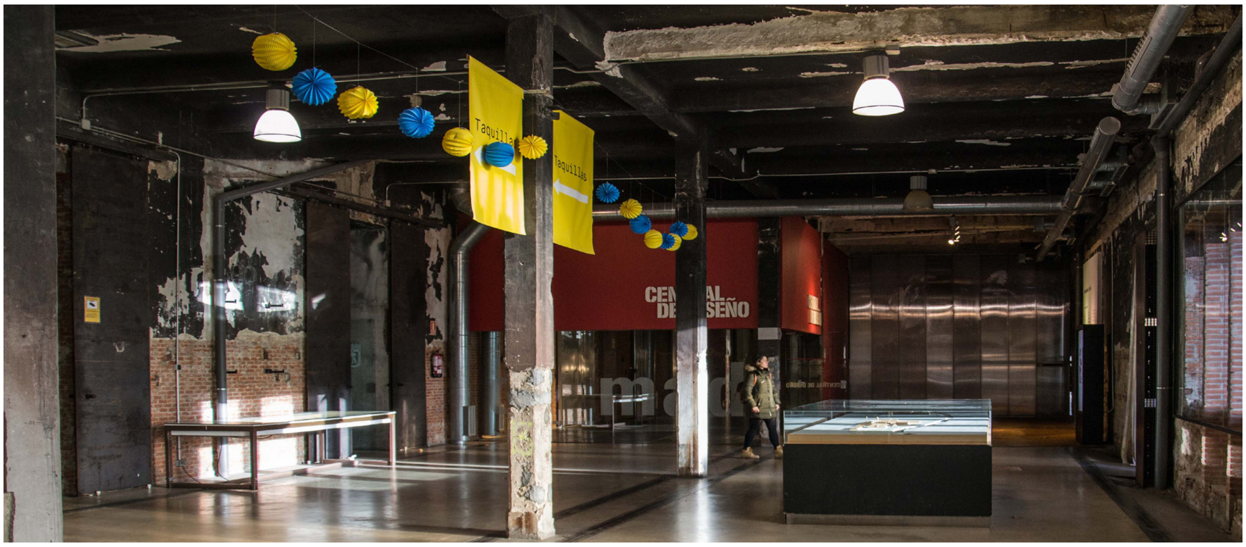


Figure 61: View of the interior of the "central de diseno" of the Matadero, in the centre of the hall is located the scale model of the Madrid Rio park. Source: Author, January 2018.

COSTS, BENEFITS, CRITICISM AND AWARDS

The Madrid Rio and Calle 30 projects involved an enormous re-engineering infrastructure operation (Perini, 2017). The first phase, which entailed submerging the Madrid traffic through 43 km of new underground tunnels, was a source of much dissatisfaction among local residents (Fig. 62) *«despite promises to improve the quality of life and increase in value real estate»* (Burgos, Garrido, Porras-Isla, 2014, p.100).

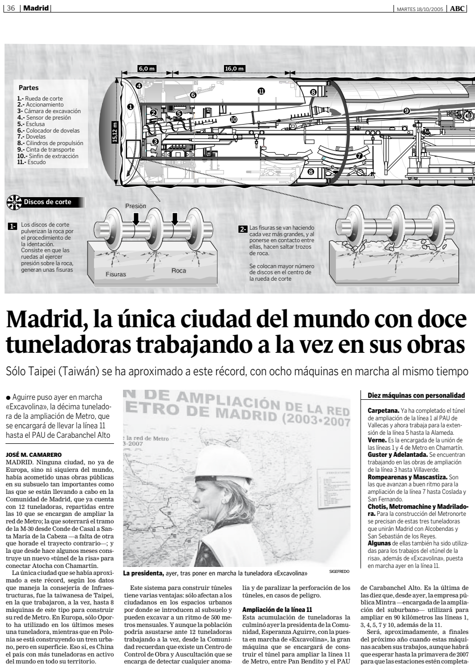
The survey of published articles shows that, at national level, the news was mostly focused on political arguments, very rarely mentioning architects or engineers (Burgos, Garrido, Porras-Isla, 2014). The word landscape was never written.

The final cost amounted to 3.9 billion Euros for the Calle30 project, and to 420 million Euros for the construction of the park on the surface, an investment that reflected the magnitude of the intervention, defined by many as unique (Garrido, Porras- Isla, Mehrotra, et al.). The high costs were mainly attributable to the large number of actions that the project incorporated. In addition to the restoration of five bridges and one historic monument on the river, twelve new bridges were built across the course of the Manzanares, broadly matching the desires of the citizenry. Amongst these were the construction of the south node walkway (costing about five million Euros) that finally connected "Usera" neighborhood to the eastern Legazpi district, although the fact that the cost of work on the *Madrid Rio* project only constituted around a sixth of the cost of the Calle30 project is of fundamental importance.

Before the creation of *Madrid Rio*, the citizens were certainly less aware of the existence of a river that flooded their city and its surroundings (Bulivant, 2013). The *madrileños,* in the past, would have asked "which river are you talking about?" (Jewell, 2011), whilst today this completely renovated area has become a crucial feature of the urban fabric (Perini, 2017).

The Madrid Río Project establishes physical and conceptual continuity between the city's neighbourhoods and the countryside outside the capital. The Manzanares River has been transformed into a connecting element (Burgos & Garrido Arquitectos et al., 2014), which has completely transformed the quality of life of local residents and has become a first-class tourist attraction (Esbjørn, 2013). The new green areas, their connections, the high quality of their design and the services and facilities provided are the crucial elements for the success of this exceptional project (Mele, 2014).

The project received many national and international awards; in 2015, the Harvard Graduate School of Design awarded the Rio Madrid Plan the 12th Veronica Rudge Green Prize in Urban Design, defining it the best urban space on a world scale.


6,0 m
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Partes
1.- Rueda de corte
2.- Accionamiento
3- Cámara de excavación
4.- Sensor de presión
5.- Esclusa
6.- Colocador de dovelas
7.- Dovelas
8.- Cilindros de propulsión
9.- Cinta de transporte
10.- Sinfín de extracción
11.- Escudo
Discos de corte
Presión
Fisuras
Roca

36 | Madrid | MARTES 18/10/2005 | ABC

1- Los discos de corte pulverizan la roca por el procedimiento de la identación. Consiste en que las ruedas al ejercer presión sobre la roca, generan unas fisuras

2- Las fisuras se van haciendo cada vez más grandes, y al ponerse en contacto entre ellas, hacen saltar trozos de roca.

Se colocan mayor número de discos en el centro de la rueda de corte

Madrid, la única ciudad del mundo con doce tuneladoras trabajando a la vez en sus obras

Sólo Taipei (Taiwán) se ha aproximado a este récord, con ocho máquinas en marcha al mismo tiempo

- Aguirre puso ayer en marcha «Excavolina», la décima tuneladora de la ampliación de Metro, que se encargará de llevar la línea 11 hasta el PAU de Carabanchel Alto

JOSÉ M. CAMARERO

MADRID. Ninguna ciudad, no ya de Europa, sino ni siquiera del mundo, había acometido unas obras públicas en su subsuelo tan importantes como las que se están llevando a cabo en la Comunidad de Madrid, que ya cuenta con 12 tuneladoras, repartidas entre las 10 que se encargan de ampliar la red de Metro; la que soterrará el tramo de la M-30 desde Conde de Casal a Santa María de la Cabeza —a falta de otra que horade el trayecto contrario—; y la que desde hace algunos meses construye un nuevo «túnel de la risa» para conectar Atocha con Chamartín.

La única ciudad que se había aproximado a este récord, según los datos que maneja la consejería de Infraestructuras, fue la taiwanesa de Taipei, en la que trabajaron, a la vez, hasta 8 máquinas de este tipo para construir su red de Metro. En Europa, sólo Oporto ha utilizado en los últimos meses una tuneladora, mientras que en Polonia se está construyendo un tren urbano, pero en superficie. Eso sí, es China el país con más tuneladoras en activo del mundo en todo su territorio.

La presidenta, ayer, tras poner en marcha la tuneladora «Excavolina» SIGEFREDO

Este sistema para construir túneles tiene varias ventajas: sólo afectan a los ciudadanos en los espacios urbanos por donde se introducen al subsuelo y pueden excavar a un ritmo de 500 metros mensuales. Y aunque la población podría asustarse ante 12 tuneladoras trabajando a la vez, desde la Comunidad recuerdan que existe un Centro de Control de Obra y Auscultación que se encarga de detectar cualquier anomalía y de paralizar la perforación de los túneles, en casos de peligro.

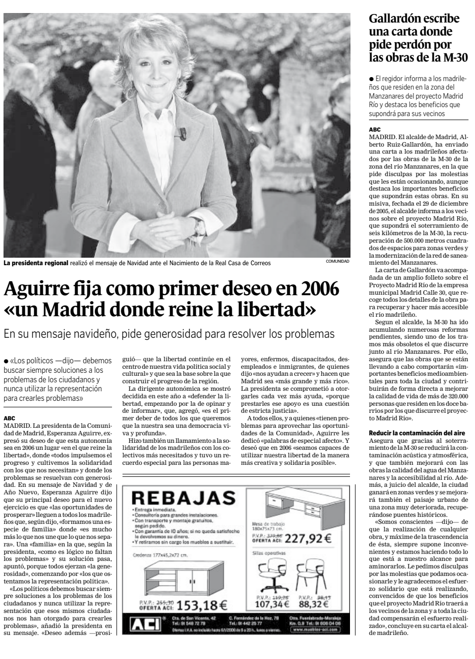
Ampliación de la línea 11

Esta acumulación de tuneladoras la culminó ayer la presidenta de la Comunidad, Esperanza Aguirre, con la puesta en marcha de «Excavolina», la gran máquina que se encargará de construir el túnel para ampliar la línea 11 de Metro, entre Pan Bendito y el PAU de Carabanchel Alto. Es la última de las diez que, desde ayer, la empresa pública Mintra —encargada de la ampliación del suburbano— utilizará para ampliar en 90 kilómetros las líneas 1, 3, 4, 5, 7 y 10, además de la 11.

Será, aproximadamente, a finales del próximo año cuando estas máquinas acaben sus trabajos, aunque habrá que esperar hasta la primavera de 2007 para que las estaciones estén completa-

Diez máquinas con personalidad

Carpetana. Ya ha completado el túnel de ampliación de la línea 1 al PAU de Vallecas y ahora trabaja para la extensión de la línea 5 hasta la Alameda.
Verne. Es la encargada de la unión de las líneas 1 y 4 de Metro en Chamartín.
Guster y Adelantada. Se encuentran trabajando en las obras de ampliación de la línea 3 hasta Villaverde.
Rompearenas y Mascastiza. Son las que avanzan a buen ritmo para la ampliación de la línea 7 hasta Coslada y San Fernando.
Chotis, Metromachine y Madriladora. Para la construcción del Metronorte se precisan de estas tres tuneladoras que unirán Madrid con Alcobendas y San Sebastián de los Reyes.
Algunas de ellas también ha sido utilizadas para los trabajos del «túnel de la risa», además de «Excavolina», puesta en marcha ayer en la línea 11.


N DE AMPLIACIÓN DE LA RED
ETRO DE MADRID (2003•2007

ABC | LUNES 2/1/2006 | Madrid | 41

La presidenta regional realizó el mensaje de Navidad ante el Nacimiento de la Real Casa de Correos COMUNIDAD

Aguirre fija como primer deseo en 2006 «un Madrid donde reine la libertad»

En su mensaje navideño, pide generosidad para resolver los problemas

- «Los políticos —dijo— debemos buscar siempre soluciones a los problemas de los ciudadanos y nunca utilizar la representación para crearles problemas»

ABC

MADRID. La presidenta de la Comunidad de Madrid, Esperanza Aguirre, expresó su deseo de que esta autonomía sea en 2006 un lugar «en el que reine la libertad», donde «todos impulsemos el progreso y cultivemos la solidaridad con los que nos necesitan» y donde los problemas se resuelvan con generosidad. En su mensaje de Navidad y de Año Nuevo, Esperanza Aguirre dijo que su principal deseo para el nuevo ejercicio es que «las oportunidades de prosperar» lleguen a todos los madrileños que, según dijo, «formamos una especie de familia» donde «es mucho más lo que nos une que lo que nos separa». Una «familia» en la que, según la presidenta, «como es lógico no faltan los problemas» y su solución pasa, apuntó, porque todos ejerzan «la generosidad», comenzando por «los que ostentamos la representación política».

«Los políticos debemos buscar siempre soluciones a los problemas de los ciudadanos y nunca utilizar la representación que esos mismos ciudadanos nos han otorgado para crearles problemas», añadió la presidenta en su mensaje. «Deseo además —prosiguió— que la libertad continúe en el centro de nuestra vida política social y cultural» y que sea la base sobre la que construir el progreso de la región.

La dirigente autonómica se mostró decidida en este año a «defender la libertad, empezando por la de opinar y de informar», que, agregó, «es el primer deber de todos los que queremos que la nuestra sea una democracia viva y profunda».

Hizo también un llamamiento a la solidaridad de los madrileños con los colectivos más necesitados y tuvo un recuerdo especial para las personas mayores, enfermos, discapacitados, desempleados e inmigrantes, de quienes dijo «nos ayudan a crecer» y hacen que Madrid sea «más grande y más rico». La presidenta se comprometió a otorgarles cada vez más ayuda, «porque prestarles ese apoyo es una cuestión de estricta justicia».

A todos ellos, y a quienes «tienen problemas para aprovechar las oportunidades de la Comunidad», Aguirre les dedicó «palabras de especial afecto». Y deseó que en 2006 «seamos capaces de utilizar nuestra libertad de la manera más creativa y solidaria posible».

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Gallardón escribe una carta donde pide perdón por las obras de la M-30

- El regidor informa a los madrileños que residen en la zona del Manzanares del proyecto Madrid Río y destaca los beneficios que supondrá para sus vecinos

ABC

MADRID. El alcalde de Madrid, Alberto Ruiz-Gallardón, ha enviado una carta a los madrileños afectados por las obras de la M-30 de la zona del río Manzanares, en la que pide disculpas por las molestias que les están ocasionando, aunque destaca los importantes beneficios que supondrán estas obras. En su misiva, fechada el 29 de diciembre de 2005, el alcalde informa a los vecinos sobre el proyecto Madrid Río, que supondrá el soterramiento de seis kilómetros de la M-30, la recuperación de 500.000 metros cuadrados de espacios para zonas verdes y la modernización de la red de saneamiento del Manzanares.

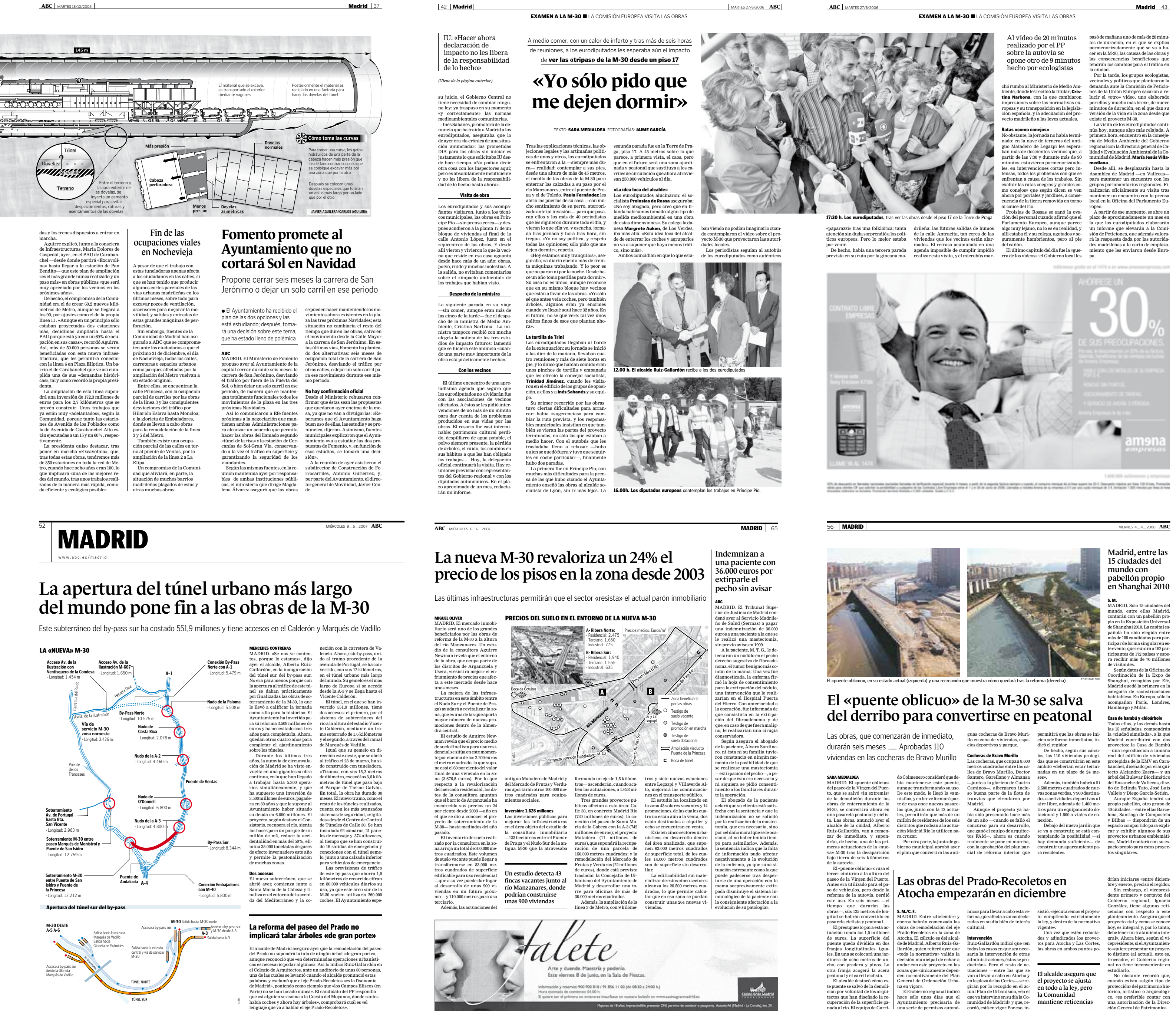
La carta de Gallardón va acompañada de un amplio folleto sobre el Proyecto Madrid Río de la empresa municipal Madrid Calle 30, que recoge todos los detalles de la obra para recuperar y hacer más accesible el río madrileño.

Segun el alcalde, la M-30 ha ido acumulando numerosas reformas pendientes, siendo uno de los tramos más obsoletos el que discurre junto al río Manzanares. Por ello, asegura que las obras que se están llevando a cabo comportarán «importantes beneficios medioambientales para toda la ciudad y contribuirán de forma directa a mejorar la calidad de vida de más de 320.000 personas que residen en los doce barrios por los que discurre el proyecto Madrid Río».

Reducir la contaminación del aire

Asegura que gracias al soterramiento de la M-30 se reducirá la contaminación acústica y atmosférica, y que también mejorará con las obras la calidad del agua del Manzanares y la accesibilidad al río. Además, a juicio del alcalde, la ciudad ganará en zonas verdes y se mejorará también el paisaje urbano de una zona muy deteriorada, recuperándose puentes históricos.

«Somos conscientes —dijo— de que la realización de cualquier obra, y máxime de la trascendencia de ésta, siempre supone inconvenientes y estamos haciendo todo lo que está a nuestro alcance para aminorarlos. Le pedimos disculpas por las molestias que podamos ocasionarle y le agradecemos el esfuerzo solidario que está realizando, convencidos de que los beneficios que el proyecto Madrid Río traerá a los vecinos de la zona y a toda la ciudad compensarán el esfuerzo realizado», concluye en su carta el alcalde madrileño.



ABC | MARTES 18/10/2005 | Madrid | 37

145 m
El material que se excava, es transportado al exterior mediante vagones
Posteriormente el material es reciclado en una factoría para hacer las dovelas del túnel
Túnel
Dovelas
Cemento
Terreno
Entre el terreno y la cara exterior de las dovelas, se inyecta un cemento especial para evitar desplazamientos, roturas y asentamientos de las dovelas
Más presión
Cabeza perforadora
Menos presión
Dovelas asimétricas
Dovelas normales
Cómo toma las curvas
Para tomar una curva, los gatos hidráulicos de una parte de la cabeza hacen más presión que los del lado contrario, con lo que se consigue excavar más por una zona que por la otra
Después se colocan unas dovelas especiales que forman un anillo más largo por un lado que por el otro
JAVIER AGUILERA/CARLOS AGUILERA

das y los trenes dispuestos a entrar en marcha.

Aguirre explicó, junto a la consejera de Infraestructuras, María Dolores de Cospedal, ayer, en el PAU de Carabanchel —desde donde partirá «Excavolina» hasta llegar a la estación de Pan Bendito— que este plan de ampliación «es el más grande nunca realizado y un paso más» en obras públicas «que será muy apreciado por los vecinos en los próximos años».

De hecho, el compromiso de la Comunidad era el de crear 60,2 nuevos kilómetros de Metro, aunque se llegará a los 90, por ajustes como el de la propia línea 11 . «Aunque en un principio sólo estaban proyectadas dos estaciones más, decidimos ampliarla hasta el PAU porque está ya con un 60% de ocupación en sus casas», recordó Aguirre. Así, más de 50.000 personas se verán beneficiadas con esta nueva infraestructura, que les permitirá conectar con la línea 6 en Plaza Elíptica. Un barrio el de Carabanchel que ve así cumplida una de sus «demandas históricas», tal y como recordó la propia presidenta.

La ampliación de esta línea supondrá una inversión de 172,3 millones de euros para los 2,7 kilómetros que se prevén construir. Unos trabajos que ya están muy «adelantados», según la Comunidad, porque tanto las estaciones de Avenida de los Poblados como la de Avenida de Carabanchel Alto están ejecutadas a un 15 y un 60%, respectivamente.

La presidenta quiso destacar, tras poner en marcha «Excavolina», que, tras todas estas obras, tendremos más de 350 estaciones en toda la red de Metro, cuando hace ocho años eran 100, lo que implicará «una de las mejores redes del mundo, tras unos trabajos realizados de la manera más rápida, cómoda eficiente y ecológica posible».

Fin de las ocupaciones viales en Nochevieja

A pesar de que el trabajo con estas tuneladoras apenas afecta a los ciudadanos en las calles, sí que se han tenido que producir algunos cortes parciales de las vías urbanas madrileñas en los últimos meses, sobre todo para excavar pozos de ventilación, ascensores para mejorar la movilidad, y salidas y entradas de estas grandes máquinas de perforación.

Sin embargo, fuentes de la Comunidad de Madrid han asegurado a ABC que se comprometen ante los ciudadanos a que el próximo 31 de diciembre, el día de Nochevieja, todas las calles, carreteras o espacios urbanos como parques afectadas por la ampliación del Metro vuelvan a su estado original.

Entre ellas, se encuentran la calle Princesa, con la ocupación parcial de carriles por las obras de la línea 3 y las consiguientes desviaciones del tráfico por Hilarión Eslava hasta Moncloa; o la glorieta de Embajadores, donde se llevan a cabo obras para la remodelación de la línea 3 y 5 del Metro.

También existe una ocupación parcial de las calles en torno al puente de Ventas, por la ampliación de la línea 2 a La Elipa.

Un compromiso de la Comunidad que aliviará, en parte, la situación de muchos barrios madrileños plagados de estas y otras muchas obras.

Fomento promete al Ayuntamiento que no cortará Sol en Navidad

Propone cerrar seis meses la carrera de San Jerónimo o dejar un solo carril en ese periodo

- El Ayuntamiento ha recibido el plan de las dos opciones y las está estudiando; después, tomará una decisión sobre este tema, que ha estado lleno de polémica

ABC

MADRID. El Ministerio de Fomento propuso ayer al Ayuntamiento de la capital cerrar durante seis meses la carrera de San Jerónimo, desviando el tráfico por fuera de la Puerta del Sol, o bien dejar un solo carril en ese periodo, de manera que se mantengan totalmente funcionales todos los movimientos de la plaza en las tres próximas Navidades.

Así lo comunicaron a Efe fuentes próximas a la negociación que mantienen ambas Administraciones para alcanzar un acuerdo que permita hacer las obras del llamado segundo «túnel de la risa» y la estación de Cercanías de Sol-Gran Vía, conservando a la vez el tráfico en superficie y garantizando la seguridad de los viandantes.

Según las mismas fuentes, en la reunión mantenida ayer por responsables de ambas instituciones públicas, el ministerio que dirige Magdalena Álvarez aseguró que las obras se pueden hacer manteniendo los movimientos ahora existentes en la plaza las tres próximas Navidades; esta situación no cambiaría el resto del tiempo que duren las obras, salvo en el movimiento desde la Calle Mayor a la carrera de San Jerónimo. En estas últimas vías, Fomento ha planteado dos alternativas: seis meses de ocupación total de la carrera de San Jerónimo, desviando el tráfico por otras calles, o dejar un solo carril para ese movimiento durante ese mismo periodo.

No hay confirmación oficial

Desde el Ministerio rehusaron confirmar que éstas sean las propuestas que quedaron ayer encima de la mesa, ya que no van a divulgarlas: «Esperamos que el Ayuntamiento haga buen uso de ellas, las estudie y se pronuncie», dijeron. Asimismo, fuentes municipales explicaron que el Ayuntamiento «va a estudiar las dos propuestas de Fomento, y, en función de esos estudios, se tomará una decisión».

A la reunión de ayer asistieron el subdirector de Construcción de Ferrocarriles, Antonio Gutiérrez, y, por parte del Ayuntamiento, el director general de Movilidad, Javier Conde.

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EXAMEN A LA M-30 ■ LA COMISIÓN EUROPEA VISITA LAS OBRAS

IU: «Hacer ahora declaración de impacto no les libera de la responsabilidad de lo hecho»

(Viene de la página anterior)

su juicio, el Gobierno Central no tiene necesidad de cambiar ninguna ley: ya traspuso en su momento «y correctamente» las normas medioambientales comunitarias.

Inés Sabanés, promotora de la denuncia que ha traído a Madrid a los eurodiputados, aseguraba que lo de ayer era «la crónica de una situación anunciada»: las prometidas DIA para las obras sin iniciar es justamente lo que solicitaba IU desde hace tiempo. «No podían decir otra cosa con los inspectores aquí; pero es absolutamente insuficiente y no les libera de la responsabilidad de lo hecho hasta ahora».

Visita de obra

Los eurodiputados y sus acompañantes visitaron, junto a los técnicos municipales, las obras en Príncipe Pío —sin prensa cerca— y después acudieron a la planta 17 de un bloque de viviendas al final de la calle Antonio López, justo en el «epicentro» de las obras. Y desde allí vieron y vivieron lo que la vecina que reside en esa casa aguanta desde hace más de un año: obras, polvo, ruido y muchas molestias. A la salida, no evitaban comentarios sobre el «impacto ambiental» de los trabajos que habían visto.

Despacho de la ministra

La siguiente parada en su viaje —sin comer, aunque eran más de las cinco de la tarde— fue el despacho de la ministra de Medio Ambiente, Cristina Narbona. La ministra tampoco recibió con mucha alegría la noticia de los tres estudios de impacto futuros: lamentó que se hiciera este anuncio «cuando una parte muy importante de la obra está prácticamente hecha».

Con los vecinos

El último encuentro de una apretadísima agenda que seguro que los eurodiputados no olvidarán fue con las asociaciones de vecinos afectados. A éstos se les pidió intervenciones de no más de un minuto para dar cuenta de los problemas producidos en sus vidas por las obras. El rosario fue casi interminable: patrimonio cultural perdido, despilfarro de agua potable, el polvo siempre presente, la pérdida de árboles, el ruido, los cambios en sus hábitos a que les han obligado los trabajos... Hoy, la delegación oficial continuará la visita. Hay reuniones previstas con representantes del Gobierno regional y con los diputados autonómicos. En el plazo aproximado de un mes, redactarán un informe.

A medio comer, con un calor de infarto y tras más de seis horas de reuniones, a los eurodiputados les esperaba aún el impacto de **ver las «tripas» de la M-30 desde un piso 17**

«Yo sólo pido que me dejen dormir»

TEXTO: **SARA MEDIALDEA** FOTOGRAFÍAS: **JAIME GARCÍA**

Tras las explicaciones técnicas, las objeciones legales y las artimañas políticas de unos y otros, los eurodiputados se enfrentaron a la —siempre más dura— realidad: contemplar a sus pies, desde una altura de más de 45 metros, el meollo de las obras de la M-30 para enterrar las calzadas a su paso por el río Manzanares, entre el puente de Praga y el de Toledo. **Paula Fernández** les abrió las puertas de su casa —con mucho sentimiento de su perro, aterrorizado ante tal invasión— para que pasaran ellos y los más de 40 periodistas que les siguieron durante todo el día, y vieran lo que ella ve, y escucha, jornada tras jornada y hora tras hora, sin tregua. «Yo no soy política, y respeto todas las opiniones; sólo pido que me dejen dormir», repetía.

«Hoy estamos muy tranquilos», aseguraba; «a diario cuento más de treinta máquinas trabajando. Y lo peor es que no paran ni por la noche. Desde hace un año tomo pastillas para dormir». Su caso no es único, aunque reconoce que en su mismo bloque hay vecinos que están a favor de las obras. «Yo sólo sé que antes veía coches, pero también árboles, algunos eran ya enormes cuando yo llegué aquí hace 32 años. En el futuro, no sé qué veré: tal vez unos palitos finos de esos que plantan ahora».

La tortilla de Trini

Los eurodiputados llegaban al borde de la extenuación: su jornada se inició a las diez de la mañana, llevaban cuatro reuniones y más de siete horas en pie, y lo único que habían comido eran unos pinchos de tortilla y empanada que les ofreció la concejal socialista, **Trinidad Jiménez**, cuando les visitaron en el edificio de los grupos de oposición, a ellos y a **Inés Sabanés** y su equipo.

Su primer recorrido por las obras tuvo ciertas dificultades para arrancar: había «sugerencias» para cambiar la ruta prevista, y los responsables municipales insistían en que también se vieran las partes del proyecto terminadas, no sólo las que estaban a medio hacer. Con el autobús que les trasladaba lleno a rebosar —hubo quien se quedó fuera y tuvo que seguirles en coche particular—, finalmente hubo dos paradas.

La primera fue en Príncipe Pío, con muchas más dificultades para la prensa de las que hubo cuando el Ayuntamiento enseñó las obras al alcalde socialista de Lyón, sin ir más lejos. La segunda parada fue en la Torre de Praga, piso 17. A 45 metros sobre lo que parece, a primera vista, el caos, pero que en el futuro será una zona ajardinada y peatonal que sustituya a los carriles de circulación que ahora atraviesan 250.000 vehículos al día.

«La idea loca del alcalde»

Los eurodiputados alucinaron: el socialista **Proinsias de Rossa** aseguraba: «No soy abogado, pero creo que en Irlanda habríamos tomado algún tipo de medida medioambiental en una obra de estas dimensiones». Su colega la danesa **Margrete Auken**, de Los Verdes, iba más allá: «Esta idea loca del alcalde de enterrar los coches y agruparlos no va a suponer que haya menos tráfico, sino más».

Ambos coincidían en que lo que estaban viendo no podían imaginarlo cuando contemplaron el vídeo sobre el proyecto M-30 que proyectaron las autoridades locales.

Los periodistas seguían al autobús de los eurodiputados como auténticos

12.00 h. El alcalde Ruiz-Gallardón recibe a los dos eurodiputados

16.00h. Los diputados europeos contemplan los trabajos en Príncipe Pío.

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EXAMEN A LA M-30 ■ LA COMISIÓN EUROPEA VISITA LAS OBRAS

17:30 h. Los eurodiputados, tras ver las obras desde el piso 17 de la Torre de Praga

«paparazzi» tras una folklórica; tanta atención sin duda sorprendió a los políticos europeos. Pero lo mejor estaba por venir.

De hecho, había una tercera parada prevista en su ruta por la gincana madrileña: las futuras salidas de humos de la calle Antracita, tan cerca de las viviendas que los vecinos están alarmados. El retraso acumulado en una agenda imposible de cumplir impidió realizar esta visita, y el microbús marchó rumbo al Ministerio de Medio Ambiente, donde les recibió la titular, **Cristina Narbona**, con la que cambiaron impresiones sobre las normativas europeas y su transposición en la legislación española, y la adecuación del proyecto madrileño a las leyes actuales.

Al vídeo de 20 minutos realizado por el PP sobre la autovía se opone otro de 9 minutos hecho por ecologistas

Ratas «como conejos»

No obstante, la jornada no había terminado: en la nave de terneras del antiguo Matadero de Legazpi les esperaban más de doscientos vecinos que, a partir de las 7:30 y durante más de 90 minutos, estuvieron pormenorizándoles, en intervenciones cortas pero intensas, todos los problemas con que se enfrentan a causa de los trabajos. Sin excluir las ratas «negras y grandes como conejos» que según dicen se ven ahora por portales y jardines, a consecuencia de la tierra removida en torno al cauce del río.

Proisias de Rossas se ganó la ovación del personal cuando afirmó que el Parlamento Europeo, aunque parece algo muy lejano, no lo es en realidad, y allí estaba él y su colega, agotados y seguramente hambrientos, pero al pie del cañón.

El último capítulo del día fue la «guerra de los vídeos»: el Gobierno local les pasó de mañana uno de más de 20 minutos de duración, en el que se explica pormenorizadamente qué se va a hacer en la M-30, las causas de las obras y las consecuencias beneficiosas que tendrán los cambios para el tráfico en la ciudad.

Por la tarde, los grupos ecologistas, vecinales y políticos que plantearon la demanda ante la Comisión de Peticiones de la Unión Europea sacaron a relucir el «otro» vídeo, uno elaborado por ellos y mucho más breve, de nueve minutos de duración, en el que dan su versión de la vida en la zona desde que existe el proyecto M-30.

La visita de los eurodiputados continúa hoy, aunque algo más relajada. A primera hora, encuentro en la consejería de Medio Ambiente del Gobierno regional con la directora general de Calidad y Evaluación Ambiental de la Comunidad de Madrid, **María Jesús Villamediana**.

Desde allí, se desplazarán hasta la Asamblea de Madrid —en Vallecas— para mantener un encuentro con los grupos parlamentarios regionales. Finalizarán oficialmente su visita tras mantener un encuentro con la prensa local en la Oficina del Parlamento Europeo.

A partir de ese momento, se abre un plazo de aproximadamente un mes en la que los eurodiputados elaborarán un informe que elevarán a la Comisión de Peticiones, que además valorará la respuesta dada por las autoridades madrileñas a la carta de emplazamiento que les enviaron desde Europa.

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MADRID

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La apertura del túnel urbano más largo del mundo pone fin a las obras de la M-30

Este subterráneo del by-pass sur ha costado 551,9 millones y tiene accesos en el Calderón y Marqués de Vadillo

LA «NUEVA» M-30
Acceso Av. de la Ilustración con Ventisquero de la Condesa - Longitud: 1.454 m
Acceso Av. de la Ilustración M-607 - Longitud: 1.650 m
A-1
Conexión By-Pass Norte con A-1 - Longitud: 5.479 m
Carretera del Pardo
Herrera Oria
Avda. de la Ilustración
Nudo de la Paloma - Longitud: 5.508 m
By-Pass Norte - Longitud: 10.525 m
Vía de servicio M-30 zona noroeste - Longitud: 3.426 m.
Nudo de Costa Rica - Longitud: 2.078 m
Nudo de la A-2 - Longitud: 4.460 m
Puente de los Franceses
Puente de Ventas
Nudo de O'Donnell - Longitud: 6.800 m
Soterramiento Av. de Portugal hasta Gta. San Vicente - Longitud: 2.983 m
Nudo de la A-3 - Longitud: 4.800 m
Soterramiento M-30 entre paseo Marqués de Monistrol y Puente de San Isidro - Longitud: 12.759 m
By-Pass Sur - Longitud: 8.344 m
Soterramiento M-30 entre Puente de San Isidro y Puente de la Princesa - Longitud: 12.212 m
Puente de Andalucía
A-4
Conexión Embajadores con M-40 - Longitud: 5.800 m
Apertura del túnel sur del by-pass
M-30 OESTE A-5 A-6
Salida hacia la calzada Marqués de Vadillo
Salida hacia Glorieta de Pirámides
Acceso a by-pass sur desde la Glorieta Marqués de Vadillo
Río Manzanares
Acceso a by-pass sur
M-30 Salida hacia M-30 norte
Acceso a by-pass sur y M-30 desde A-3
A-3
Salida hacia A-3
Salida hacia la calzada central y vía de servicio M-30
TÚNEL NORTE
TÚNEL SUR
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MERCEDES CONTRERAS

MADRID. «Se nos ve contentos, porque lo estamos», dijo ayer el alcalde, Alberto Ruiz-Gallardón, en la inauguración del túnel sur del by-pass sur. No era para menos porque con la apertura al tráfico de este túnel se daban prácticamente por finalizadas las obras de soterramiento de la M-30, lo que le llevó a calificar la jornada como «día para la historia». El Ayuntamiento ha invertido para su reforma 3.508 millones de euros y ha necesitado casi tres años para completarla. Ahora, quedan otros cuatro años para completar el ajardinamiento sobre los túneles.

Durante los últimos tres años, la autovía de circunvalación de Madrid se ha visto envuelta en una gigantesca obra continua, en la que han llegado a trabajar hasta 5.300 operarios simultáneamente, y que ha supuesto una inversión de 3.500 millones de euros, pagadera en 30 años y que le supone al Ayuntamiento haber situado su deuda en 6.000 millones. El proyecto, según destaca el Consistorio, recupera el río, sienta las bases para un parque de un millón de m2, reduce la accidentalidad en más del 50%, elimina 35.000 toneladas de gases de efecto invernadero este año y permite la peatonalización de muchas zonas.

Dos accesos

El nuevo subterráneo, que se abrió ayer, comienza junto a Santa María de la Cabeza y finaliza en el entorno de la avenida del Mediterráneo y la conexión con la carretera de Valencia. Ahora, este by-pass, unido al tramo procedente de la avenida de Portugal, se ha convertido, con sus 12 kilómetros, en el túnel urbano más largo del mundo. Su gemelo es el más largo de Europa si se accede desde la A-3 y se llega hasta el Vicente Calderón.

El túnel, en el que se han invertido 551,9 millones, tiene dos accesos: el primero, por el sistema de subterráneos del río a la altura del estadio Vicente Calderón, mediante un tramo soterrado de 1,6 kilómetros y el segundo, a través del ramal de Marqués de Vadillo.

Igual que su gemelo en dirección este-oeste, que se abrió al tráfico el 23 de marzo, ha sido construido con tuneladora. «Tizona», con sus 15,2 metros de diámetro, excavó los 3,6 kilómetros de túnel que pasa bajo el Parque de Tierno Galván. En total, la obra ha durado 30 meses. El nuevo tramo, como el resto de los túneles realizados, cuenta con los más avanzados sistemas de seguridad, «vigilados» desde el Centro de Control de Túneles de Calle 30. Se han instalado 92 cámaras, 21 paneles de mensaje y 374 altavoces, al tiempo que se han construido 19 salidas de emergencia y conexiones con el túnel gemelo, junto a una calzada inferior para vehículos de emergencia.

Las previsiones de tráfico de este by-pass que ahorra 1,5 kilómetros de recorrido cifran en 80.000 vehículos diarios su uso, ya que este arco sur de la M-30 suelen utilizarlo 260.000 coches. El Ayuntamiento espe-

La reforma del paseo del Prado no implicará talar árboles «de gran porte»

El alcalde de Madrid aseguró ayer que la remodelación del paseo del Prado no supondrá la tala de ningún árbol «de gran porte», aunque reconoció que «en determinadas operaciones urbanísticas es necesario podar algunos». Así lo indicó Ruiz-Gallardón en el Colegio de Arquitectos, ante un auditorio de unas 80 personas, una de las cuales se levantó cuando el alcalde pronunció estas palabras y exclamó que el eje Prado-Recoletos «es la fisonomía de Madrid», poniendo como ejemplo que «los Campos Elíseos (en París) no se han tocado nunca». El candidato del PP respondió que «si alguien se asoma a la Cuesta del Moyano», donde «antes había coches y ahora hay árboles», comprobará cuál es «el lenguaje que va a hablar el eje Prado-Recoletos».

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La nueva M-30 revaloriza un 24% el precio de los pisos en la zona desde 2003

Las últimas infraestructuras permitirán que el sector «resista» el actual parón inmobiliario

MIGUEL OLIVER

MADRID. El mercado inmobiliario será uno de los grandes beneficiados por las obras de reforma de la M-30 a la altura del río Manzanares. Un estudio de la consultora Aguirre Newman revela que el entorno de la obra, que ocupa parte de los distritos de Arganzuela y Usera, «resistirá mejor» el enfriamiento de precios que afecta a este mercado desde hace unos meses.

La mejora de las infraestructuras en este ámbito (entre el Nudo Sur y el Puente de Praga) ayudará a revitalizar la zona, que es una de las que aporta mayor número de nuevas promociones dentro de la almendra central.

El estudio de Aguirre Newman revela que el precio medio de suelo finalista para uso residencial se sitúa en este momento por encima de los 2.200 euros el metro cuadrado, lo que supone casi el 60 por ciento del valor final de una vivienda en la zona (3.676,5 euros). Por lo que respecta a la revalorización del mercado residencial, los datos de la consultora apuntan que el barrio de Arganzuela ha encarecido sus precios un 24 por ciento desde 2003 —año en el que se dio a conocer el proyecto de soterramiento de la M-30— hasta mediados del año pasado.

El inventario de suelo realizado por la consultora en la zona arroja un total de 300.000 metros cuadrados. Este volumen de suelo vacante puede llegar a transformarse en 83.000 metros cuadrados de superficie edificable para uso residencial —que a su vez puede dar lugar al desarrollo de unas 900 viviendas en un futuro próximo— y 110.000 metros para uso terciario.

Además, las actuaciones del antiguo Matadero de Madrid y del Mercado de Frutas y Verduras aportarán otros 100.000 metros cuadrados para equipamientos sociales.

Inversión: 1.628 millones

Las inversiones públicas para mejorar las infraestructuras en el área objeto del estudio de la consultora inmobiliaria —133 hectáreas entre el Puente de Praga y el Nudo Sur de la antigua M-30 que la atravesaba formando un eje de 1,5 kilómetros— ascenderán, cuando acaben las actuaciones, a 1.628 millones de euros.

Tres grandes proyectos públicos afectan a esta área: Calle 30, en concreto Madrid Río (720 millones de euros); la conexión del paseo de Santa María de la Cabeza con la A-3 (742 millones de euros); el proyecto Matadero (11 millones de euros), que supondrá la recuperación de una parcela de 150.000 metros cuadrados; y la remodelación del Mercado de Frutas y Verduras (22 millones de euros), donde está previsto trasladar la Concejalía de Urbanismo del Ayuntamiento de Madrid y desarrollar una torre para oficinas de más de 30.000 metros cuadrados.

Además, la ampliación de la línea 3 de Metro, con 9 kilómetros y siete nuevas estaciones entre Legazpi y Villaverde Alto, mejorará las comunicaciones en el transporte público.

El estudio ha localizado en la zona 43 solares vacantes y 14 promociones, de las cuales cuatro no están aún a la venta, dos están destinadas a alquiler y ocho se encuentran en venta.

Existen cinco sectores urbanísticos en desarrollo dentro del área analizada, que suponen 63.000 metros cuadrados de superficie total, de los cuales 14.000 metros cuadrados son de superficie sin desarrollar.

La edificabilidad sin materializar de estos cinco sectores alcanza los 26.500 metros cuadrados, lo que permite calcular que en esa zona se puedan construir unas 264 nuevas viviendas.

PRECIOS DEL SUELO EN EL ENTORNO DE LA NUEVA M-30

Un estudio detecta 43 fincas vacantes junto al río Manzanares, donde podrían construirse unas 900 viviendas

Indemnizan a una paciente con 36.000 euros por extirparle el pecho sin avisar

ABC

MADRID. El Tribunal Superior de Justicia de Madrid condenó ayer al Servicio Madrileño de Salud (Sermas) a pagar una indemnización de 36.000 euros a una paciente a la que se le realizó una mastectomía, sin previo aviso en 1999.

A la paciente, M. T. G., le detectaron un nódulo en el pecho derecho sugestivo de fibroadenoma, el tumor benigno más común de la mama. Una vez fue diagnosticada, la enferma firmó la hoja de consentimiento para la extirpación del nódulo, una intervención que le realizarían en el Hospital Puerta del Hierro. Con anterioridad a la operación, fue informada de que consistiría en la extirpación del fibroadenoma y de que, en caso de que fuera maligno, le realizarían una cirugía conservadora.

Según asegura el abogado de la paciente, Álvaro Sardinero, ni ésta ni su familia tuvieron constancia en ningún momento de la posibilidad de que se realizase una mastectomía —extirpación del pecho—, a pesar de que ésta era necesaria y ni siquiera se pidió consentimiento a los familiares durante la operación.

El abogado de la paciente aclaró que su clienta está satisfecha con la sentencia y que la indemnización no se solicitó por la realización de la mastectomía, que era necesaria, sino por «el daño moral que se le ocasionó, al no haber tenido tiempo para asimilarlo». Además, la sentencia indica que la falta de información pudo afectar negativamente a la evolución de la enferma, ya que «una situación estresante como la que puede padecerse tras despertarse de una operación con la mama sorpresivamente extirpada disminuye el sistema inmunológico de la paciente con la consiguiente afectación a la evolución de su patología».

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Hora estimada de comienzo: 01:00 h.

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El «puente oblicuo», en su estado actual (izquierda) y una recreación que muestra cómo quedará tras la reforma (derecha) AYUNTAMIENTO

El «puente oblicuo» de la M-30 se salva del derribo para convertirse en peatonal

Las obras, que comenzarán de inmediato, durarán seis meses — Aprobadas 110 viviendas en las cocheras de Bravo Murillo

SARA MEDIALDEA

MADRID. El «puente oblicuo» del paseo de la Virgen del Puerto, que se salvó «in extremis» de la demolición durante las obras de enterramiento de la M-30, se convertirá ahora en una pasarela peatonal y ciclista. Las obras, anunció ayer el alcalde de la ciudad, Alberto Ruiz-Gallardón, van a comenzar de inmediato, y supondrán, de hecho, una de las primeras actuaciones de la «nueva» M-30 tras la desaparición bajo tierra de seis kilómetros de la autovía.

El «puente oblicuo» cruza el tercer cinturón a la altura del paseo de la Virgen del Puerto. Antes era utilizado para el paso de vehículos, pero desde la reforma de la autovía, perdió este uso. En seis meses —el tiempo que durarán las obras—, sus 125 metros de longitud se habrán convertido en pasarela ciclista y peatonal.

El presupuesto para esta actuación ronda los 1,5 millones de euros. La superficie del puente queda dividida en dos franjas longitudinales iguales. En una se colocará una jardinera de ocho metros de ancho, con pradera y pinos. La otra franja acogerá la acera peatonal y el carril ciclista.

El alcalde destacó cómo este puente se salvó de la demolición por voluntad de los arquitectos que han diseñado la recuperación de la superficie ganada al río. El equipo de Garrido Colmenero consideró que debía mantenerse este puente, aunque transformando su uso. De este modo, le llegó la «amnistía», y en breve formará parte de esas once nuevas pasarelas que, junto con la 12 actuales, permitirán que más de un millón de residentes de los seis distritos que rodean a la actuación Madrid Río lo utilicen para cruzar.

Por otra parte, la junta de gobierno municipal aprobó ayer el plan que convertirá las antiguas cocheras de Bravo Murillo en zona de viviendas, espacios deportivos y parque.

Cocheras de Bravo Murillo

Las cocheras, que ocupan 8.600 metros cuadrados entre las calles de Bravo Murillo, Doctor Santero, Garellano y Almansa —junto a la glorieta de Cuatro Caminos—, albergaron incluso buena parte de la flota de tranvías que circularon por Madrid.

Aunque el proyecto ya había sido presentado hace más de un año —cuando se falló el concurso para su desarrollo, que ganó el equipo de arquitectos FAM—, ahora es cuando realmente se pone en marcha, con la aprobación del plan parcial de reforma interior que permitirá que las obras se inicien «de forma inmediata», indicó el regidor.

De hecho, según sus cálculos, las 110 viviendas protegidas que se construirán en este ámbito «deberían estar terminadas en un plazo de 24 meses».

Además, también habrá allí 2.500 metros cuadrados de nuevas zonas verdes, y 900 destinados a actividades deportivas al aire libre, además de 1.400 metros para un equipamiento dotacional y 1.500 a viales de conexión.

Debajo del nuevo jardín que se va a construir, se está contemplando la posibilidad —si hay demanda suficiente— de construir un aparcamiento para residentes.

Madrid, entre las 15 ciudades del mundo con pabellón propio en Shanghai 2010

S. M.

MADRID. Sólo 15 ciudades del mundo, entre ellas Madrid, contarán con un pabellón propio en la Exposición Universal de Shanghai 2010. La capital española ha sido elegida entre más de 188 candidatas para participar de forma singular en este evento, que reunirá a 192 participantes de 172 países y espera recibir más de 70 millones de visitantes.

Según datos de la Oficina de Coordinación de la Expo de Shanghai, recogidos por Efe, Madrid quedó la primera en la categoría de «construcciones habitables». En Europa, sólo la acompañan París, Londres, Hamburgo y Milán.

Casa de bambú y «bioárbol»

Todas ellas, y las demás hasta las 15 señaladas, compondrán la «ciudad simulada», a la que Madrid contribuirá con dos proyectos: la Casa de Bambú —una reproducción a tamaño real del edificio de viviendas protegidas de la EMV en Carabanchel, diseñado por el arquitecto Alejandro Zaera— y un árbol del Bulevar Bioclimático del Ensanche de Vallecas, diseño de Belinda Tato, José Luis Vallejo y Diego García-Setién.

Aunque España tendrá su propio pabellón, otro grupo de 40 ciudades —entre ellas Barcelona, Santiago de Compostela y Bilbao — dispondrán de un espacio compartido para explicar y exhibir algunos de sus proyectos urbanos emblemáticos, Madrid contará con su espacio propio para estos proyectos singulares.

Las obras del Prado-Recoletos en Atocha empezarán en diciembre

S. M./C. F.

MADRID. Entre «diciembre y enero» habrán comenzado las obras de remodelación del eje Prado-Recoletos en la zona de Atocha. El cálculo es del alcalde de Madrid, Alberto Ruiz-Gallardón, quien reiteró ayer que «toda la normativa» valida la decisión municipal de echar a andar con este proyecto en las zonas que «únicamente dependen normativamente del Plan General de Ordenación Urbana en vigor».

El Gobierno regional indicó hace sólo unos días que el Ayuntamiento precisaría de una serie de permisos autonómicos para llevar a cabo esta reforma, que afecta a zonas declaradas en su día bién de interés cultural.

Intervención

Ruiz-Gallardón indicó que «en todos los casos en que sea necesaria la intervención de otras administraciones, éstas se producirán». Pero el resto de actuaciones —entre las que se van a llevar a cabo en Atocha y en la plaza de las Cortes— se regirán por lo recogido en el actual Plan de Urbanismo, «en el que ya intervino en su día la Comunidad de Madrid» y que, recordó, está en vigor. Por eso, insistió, «ejecutaremos el proyecto cumpliendo estrictamente la ley, y dentro de la normativa vigente».

Una vez que estén redactados y adjudicados los proyectos para Atocha y Las Cortes, las obras en ambos puntos podrían iniciarse «entre diciembre y enero», precisó el regidor.

Sin embargo, el vicepresidente primero y portavoz del Gobierno regional, Ignacio González, tiene algunas reticencias con respecto a este planteamiento. Asegura que el proyecto «tal y como se conoce hoy, es integral y, por lo tanto, debe tener un tratamiento integral». Ahora bien, según el vicepresidente, si el Ayuntamiento «quiere presentar un proyecto distinto (al actual), esto es, troceado», el Gobierno regional no tiene inconveniente en estudiarlo.

No obstante recordó que, cuando exista «algún tipo de protección» del patrimonio histórico, artístico o arqueológico, «es preferible contar con una autorización de la Dirección General de Patrimonio».

El alcalde asegura que el proyecto se ajusta en todo a la ley, pero la Comunidad mantiene reticencias

Figure 62: Articles related to the execution of the works, published by the newspaper "El Mundo", from 2004 to 2006. Source: Courtesy of the authors of the project.

INTERVIEW WITH GÌNES GARRIDO

How did you open your practice? And how have your interests and convictions changed over time?

I became an architect in 1989 and after working in some architectural studios, I opened one of my own and finally, in 2000, I founded Burgos & Garrido with Francisco Burgos. At the dawn of my career I worked mainly on small-scale architectural projects, which, overtime, gave me the opportunity to carry out projects on an urban and territorial scale. My interests have definitely changed over the course of my career, but cartography and geography have always particularly fascinated me, which is, perhaps, why I have always been passionate about hiking ... I have walked across the Pyrenees Mountains, from the Mediterranean Sea to the Atlantic Ocean. In 2005, when the Madrid Rio design competition was announced, I knew the river Manzanares very well, as since the beginning of my career I had accumulated a very specific knowledge of the place: its origins, its natural characteristics and of its landscapes, having walked along its course many times during my life.

The Madrid Rio project was assigned through the announcement, by the Municipality of Madrid, of a two-stage ideas competition. In relation to the composition of the project team, and as a team director, how would you describe the nature of the team? What specific strengths did the four practices bring to the project?

I decided to take part in the competition and for this reason I personally took care of the composition of the design team. The reasons that led me to form this team were various: I contacted Fernando Porras, because I had already worked with him, and being also a dear friend of mine, I thought we could work well together. In the case of Carlos Rubio and Enrique Alvarez-Sala, I thought that involving one of the most important and biggest studios in Madrid could help us win the competition, which in reality was not absolutely relevant. Finally I decided to involve West8, not so much because of the massive size of the project, because at the time the practice had not yet carried out such large scale interventions, but rather because they had a lot of experience in public space projects. The fundamental reason that led me to form this working group, therefore, was simply to win the competition, without thinking too much about how we could develop the project, also because I had no idea yet!

What roles did the different members of the design group take on? Did they remain unchanged over the course of the project? What was the role of the landscape architects? How would you define the working method used to draft the project? And how did you manage to come up with a proposal that would include the ideas of all the personalities involved?

The roles that we had originally decided to assign to each member were not actually respected at all, as the four practices worked in a coordinated way, discussing every aspect of the project horizontally on the same level, thus achieving an interdisciplinary design. not only thanks to the skills of the various members of the four studies, but also because the City of Madrid had hired us as the sole project manager and therefore we were able to work alongside mechanical engineers, industrial engineers, hydraulic engineers, civil engineers, botanists, soil technicians and many other experts. The team was not only formed by our four practices, but also by the many specialists with whom we worked very closely.

What kind of knowledge did you acquire from this working method?

It was a job that enriched me a lot from the professional point of view because I had the opportunity to see specialists of various disciplines at work, a collaboration that rarely happens... such as lighting technicians or for example the police specialists for issues related to public space, politicians and the mayor ... in short, there were many individuals who worked with the project team and each of them brought something. I was the director of a team that directed another great team that, in turn, had to work with engineers and municipal officials, so that the project could be implemented.

For the development of the Madrid Rio project, you looked into two urban interventions with similar characteristics and objectives, the Rose Fitzgerald Greenway in Boston and Cheonggyecheon in Seoul. What are the lessons learned from this type of analysis? How did these projects influence your design?

Once we decided to take part in the competition, we made several trips to visit places where similar projects had been carried out. These two projects are actually quite different and hardly comparable: the case of Boston is a redevelopment of an urban space above a high highway, whose passage hugely influenced the urban development towards the historic centre in relation to the seafront. In the case of Madrid, although the M30 effectively constituted a physical barrier, the city had already developed on both sides of the motorway.

What we considered particularly interesting in Boston was the large-scale real estate process that drove the urban development at the seafront, even though, compared to Madrid, it is a city with much lower density which is more deeply linked to green spaces, thanks to its humid climate. This is an interesting operation, but from a critical point of view, I believe that on the surface, the design of the public space does not have the necessary strength to make the pedestrian space dominant over the vehicle space.

The Cheonggyecheon project in Seoul, on the other hand, is concerned with the demolition of a highway and the recovery of the river and the consequent re-naturalization of the area, thus it includes a series of operations related to the reorganization of car traffic, which were, however, not necessary in Madrid after opting for the burial of the highway. What was interesting to study were rather the choices made for the re-naturalization of the watercourse and for the reconstruction of historical and cultural traces that had been erased from the area, the reconstruction of native biotopes and the dynamism of the new public space that had been created.

Your proposal puts forward an additional master plan that includes a much larger portion of land, proposing a program of fifteen-year interventions all along the course of River Manzanares, a set of new functions and new public spaces that connect natural parks and reserves to rural areas and urban parks, which will eventually constitute a green infrastructure. What motivations and interpretations led you to draw up this design strategy?

The fundamental reference that guided me in the development of the project was the knowledge gained by walking along the River Manzanares, my personal vision of its landscapes and the belief that these could relate to the interior of the city.

From the beginning, we understood that without reasoning on a large scale, we could not come up with a functional proposal for the small scale ... The dimension of all the landscapes that the river flows through make it a “cultural infrastructure” in the sense that certain events in the course of history have fixed, in the popular imagination, a very precise vision of Madrid’s landscapes and consequently of the identity of this land, and this is why the fundamental instrument in developing the project was the interpretation of these different landscape identities that the river crosses.

If the fundamental inspiration that guided the project was that of the "revelation" of Madrid's landscape, where these traces had been completely erased, how did this interpretation provide you with the guiding elements in this process of urban transformation?

We tried to gain a deep understanding of the landscape that surrounds us as a "cultural construct", in the sense that it was very important for us to know how the landscape of the River Manzanares works, but also to understand how the river is perceived by a citizen of Madrid and how he reads what is around it.

The river, although very artificial, has undoubtedly influenced the development of the city and, above all, determined its topography. These traces determined by the fluvial geography have mostly been erased, since many of these secondary torrents have been intubated, for this reason our goal was to devise a new system able to relate the geographical and geological structure of the river Manzanares with the built fabric of Madrid, an extremely dense city, where the connection with the natural is particularly difficult because of its very compact urban structure.

In comparison to the proposal developed during the competition, how did your proposal change during the realization of the project? Did any problems arise during the implementation phase? If so, how did they affect the project?

The project changed a lot, but not conceptually. We wanted to create a large park made up of fragments, each of which had to have different characteristics, and that's what we did. But we must bear in mind that the Madrid Rio project was designed and built, for the most part, in four years, which is a very short time! In addition, we designed chaotically and under great pressure because we had to work very quickly... which forced us to make decisions very quickly, perhaps without reflecting enough on what we wanted ... that said, I have to say that, as a whole, there are not many things that I would have done differently!

Without doubt, the way in which the process was organized both from the point of view of time management and from that of negotiating with citizens, and above all the fact of having to think about how to implement the project right from the design phase , are factors that greatly determined the final result of the project ... as often happens in very complex projects like this.

What were the fundamental aspects of the negotiation between architecture, the biodiversity agenda and the ongoing operations in the subsoil and on the surface? What sustainable solutions were adopted to create a durable and functional space?

A very important aspect was the planting of the maximum possible number of trees of certain species, to enable the development of an impressive green space, both visually and from the point of view of biodiversity.

At this very moment we are carrying out work related to biological processes that have always been present in our agenda of operations, but could not be carried out immediately after the completion of the works and which will have very important repercussions on the park ... We are introducing, in phases, some animal species like squirrels, bats and certain birds, and we have started the process of re-naturalization of the river, which has already led to the nesting of some birds.

Regarding the water resources, though, the entire park is irrigated with partly recovered water, and we have also completely renewed the system of water infrastructure, at the same time as planning for the planting of vegetation that needs little irrigation. These are just the ecological benefits on the surface of the park, without counting the beneficial effects of reducing pollutants and noise pollution caused by the burial of the highway ... when the continuity with the Green Infrastructure is greater, animals will cross the river ... it's a process that needs time ... but it will happen!

Eight years after the completion of the work, do the evolution of the plants and the arboreal systems introduced correspond to the formal and functional objectives that were proposed when the project was set out? Which rules and technical procedures are used to monitor the ordinary and extraordinary maintenance of the various systems implemented?

We have made some substitutions where the trees have not taken root; through a process of monitoring and evaluation of the species that have survived better and those that have had difficulty, changes have been made, but in general the trees are in excellent health and are very well taken care of, which is underlined by the rapidity with which the specimens have grown.

The park is constantly monitored by the Calle30 company that deals with the daily maintenance of the tunnels, while the Director of the park, Nieves Vicente, manages a team of people in charge of the maintenance; they are allowed to introduce changes, not only to improve growth and evolution of the plant structure, but also to adopt variations to the space, because being public spaces designed for being flexible, sometimes unpredictable uses require changing the vegetation, depending on the use of the plant cover.

Personally, I don't like some of these small changes while others convince me more, but each of the interventions were made with the aim of making the park as sustainable as possible.

What critical problems were encountered during this first project life period?

The fundamental problems encountered were due to one reason: the ground on which the park was built is artificial in nature, in many cases the soil has been deposited over the tunnels of the highway, in other cases not ... From the vegetal point of view it was preferable that the soil was as spongy as possible in order to contain high amounts of oxygen to facilitate the growth of trees, but from the point of view of the use of surfaces it was preferable that the soil was as compact as possible, so that it would not produced inflections due to foot traffic or to vibrations caused by the passage of means of transport.

As we had foreseen, due to the characteristics of the soil, of non-ideal quality with which we had to work and the stresses to which the area is subjected, the park is stabilizing, that means the quote 0 is not perfectly stable, so the horizontal surfaces tend to take on a more undulating shape;

However, this is not a major problem due to the fact that the surface structure of the park has been designed in a flexible manner and this allows us to promptly correct the undesired effects of these movements.

During the different phases of the design process, which model of participation was chosen? informative, consultative or interactive?

All urban planning processes in Spain, by law, must include a phase of public information/ participation, the residents in the project area presented reports that were examined and some of these were taken into consideration and changes made.

Secondly, we participated in a lot of consultative meetings, most of which were informal, where we spoke with the residents about what we were doing ... the position of some of the sports facilities and public services, for example, was changed according to the requests of citizens, such as the location of bus stops and other traffic-related issues, as we acted not only on the riverside, but also in all urban areas around the project area.

Equally in the design phase of the *Plan Especial*, which is the master plan, dealing with an additional area of about 800 ha., we convened many meetings, in consultation with many people.

Your project seems to prefigure a ground-breaking innovation in the culture of the reinvention of the city in the 21st century, demonstrating how landscape is the ideal means to restore relationships between interconnected and interdependent systems. As happened in the recovery and regeneration of disused industrial areas, is it possible, in your opinion, to imagine a similar action of recovery and reinvention of infrastructures, designed to satisfy a model of urban mobility and growth that at that time was imagined as an unlimited type, thus attributing to the urban landscape project the synthesis role that has been achieved in the Madrid Rio project?

It is totally possible! Infrastructures have grown immeasurably, and public space has become increasingly smaller and poorer and poorer over time ... Today this process has been reversed, no one doubts the fact that public space is important for cities as well as infrastructures.

Without doubt, mobility is an essential factor for the generation of wealth, but the models through which it manifests itself are being modified. I think Madrid Rio is a good example of how infrastructure and public space can combine... I personally believe that infrastructure, public space and mobility can be intertwined and can coexist and be achieved simultaneously.

In this case the project was developed, almost automatically, by designing one thing under another and something different at the top, but this does not mean that it must necessarily be so ... What I learned from Madrid Rio is that the management of the process of design is essential ... if 20% of the surface of the motorway had not been buried, it would not have changed anything ... maybe it would have saved economic resources that could have been used for public space ...

The lesson learned is that only if public space and infrastructure are designed in a coordinated way can we think about cities in a different way from the usual, without thinking and acting in watertight compartments, giving the public space the importance it deserves without affecting the functioning of the infrastructures.

Does this project incorporate a paradigm shift in the meaning of infrastructure? In your opinion, what is the meaning that the term infrastructure has taken on in contemporary times?

Infrastructure is something prepared for what will happen next. I believe that in a certain way the paradigm shift has taken place, as many of the urban interventions that will take place in Madrid, or that are already taking place, act according to this same logic ... for example, the Community of Madrid has bought a vast amount of land to connect Madrid Rio to the Culebro river, about 20 km further south.

This means that, little by little, a set of spaces and places with different characteristics and strong identifying values will be connected to each other, following a logic based on the continuity and the peculiarities of the land, which in reality is what an infrastructure should do.

Madrid Rio is a park with a longitudinal shape, designed and conceived as a piece of a whole of which, in this sense, the whole is formed by different systems that have to do with geography, topography, hydrology, the identifying characteristics of a place, which can certainly be understood as an infrastructure.

In an interview released in 2015 during the "Veronica Rudge Green Prize" award, you stated that *"the project links what is infrastructural with what is super-structural"*. **What do you mean by a super-structural component? Given that the project perfectly complements the large infrastructure system with the built-up urban fabric and the surrounding natural environment, what defines the super-structure?**

The super-structural component is the one which is capable of changing, in this case it is the set of systems that coexist on the surface of which I spoke before.

With the term super-structure I refer to the condition mentioned by Stan Allen[200] in his texts, which is the ability of a space to put different elements into a system while respecting the identity of each one, where this same relationship between the parts allows the user to decide how to use the space in different ways.

Here the infrastructural component is that of the green public space, which in its turn, has been converted into an infrastructure or a territorial structure, as it obeys the logic of connection and continuity between territories.

In your opinion, can this project be defined as a source of knowledge for the transformation processes of urban spaces in terms of designing, reading and preservation of historical and geographical traces, sustainability, flexibility and multifunctionality of space?

Yes, I am convinced that this project has played a very important role in these terms, it is the first project in the world that has managed to satisfy all the objectives you have listed in a concrete way.

The way in which green infrastructure is linked to the public space is something that many have theorized, but that until now had been put into practice only on a small scale, The Madrid Rio project has shown that it is possible to act with this logic even on a large scale and the repercussions have been enormous.

[200] See Allen S. (1985,1999), Field Condition, in Points + Lines, Princeton Architectural Press.

In the publication related to the project, "Paisajes en la Ciudad", you underlined how "The landscape, here, is a table of operations, a careful observation of the city, an interpretation of its vectors and, therefore, an artificial construction that sutures again the infrastructure fabric". What then, in your view, is the meaning that landscape has taken on in this context and more generally in contemporary times?

I believe that when we look at the city and therefore draw it, we are already building something that is the result of our interpretation... therefore these actions are produced simultaneously. In the case of Madrid Rio, the new landscape that we have created is really the result of a certain way of observing and interpreting the city... the project comes from a personal vision of Madrid that originates from knowledge of places and emotional experience.

As I have reiterated on several occasions the city is not just a built fabric, but is formed by intermediate spaces that have their own identity and where people establish certain links; it is a concept which seems so obvious but that has also suffered from a certain "inertia" in being put in place. In the last ten years we have finally realized that the spaces on which we must intervene are those around buildings and streets ... those empty spaces where people meet, can organize activities and create a community. This is a cultural-adaptation obligation that is as important as much as climate adaptation.

Landscape, for me today, is synonymous with the settings that people actively help to build, it is a system of different systems: the green, the hydrographic, the traffic, buildings and people and the activities they perform.

Could you summarize this project in a few key words?

It is a large artificial park above a highway where the maximum number of trees have been planted with the aim of transforming a place dominated by vehicular traffic into a fresh and green one, with which it is easy to empathize.

Are there any other similar examples of design that your practice has led?

After Madrid Rio we were in charge of the development of other large projects for public spaces along rivers, one of the most important of which is the rehabilitation of the Tagus riverside in Toledo. While in Madrid this project has generated a real culture by which Madrid Rio has become an exemplary model of creating public space that will slowly transform the city. I believe that the project has had a strong impact all over the world and that, little by little, processes of this kind are being activated and carried out more and more.

Madrid, January 29th 2018.

INTERVIEW WITH FERNANDO DE PORRAS-ISLA-FERNANDEZ

Your professional practice, Porras La Casta arquitectos, along with your teaching and research activities, focus *"not only on architecture, but also on the territory, on the landscape and on international cooperation"*. **How did you open your studio? And how have your interests and convictions changed over time?**

My colleague, Arantxa La Casta Muñoa, and I founded the studio in 1985. We both work as architectural designers, not in landscape architecture, but our goal has always been to carry out our interdisciplinary professional activity, relating to the landscape in a very pragmatic way, tying together artificial systems and natural systems: for us landscape is pure artificiality, even though the fundamental materials are soil and vegetation, ours are "Landscape Architecture" projects in the sense that we deal with building landscapes.

We work on projects that deal with different infrastructures: in addition to the case of Madrid Rio, where the transport infrastructure dominated the place but at the same time preserved it from real estate speculation, making transformation possible, we recently won the competition for the transformation of PIaza de España with the project "Welcome Mother Nature ... Goodbye Mr. Ford!". We will increase the pedestrianized area of this node of entry and exit from the city and we will create a green corridor that will connect directly with the Madrid Rio park, achieving thereby effective continuity between the western suburbs and the city centre.

Another project we are dealing with regards the public space around the Santiago Bernabéu stadium; in this case it is a social and cultural sports infrastructure, but at the same time it is a symbol of world fame. All these projects have an interdisciplinary nature, I believe that the figure of the architect is fundamental, because he holds the key to the global vision and design necessary to effectively coordinate all the operations.

Do you think that the design process of Madrid Rio achieved an effective interdisciplinarity among the groups of experts present in the various design teams? Did the method adopted in the design phase lead to the development of a design process that can be considered a pilot experiment for other projects?

Absolutely! Ginés Garrido and I have many things in common and fully share a belief in the foundations on which the Madrid Rio project is based, which is precisely that relationship of ambiguity of artificial systems applied to natural elements of which I spoke earlier.

In the development area there were two fundamental infrastructures: one of a natural type, the river, and one of artificial type, the gray infrastructure formed by the tunnels of the motorway.

The most powerful transformation factor was the disappearance of the car, an operation that was as expensive as much it was criticized, but which gave us the possibility to build on the surface an "artificial micro-nature", planted on a large horizontal concrete skyscraper consisting of tunnels. The whole process, both of design and of realization, was totally interdisciplinary.

Every decision was discussed and shared and each of the four practices contributed a lot to the final result, even though we worked differently: the competition was won by the four practices, but for the construction the total responsibility of the project was entrusted to the company Mrio Arquitectos, which me and Ginés Garrido founded with the atelier Alvarez-Sala, and then, from that moment on West 8 took on the role of our consultant, especially in the design phase rather than in the monitoring phase.

The three Spanish practices had direct responsibility for the work and had to interface with the City Council, while West 8 sent us their ideas and proposals, which we then discussed all together to find a solution that we could all agree on ... only at that point could we mediate with the municipal officials and construction companies.

Today, however, Mrio Arquitectos is a consortium formed exclusively by Porras La Casta and Burgos Garrido practices. Ginés and I continue to take care of Madrid Rio and to design small projects connected to it… because it is a living project, which as an integral part of the city continues to evolve ... for example, we have just started work to extend the park to the south.

Did negotiation therefore play a fundamental role in the management of the planning process?

We spent a lot of time negotiating with everyone! ... We did it with our engineers and in carrying out the project design with West 8, both with the fire brigade, who had to be able to get their trucks to the entrances of the tunnels, and with the Municipality, who checked the type of vegetation structure... our three practices had the duty to convince all these people, or possibly to be convinced, of how to carry out the project.

Negotiation was an aspect of fundamental importance, both in the design phase and in the management phase of the construction process, especially considering that all this happened at a time when the economic crisis was about to hit Spain ... we had to divide the project into many smaller projects so that the construction companies could win bids, within a system designed by municipal officials who dealt with the management of economic resources.

The great public and political consensus enjoyed by the Mayor of the time was equally important ... the intervention was financed almost entirely by revenues from taxes on citizens, while just over 20% was financed from state resources.

The key passage that made it possible to complete the project was to downgrade the M30 from the status of motorway (managed by the Ministry of Infrastructure) to that of a road (managed by the Municipality of Madrid); in this way the Municipality was able to completely manage the economic resources available, so that there was no attempt to derive profit on the intervention ... the only beneficiaries of this transformation are the citizens! Madrid Rio is a project that could be defined as "Asian" if we consider its dimensions, the speed with which it was realized, the democratic nature of the public space that has been created and the adoption of procedures that, until now, did not belong to the European world.

In the publication relating to Madrid Rio, "Paysajes en la ciudad", two urban interventions are mentioned with similar characteristics and objectives, the case of the Rose Fitzgerald Greenway of Boston and that of Cheonggyecheon in Seoul. How did these projects influence your design?

Madrid Rio is a unique project in the world ... Although they are similar, none of these projects has dealt with such a radical transformation.

The first difference is the scale of the intervention: in Boston although the intervention is smaller, the transformation process lasted about 20 years. The infrastructural aspect predominated with respect to the urban result and created a landscape which was certainly richer in green spaces, but still dominated by the presence of cars. In Seoul, the opposite happened... An ancient raised highway above a stream was completely demolished, taking advantage of the liberated space to build a completely artificial water infrastructure.

The water flowing on the bed of this stream, in fact, is not natural, it is a fountain ... it is an operation of maximum artificiality and even in this case the car is still present on the sides of the Cheonggyecheon, although the environmental result was very powerful thanks to the re-naturalization of the banks.

So, in Madrid Rio we tried to make the most of these projects: the River Manzanares is not an artificial stream but it is a real infrastructure: for every cubic meter of natural water that comes from the source to the north, 13 cubic metres of purified water coming from the surrounding houses are conveyed, therefore also in this case the vegetal order and the aspect of re-naturalization of the banks is of great importance. but the fundamental difference is the disappearance of cars from the surface ... a choice that came directly from politics, and that, in this case, made the difference.

A major flaw of the three projects, however, is the greatly reduced level of public participation!

As required by law, the Madrid Rio project was on display to the public for a month, a period of time that we thought was too short; for this reason, in agreement with the Municipality, we extended it to two months during which some members of our practices were involved in explaining the project to citizens.

Thanks to this operation, me and Ginés, came into contact with some neighbourhood associations, who came to our studios to discuss the project. Being convinced that public participation is fundamental, we listened to some of their proposals when implementing the project.

What motivations and interpretations led you to draw up the "Plan Especial"?

We wanted to create a large-scale infrastructure, connecting the region of Madrid from north to south, crossing the city and gradually consolidating... now there are a number of disconnected elements that will become a whole during the next 15 years.

The project has two dimensions: the first is the large scale of the master plan which aims to create a green infrastructure, in which the River Manzanares is the fundamental element of continuity that connects the natural parks to the north of Madrid with the south of the city.

Working on a large scale provided us with many elements for the second dimension: that of the micro-scale, which I am genuinely convinced was the factor that allowed us to win the competition of ideas. Working on the Madrid Rio project as if it were an "urban surgical operation", allowed us to process every detail with great precision and awareness of every single element... we were not the favourites in the competition... the municipal technicians were the ones that realized that our proposal was what was possible to achieve!

Throughout history, various proposals that sought to integrate nature, infrastructure and city, have been pursued: in 1925 Balbuena proposed the creation of a linear park in the "Parkway" American style, or Bidagor in 1941 suggested that the Rio Manzanares could become one " green core "centre of synthesis and connection of the regional landscape of Madrid. Did these proposals help you develop the Madrid Rio project?

Yes, we studied an interesting analysis that Pedro Bidagor had led at the time of planning the "green core".

What he proposed is that the course of the streams connected to the Manzanares, which at that time had already been turned into roads, should become over time the powerful green axes connected to the river ...

On a theoretical level this is what guided us in the development of the project, the revelation of these “profound geographical footprints”.

Each one disappeared but I know precisely each of these streams that flow across the Manzanares River and in the “Plan Especial” we developed a series of green corridors that trace these underground courses. Madrid means “mother of the waters”, so we took advantage of these deep traces of the river to create powerful green connectors. we are currently building a green connection with Plaza de España, but we do not know if we will also build the others in the future.

What does the term “landscape” mean to you? What is the significance of landscape in the Madrid Rio project?

The landscape is an intellectual construction, or at least it has been since Alberto Durero [201]coined this term during the Renaissance. From that moment on, the landscape was not nature, but the interpretation of nature. Today the rural/urban opposition has become obsolete; the landscape is also urban and is composed of different elements and relationships that interact with a certain order.

In Madrid Rio the landscape we created is an element of continuous perfection that the citizen perceives through two main factors: physical continuity, a space free of obstacles and barriers ... and visual continuity, both the one we created with the vegetation, which in addition to the perceivable effect, brings with it enormous advantages in terms of filtering odours, generation of oxygen, reduction of noise pollution, as a source of shade during the summer, psychological benefits, and so on.

The visual continuity is an integral part of the urban landscape, both that of the green, that of the facades of buildings, or even that of a large and particularly identifiable and accessible sidewalk... all these elements, which have to do with continuity, ensure that connections are created, relationships... and that these relationships acquire a hierarchy.

201. Known as Alberto Duro or Durero, Albrecht Dürer was a German painter, engraver, mathematician and treatise.

The inspiration behind these projects is never a personal repertoire of interests but a work of interpretation and mediation of the urban landscape.

As happened in the recovery and regeneration of disused industrial areas, is it possible, in your opinion, to imagine a similar action of recovery and reinvention of infrastructures, designed to satisfy a model of urban mobility and growth that at that time was imagined as being unlimited, thus attributing to the urban landscape project the synthesis role that has been achieved in the Madrid Rio project?

Yes I am convinced of it, but unlike the regenerated industrial areas, neither in Seoul nor in Boston, nor here in Madrid, the problem of the intensity of uses emerges.

I believe that any urban regeneration having to do with landscape should also deal with the social and cultural aspects of the place, which are part of that landscape ... It should not be possible for a university campus to have no social activities at the weekend that on a university campus there are no activities on the weekend ... or that in an industrial area, on a Sunday, nothing happens ... you need to intensify the uses and especially differentiate them!

The key to creating a meaningful landscape is the multi-functionality of spaces. We worked in this direction with the regeneration of the Matadero area, but I must admit that it is an area which is very well connected to the city centre and highly populated in its surroundings, where success was guaranteed by its location... as soon as the transformation was triggered, the inhabitants appropriated the place and constantly organize many activities.

The M30 also represented a physical boundary between the central core of the capital and the neighborhoods outside the ringroad that surrounds it. Does this project incorporate a paradigm shift in the meaning of infrastructure? In your view, what meaning has the term infrastructure taken on in contemporary times?

Of course, infrastructure, from being a limit, has become a connective membrane! These infrastructural spaces are full of interstices and elements that maintain a certain degree of ambiguity when they are put into use; they activate the transformation.

What historically preceded any phase of colonization of land were the “classic” infrastructures such as bridges and roads and then railways, but today the paradigm has changed, it is new, the infrastructure not only precedes urbanization, but is an opportunity, an engine of change.

Do you think this project meets the following criteria?

- **Respect the fundamental principles of human existence and the power of archetypes.**
- **Avoid adopting a strongly sectoral and formal planning and design orientation.**
- **Accept the existing and the isochronous. That is: attribute the same value to historical and contemporary structures.**
- **Promote and reinforce the mutability, feasibility and versatility of the structural networks.**
- **Create multi-purpose spaces so that free structures can be adopted.**
- **Emphasize communication and structuring factors[202].**

Totally ... I think that if one of these six principles were missing ... we could not talk of a project! The project is forced to respect the principles of human existence because it is grafted onto a consolidated city.

With respect to power archetypes, we worked with the intention of creating a project that belonged to the city, not an imprint from us architects as authors, and therefore it is closely linked to the urban archetype. Madrid Rio reacts differently depending on the districts with which it is connected and is divided into different areas structured according to the identity of the place, we have harmonized the relations between river, city and infrastructure... these great carriers that were already present.

In the same way history has a fundamental value and is present in the project; we analysed the transformations of each element, starting from the mid-sixteenth century, gathering a great deal of data to include in the project, which was as important as the use of contemporary materials for example.

In this regard and with regard to the emphasis on communication, there is one aspect of the project that has so far not received the attention it deserves and that is the social educational value linked to the *genius loci.*

Madrid Rio is dotted with small gestures that point to what would normally be difficult to understand for citizens: many information panels that tell stories of real history have been installed ... To create the gardens of the *Puente de Toledo*, the most important baroque bridge in the capital , we studied the transformation of the structure of the geometric gardens of Madrid, from the sixteenth to the nineteenth century, recreating a setting appropriate to the historical identity of the place and the invisible landscape that unfolds below. On the other hand, in the area of the *Puente del Rey*, during the design of the *Huerta de la Partida* orchard, we discovered that the city of Madrid had been drawn for the first time (Fig. 63). The belvedere we created is a tribute to this design, which was commissioned by King Philip II when he bought that estate ... Through that document we managed to recover, in the design of the park, the geographical footprints created by the ancient passage of the streams, today channelled and conveyed to the Manzanares.

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[202] The reccomendations were presented in the lecture "Between Landscape Architecture and Land Art" by Udo Weilacher,during the cycle of international conferences "Open Session on Landscape" (DIDA), February 28, 2017, Florence.

How much did the rigid geometry of the underground infrastructures affect the surface design?

When we won the competition, first the City officials invited us to visit the tunnels, which at that time were already 50% built... but we did not know how they were built or where certain installations had been positioned!

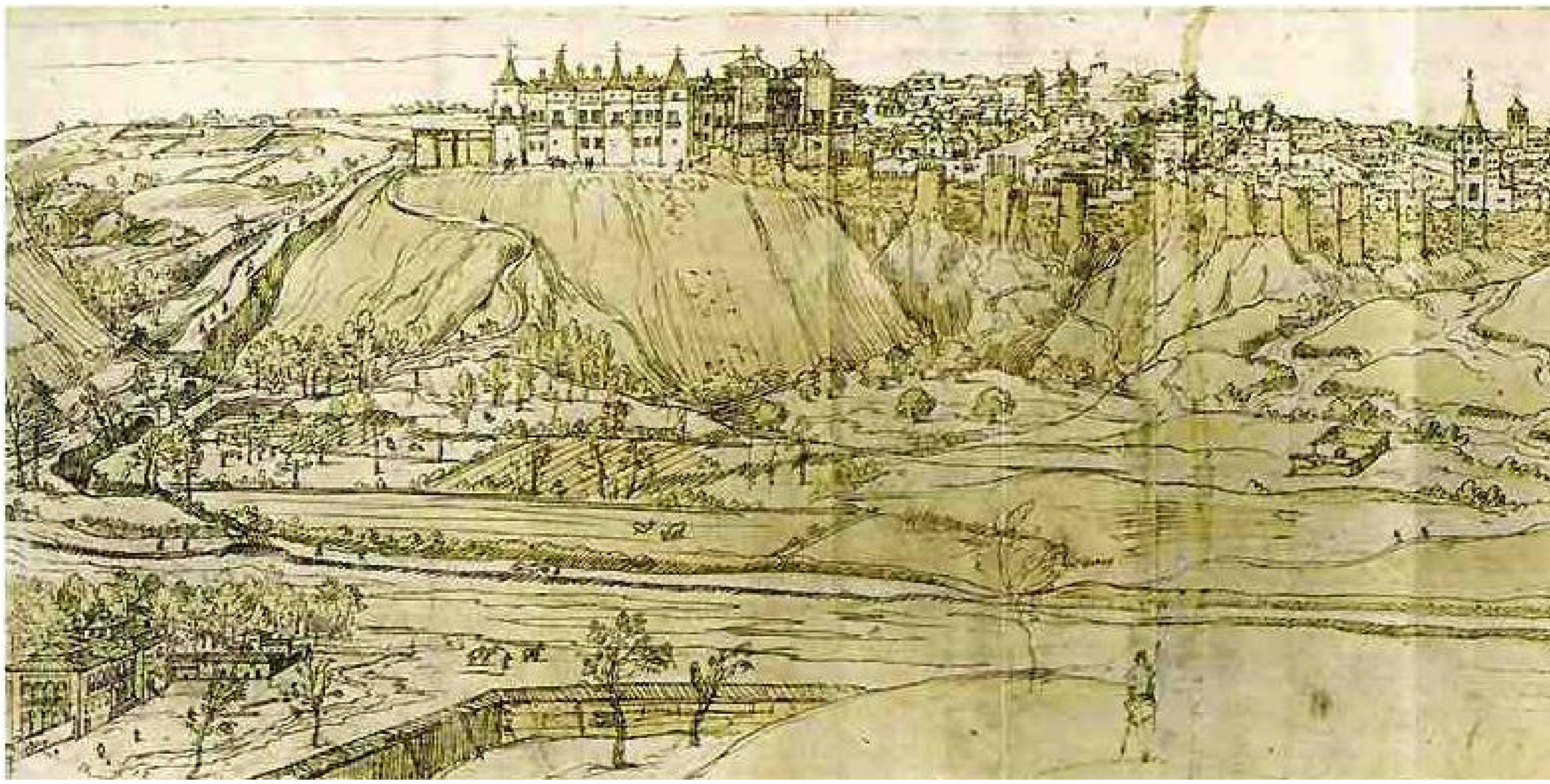
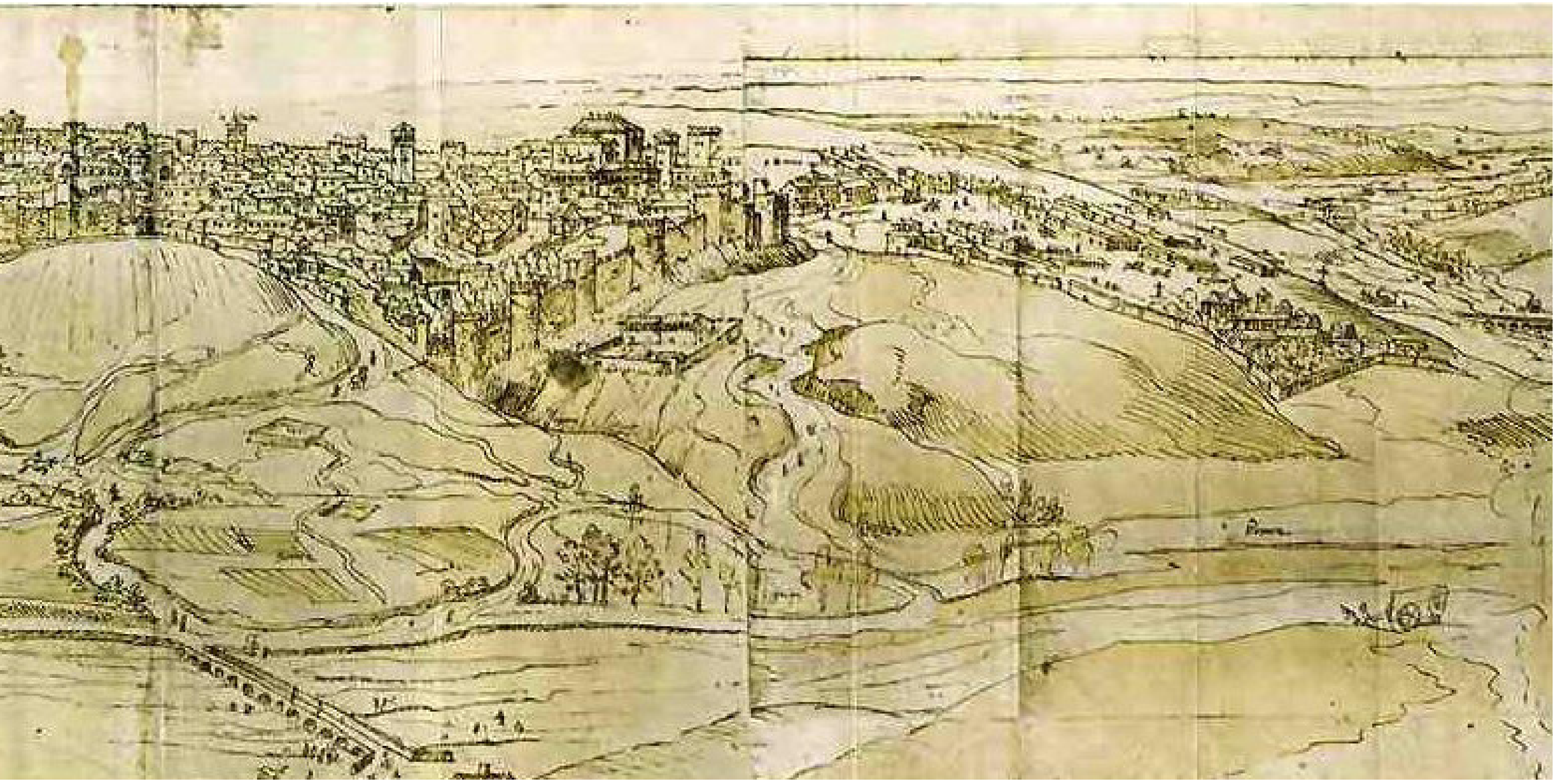


Figure 63: Antoon Van Den Wijngaerde, View of Madrid (1562). Preparatory drawing realized in pen with sepia ink and black pencil on paper. Source: Vienna National Library. Dimensions: 365 x 1252 mm; On the same geographical position where this drawing was made now is located a lookout terrace (see Fig. 34, Pag. 162 of this research).

As a result, we had to hire a team of our engineers to carry out a specific study that would allow us to know exactly how resistant the infrastructure was at every point and how much land we could pile on top of it (Fig. 64).

Basically the constructive system depended on the data that our practices had to obtain by doing research... what resulted is that, in some places, where the tunnels were not able to support the weight of the land, we built an artificial topography, creating real mountains of Forexpan[203],in which we dug the holes where to place the trees. With this technique we were able to plant 36,000 trees over 6 km of tunnels, but obviously we had to study a sort of "intensive care unit" to ensure that trees could grow and survive in good health in extremely artificial conditions.



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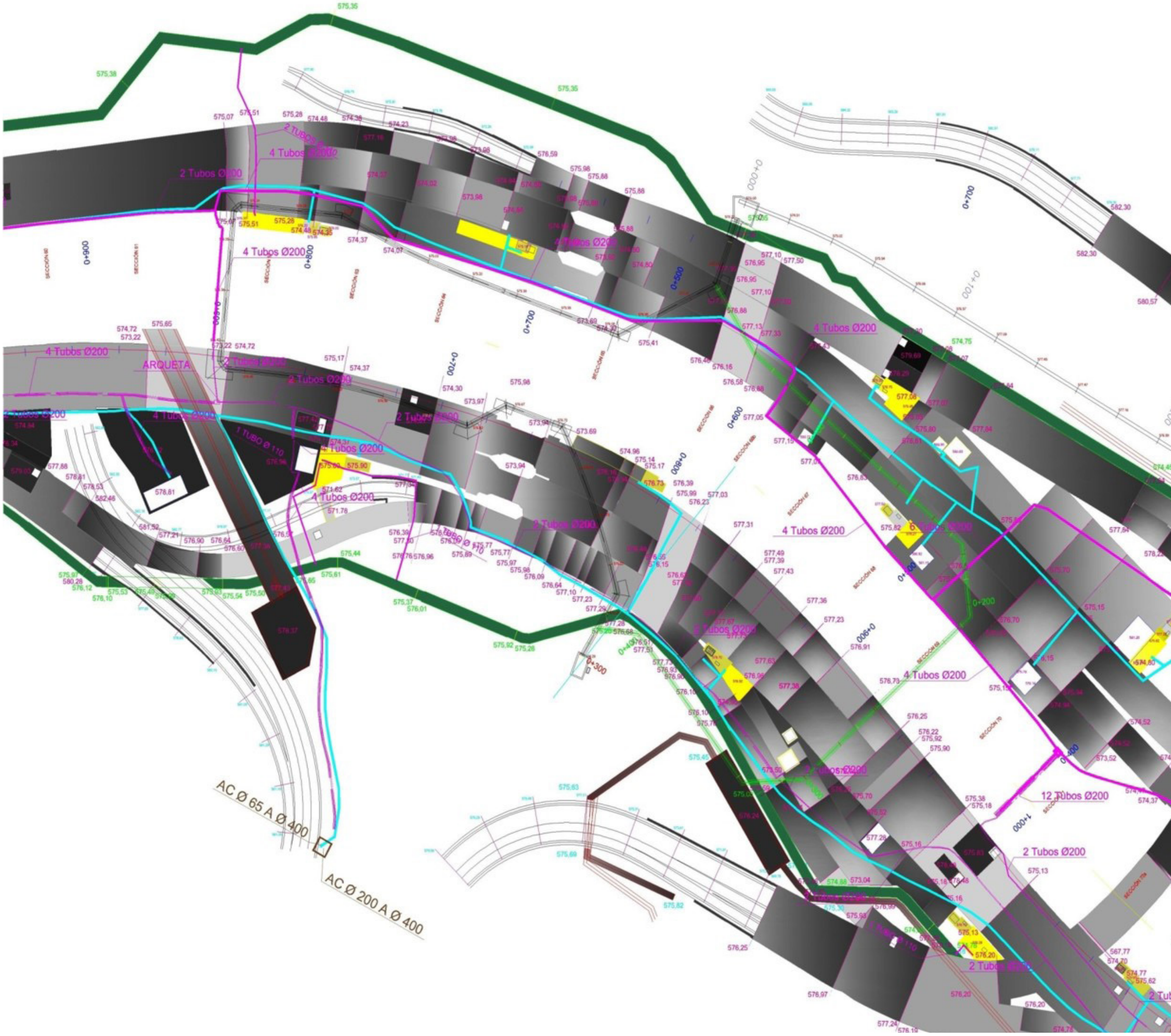
[203] Forexpan is a concentrate of fire-resistant synthetic foam specially formulated for applications such as forestry and forest fire control, structural fires and tire and paper fires; (http://angusfire.co.uk/products/foam-concentrates/product-range/class-a/forexpan/).


575,35
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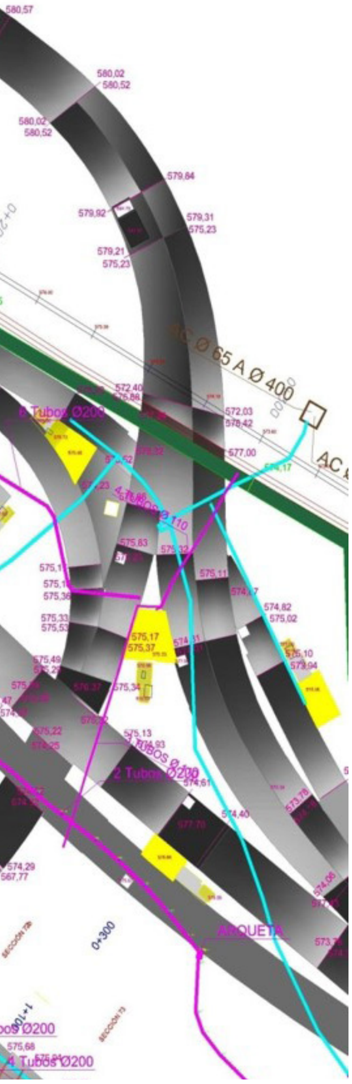
2 Tubos Ø200
4 Tubos Ø200
4 Tubos Ø200
ARQUETA
4 Tubos Ø200
1 TUBO Ø 110
4 Tubos Ø200
4 Tubos Ø200
12 Tubos Ø200
2 Tubos Ø200
0+700
0+600
0+500
0+400
0+300
0+200
0+100
0+000
AC Ø 65 A Ø 400
AC Ø 200 A Ø 400

Figure 64: detail of the calculation of the load capacity of the M30 tunnels. Source: Courtesy of the authors.

In addition to "anchoring of the roots", the irrigation network consists of two independent systems: for the first three years the collar of the plant is irrigated, while from the fourth year irrigation takes place at a deeper level to ensure that the root system grows expanding horizontally until it connects with the roots of the adjacent trees, thus lending further stability to the whole tree plantation (Fig. 65).



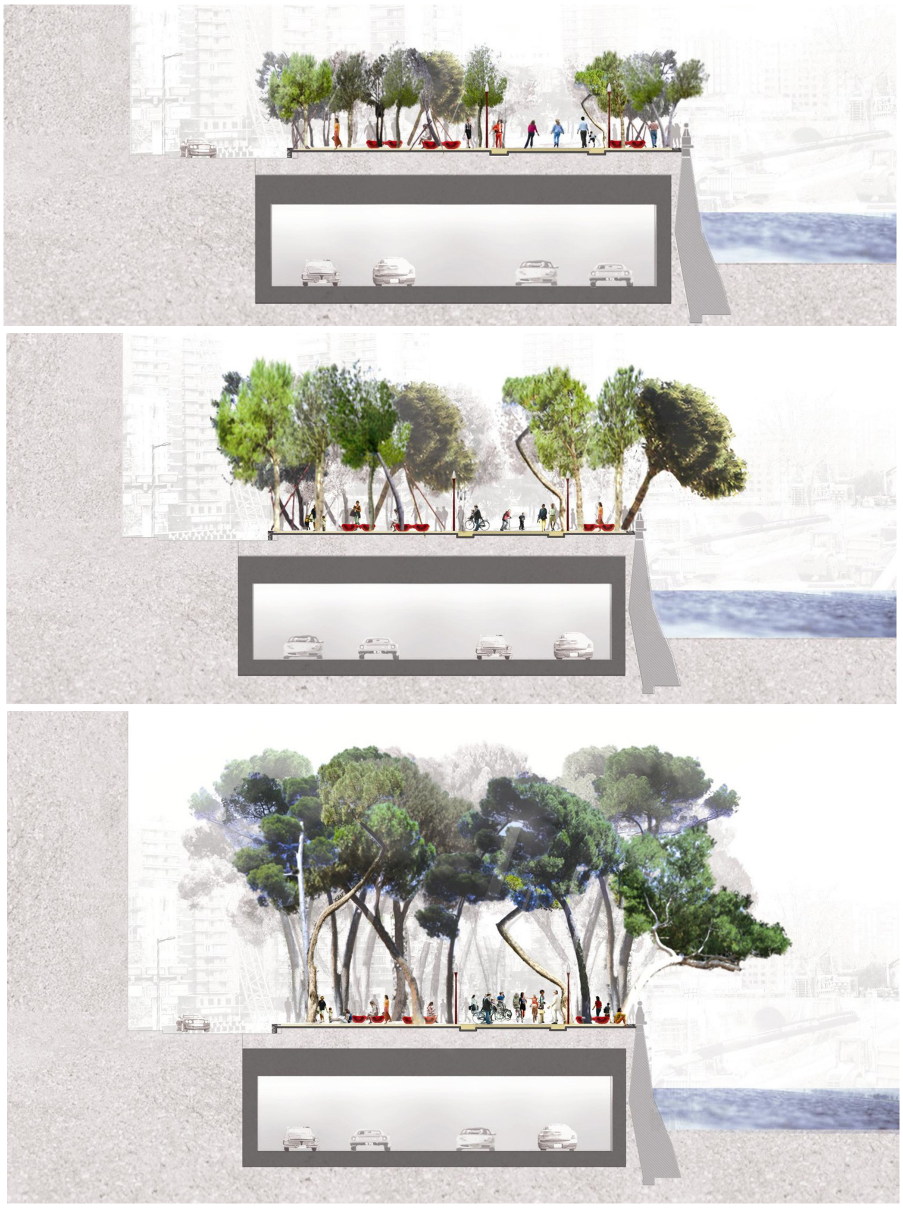


Fig. 65:Representationof the growth of the arboreal specimens of the "Salon de Pinos" over the course of 25 years. Source: Courtesy of the authors.

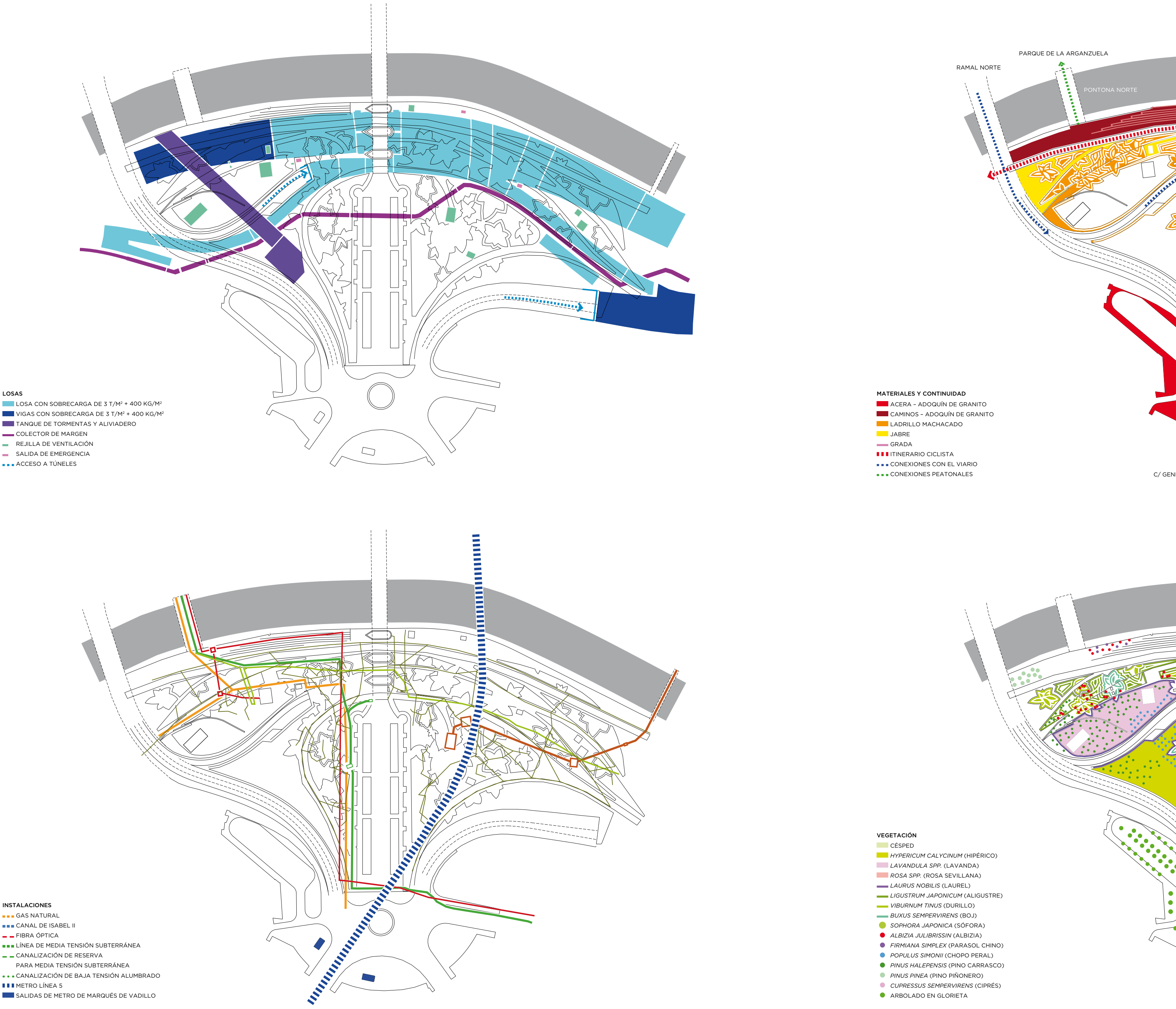
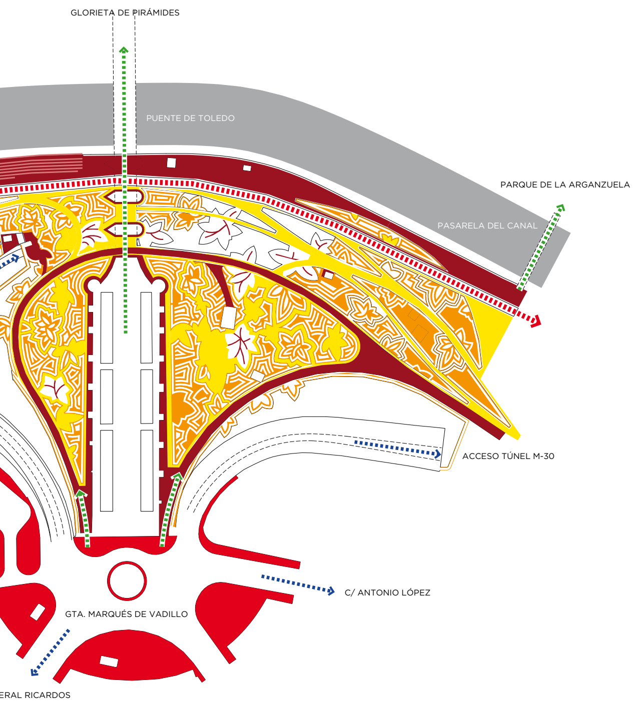

PARQUE DE LA ARGANZUELA
RAMAL NORTE
PONTONA NORTE
C/ GEN
LOSAS
LOSA CON SOBRECARGA DE 3 T/M² + 400 KG/M²
VIGAS CON SOBRECARGA DE 3 T/M² + 400 KG/M²
TANQUE DE TORMENTAS Y ALIVIADERO
COLECTOR DE MARGEN
REJILLA DE VENTILACIÓN
SALIDA DE EMERGENCIA
ACCESO A TÚNELES
MATERIALES Y CONTINUIDAD
ACERA – ADOQUÍN DE GRANITO
CAMINOS – ADOQUÍN DE GRANITO
LADRILLO MACHACADO
JABRE
GRADA
ITINERARIO CICLISTA
CONEXIONES CON EL VIARIO
CONEXIONES PEATONALES
INSTALACIONES
GAS NATURAL
CANAL DE ISABEL II
FIBRA ÓPTICA
LÍNEA DE MEDIA TENSIÓN SUBTERRÁNEA
CANALIZACIÓN DE RESERVA PARA MEDIA TENSIÓN SUBTERRÁNEA
CANALIZACIÓN DE BAJA TENSIÓN ALUMBRADO
METRO LÍNEA 5
SALIDAS DE METRO DE MARQUÉS DE VADILLO
VEGETACIÓN
CÉSPED
HYPERICUM CALYCINUM (HIPÉRICO)
LAVANDULA SPP. (LAVANDA)
ROSA SPP. (ROSA SEVILLANA)
LAURUS NOBILIS (LAUREL)
LIGUSTRUM JAPONICUM (ALIGUSTRE)
VIBURNUM TINUS (DURILLO)
BUXUS SEMPERVIRENS (BOJ)
SOPHORA JAPONICA (SÓFORA)
ALBIZIA JULIBRISSIN (ALBIZIA)
FIRMIANA SIMPLEX (PARASOL CHINO)
POPULUS SIMONII (CHOPO PERAL)
PINUS HALEPENSIS (PINO CARRASCO)
PINUS PINEA (PINO PIÑONERO)
CUPRESSUS SEMPERVIRENS (CIPRÉS)
ARBOLADO EN GLORIETA

Figure 65: top left: graph of the load capacity of the tunnels below the Jardines de Toledo; Top right: Scheme of the materials used to cover the tunnels on the surface; Bottom left: Detail of underground infrastructures; Lower right: Composition of the vegetation of the Jardines de Toledo. Source: Courtesy of the Authors of the project.



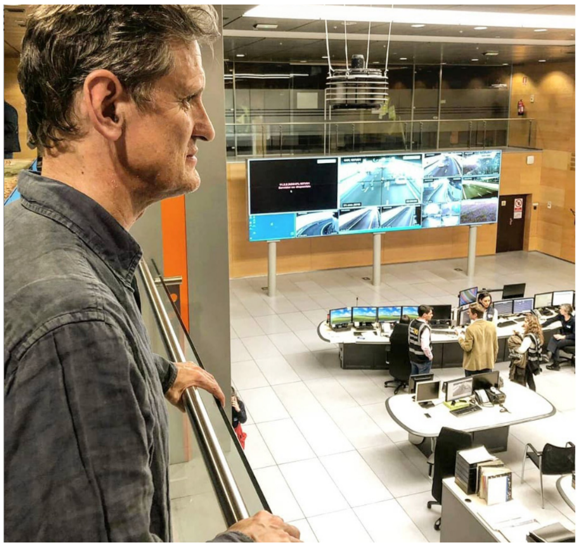
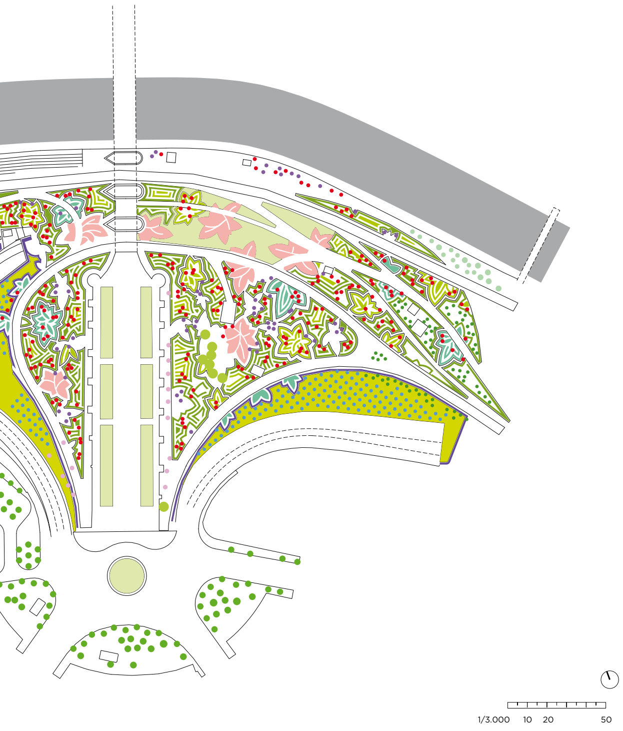


Figure 66b: Arch. Fernando de Porras Isla Fernandez at the control centre under the M30 tunnels. Source: Courtesy of the authors



The only point where the geometry of the tunnels has greatly influenced the surface design is the geographical center of Madrid Rio, the area of the *Puente de Toledo* (Fig. 66), which from the infrastructural point of view is "the navel" of the project. Consequently, the shape of the baroque garden is the result of this mediation between what already existed and our intentions in the project proposal. At 12 meters below ground is the control center of the 30 km of tunnels that form the M-30 (Fig. 66b). Occasionally I stop by to check in detail on the screens the roots of the trees of MadridRío, which we enjoied so much planting, that are growing healthy without breaking the slabs or walls of the tunnels.

Do you believe that the Rio Madrid project can be called a work of Landscape Infrastructure? If not, how would you define it?

Madrid Rio is an infrastructure that could finally incorporate a landscape! To all intents and purpose, it is an infrastructure… so I would define it as "infrastructure as landscape", not the other way around.

In Madrid, Rio it is the architectural operation of superimposing the infrastructure of urban elements that relate to the surroundings and order space which creates the landscape. The landscape here is the result of the sum of the new relationships created, a completely urban and anthropic landscape, where nature is the material used to obtain the perception of the continuity of the landscape ... It is not a landscape because there are trees ... in this case they are a constructive element of a landscape made up of different elements.

Madrid, January 31st 2018

INTERVIEW WITH CHRISTIAN DOBRICK

What was the role of West8 within the multidisciplinary team of the Madrid Rio project?

We were given the commission of the project together as a team of architects, “Mrio”. As landscape architects, we (West8) were involved as advisors to the teams of architects, from the moment that the competition was won until the definitive design. We were fully involved with Mrio until the definitive design, working here in our office in Rotterdam, with a team of 20 people, for one year. We developed standard details to facilitate the completion of the project, when in the middle of this process, the Mayor, needed to finalize 5% of the project quicker than expected, in order to finish the work before May 2007, when he was running for re-election. During that year, we were asked to work also on the “Salon de Pinos” and the whole “Avenida de Portugal”, to create a sort of pre-view to show the citizens the ambition and the quality of the entire project, showing that in addition to the tunnels, the project would benefit all the citizens of Madrid. It is an operation that was partly intended for the press, in fact the day before the elections, a substantial article, complete with our renders, was published entitled “The future of Madrid Rio is born in the Avenida de Portugal”.

How would you define the working method used to draft the project?

After the definitive design we still wanted to be involved and contribute, so we adopted a strategy-based approach: in our experience with this kind of large scale interventions, you can work only with very strong guidelines with very strong strategies that give a direction and a sort of backbone to the idea. So, for example, when you look at “Avenida de Portugal” you see that the idea of the bench and the idea of the pattern are two very strong elements that can grab the centre of the space… we tried, for the different areas, to establish this kind of guidelines to find and identify, together, a language that could be metabolized in the culture and in the minds of the local people.

We chose the pine for the “Salon de Pinos” because it grows all over the Madrid region, but also because it embodies the image of very luxurious gardens of Madrid, it is a symbol of prosperity and gives a positive feeling in a garden. There is a language studied through the vegetation but also through the materials and through the shapes, that tries to relate to older existing shapes or vegetation groups, so that people have the feeling that their memories come back in these spaces, which are reinterpreted in a new but comprehensible way, meaning that it’s not something that is imported from another planet but we created something that is based on the DNA of the city.

What kind of research did you do to understand the kind of identity that people would recognise in those places?

Of course, for me and the rest of the West8 team it was a big help to work together with local architects. We constantly worked as a unique group, adopting a multidisciplinary approach in every aspect! It was necessary to be able to identify the historical context (which from our perspective, was not very easy to perceive): we visited a lot of gardens and parks and public spaces in the city but also in the surroundings, identifying spaces within the city, like the linear parks in the north, to really understand which areas are positively perceived and how people use the spaces, but also how people behave in the gardens...and this was a big inspiration. What we observed is that during the evening, in Madrid, it's traditional for people to dress up in the evening, to show themselves and to "promenade". That's why we supposed that a "salon" would be a very good opportunity to walk from your neighbourhood to a restaurant, or to go visit your relatives, or simply meet people while having a walk dressed up… Now if you visit the "Salon de Pinos" during the evening, in spring or summer, you will easily see lots of people dressed up smart, walking back and forth. This is something specific that we observed in the city and incorporated in our design, trying to facilitate this typical behaviour.

Through which concepts were you able to reinforce the identity of the new landscapes created along the river Manzanares?

We saw that in the northern part, at the "Casa de Campo" there were some popular cycling routes, but people were reaching them by car, going to the parking space, unloading the bike from the car and then starting the tour inside the historical hunting reserve. That was because those cycle paths were completely disconnected from all the others existing in the city.

Now, the new network of paths enables people to cycle along the "Salon de Pinos" to reach "Casa de Campo" and the northern cycle routes, using their bikes to move outside and into the city. At the same time, we tried to create something that could work also for the single neighbourhoods, like the "Avenida de Portugal" which resembles almost a neighbourhood garden. while the "Arganzuela Park" is intended for the big neighbourhood which borders on it, dotted with quiet spaces to relax, but designed as a network of elements that ties into the bigger scale.

Your design proposal is made of a double strategy: a bigger master plan, a "green infrastructure" to be created in the future, whose construction starts with Madrid Rio…

Yes, that was the big work of Ginés (Garrido) and his team, to set the ambition of this project into a bigger master plan, to define a material language that originates in the Madrid Rio project (from the sidewalk paving material to the lighting scheme) and that can be a standard that is spread over a much bigger scale. I think that is a big achievement, that Ginés was able to convince the municipality that this is not an isolated intervention but is setting a new standard for this city. It is a very clever strategy and the city is now using Madrid Rio as a sort of language to use for other interventions, enhancing its strength as an element that is embedded into the urban fabric.

The concept behind a similar project, the Sagrera linear park, is based on "Building the new city on the existing. A new compact urban piece on multiple layers: the surface and the subsoil". The Madrid Rio project originates form the same concept… In this way, an innovative concept is introduced into the theory of landscape architecture, according to which topography is not only what is on the surface but also what is underneath. Given the proliferation of these types of landscapes that arise from this reversal, do you think that this strategy can be the objective through which the discipline of landscape architecture will be able to respond to the many apparently insoluble critical issues of the 21st century?

We are strongly convinced that it's always a good idea to embed any kind of project into the cultural and infrastructural context of the place...This is the essence of all our projects. When we create projects, we do it essentially with the vision that people see them as a sort of canvas where they can act on, which gives them the chance or inspiration to use a space in different ways.

I try to create multi-functional spaces but without overly facilitating the determination of the uses. So, for example, when looking at the "Salon de Pinos" there is very little furnishing in it, while the edge of stone that defines it gives a lot of options whether to sit or to play. It is fundamental to observe how people use open space… in the Asian context, where we work a lot, we identified that people have a totally different relationship with the outdoors: people don't sit on the grass, are sort of afraid of getting dirty... so there we need to create more sheltered spaces, more elevated spaces, dry spaces, shady places, in order to create a place where local people feel comfortable. This is an exercise that we try to do in every project in a new way and we try to never isolate a garden completely, but always embed it into a bigger fabric, because it can ultimately facilitate the adoption of the place as a "stepping stone" for other public spaces.

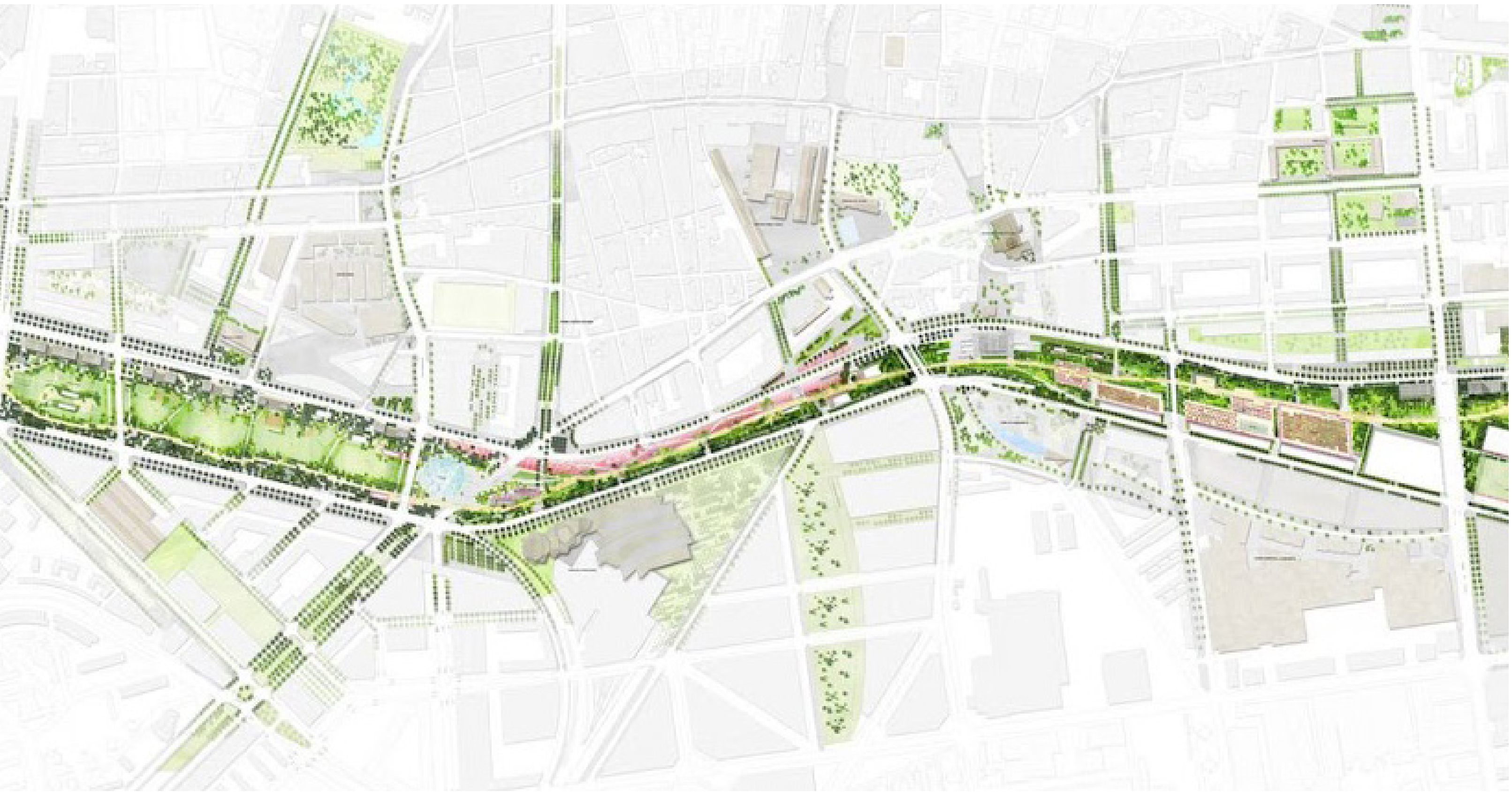


Figure 65: Part of the Plan for the Sagrera linear park in Barcelona designed by West8 (under construction). Source: http://www.barcelonasagrera.com/

What about the role of ecology?

Ecology also has a fundamental role; we learnt that is essential to understand what the local plantings and the composition of the soil are, to be able to create a project which can be maintained and sustained for 400 or 200 years. A landscape project is supposed to evolve into something that must last and thinking about the Madrid Rio project and the large-scale development that has come with it over these years, it is easily noticeable that most people understand intuitively how the maintenance works, so it is evolving in the way we imagined.

The only mentionable exception is related to the "Arganzuela Park": we wanted to have a sort of secondary bush layer, which we thought would make the second layer of vegetation very fresh and green, but the maintenance team identified these bushes as ornamental ones and put them into small bowls, because they're used to treating them that way in the gardens... while in this case it is an urban park. This is just an example of a misunderstanding with the maintenance team, not a terrible one to see, but of course it changed the evolution of the vegetation of the park in the long term. Therefore, we put so much care into creating a comprehensible design, because we must leave our creations in their hands, and if you have too many of these misunderstandings it can ultimately damage the project, which is what we try to avoid.

A landscape project is something that should be not only rooted but also comprehensible for who will take care of it.

What was the inspiration behind the concept of "Second Nature" you brought at IFLA 2016? Does it related with this project?

I refer to the idea of trying to create an artificial nature, which can be based on a fantasy, on an image, or on an illusion of landscape, which we try to recreate in a very professional way. This means creating something that actually works, which is not a picturesque representation or an art piece, but we try to make it as an engineered landscape.

Creating a Second Nature should fulfil these goals, it is based on the logic of the soil, on the water, on the climate, on the species, it is based in our Dutch DNA.. engineering is the basis that evolves into the creation of an illusion of landscape, which eventually raises memories, or a fantasy, or a feeling.

The new landscapes we create originate mostly from the resources that are there, but it doesn't need to be 100% the landscape that was there, our work is not to recreate a landscape as it was, it is not a sort of complete restoration of nature, but is a sort of exaggeration of it, adding topography, adding a view line, it's a creation of an enriched landscape which is way more than pure nature, but still works as well as nature, with maintenance. We believe that the perfect re-creation of nature is not our goal in parks or in landscape design in general, we must add to a place the aspects of the culture, of the human use of it, also thinking of the new generations and the new needs that they will have.

A Second Nature can be more than just a copy; Madrid Rio is a very good example because when you look at it, given the situation of these very large infrastructure tunnel constructions, what we basically built is a 120-hectare rooftop garden, an essentially artificial landscape. It would have been foolish to think of recreating something natural, we needed to construct an engineered intelligent design, able to deal with the existing situation, that is to design not in a sort of childish, enthusiastic way, but in a clever engineering way. On the other hand in some aspects, like the fruit garden beside "Casa de Campo", the cherry blossom in the "Avenida de Portugal", these are places that give the spectator the illusion of being in a special space, with different atmospheres, bur never feeling out of context.

The city of Rotterdam has become a symbol of sustainability; many initiatives undertaken in recent years involve the conversion or creation of many different types of infrastructure, from the creation of community gardens on the roofs of buildings, to crowd-funding for the pedestrian connection Luchtsingel. As a designer, but also as a citizen, what do you think are the most tangible results of this attitude?

I have lived in Rotterdam for 12 years now and what I mostly notice is that Rotterdam has become much softer, in a positive way... When I arrived here, Rotterdam was a very harsh, cold city, in many aspects. Interventions like the entrance to the train station with this green axis connecting the "Westersingel" all the way to the centre, or the continuous pavement strategy in the city, have enriched the quality of the city, as much as little interventions, like the small Piet Oudolf garden at the foot of the Erasmus bridge ("Westerkade") and many other works at the human scale that Rotterdam municipality has carried out in order to make the city more human and more approachable. At the same time there is a critical amount of interventions that give the city a sort of cultural aspect, like the Market Hall (by MVRDV), which has now become an icon. We are now working on the Coolsingel, the main street in the city, and the strategy is also to plant more trees to make it softer and give it a warmer feeling, greatly enriching the pedestrian uses and decreasing vehicular traffic; we are also using softer materials and warmer colours so that the way that people can move in the space is very much focused on perception and the variety of functions of this space, interconnecting with the rest of the city. We always study the flows and movement of people before any design.

What kind of opportunities do Landscape Infrastructure projects open up for the landscape architecture profession in Europe?

In the Netherlands, landscape architecture is not just an isolated profession, which is the ultimate reason why I came here, because I was frustrated in Germany, where I come from, to see that architecture and urbanism and landscape architecture are not growing hand in hand.

Very often the architect believes that he can manage everything and sometimes urbanists think they can do everything… ...This results in a misunderstanding of landscape, which results in missing some of the chances that are there.

Here at West8 we are combining the professions of urbanism and landscape architecture and very often, for some of the problems that arise from the questions of urban design, we use landscape architecture to solve them, because it turns out that that is a very good strategy!

Landscape architecture can solve a lot of urban problems!

The good thing is that in adopting a multidisciplinary approach and looking at all these aspects at the same time, we noticed that most of the problems brought to us show complexity in all these three aspects and landscape can provide a huge repertoire of solutions, which relate to many different aspects, infrastructures included, and not just in terms of green space.

What would you change about the Madrid Rio project?

Well there is a very small detail, but it was one of our favourites... We had worked a lot on the connection between the “Casa de Campo” over the Puente del Rey, and this access point that goes into the royal gardens.

Historically there was an underground path, the “Bonaparte Tunnel”, which we tried to incorporate into the design as an integral part of Madrid Rio, to make this powerful connection comprehensible... For some reason, that never came to life and still, when we talk about this project and especially about the “Casa de Campo”, I think about this, because it’s an essential part that would help people to understand that history is so much grounded on this very spot. The king would go through this tunnel to go to his hunting grounds and that that was his route over the Puente del Rey. Maybe in the future we’ll find somebody to help us to complete this opening of the tunnel[204].

Rotterdam, March 29th 2018.

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[204] After this interview, the redevelopment operation was approved by the Municipality of Madrid in June 2018.

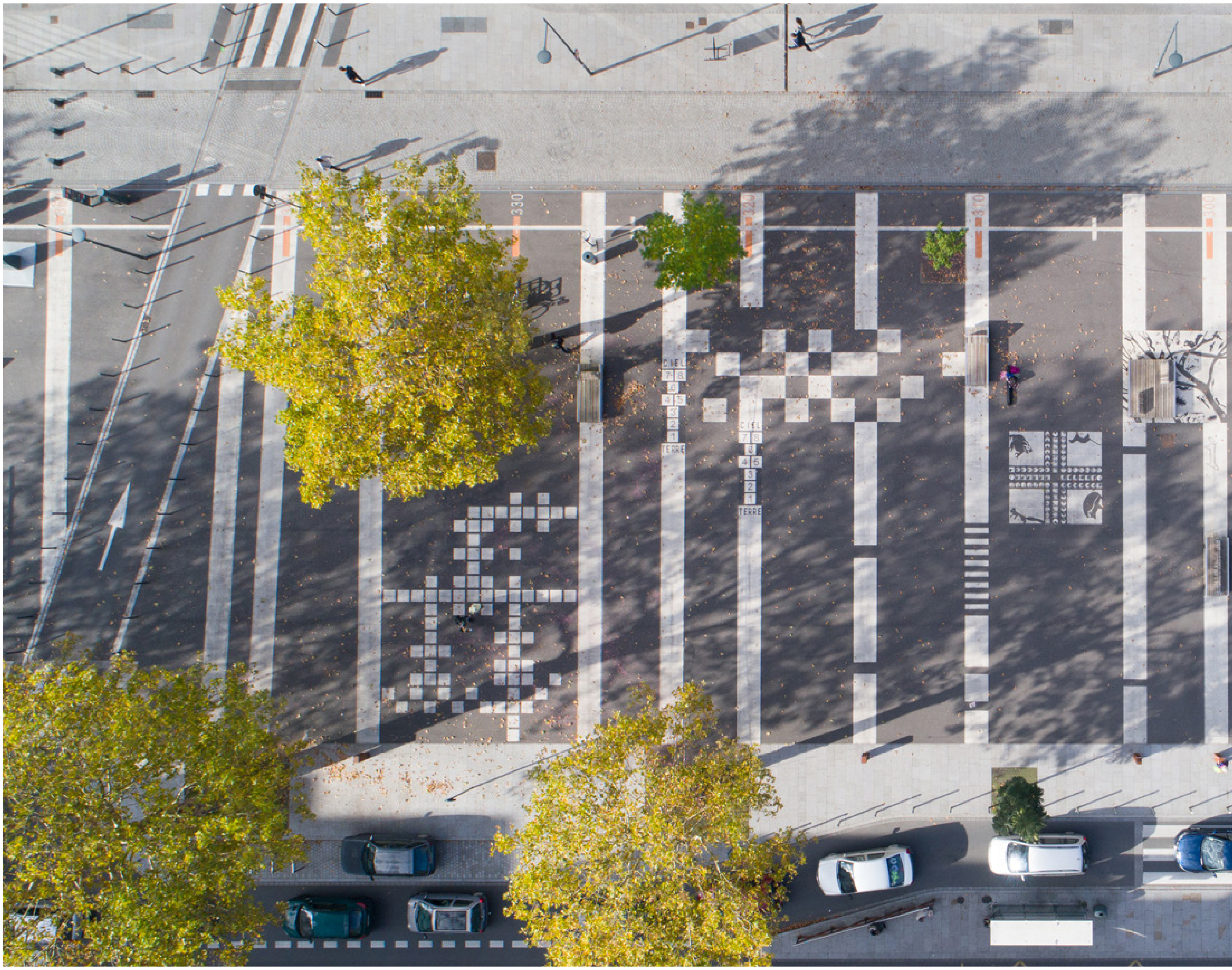

330
320
310
300
CIEL
7 8
6
4 5
3
2
1
TERRE

Figure 1: Top view of part of the François Mitterand strip. Source: Courtesy of Mutabilis.

FRANÇOIS MITTERAND STRIP

PROJECT DATA

Location:
Rennes, France.

Clients:
Ville de Rennes,
Rennes Métropole

Cost:
9 000 000 €

Design period:
2012-2013

Construction period:
December 2013- May 2015

Project area:
850 metres long – 50 metres large

Designers:
Project mandatary:
Mutabilis paysage et urbanisme
Engineering:
IGREC Ingénierie BET
Lightining design:
Agence ON

SITE ANALYSIS

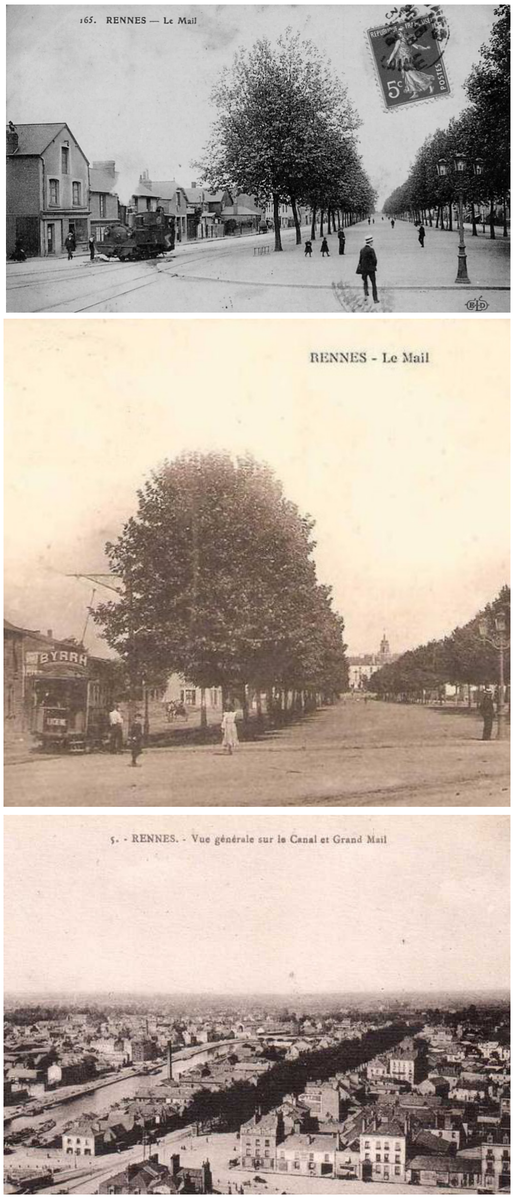


Figure 2a: Top: A locomotive of the T.I.V. line on the Mail at the beginning of the 20th century; Source: Rennes Archives 100FI17. Middle: View of the Mail from the west with the tram on the left printed on postcard of early 1900s, Source: WikiRennes.fr. Bottom: View of the strip in 1910, Source: WikiRennes.fr

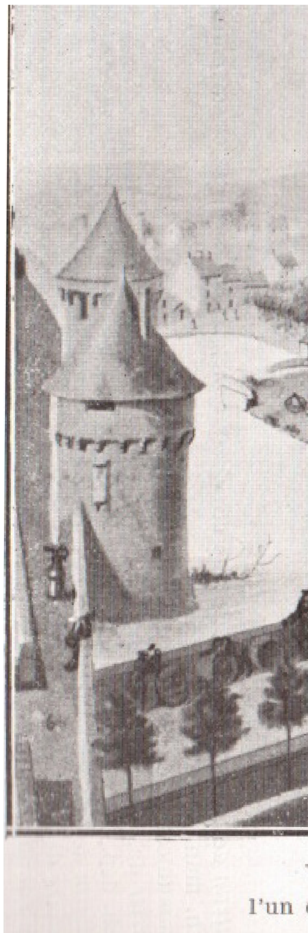
Geographical and Historical Context

The "François Mitterand" strip is a major historical site for the city of Rennes. «*It was constructed in 1677 at the foot of ramparts, dominating the swampy confluence of the Ille and Vilaine rivers*» (Gallais, Bailly-Maitre, 2014, p.92). The strip was built according to the landscaping canons of the time by the Duke of Chaulnes, governor of Brittany; it was designed as a *promenade* dedicated to aristocratic and bourgeois circles, planted with rectilinear lines of trees parallel to the Vilaine river (Fig. 2), opening the city out towards the West side. It is precisely the proximity of the Vilaine river that makes this area potentially floodable, which explains the later difficulties the city had in extending in this direction and hence why the urban fabric sprawled out towards the eastern side of the region (Bensoussan, 2015).

On both sides of the promenade two canals were dug and surrounded by four rows of *Elm* trees, replaced by *Tilia* tress in 1784, which in turn, at the beginning of the twentieth century, were replaced by *Sycamores*. The strip (Mail in French) was a place for strolling but also used for ceremonies and celebrations: in 1793, General Sans-Culotte Rossignol offered a banquet to his 4000 soldiers there, and throughout the 19th century the Mail was on many occasions used as the setting for services of patriotic commemoration.

At the end of the 19th century, the strip was considered a privileged place for the installation of the first network of Steam Tramways (TIV), a narrow-gauge railway company (Fig.2a and 2b). At the beginning of the 20th century, the function of the strip changed, and it «*went from a place of strolling to a more functional location absorbed by the city's grid of the roads*» (Gallais, Bailly-Maitre, 2014, p.92).

In 1845, despite the opposition of a large part of the population of the city of Rennes, the avenue was downgraded from the status of "royal road" and sold to the State, which integrated it with the No.12 Paris-Brest road. The side canals, which turned into black, muddy pits during summer, were filled in in 1860 with soil obtained from the excavations for the construction operations of the "Maison Centrale". The strip thus was renamed "Rue du Mail" in 1862, going on to become, in 1923, the "Avenue du Mail".



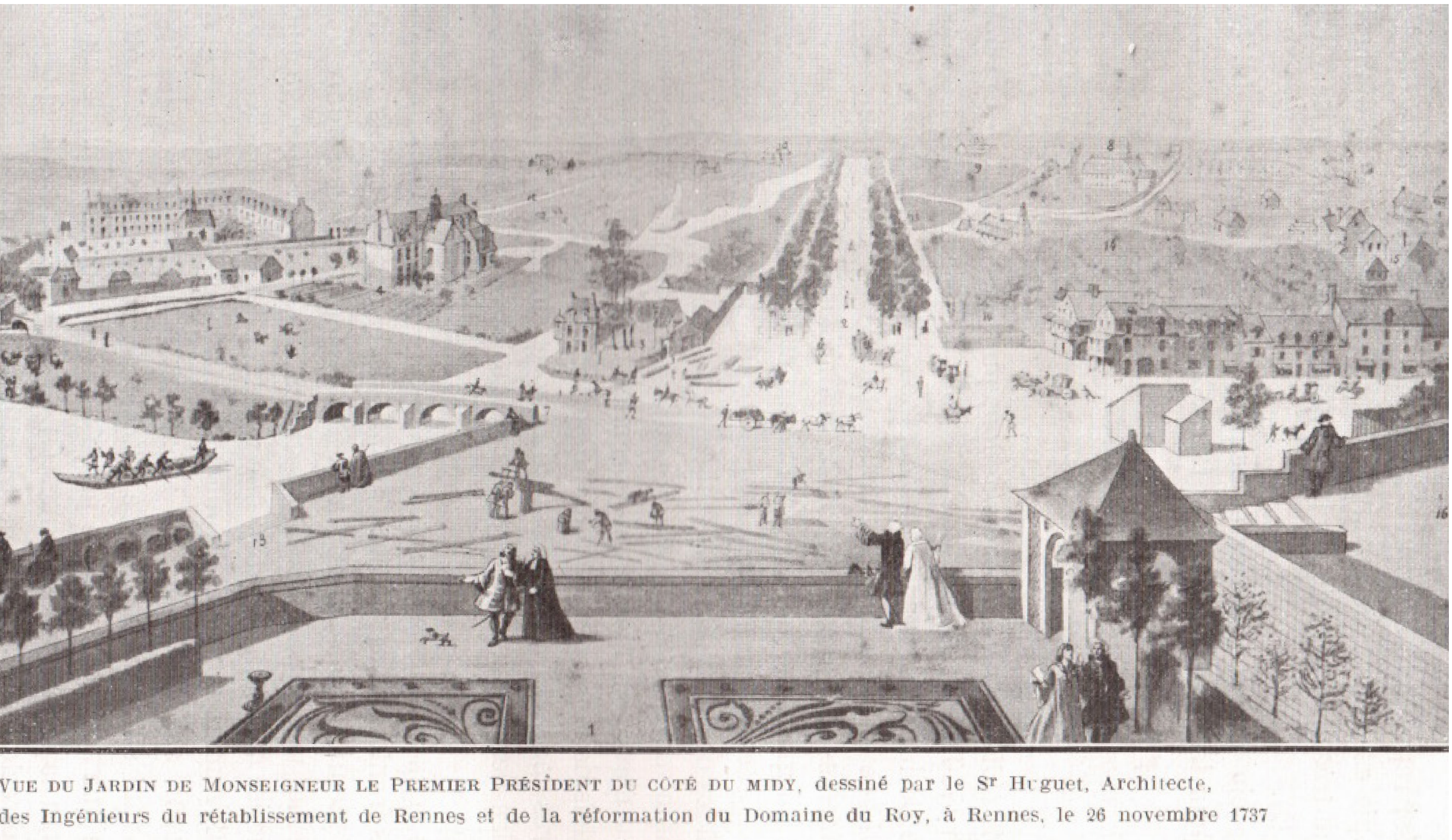

VUE DU JARDIN DE MONSEIGNEUR LE PREMIER PRÉSIDENT DU CÔTÉ DU MIDY, dessiné par le Sr Hrguet, Architecte,
des Ingénieurs du rétablissement de Rennes et de la réformation du Domaine du Roy, à Rennes, le 26 novembre 1737

Figure 2: View of "Jardin de Monseigneur le Premier President" designed by Architect Hurguet on November 26th, 1737; In the background the "Grand Mail" of Rennes, can be seen from the tree-lined avenue. Source: WikiRennes.fr

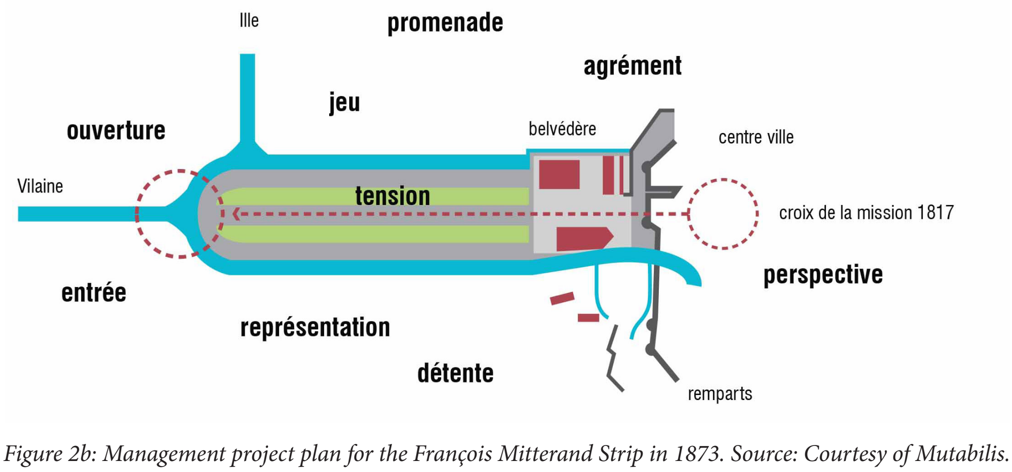

Ille
promenade
agrément
jeu
ouverture
belvédère
centre ville
Vilaine
tension
croix de la mission 1817
perspective
entrée
représentation
détente
remparts

Figure 2b: Management project plan for the François Mitterand Strip in 1873. Source: Courtesy of Mutabilis.

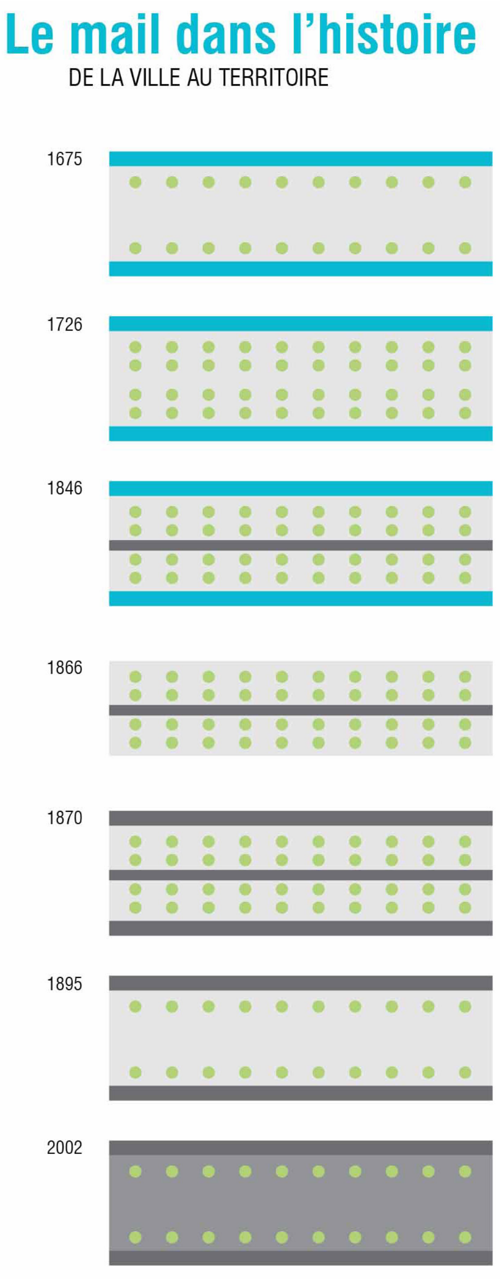


Figure 4: Graphic representation of the historical evolution of the François Mitterand Strip configuration;. Source: Courtesy of Mutabilis.

Over time, construction projects replaced the canals and the original horizon, which literally disappeared with the growth of the city; in the 1970s, with the advent of the motorcar, the strip became a vast car park (Fig. 3 and 4), and therefore, before the transformation work, «*the surface space and the underground levels showed evidence of the opportunistic construction work serving typical evolving urban needs*» (Gallais, Bailly-Maitre, 2014, pag.92). In 1991 the coastal districts south of the "Avenue du Mail" were the subject of an important redevelopment carried out by the Architect and Urban Planner Alexandre Chemetoff. The Avenue was officially renamed "Mail François Mitterrand" on April 1st, 1996.

The project studied here regards the re-configuration of the "Mail François Mitterand", as well as the redevelopment of the portion of territory at the western end of the strip, going by the name of Jardin de la Confluence (Fig.5). It is located at the confluence of the river Ille and the river Vilaine, almost below the bridge Louis Guilloux (formerly Pont Saint-Cyr). It is a peninsula that has long hosted activities related to water and water sports, first as a place to swim (before the increase in water pollution), then as the location of a canoeing centre and of course fishermen's meeting point, until in 1977 it became the finishing line for the regattas organized by the Regatta Society of Rennes founded in 1867, which is one of the oldest sports associations in the city (Botrel 2008).

Before development, the Jardin de la Confluence was a large lawn overlooking the confluence of the rivers, whose only ornament was a single bench at one of its ends (Fig. 6). The only trace of its historical identity is the large specimen of *Salix Babylonica*, planted in 1937 by the honorary president of the "Societé Regatés Rennaise" Maurice Cognet (Botrel, 2008).

1274. Rennes — Paysage sur la Vil

Figure 5: Postcard from 1910 dep

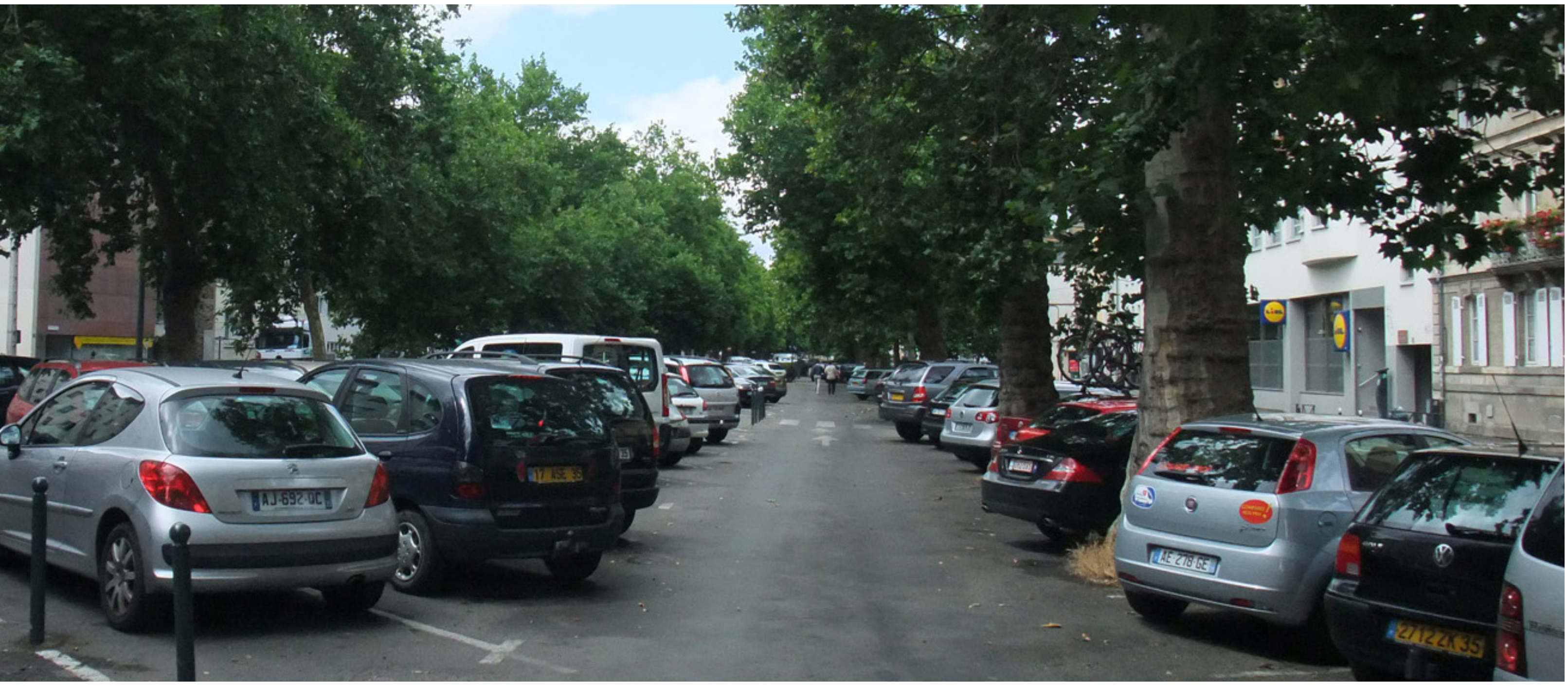
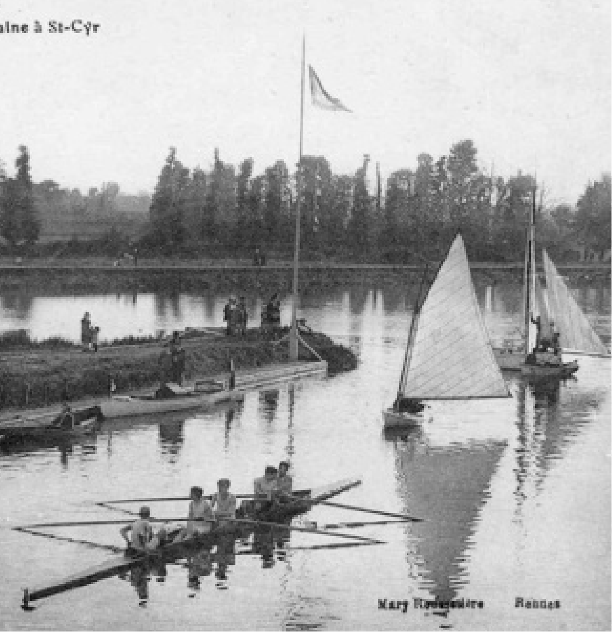


Figure 3: View of François Mitterand Strip in 2010; Source: Courtesy of Mutabilis



icting the Jardin de la Confluence. Source: Botrel, 2008.

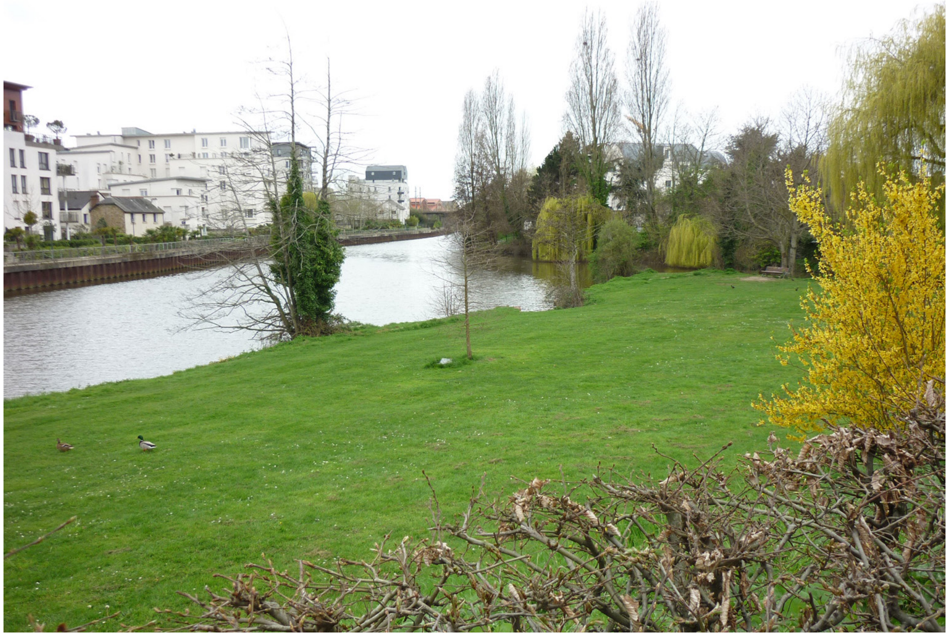


Figure 6: View of the area of the "Jardin de la Confluence" in 2010. Source: Courtesy of Mutabilis.

DESIGN, DEVELOPMENT AND DECISION-MAKING PROCESS

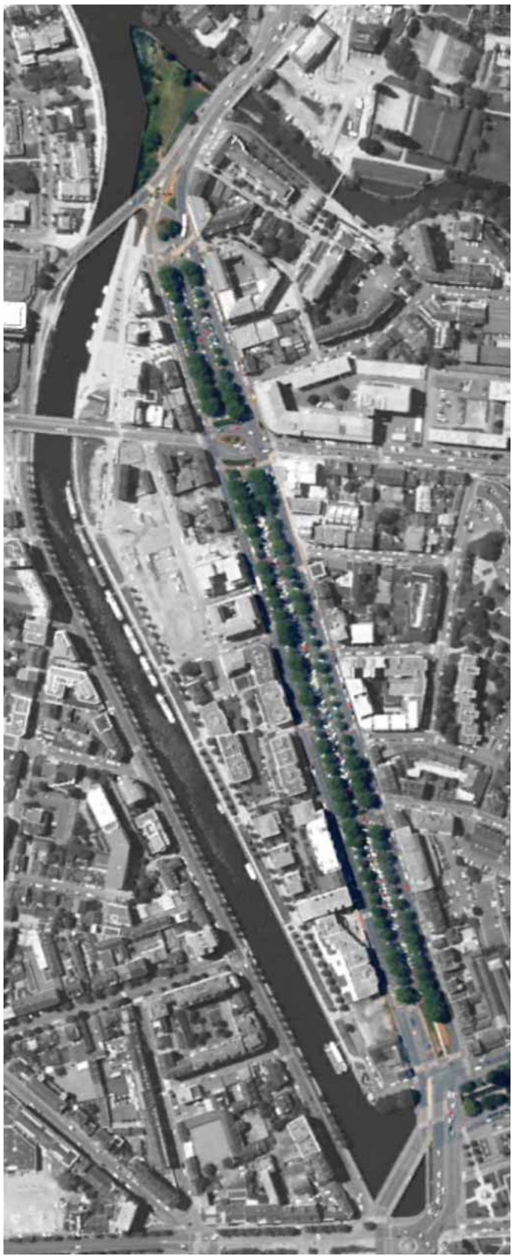


Figure 7: Graphic elaboration of the East-Wes satellite view of Mail François Mitterand in 2002, the project area is coloured, while the surroundings are in black and white. Source: Author.

Originally voted through by the elected representatives of the City of Rennes, the program aiming to "restore space for pedestrians and life in public spaces, from the fountain on "Rue de Coëtquen" to the "Esplanade Charles-de-Gaulle" (Guéguen, 2012) was developed in 2009, and was entrusted to Rennes Métropole in 2012.

The main objectives of the program were:

- The promotion of new uses;
- Reducing the space occupied by automobiles;
- The implementation a strategy of traffic reduction while maintaining a successful service from the public transport network (Metropole.rennes.fr, 2012)

Key objectives of the redevelopment project of the "Mail François Mitterand"

The project manager at Rennes Métropole, Hervé Hamon, declared that «*the main objective is to give back to the strip its historical character*» (Metropole.rennes.fr, 2012).

In 2009, over 82% of the surface space of the strip was occupied by roads and parking facilities, which erased the historical traces of the area and caused significant damage to the ancient rows of trees. For these reasons, the main objectives identified for the redevelopment of the "Mail François Mitterand" were[205]:

- The restoration of the image and functionality of this major space;
- Connecting the new development to the neighbourhood and the city;
- To promote the development of new uses;
- To implement public transport services (continuation of the east / west axis);
- To promote soft modes of transport;
- To value the tree heritage and guarantee its good health condition.

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[205] See Metropole.Rennes.fr, 2012

Design Process

In 2009, a restricted tender procedure for the project management contract was launched. As a result, the entire project management mission was entrusted to *Mutabilis paysage et urbanism* (Project mandatory) and *Igrec Ingénieri*e (co-contractor).

The investigatoty process for the design started in May 2010, while preliminary design studies (AVP) were conducted in the first half of 2011, followed by the project studies (PRO) in the second half of 2011. It was necessary to prepare a "water law dossier", that received a favourable opinion from the DDTM35 in 2012, followed by an "impact assessment report", which also received the approval of by the Environmental Authority (DREAL Bretagne).

As soon as the design program was finalized, a wide consultation process was conducted by the "Redevelopment of the Mail" consultation group, which brought together local associations and the Neighbourhood Council. Simultaneously, meetings were held with pedestrian and cyclists' associations, the "Handicap 35 collective", the traders and the freelance professionals of the area and the representatives of the "Lices" merchants from a weekly market that took place in the project area. In addition, participatory work was organized with the pupils of the "Ille" school[206], followed by an exhibition titled "City Fun: A Green Place, a Mail for All", which was held on the project site from 12th November, 2011 to 11th February, 2012. After the exhibition, a final conference was held at the site of Information on Town Planning (CIU), dedicated to the explanation in detail of the redevelopment operation. On this occasion, the participants had the opportunity to have guided tours of the site, organized with the Rennes Métropole Tourist Office (Metropole.Rennes.fr, 2012).

The studies carried out for the project involved a historical analysis of how the space had evolved throughout history and the identification of the potential uses that might come to fruition through the requalification project.

This information was shared with the inhabitants through an inclusive public inquiry held from June 18th to July 20th, 2012, in order to obtain approval to start the works (Fig. 8). The aim of encouraging people to use public transport was pursued through the re-organization of the car and public transport network. According to the designers[207], the major constraint for this axis was the east-west bus line and the desire to keep one pedestrian footpath separate from regular traffic.

The strip, measuring, 50 meters in width and 853 meters in length, was supposed to contain cars in the north side, buses in the south area and a central median lane for pedestrians (Fig.9).

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206. Interview with Ronan Gallais 2018;

207. Ibid.

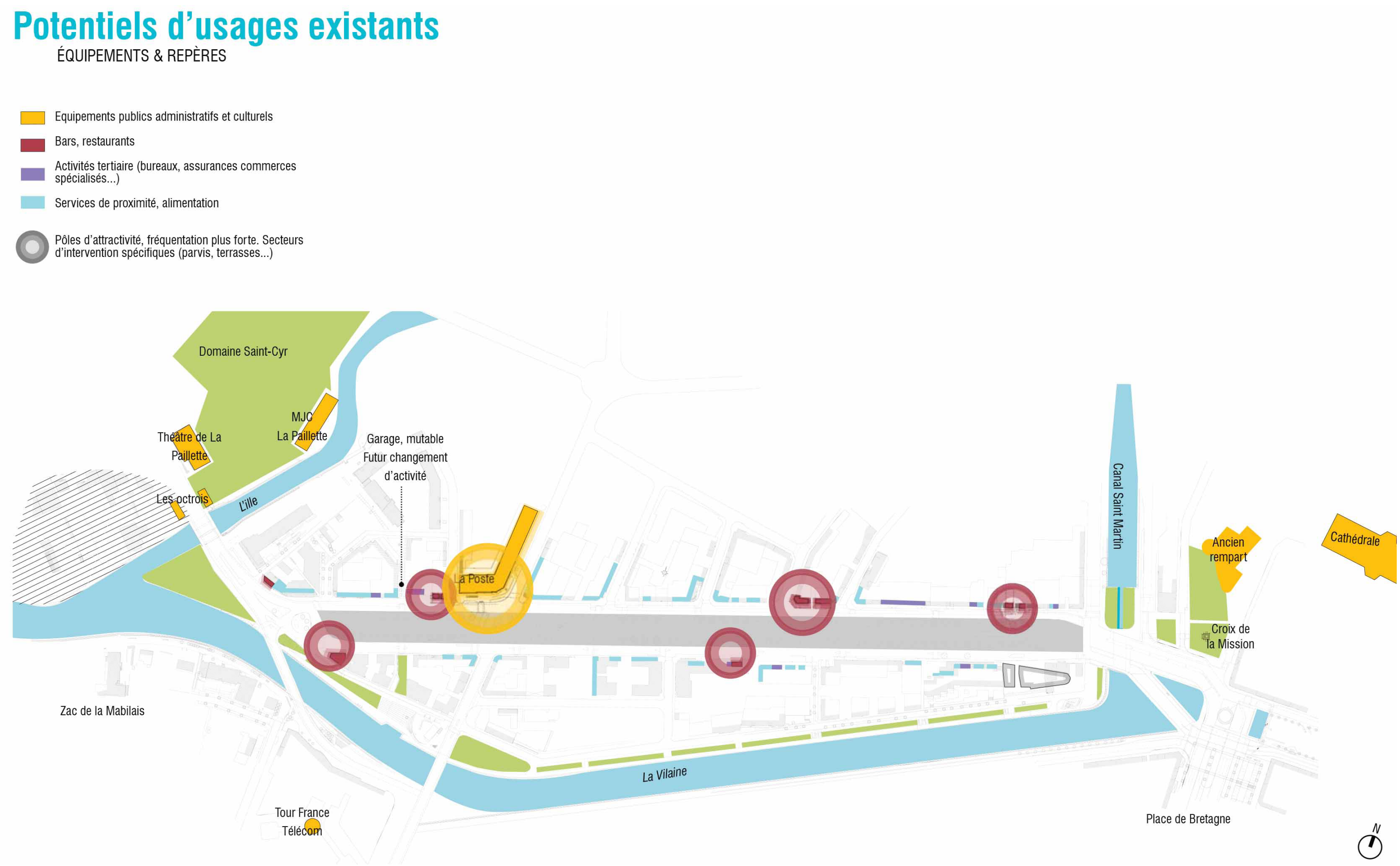

Potentiels d'usages existants
ÉQUIPEMENTS & REPÈRES
Equipements publics administratifs et culturels
Bars, restaurants
Activités tertiaire (bureaux, assurances commerces spécialisés...)
Services de proximité, alimentation
Pôles d'attractivité, fréquentation plus forte. Secteurs d'intervention spécifiques (parvis, terrasses...)
Domaine Saint-Cyr
MJC
La Paillette
Théâtre de La Paillette
Les octrois
L'ille
Garage, mutable
Futur changement d'activité
La Poste
Canal Saint Martin
Ancien rempart
Cathédrale
Croix de la Mission
Zac de la Mabilais
La Vilaine
Tour France Télécom
Place de Bretagne
N

Figure 8: Analysis of the potential uses of the Mail. Source: Courtesy of Mutabilis.

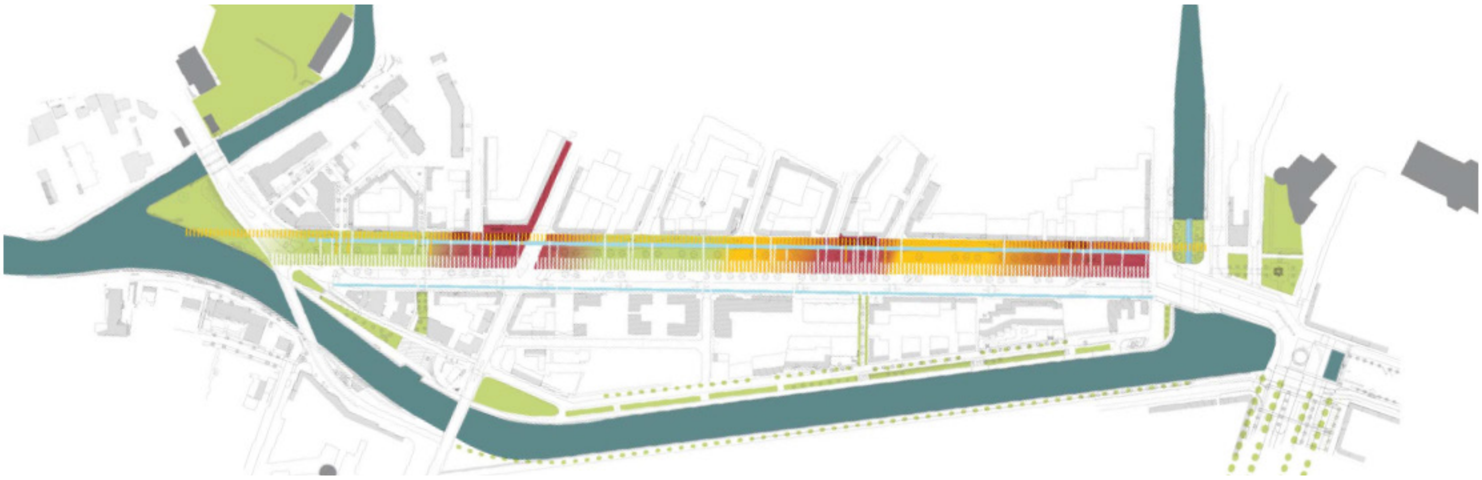


Figure 9: Analysis of the intensity of uses of the space of the Mail. Source: Courtesy of Mutabilis.

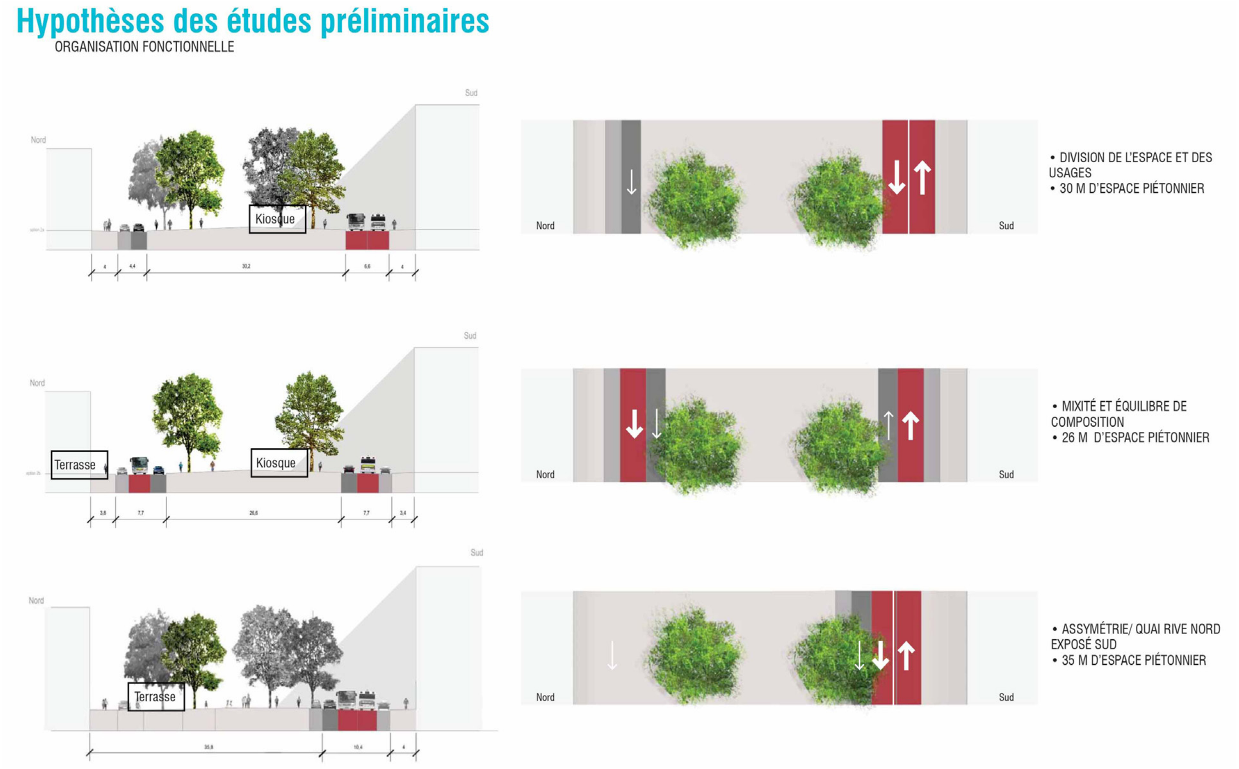

Hypothèses des études préliminaires
ORGANISATION FONCTIONNELLE
Nord
Sud
Kiosque
• DIVISION DE L'ESPACE ET DES USAGES
• 30 M D'ESPACE PIÉTONNIER
Terrasse
Kiosque
• MIXITÉ ET ÉQUILIBRE DE COMPOSITION
• 26 M D'ESPACE PIÉTONNIER
Terrasse
• ASSYMÉTRIE/ QUAI RIVE NORD EXPOSÉ SUD
• 35 M D'ESPACE PIÉTONNIER

Figure 10: Preliminary study hypothesis for the functional organization of the traffic flow in François Mitterand Strip. Source; Courtesy of Mutabils.

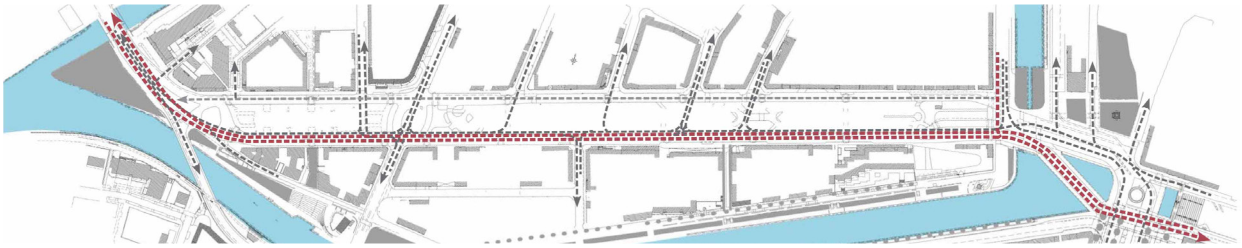


Figure 11: Functional organization of the traffic flows, in red the bus fluxes, in black the automobile ones. Source: Courtesy of Mutabilis.

To this end, the designers studied different solutions for the new layout of the streets (Fig.10). After comparing the results, Mutabilis designers suggested moving the pedestrian median strip to the north, thus creating a useful connection with the commercial one at ground level. The traffic flow was transferred to the south of the area, thus enabling parking and traffic to remain in the shade during the hot seasons, while on the north side, short-term parking to access shops and services for visitors or delivery people was maintained (Fig. 11).

Program Elements

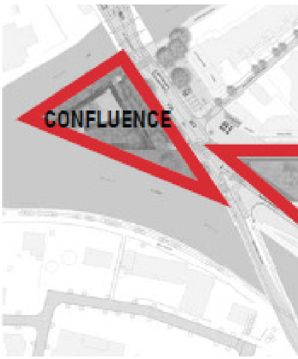
As the François Mitterand Strip is one of the main historical and contemporary access routes to the city centre, the designers aim was to create an utterly urban landscape and simultaneously a multifunctional and flexible public space[208].

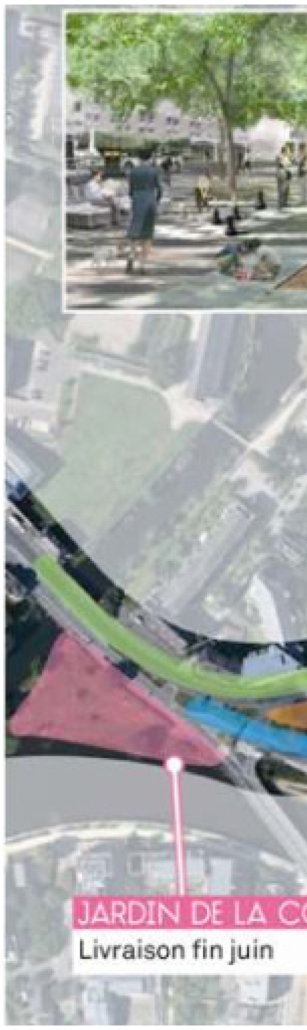
The project was divided into three different entities (Fig. 12), which are:

- **Foch square:** located at the intersection of three major transport infrastructures, the area subject to redevelopment is identified more precisely with the edges of the navigable canal "d'Ille et Rance" and its enclosure;
- **The "Mail":** constituting the heart of the project, where developing new uses of public space without affecting its historical character;
- **The Confluence**: Alluvial area located west of the Mail, at the confluence of the Vilaine and Ille rivers.

The main objectives of the program (Fig. 13), approved by public consultation, were identified as the following:

- the redevelopment of the public space, from facade to facade, over a linear space of 800 m;
- the strengthening of the two-way bus axis in the southern part;
- the construction of a wide promenade in the central part;
- the widening of the north and south sidewalks;
- the maintenance of a portion of viable existing plane trees and the planting of new plants with varied species;
- the re-development of the "Confluence" garden and the installation of specific furniture and architectural signs (Poirier, 2012).





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[208] Interview with Ronan Gallais 2018;

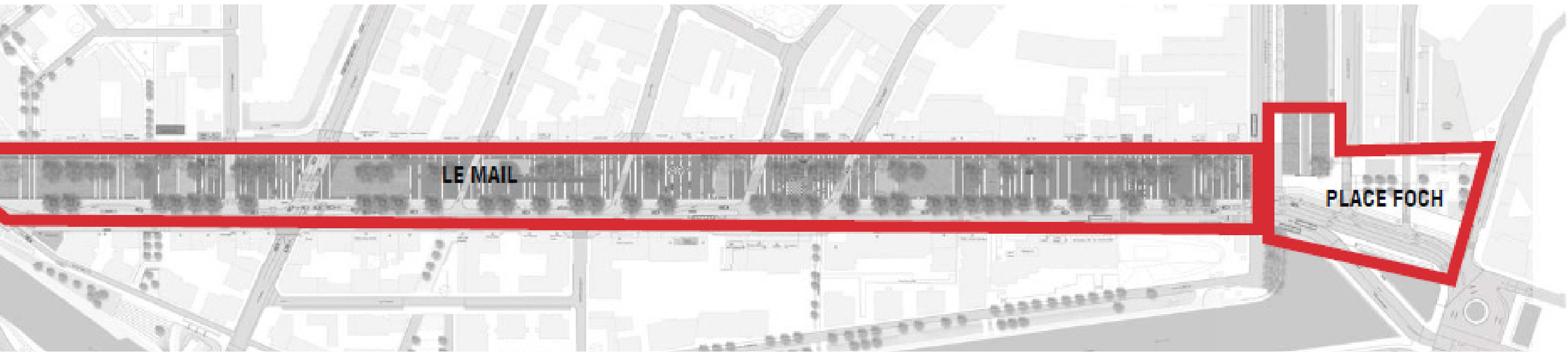

LE MAIL
PLACE FOCH

Figure 12: Schematic diagram of the project elements. Source: Courtesy of Mutabils.

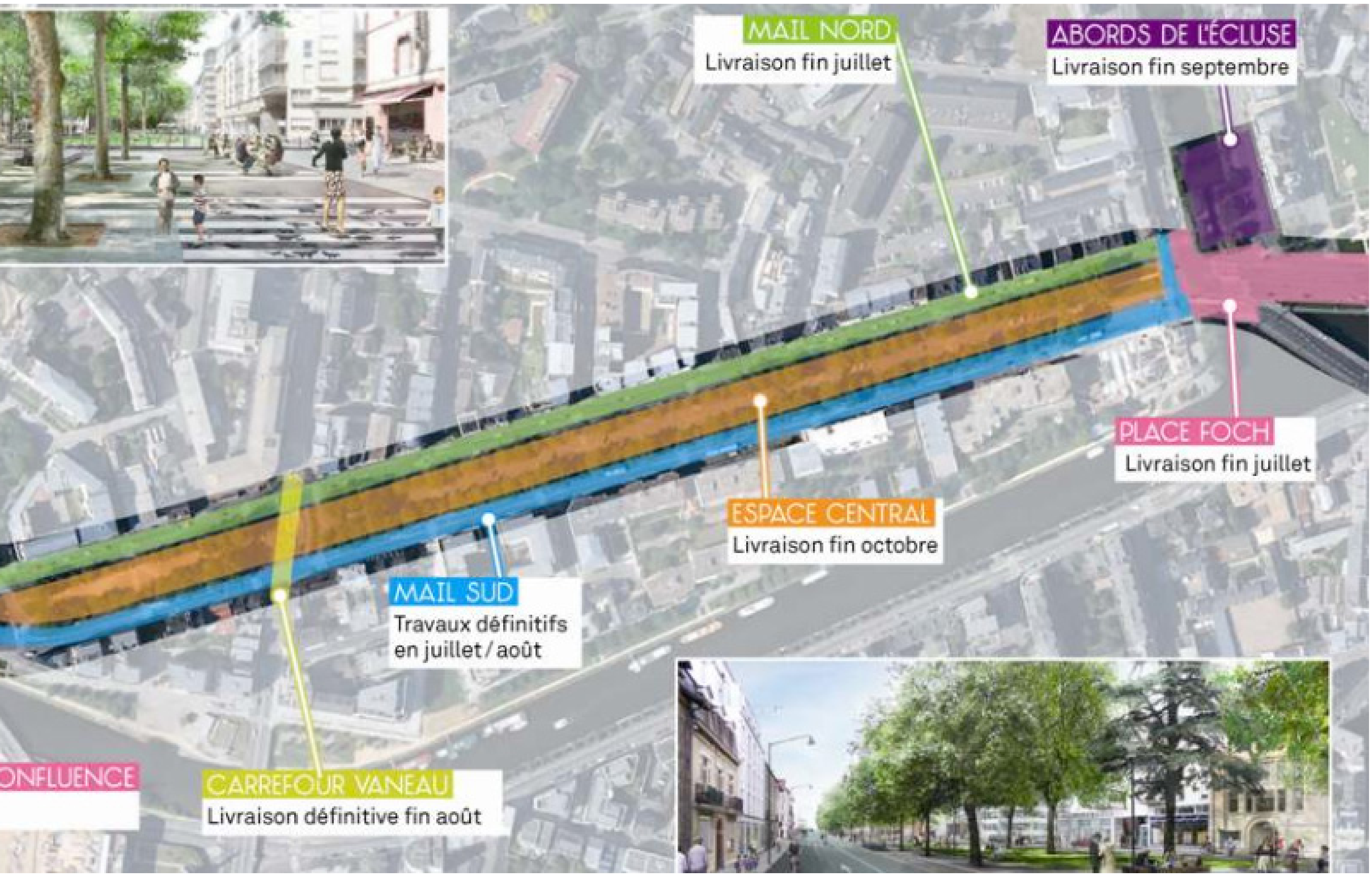

MAIL NORD
Livraison fin juillet
ABORDS DE L'ÉCLUSE
Livraison fin septembre
PLACE FOCH
Livraison fin juillet
ESPACE CENTRAL
Livraison fin octobre
MAIL SUD
Travaux définitifs
en juillet/août
ONFLUENCE
CARREFOUR VANEAU
Livraison définitive fin août

Figure 13: Schenatic diagram of the temporal construction phases. Source: Metrople.rennes.fr

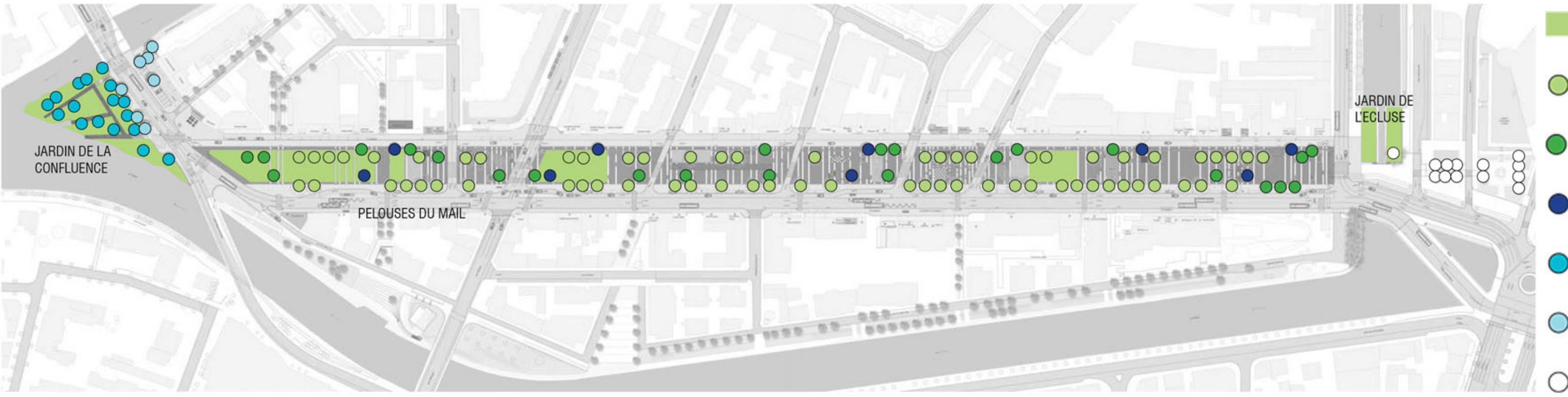

JARDIN DE LA CONFLUENCE
PELOUSES DU MAIL
JARDIN DE L'ECLUSE

Figure 15: Plantation design plan. Source: Courtesy of Mutabilis.

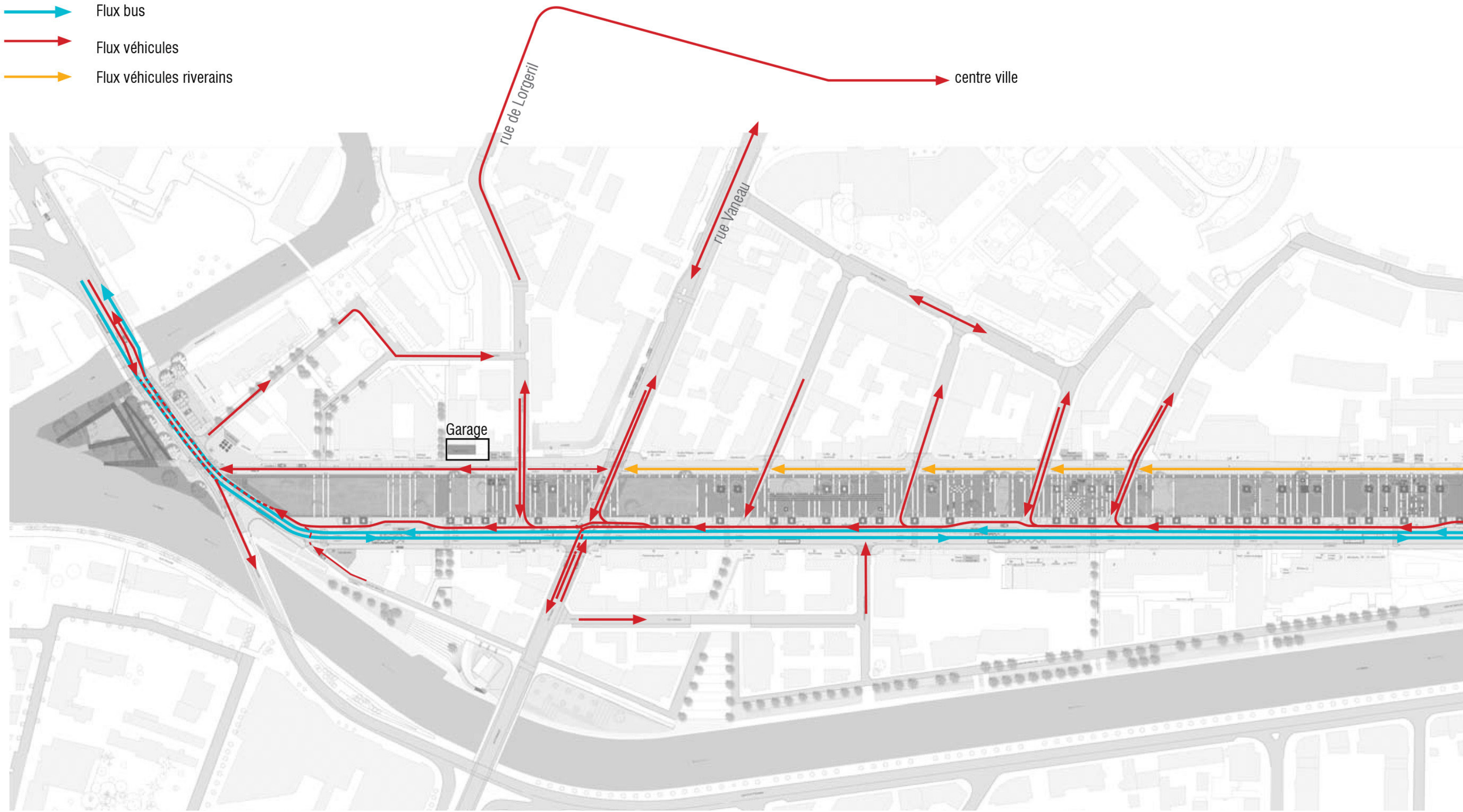
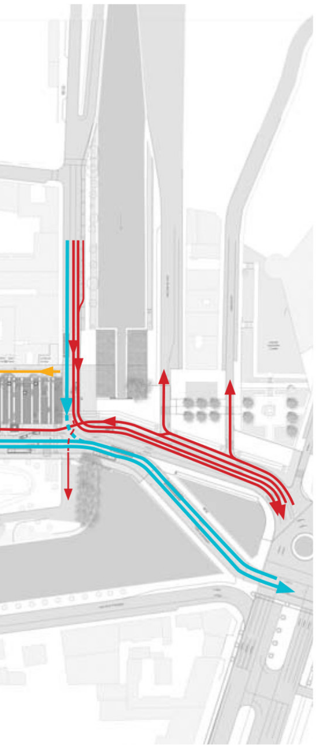

Flux bus
Flux véhicules
Flux véhicules riverains
centre ville
rue de Lorgeril
rue Vaneau
Garage

Figure 16: Schematization of the functioning of the circulation envisaged by the project. Source: Courtesy of Mutabilis.

🟩 Pelouses, herbacées et vivaces
Arbres existants (Platane)
Arbres nouveaux
Cèdre du Liban
Cyprès de la Confluence
Métaséquoia
Arbres existants non modifiés



Technical Solutions

Tree Heritage:

The maintenance of historic trees required research for a suitable technical solution, both during the construction phase, and for the maintenance of the specimens once the redevelopment of the area was completed (Bailly-Maitre, 2018). Of the 117 plane trees present on the site before the start of the work, 67 were kept. In addition, in order to maintain these historic tree specimens in excellent health, control and monitoring operations were planned on site. During this phase galvanized steel grids (Fig.14) of about 150 cm width per side were placed to protect the roots of the trees framing the central "supporting structure" and covered in expanded clay, which protects the collar of the trees and enables the filtration of rainwater.

To reinforce, also on a visual level, the linearity of the west-east axis of the Mail, more specimens of *Platanus orientalis* and *Pterocarya fraxinifolia* were planted along the central promenade, replacing some specimens of sycamores in poor heath, while nine *Cedrus libani* were planted to create shaded areas during the winter season. The choice of new plant species characterizes the different project entities: the variation of tree species highlight the different nature of the Jardin de la Confluence, where numerous specimens of *Taxodium distichum* and *Metasequoia glyptostroboides* have been planted (Fig. 15). The choice of these species was due both to the alluvial nature of the territory, but also to the reddish colour that the trees take on during the cold months, allowing the place to visually change in line with the seasons[209].

Traffic Network System (Fig.16):

The traffic was brought back to the south lane, consisting of two bus lanes, one for each direction, and a lane for automobile traffic, thus maintaining access to the roads connecting to Brest and Lorient from Place de Bretagne, but with speeds limited to 30 km / h to mitigate the noise of traffic and to create a safer area for pedestrians.

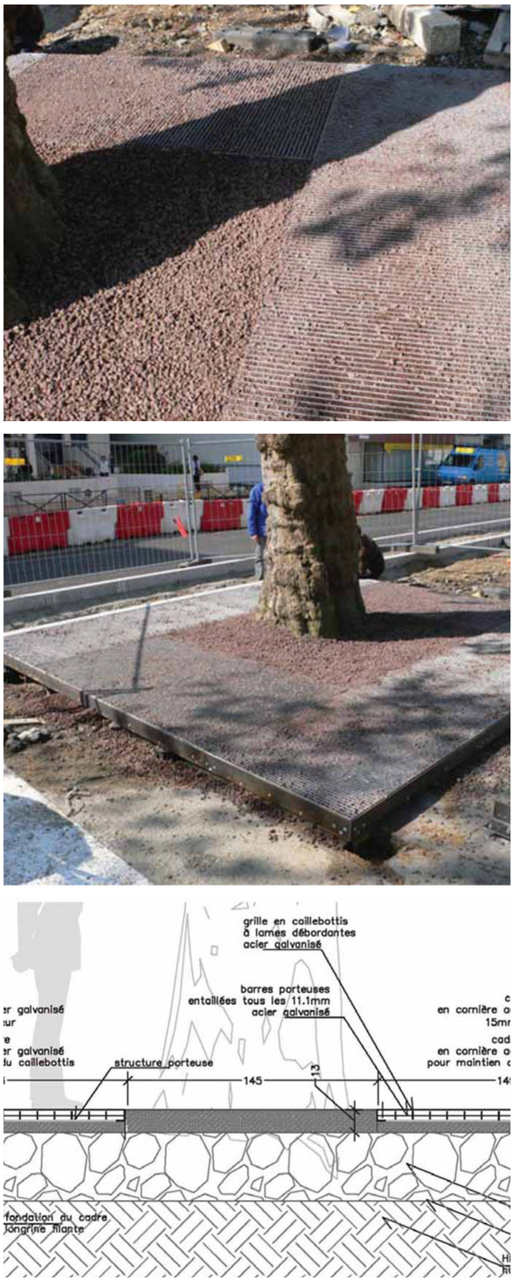


Figure 14: Images of the steps to secure the root system and the plane-tree collar. Source: Courtesy of Mutabilis.

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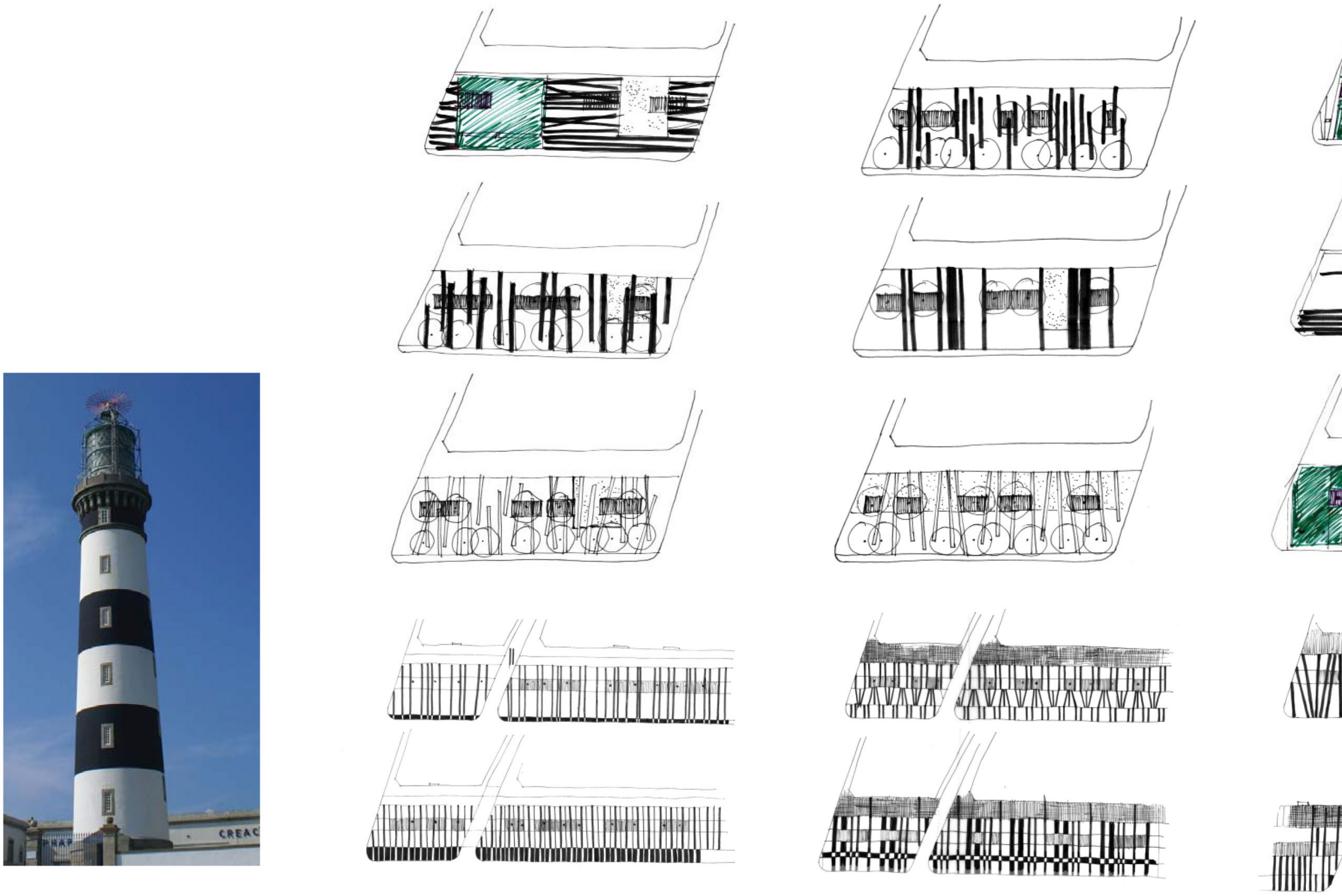
[209] Interview with Ronan Gallais 2018;



LES MOTIFS

LA MESURE, LA LONGUEUR

LES JEUX

LA DANSE

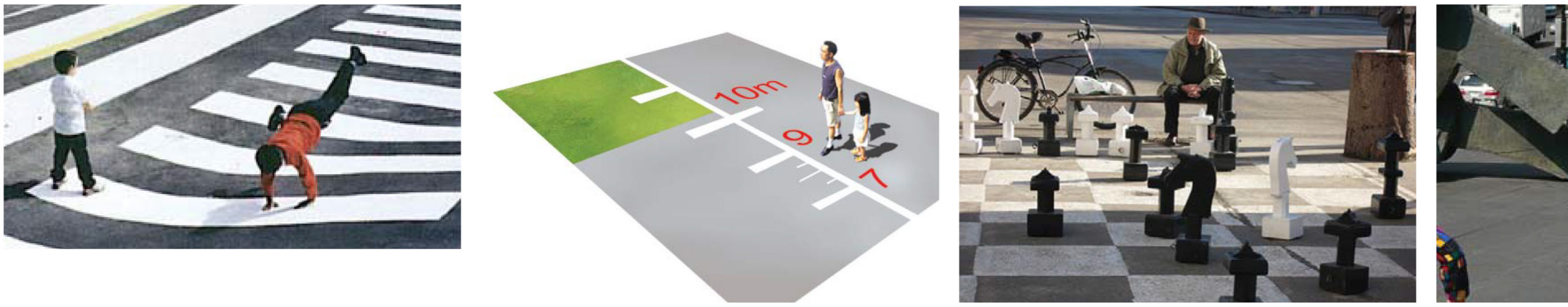
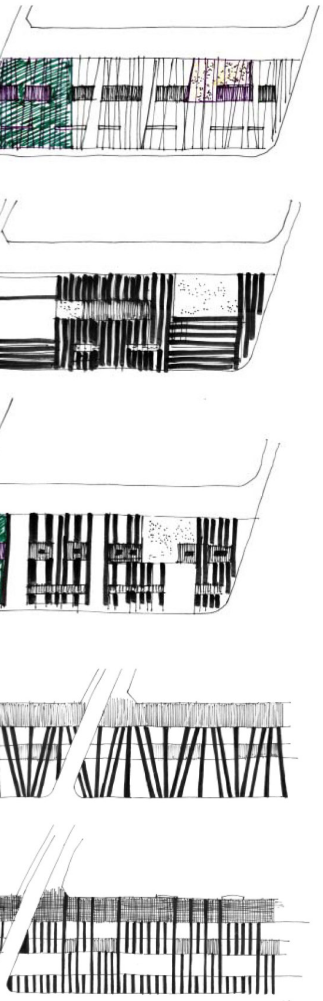


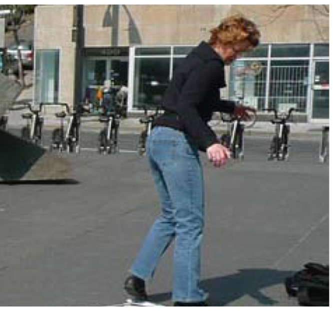
Figure 17: Graphic design research for the paving of François Mitterand Strip. Source: Courtesy of Mutabilis.



This new configuration of the space provided 80 parking spaces for residents, and also made it possible to enlarge the parking spaces near the project area. The project was set out along the east-west axis, from the *Croix de la Mission* to the Confluence Garden at the west end of the Strip, focusing on the reclamation of the central space of the axis to be dedicated to pedestrians and bicycles.

Graphic Design Research:

The aim of the designers was to avoid the creation of a project that "would simply be the outcome of physical limits and the surface material on the ground" (Gallais, Bailly-Maitre, 2014). Consequently, inspiration for the design of the new public space was sought in the black and white colours of the Breton flag and the many possibilities of how to structure the space using this culturally deep-rooted colour scheme were examined (Fig. 16). Through the use of the black and white colours and different typologies of pavement materials, the designers managed to structure the space using different shapes in order to visually "expand or narrow down spaces", giving them measurements and rhythm (Gallais, Bailly-Maitre, 2014, 2018).Indeed, the patterns thereby created (Fig. 17 and 18) suggest different uses of the space and open up the strip connecting it to the residential fabric to the north and south. References to the local fauna of Brittany were inserted as drawings on the shimmering asphalt and concrete paving at the centre of the strip, as well as chess patterns and many other graphic motifs that could inspire people as to the different uses that the new public space could host. The choice of the materials of construction «*reflects this desire for the diverse use of the space*» (Gallais, Bailly-Maitre, 2014, p. 94).



Banks of the Confluence Garden:

The creation of a garden at the confluence between the Vilaine and the Ille rivers had as its primary goal that of putting citizens back in touch with the water in this singular and historical part of the city of Rennes. The design of the new garden provided for the remodelling of the banks and the topography of the area (Fig. 19), making it resilient to the occasional flooding to which the area is subject.

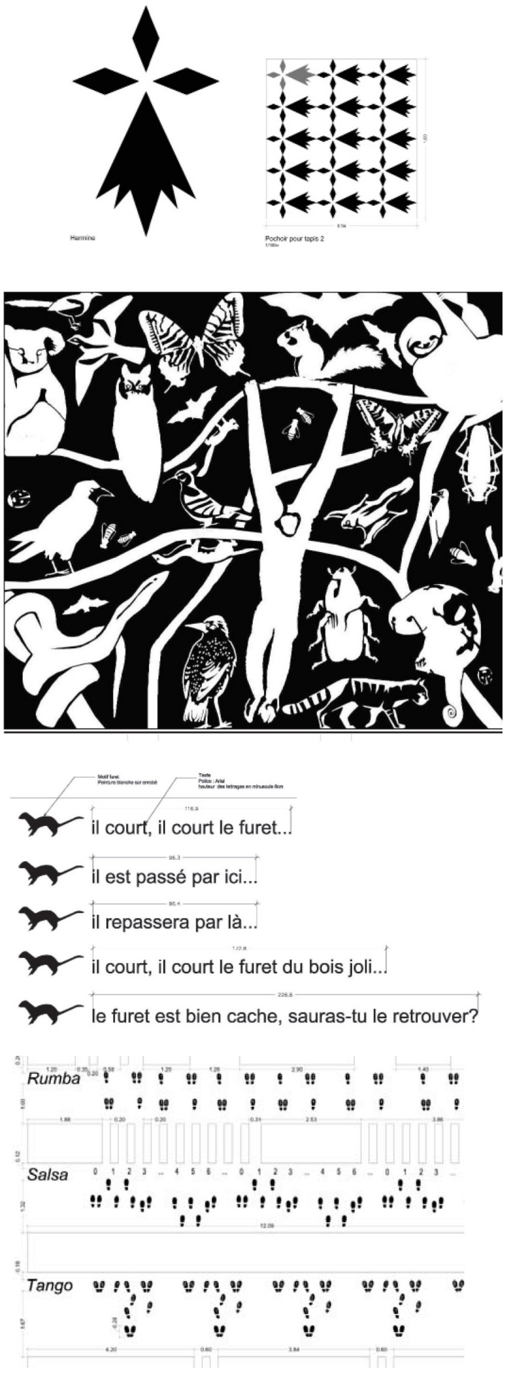

Harmine
Pochoir pour tapis 2
il court, il court le furet...
il est passé par ici...
il repassera par là...
il court, il court le furet du bois joli...
le furet est bien cache, sauras-tu le retrouver?
Rumba
Salsa
Tango

Figure 18: Detail of the graphic motifs that create new uses of the space. Source: Courtesy of Mutabilis.

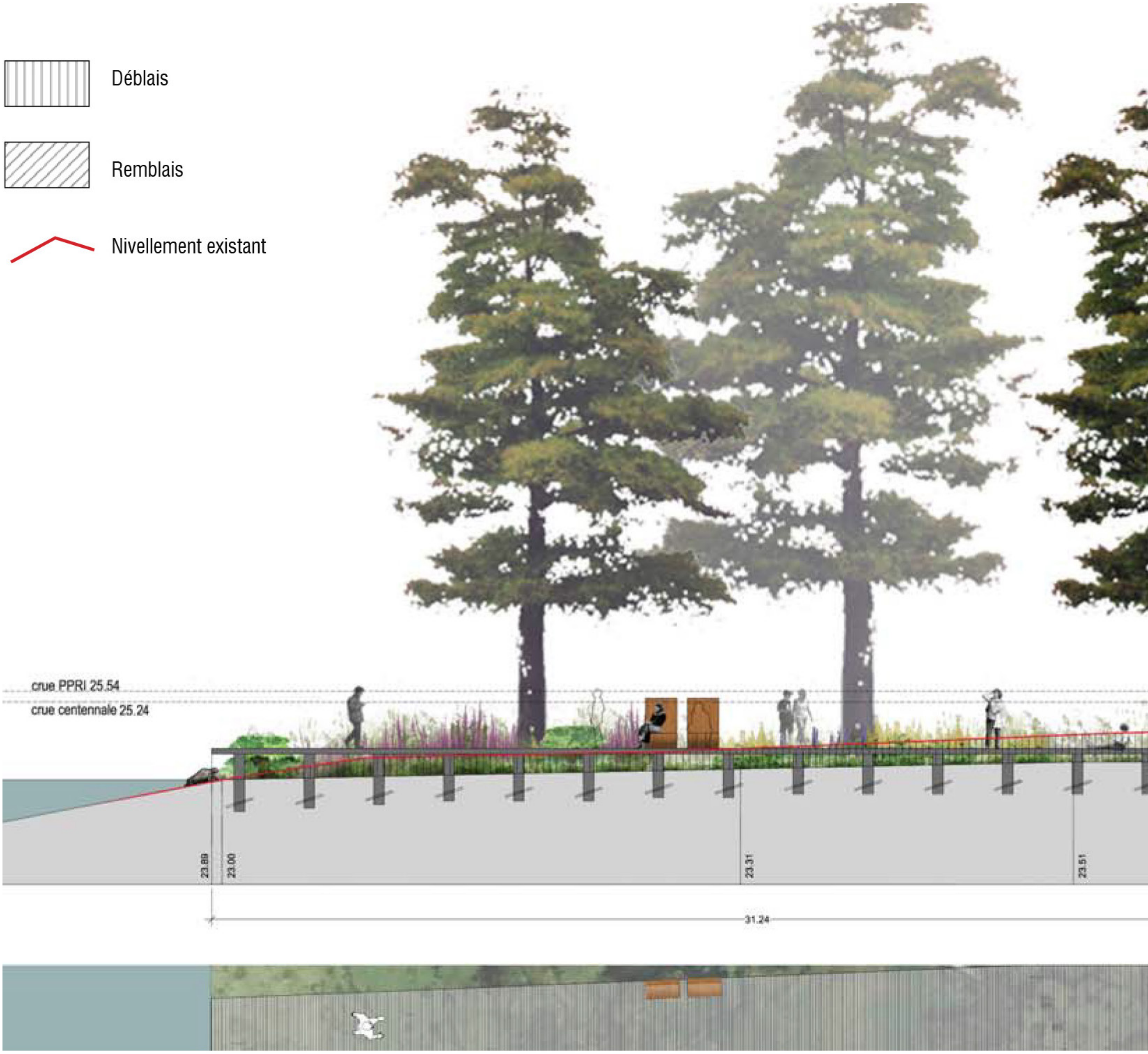
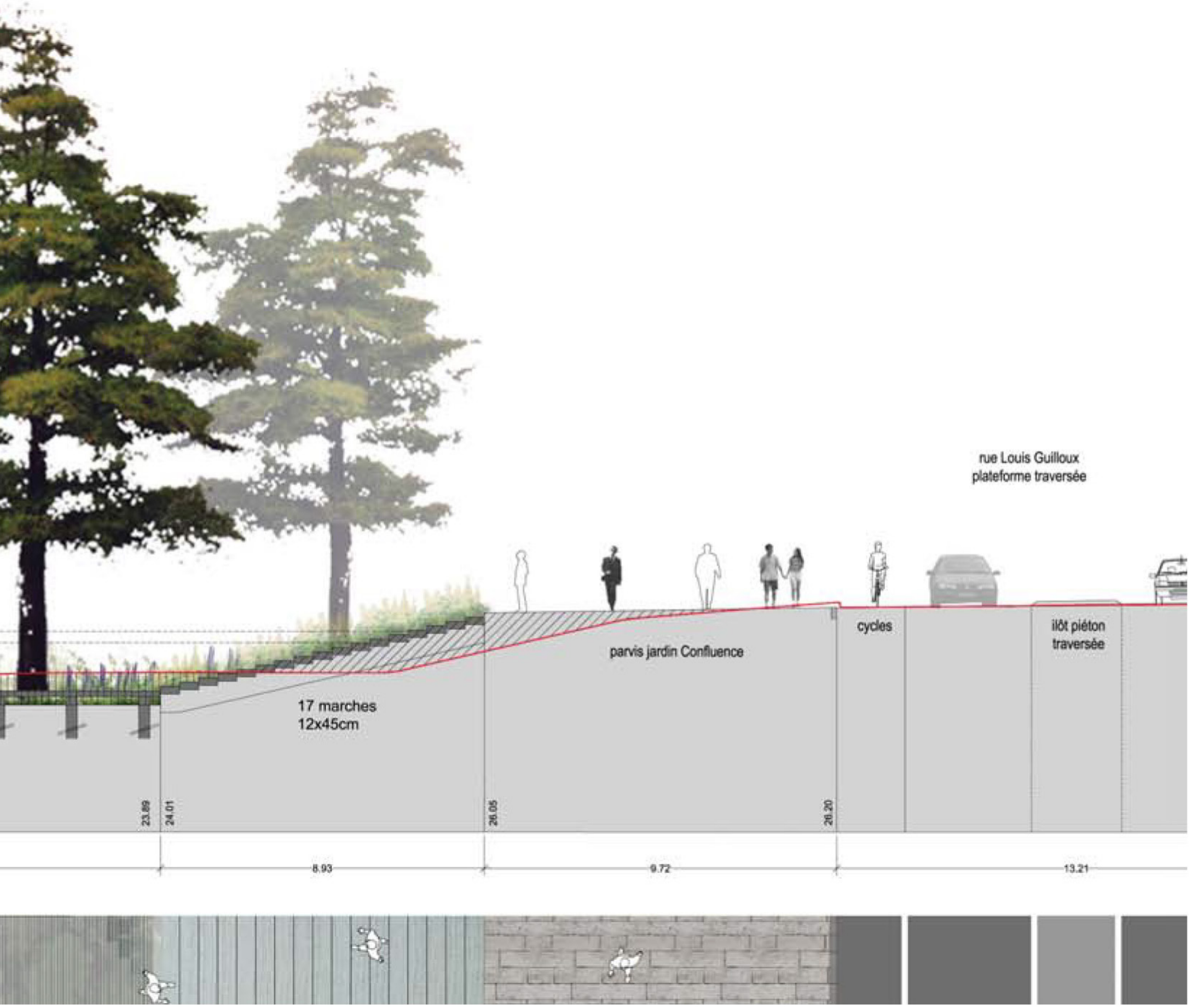
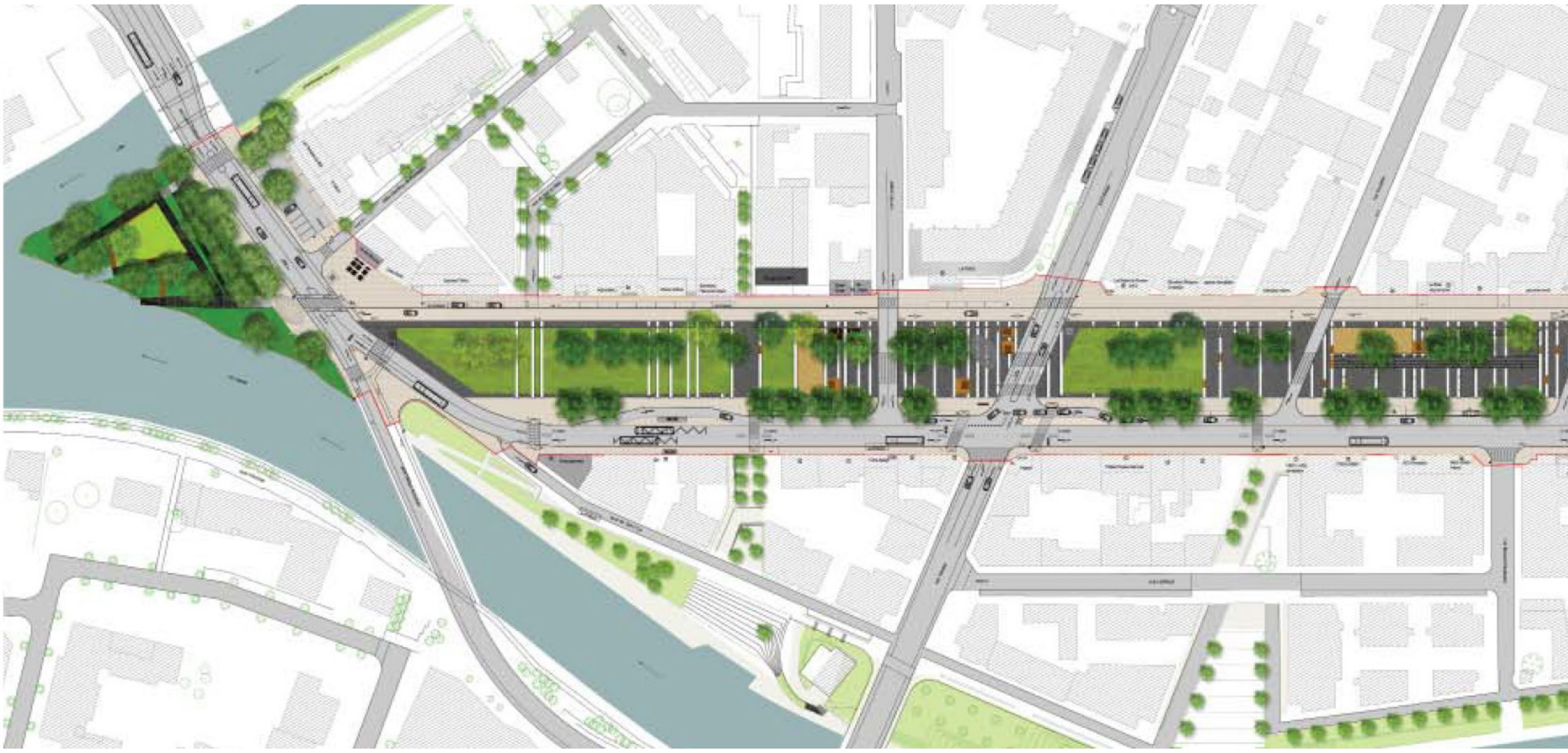

Déblais
Remblais
Nivellement existant
crue PPRI 25.54
crue centennale 25.24
23.89
23.00
23.31
23.51
31.24

Figure 19: Project section of the Confluence Garden. Source: Courtesy of Mutabilis.


rue Louis Guilloux
plateforme traversée
cycles
ilôt piéton
traversée
parvis jardin Confluence
17 marches
12x45cm
23.89
24.01
26.05
26.20
8.93
9.72
13.21



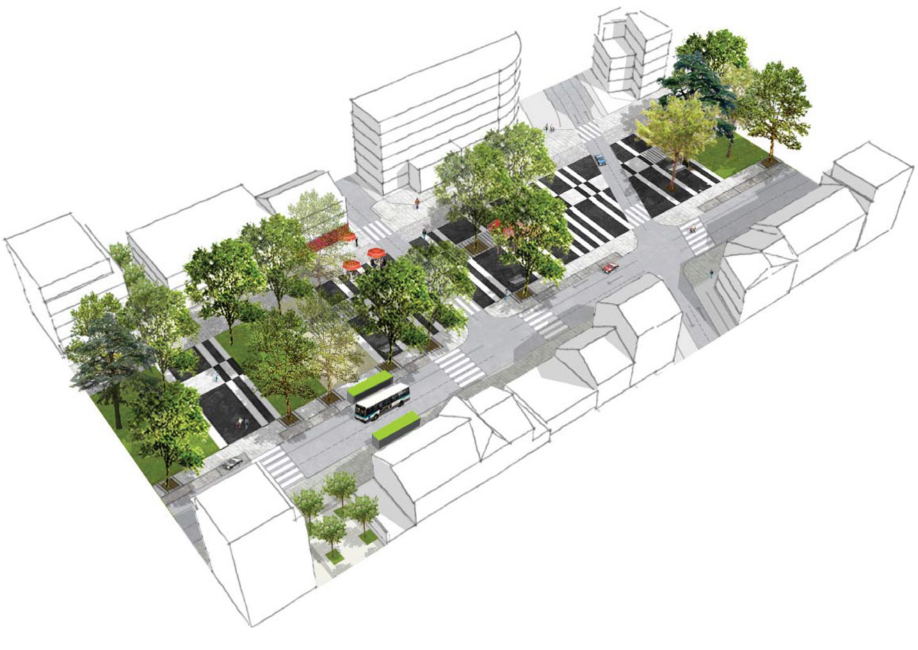
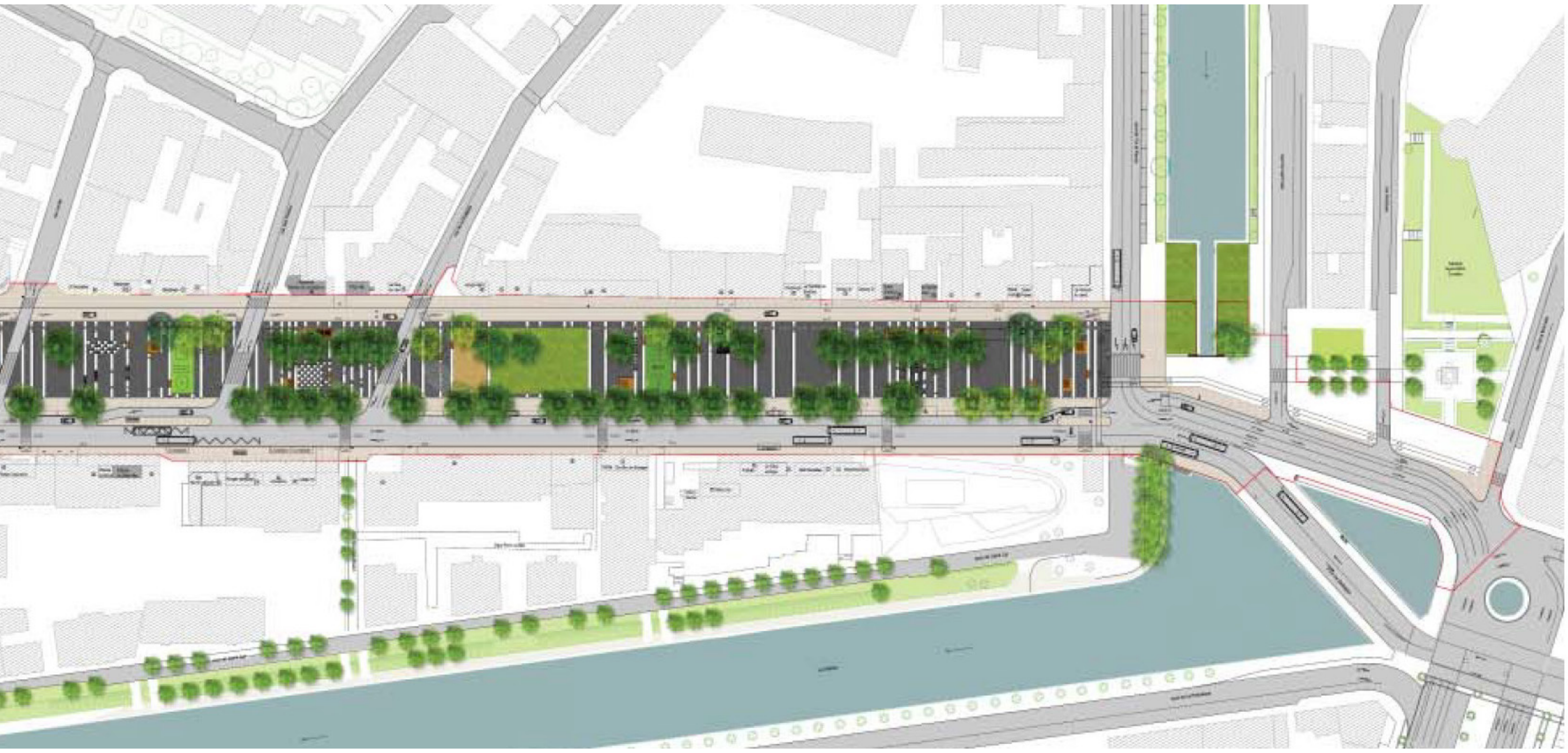


Figure 20: Top: Design plan; Bottom: Axonometry of the composition of the new public space. Source: Courtesy of Mutabilis.



GRAMMAR, POETICS AND PERCEPTION OF THE SITE

The main factor on which this project is based is the removal of cars from the central lane of the area. Thanks to this operation, the designers developed the project reinforcing the linear dynamic of the Mail, with the exception of the garden part at the west end of the strip. Water is one of the major characteristics of the neighbourhood, it being surrounded by water canals (Fig. 20).

To reach the eastern part of the project, it is necessary to cross the "Bretagne Bridge" over the Ille river. The Mail François Mitterand is located less than 300 meters away from the *Porte Mordelaise*[210] and the ramparts associated with it (last vestiges

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[210] A castle entrance gate with two towers, defended by a drawbridge and featuring two smaller gates for carriages and pedestrians, once led to Mordelles. This symbolic setting was where the future Dukes of Brittany swore an oath to defend Brittany's freedoms. The mediaeval walls to the west were built on the site of a third-century wall (Tourisme-Rennes.com).

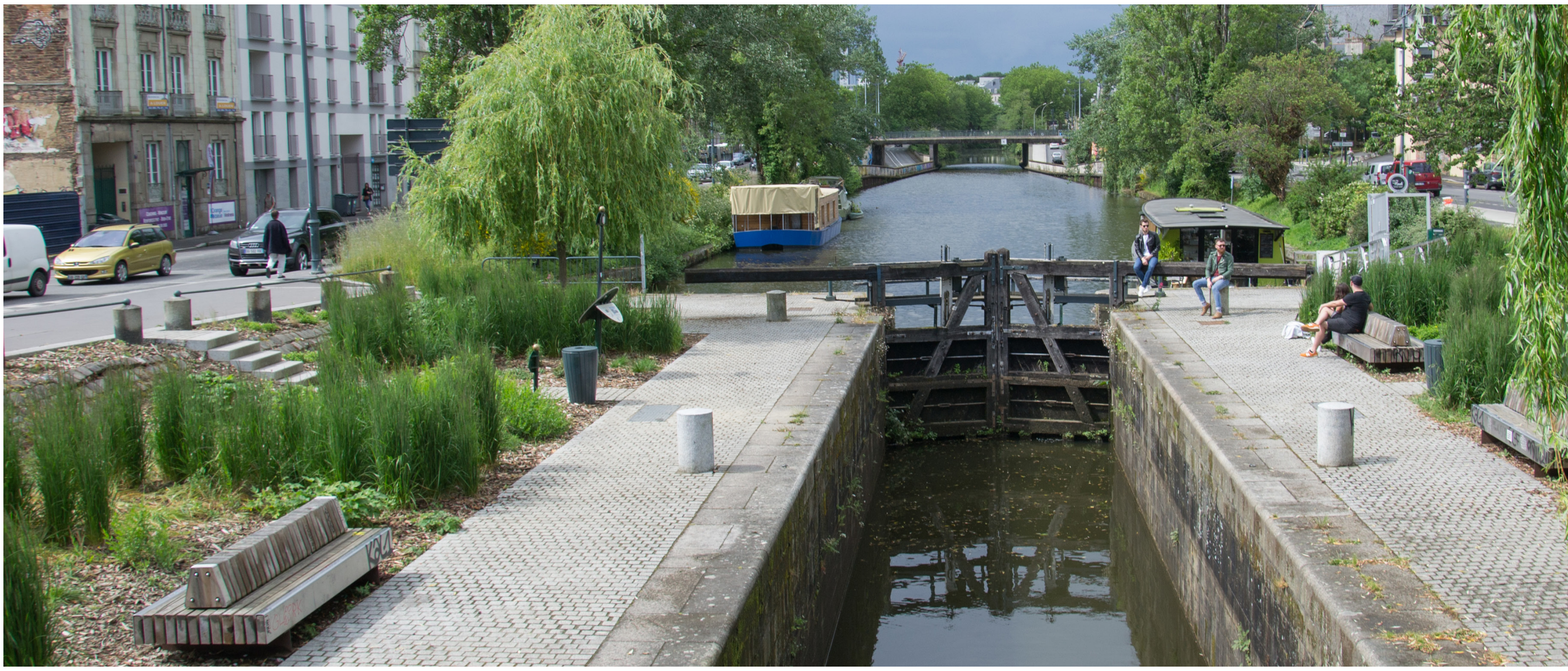


Figure 21: View of the restored area of the sluice of the Ile canal. Source: Author, 2018.

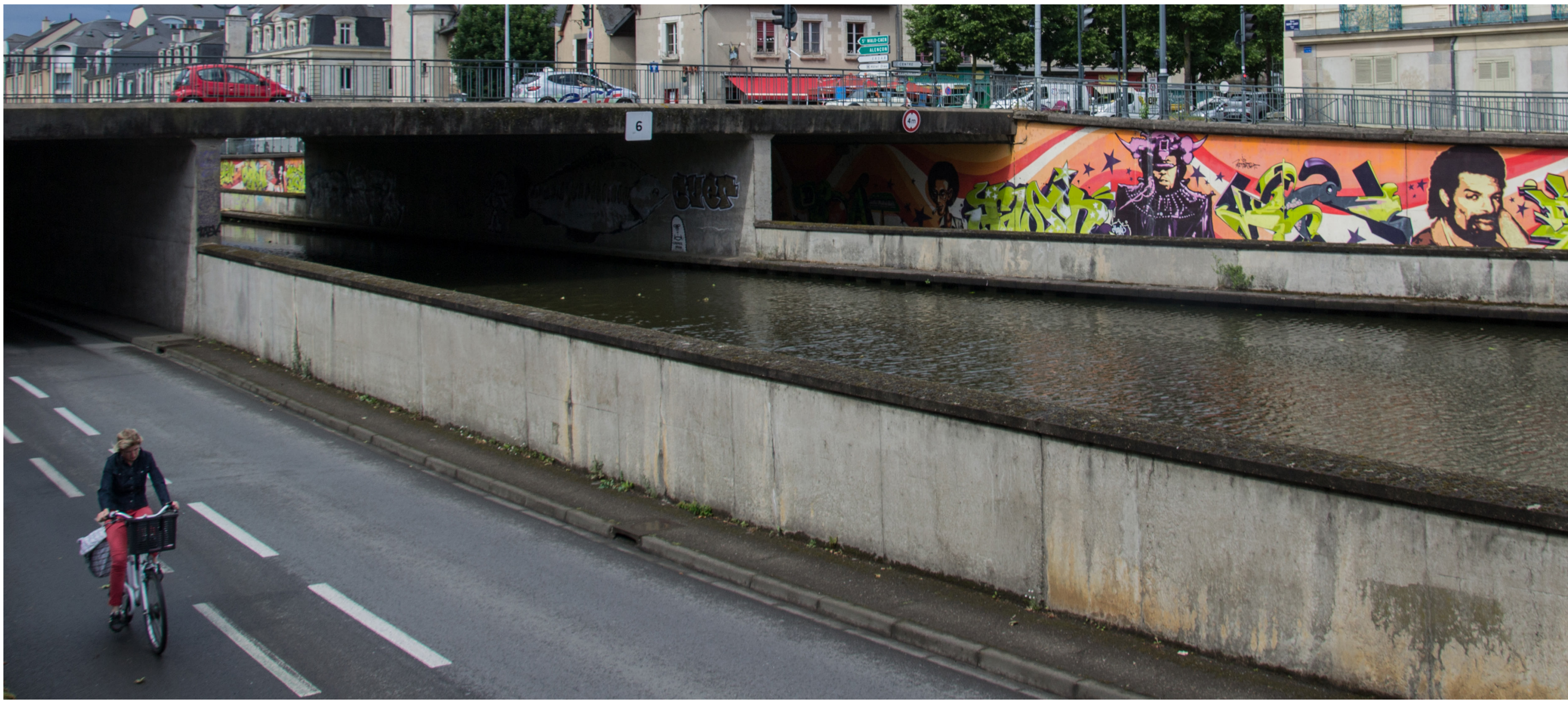
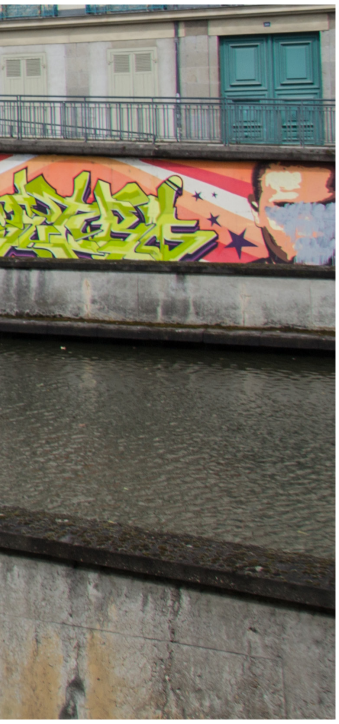


Figure 22: View of a tract of the Ile canal, this area placed a few meters north from the restored sluice of the canal shown in Figure 21. Source: Author, 2018.



of the Roman and medieval city walls of Rennes), up to *Place Maréchal Foch* and the Vilaine river[211].On the western side of *Place Maréchal Foch* is the first segment of the Mail François Mitterand redevelopment project, involving the readjustment of the sluice gate of the Ille canal (Fig.21). Finally, the transformation of the crossroads of *Place Maréchal Foch*, (to be delivered in 2019) will create a continuity between the Mail and the city centre.

The sluice of the Ille canal is a rather limited space where typical shrubs from the marsh areas and *Salix Babylonica* were planted. Although the redevelopment process seems very simple, the area of the sluice appears visibly different from the remaining course of the canal that has no pedestrian paths on its banks(Fig. 22).

The double benches in wood (Fig. 23) along the canal and the insect lodge, designed by Juliette Bailly-Maitre and Ronan Gallais founders of Mutabilis firm, underline the relevance of this space to that of the Mail François Mitterand and the Jardin de la Confluence to the east.

A bicycle and pedestrian lane connect the sluice to the Mail, long massively affected by heavy car traffic flows, and today back to the recreational function that originally characterized it.

The black and white stripes of the pedestrian crossing blend with the drawings on the bright black asphalt pavement covering some stretches of the central area of the Mail, creating fun spaces whose uses are suggested by the motifs drawn on the ground (Fig. 24 and 25).

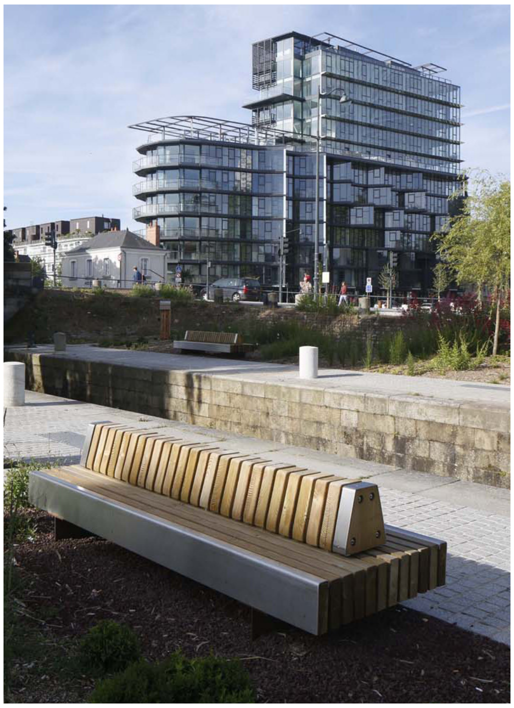


Figure 23: Detail of one of the benches along the Ile canal. Source: Courtesy of Mutabilis.

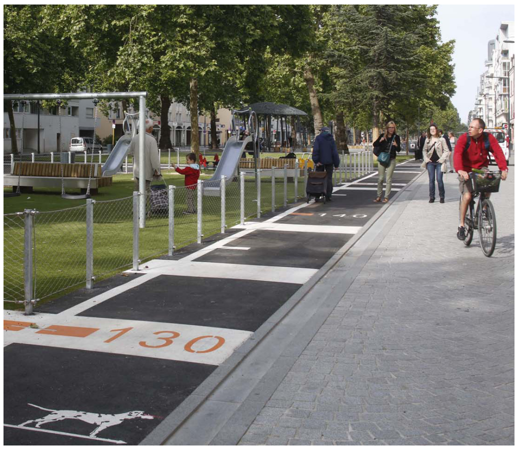


Figure 24: Pedestrian and bycicle paths. Source: Courtesy of Mutabilis.

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[211] The complex is currently object of a redevelopment project led by the City of Rennes and the Atelier de Paysages BRUEL-DELMAR, which started in 2014 and will create a new public space extending from Rue de Juillet to Place Maréchal Foch (about 270 linear meters).

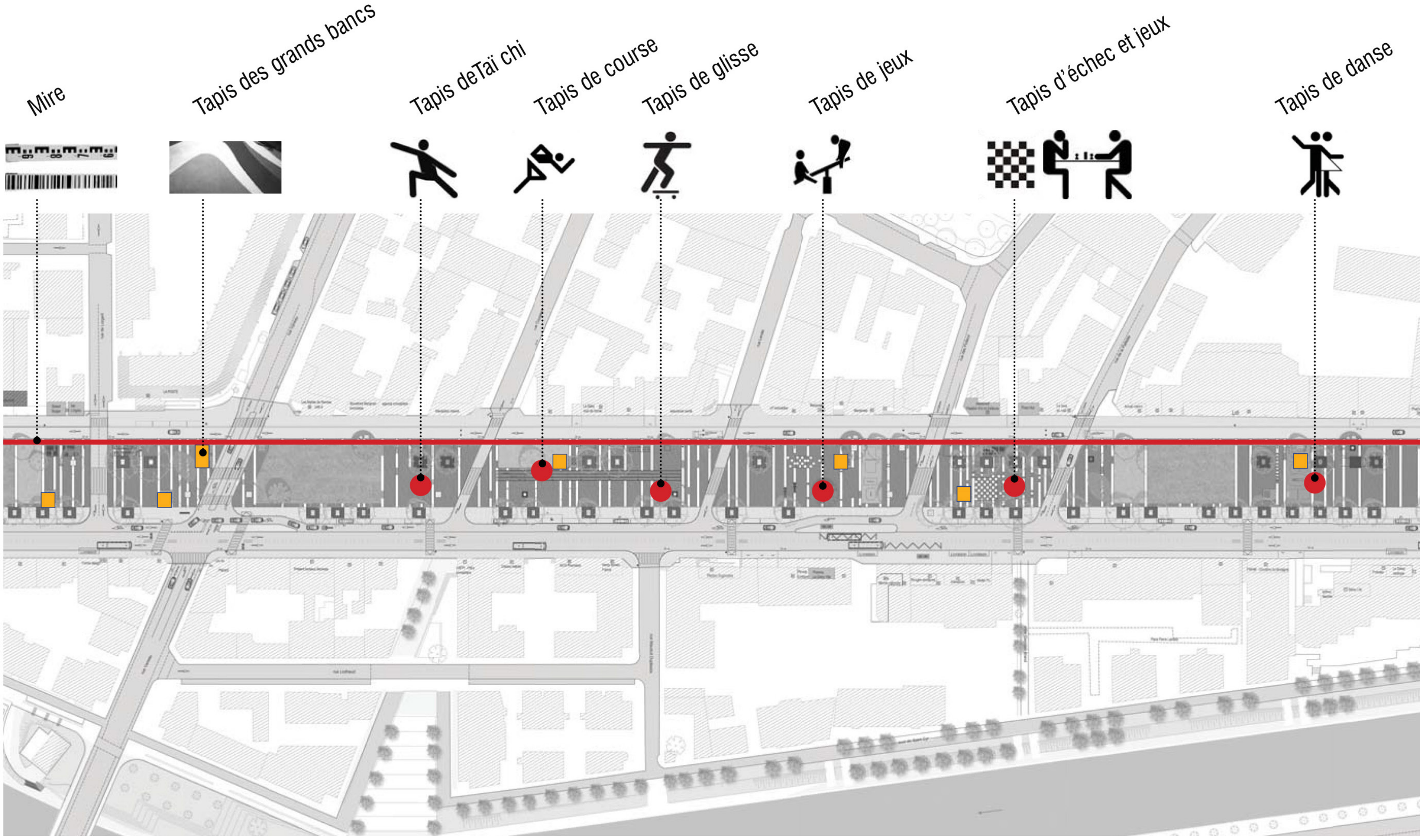

Mire
Tapis des grands bancs
Tapis deTaï chi
Tapis de course
Tapis de glisse
Tapis de jeux
Tapis d'échec et jeux
Tapis de danse

Figure 25: Schemeatic diagram of land use partitions. Source: Courtesy of Mutabilis.

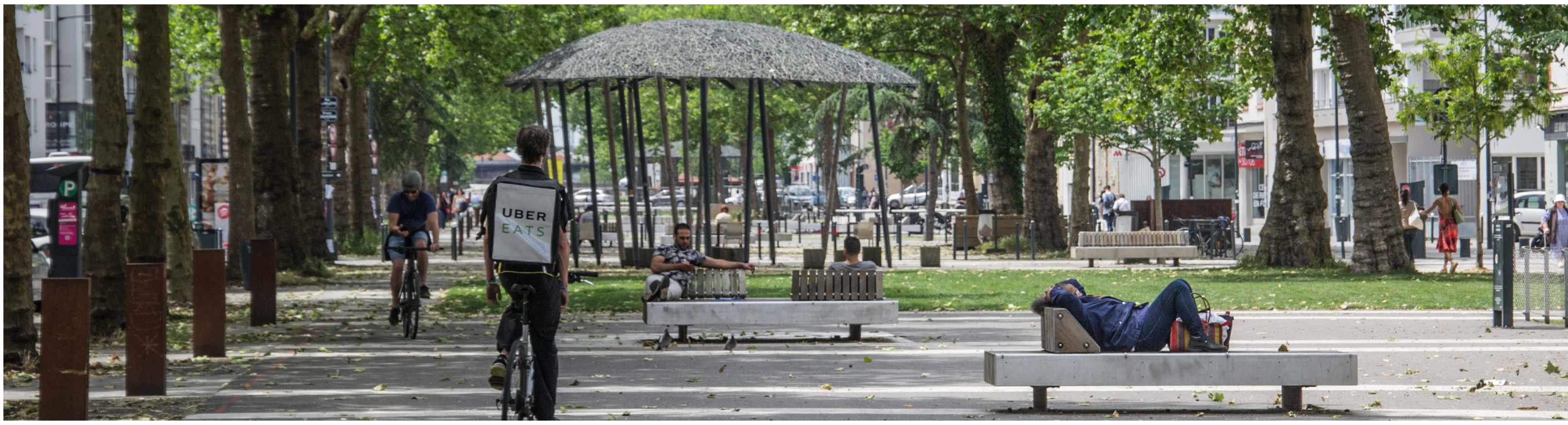


Figure 27: View of the François Mitterand Strip, in the background one of the huts positioned along the space. Source: Author, 2018.

Tapis de motifs

All the bus system, as well as general traffic (in zone 30), follow the east to west axis in the southern part of the Mail, while on the other side, the sidewalks were expanded with Roubaix granite to signal continuity with the city centre (Fig. 26).

Bicycles for sharing are available to the public and are positioned in front of the Post Office close to one of the three gazebos positioned along the Mail (Fig.27).

These modern huts were designed as sort of “follies” which look like large spider’s webs supported by poles. The artist who created them is Norman Stephanie Buttier. Their metal structure (Fig. 28) is peculiar, made with a braided copper mesh on steel frames. They have been positioned as landmarks of the new public space: the first one can be found at the longitudinal centre point of the Mail, the second one in front of the entrance to the Post building, the third one at the entrance to the “Jardin de la Confluence”.

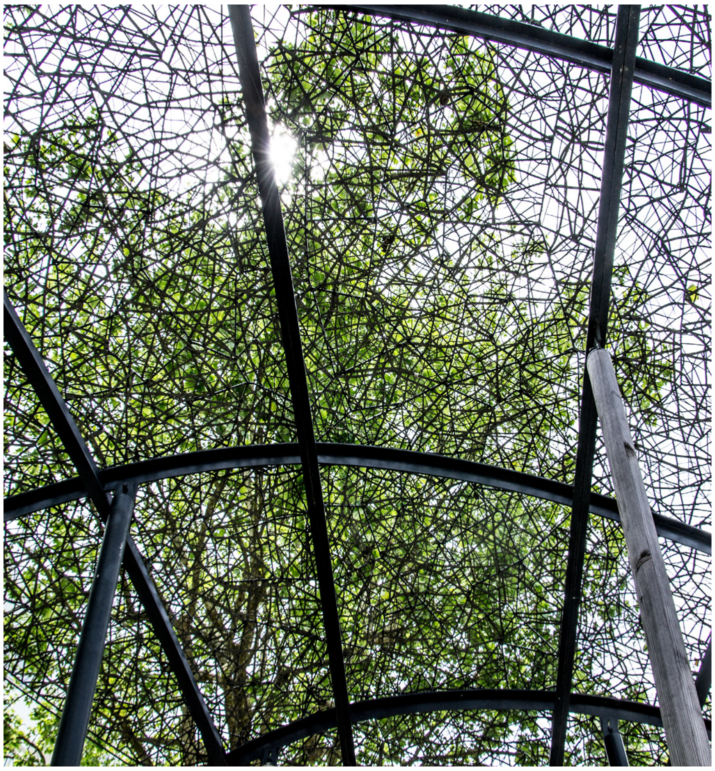


Figure 28: Detail of the copper mesh on top of one of the huts. Source: Author, 2018.

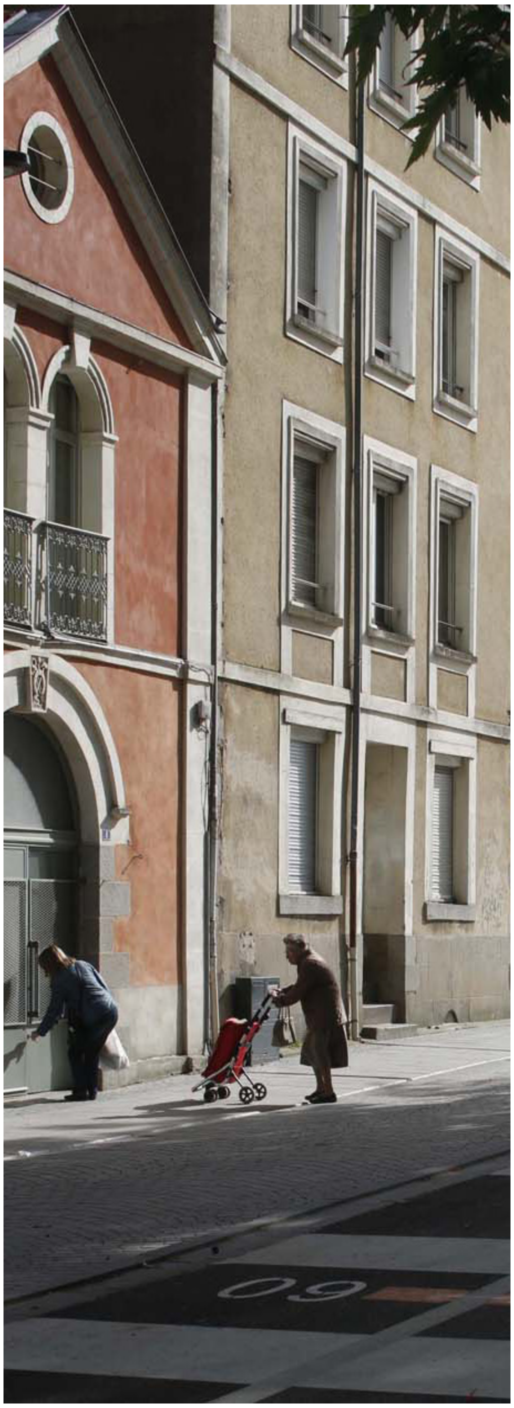


Figure 26: Detail of the transition of the paving materials in an area close to the city centre. Source: Courtesy of Mutabilis.

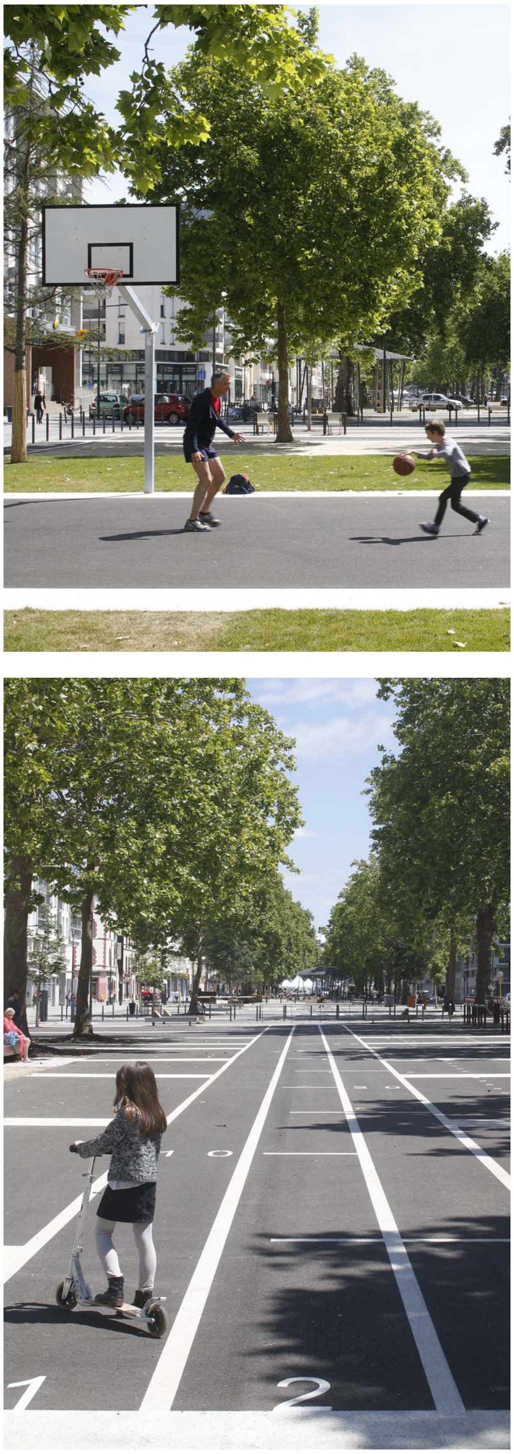


Figure 29: Areas for sport activities. Source: Courtesy of Mutabilis.

The central area of the Mail is not completely paved; the paving is alternated with play areas covered with impact-resistant flooring and lawn areas for picnics or lying on the grass (Fig. 29), and others on a synthetic lawn for playing ball games without encountering problems caused by humidity, given the temperate climate of the city.

The new Mail is an extremely multifunctional place: spaces dedicated to sports alternate with play areas suitable for children of different ages, but also for adults thanks to the chess tables and wooden containers which contain all the objects necessary to take advantage of the different activities that this place can host (Fig. 30).

The central space of the Mail is configured as a meeting place for both the inhabitants of the neighbourhood and for the inhabitants of the city. Observing the space throughout the day one can notice how intensely it is lived by the citizens: during the morning the atmosphere is quiet and relaxing, the space is frequented by the inhabitants of the neighbourhood who, after having breakfast in one of the many bars overlooking the Mail, go by bike or on foot towards their respective destinations. In the early afternoon, the tables of the restaurants located on the Mail are full, tourists and Rennes citizens of all ages sit here and in the meanwhile children play in the areas dedicated to them or following the white traces drawn on the asphalt that trigger their creativity. Long stays are encouraged by the comfort of this space, sheltered from the wind and the sun by the branches of the majestic historical sycamores on which birdhouses have been placed (Fig. 31). Elderly adults sit on large wooden benches of different shapes reading the newspaper or working on their laptops under the gazebos away from the sunlight.

In addition to the asphalt, wood and granite, Corten steel is the other material used by the designers for the external covering of the public toilets and the lighting of the south side of the Mail, thus camouflaging the service buildings and the technical control areas (Fig. 32).

Approaching the confluence with the river Vilaine, the pavement gradually becomes more permeable, until in the last stretch of the Mail a large semi-elevated garden with curbs in Corten starts, which anticipates the entrance to the "Jardin de la Confluence" (Fig. 33).

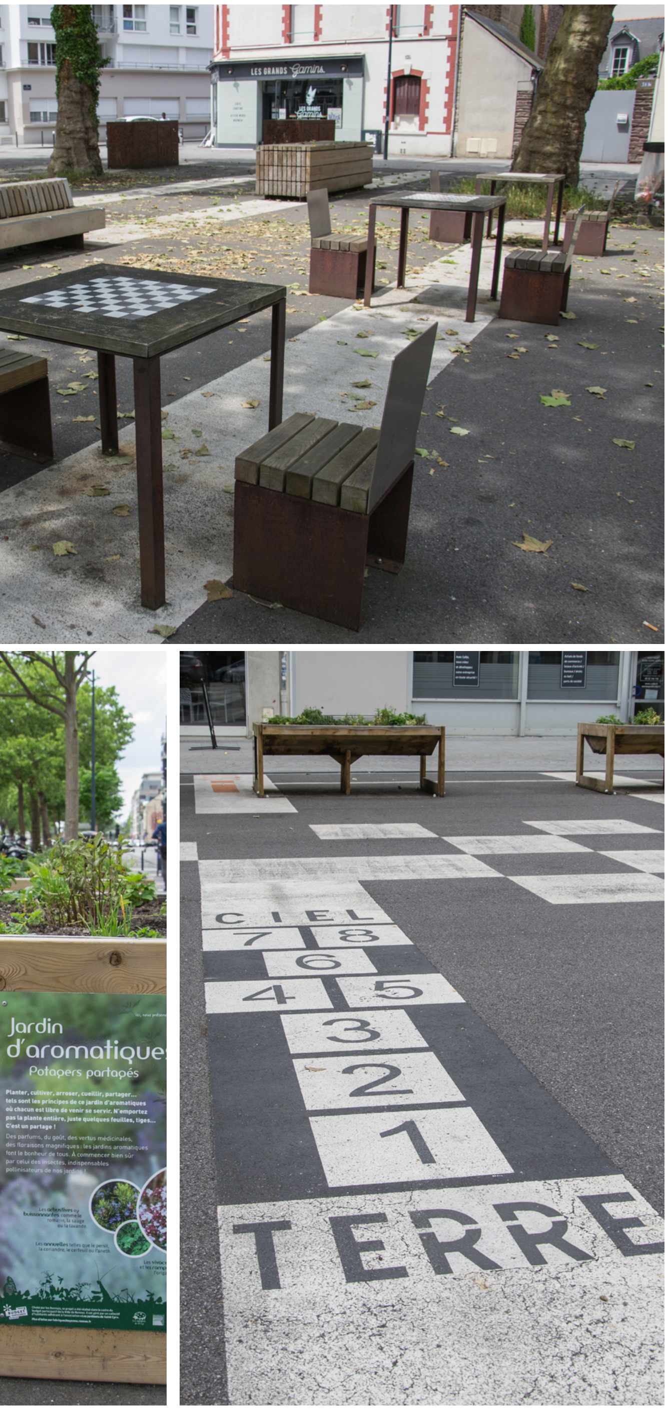

LES GRANDS Gamins
Jardin
d'aromatiques
Potagers partagés
CIEL
7
8
6
4
5
3
2
1
TERRE

Figure 30: Top: The chess tables of the Strip, in the backround ne of the wooden boxes with tools to play in the space; Bottom: An aromatic garden installed on the Strip and games drawn on the paving. Source: Author, 2018.

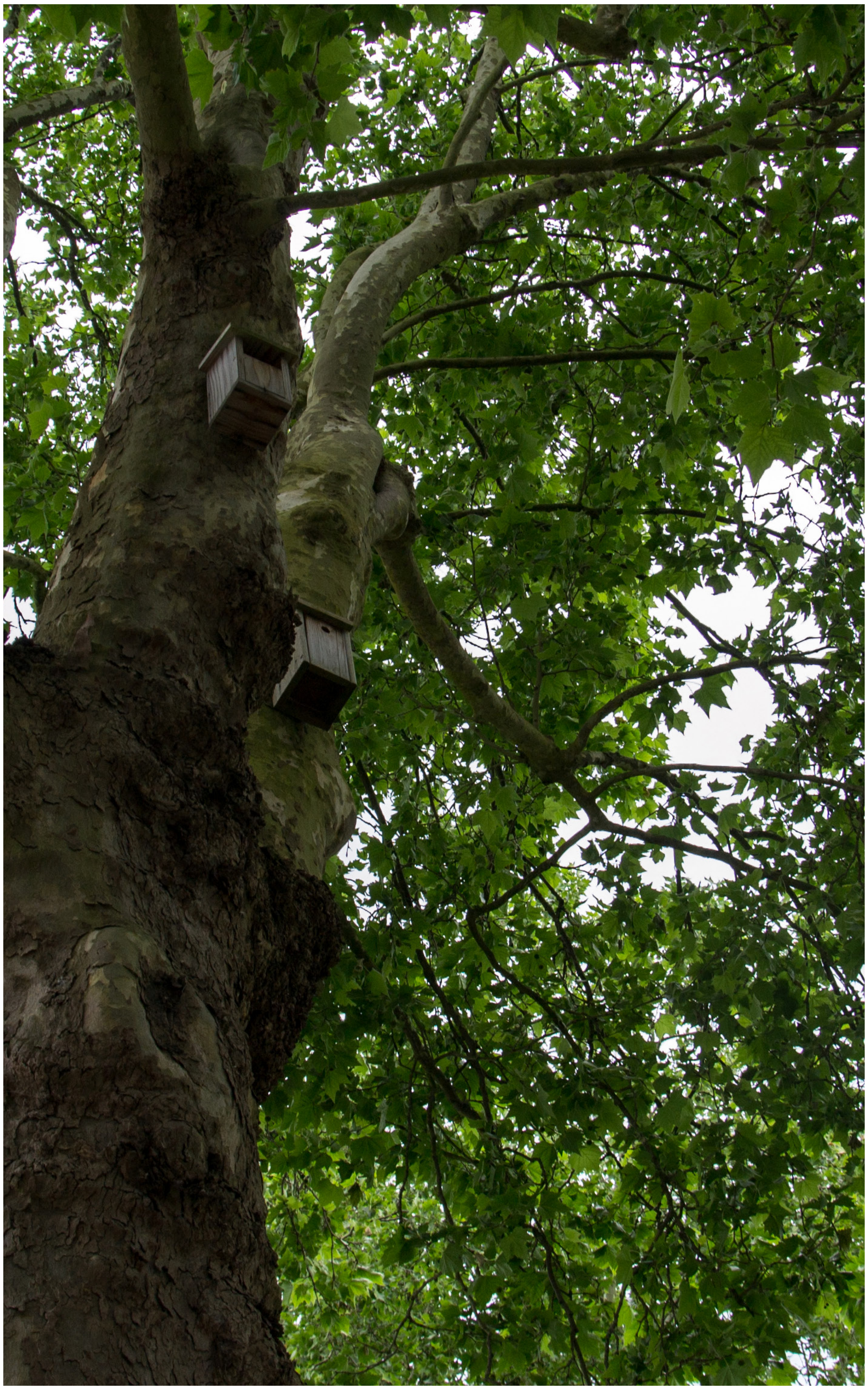


Figure 31: Detail of the houses for birds placed on top of the trunks of the secolar Sycamores. Source: Author, 2018.

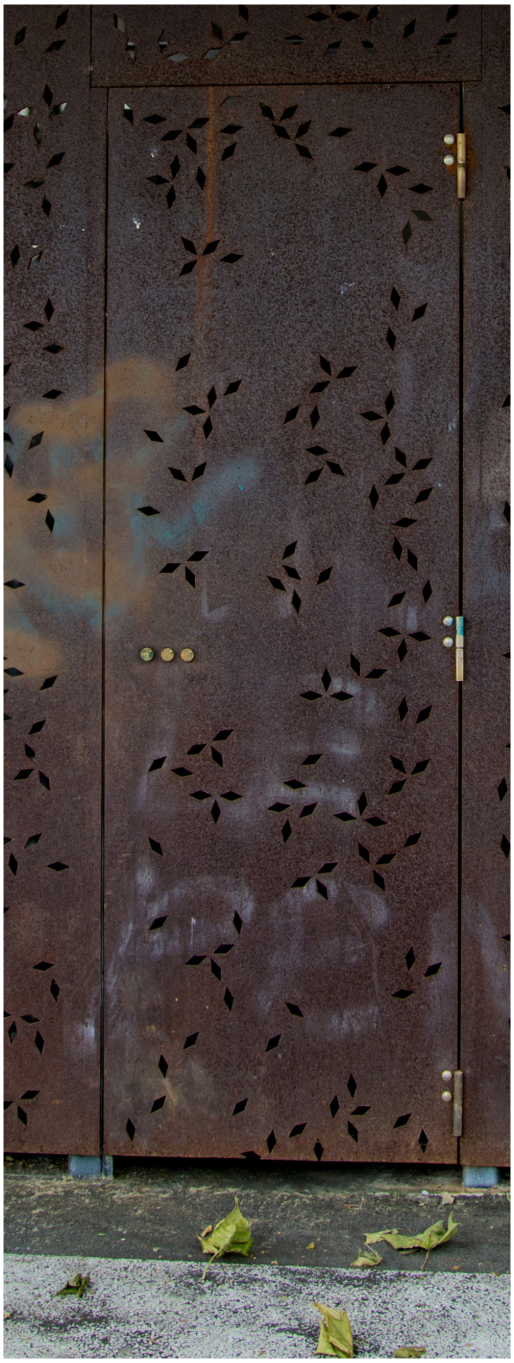


Figure 32: Detail of the entrance to one of the public toilets of the area, the external cover in Corten steel has been designed by Mutabilis Paysage et Urbanism. Source: Author, 2018.

Throughout the Mail metal plates equipped with QR codes corresponding to different itineraries of urban exploration can be found (Fig. 34). This project originated in the context of the consultation phase with citizenship, organized by the Municipality in April 2016. The Municipality offered guided walks to rediscover the urban, architectural and landscape heritage of Rennes (Rennes20130.fr). During these walks, the participants were able to discuss the needs of the city, sharing their observations and suggestions, but also being informed about the ongoing redevelopment projects.

Today, the tourist office, going by the name of “Destination Rennes”, still offers guided tours to discover these 14 routes, in the summer months of the year, to those that want to know more about the routes shown on the downloadable municipal app.

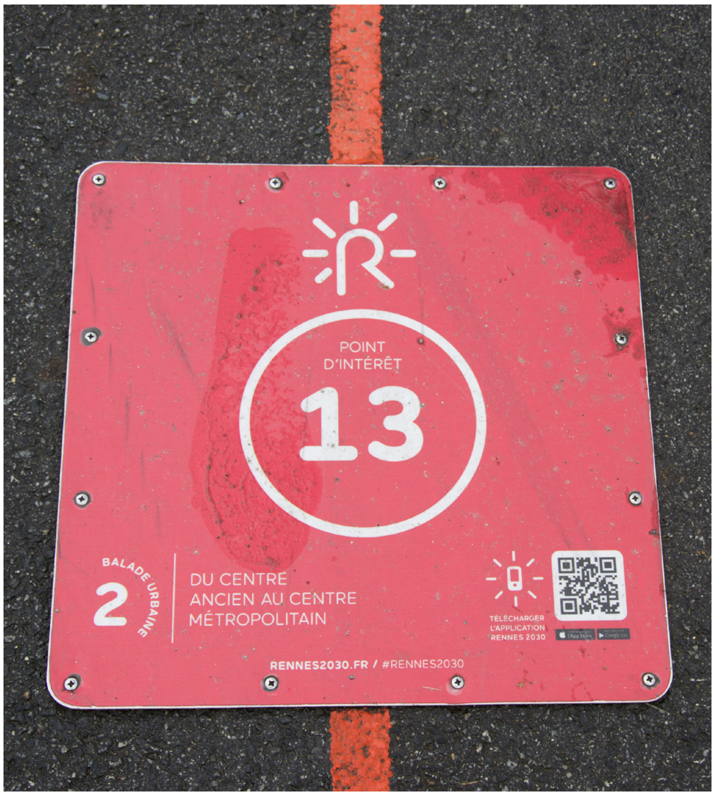

POINT
D'INTÉRÊT
13
BALADE URBAINE
2
DU CENTRE
ANCIEN AU CENTRE
MÉTROPOLITAIN
TÉLÉCHARGER
L'APPLICATION
RENNES 2030
RENNES2030.FR / #RENNES2030

Figure 34: Detail of one of the signs signalling the points of interest of the city, The point 13 in the picture indicates the vicinity to the Confluence Garden. Source: Author, 2018.

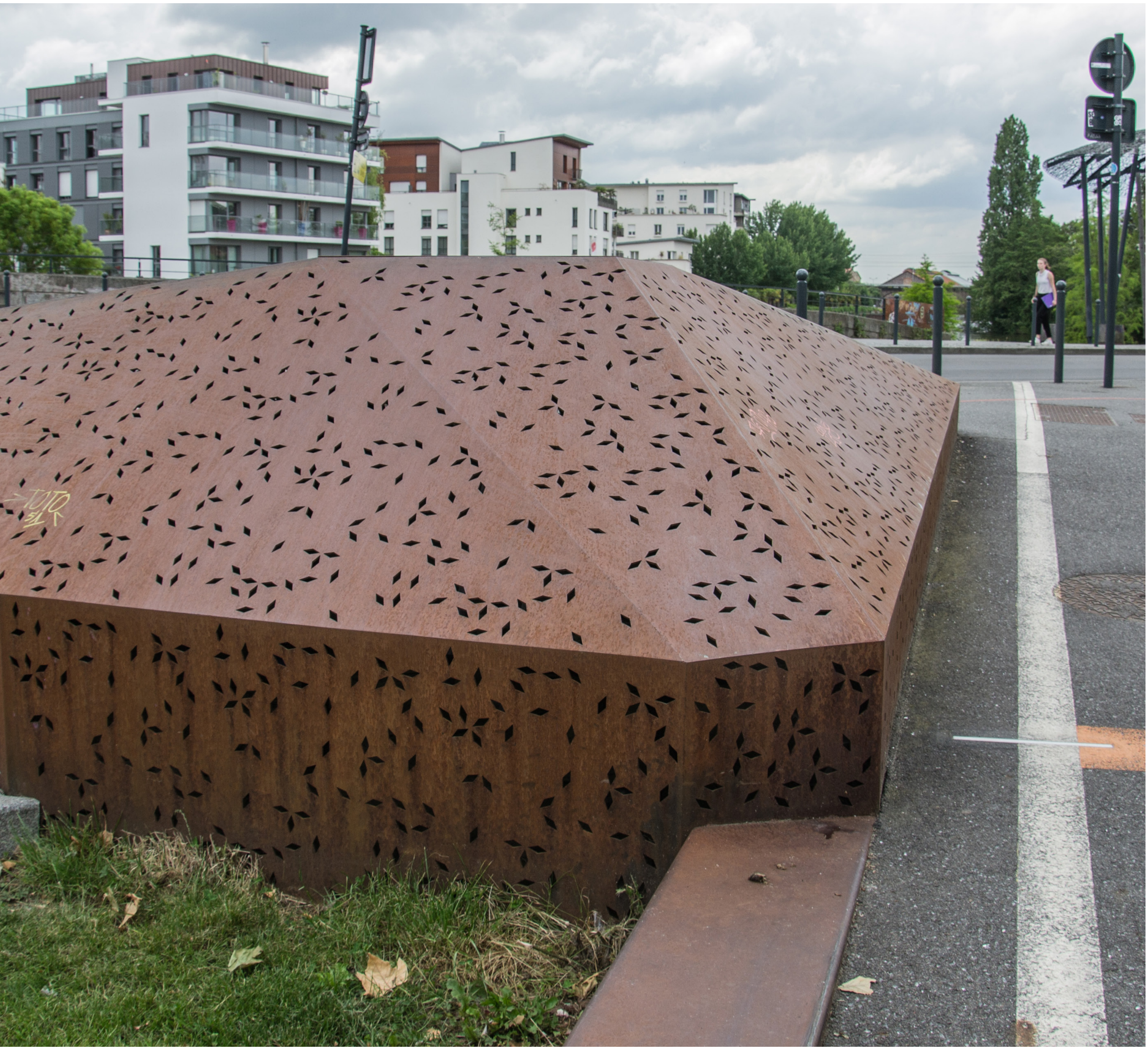


Figure 33: Detail of the Corten steel coverage of technical equipments close to the Confluence Garden. Source: Author, 2018.

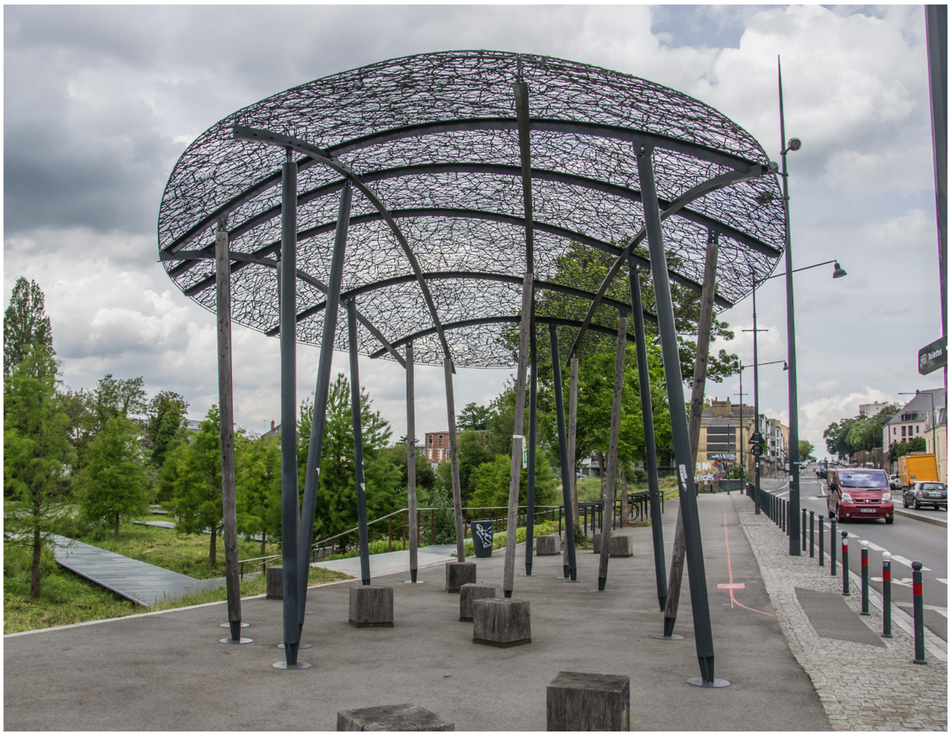


Figure 35: View of the hut placed at the entrance of the Confluence garden. Source: Author, 2018.

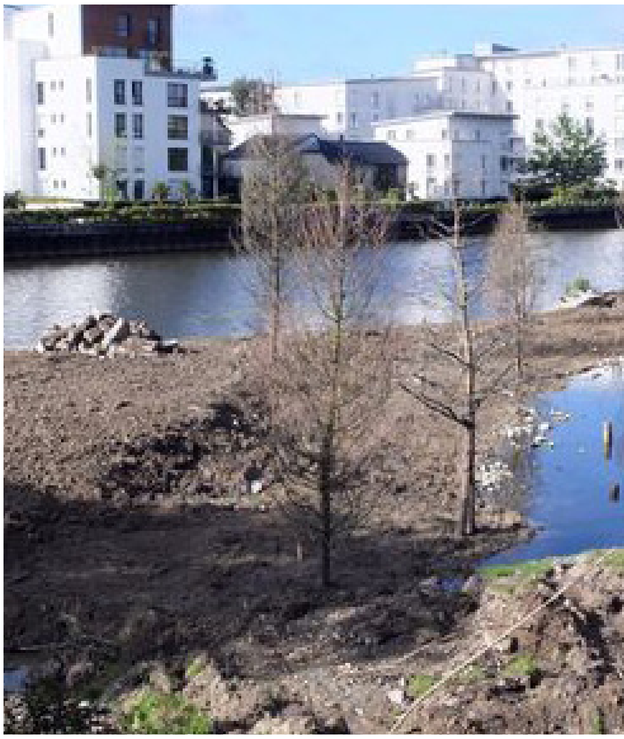


Figure 36: View of the Confluence garden during the construction works, May 15th 2013. Source: metropoles-rennes.fr

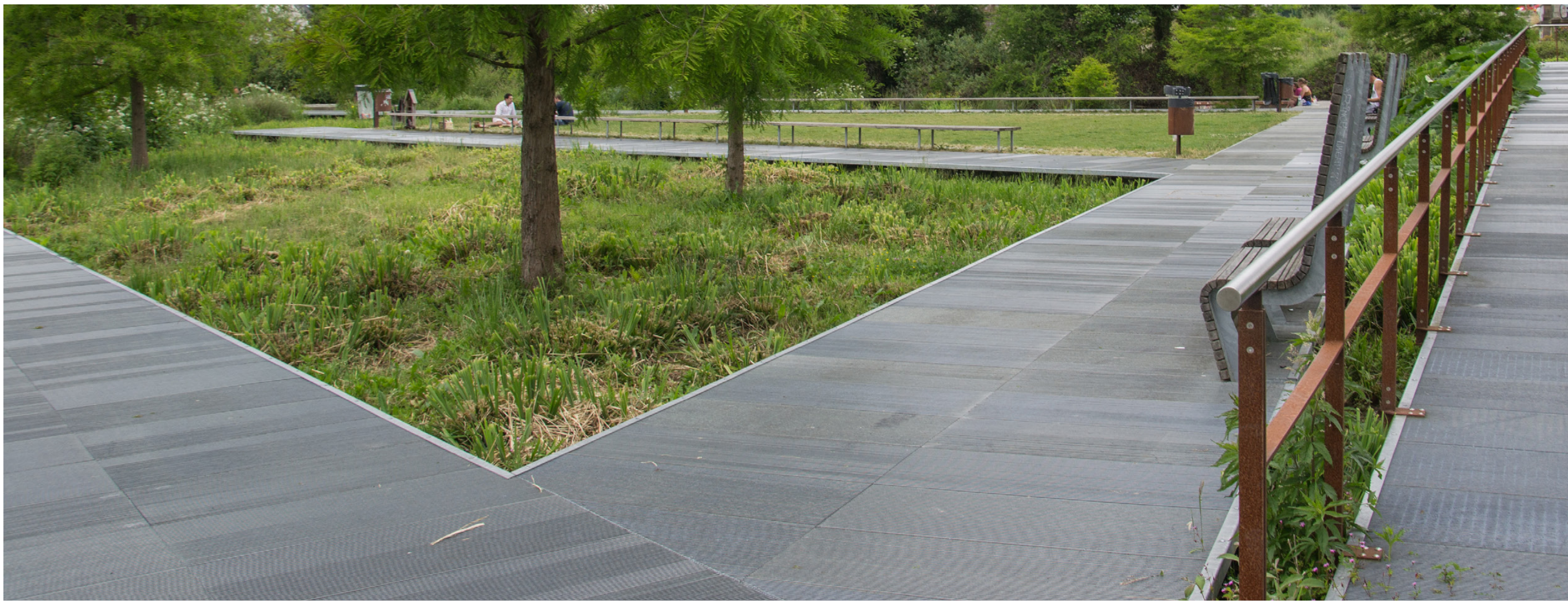
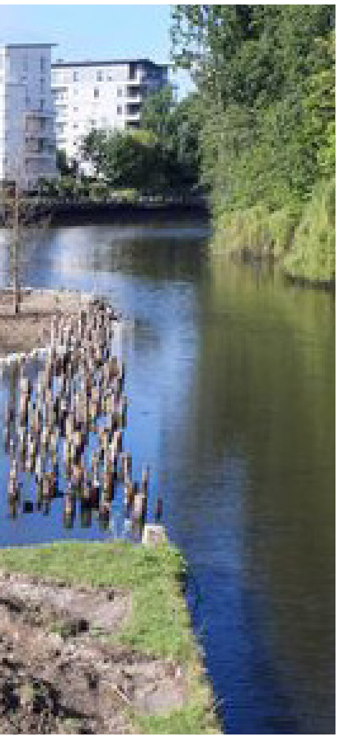


Figure 37: Detail of the steel walkways of the Confluence garden. Source: Author, 2018.



At the western end of the Mail François Mitterand the Confluence Garden is located, a triangular strip of land located at the exact point of the confluence of the Ille and Vilaine rivers. The garden is located in a highly emblematic place for the history of the city of Rennes, whose Gallic name *"Condate"* means precisely "Confluence" (Botrel, 2008). After its past as a privileged place for the observation and organization of national and international regattas, the area was neglected for a long time. The garden, unlike the Mail, is a semi-hidden place marked by the presence of a third gazebo which stands before its entrance (Fig. 35). The area occupies a total area of 2600 m2; Its redevelopment entailed earthworks and the reconfiguration of its banks (Fig. 36), as well as the insertion of new plant species and the installation of steel walkways (Fig.37). The garden is accessible at its south and north ends through two staircases and through the steel ramp that allows easy access even for people with reduced mobility, who, thanks to this solution, can move within the space in total safety (Fig. 38). On entering the garden, the atmosphere is completely different from the dynamic and frenetic Mail. Despite its proximity to the roads, the garden, thanks to the slow degradation of the land up to 0 m asl, is an oasis of peace on the edge of the water (Fig. 39).

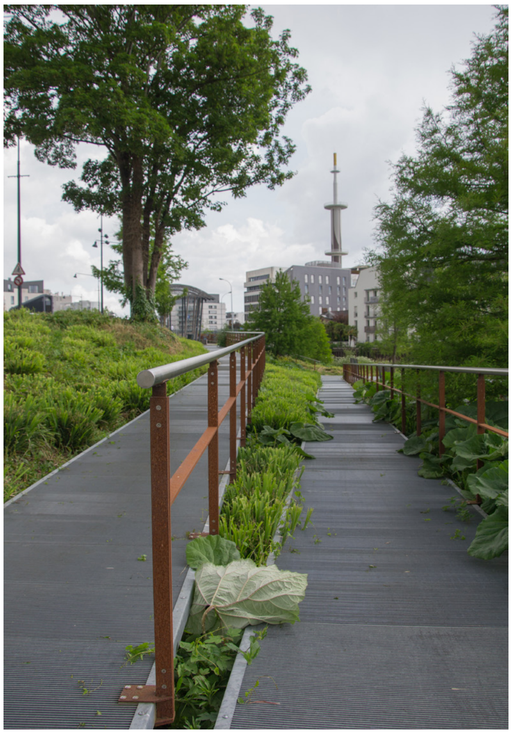


Figure 38: Detail of the ramps to access to the Confluence garden. Source: Author, 2018.

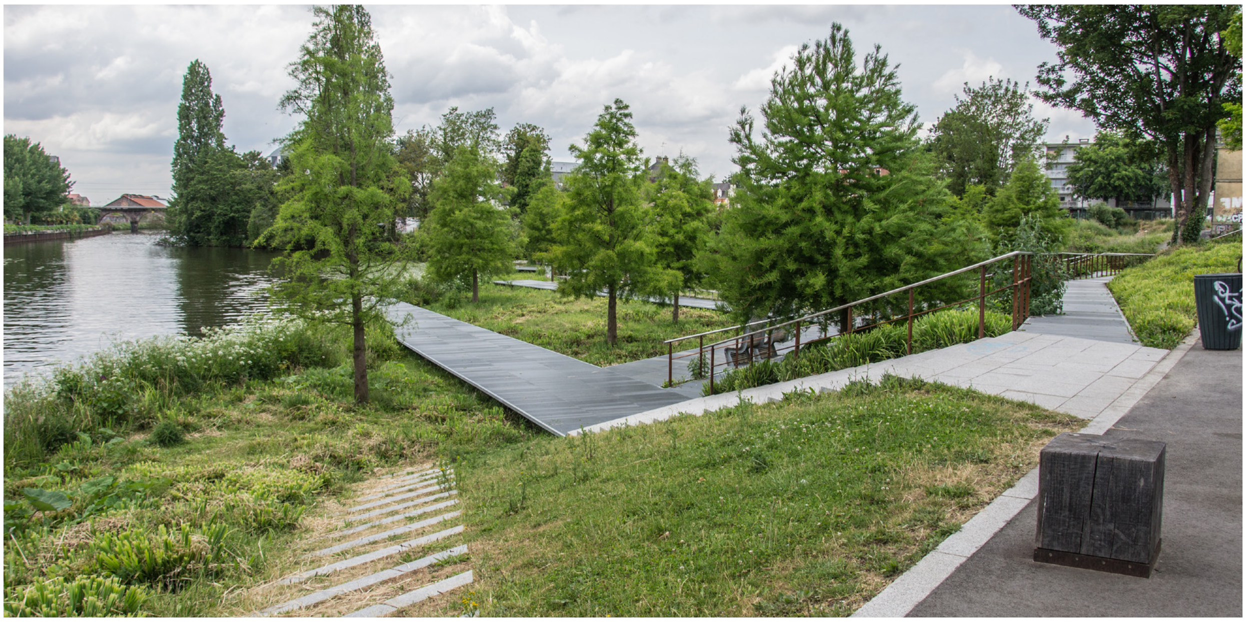


Figure 39: View of the Confluence garden from the Mail François Mitterand. Author, 2018.

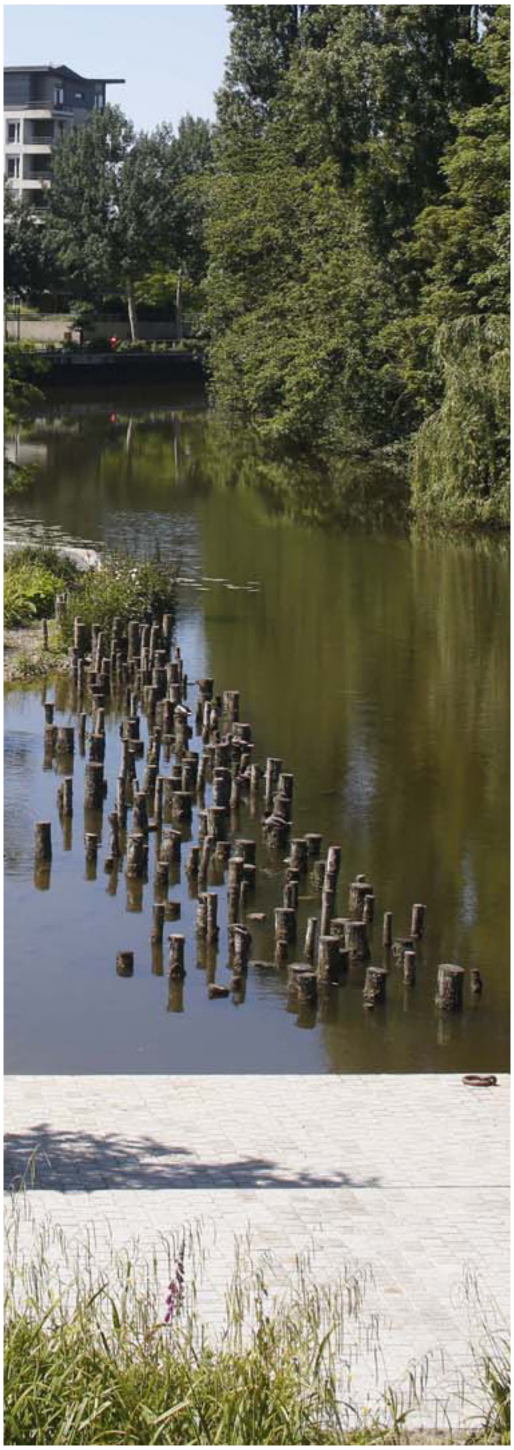


Figure 40: Detail of the wooden structures for fishes and ducks. Source; Author 2018.

The aim of this reconfiguration was to encourage the return of, and increase in, the biodiversity of the place (Fig. 40), thereby reintroducing the local fauna and flora into the heart of the city.

Along the steel walkways, which can be submerged during periods of flooding, *Zantedeschia Calloidae*, *Iris pseudacorus* (Fig. 41) and water lilies grow. Ducks and birds have established themselves again in this place, which the inhabitants of Rennes appreciate as a place of rest and meeting. The *Bald Cypress* and *Metasequoias* are the new tree species inserted, given their ability to adapt to water gardens. The wooden benches, designed by the landscape architects, constitute the grammatical elements that connect this space with the urban one of Mail François Mitterand (Fig. 42).

At the centre of the garden a lawn of modest size is located, where young people entertain themselves during sunny days while often having a picnic. An amusing wooden house, pierced by holes (Fig. 43), provides shelter to insects, while the banks have been specially degraded and equipped with poles and gravel to create land for breeding fish and to allow the reproduction of animals. (Fig.44).

The various walkways overlooking the confluence offer a privileged meeting place for fishermen who can reach the garden by boat: here you can fish for pike and sea bream thanks to the proximity to the Atlantic Ocean (Ouest-France, 2015).

Moreover, the garden offers a panoramic view of the banks of the river Vilaine on which the residential neighborhood designed in the 1990s by Alexandre Chemetoff stands, while, on the bank of the river Ille, the view is occluded by the lush and uncultivated vegetation of the Ilot de l'Octroi, a neighbourhood currently undergoing reconfiguration (Fig. 45).

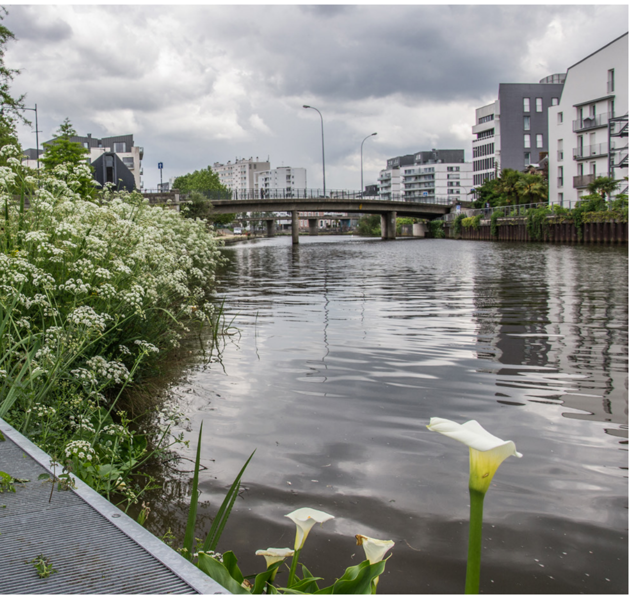


Figure 41: Detail of the vegetation growing along the steel decks overlooking the confluence of Ile and Vilaine rivers. Source, Author 2018.

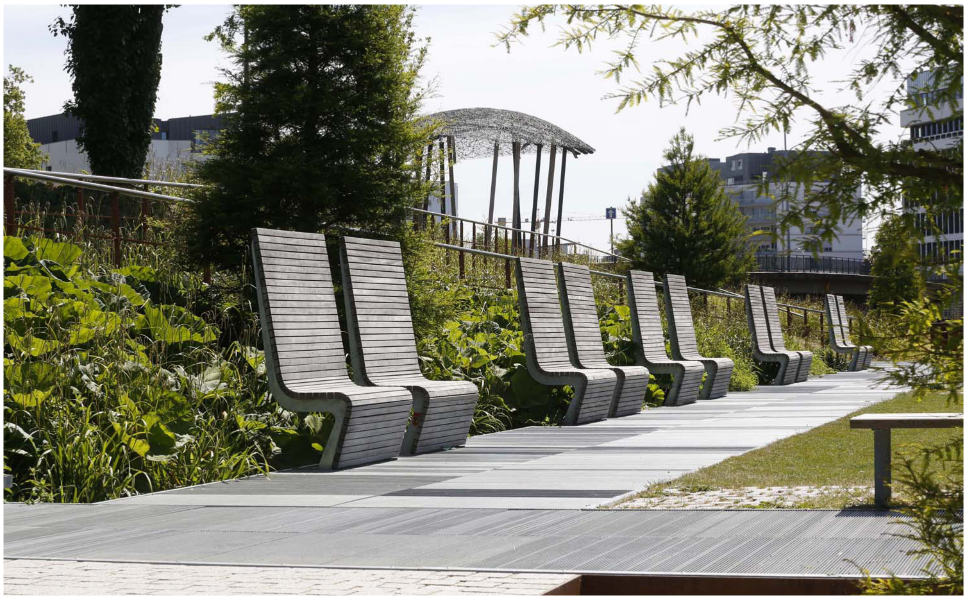


Figure 42: Detail of the wooden benches in the Confluence garden. Source: Courtesy of Mutabilis.

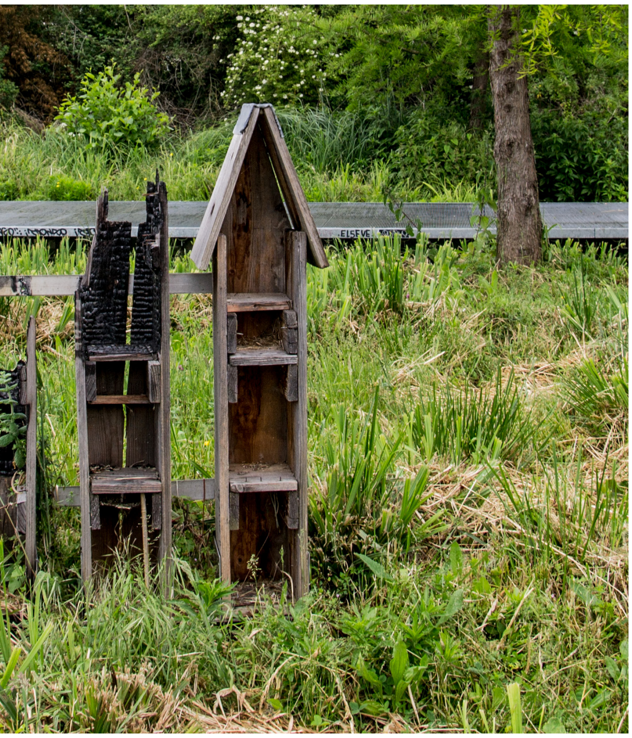


Figure 43: Detail of the wooden house for insects and birds, partially burned by vandals. Source: Author, 2018.

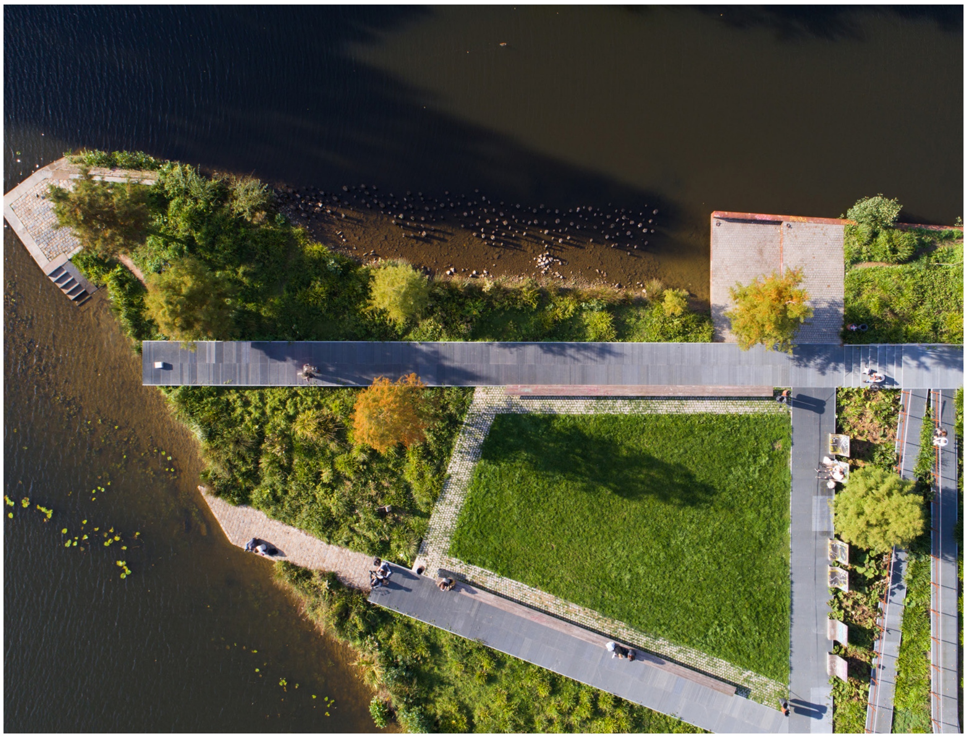


Figure 44: View of the Confluence garden from above. Source: Courtesy of Mutabilis.

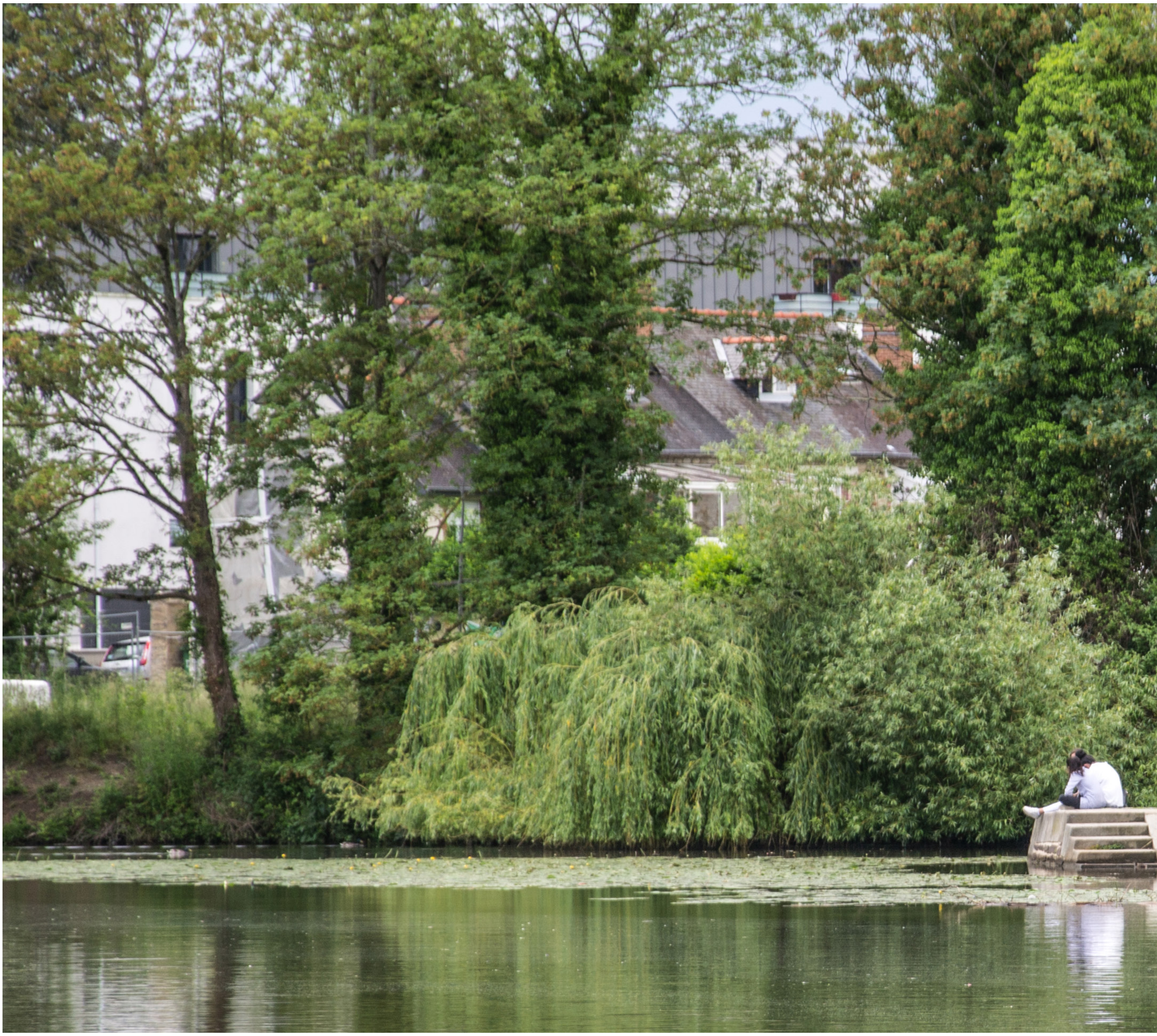


Figure 45: View of the docks of the Confluence garden, in the background, beyond the trees, the roofs of the houses of the "Ilot de l'Octroi" stand out. Source: Author, 2018.

COSTS, BENEFITS, CRITICISM AND AWARDS

The new Mail, refurbished after more than two years of work, was inaugurated in May 2015 (Fig. 46). The area, which had previously been used as a large open-air car park, was finally reclaimed as a pedestrian area and reduced motor traffic from 82% to 33%, with the southern route becoming a 30 km/h speed-restricted area. The inauguration ceremony (Fig. 47) was defined as "festive, with a lot of entertainment: concerts, storytelling, circus workshops, makeup for children, giant games, etc." (Ouest-France.fr).

Many articles in the French national press testify that the citizenry welcomed the opening of the new public space with great enthusiasm and interest: in the centre of the Mail, the children's playground had had many constraints for those living nearby, one of whom recently declared: "Now we really appreciate it. What is surprising is that there are no more cars. It is much quieter. Listen, it's almost silent!" (Ouest-France.fr, 2014). In 2017, two years after the inauguration of the new public space, both the national press and the international press continued to describe the happy outcomes of this redevelopment project, which has transformed a neglected area into a "trendy neighbourhood" (Gicquel, 2017). Since the inauguration, the Mail François Mitterand has become the scene of many sporting and cultural events, as well as becoming a place for strolling and going out . In 2017, the first edition of the "Urban Trail de Rennes" was organized, in which more than 3.300 people took part, while during the 2016 edition of the "Maintenant" music festival, the Mail was decorated with artistic installations that enlivened the new public space (Fig. 48 and 49). The city of Rennes has been able to organize and manage numerous initiatives, which have registered huge success among citizens and tourists, as evidenced by the many videos uploaded on Youtube and on various social media.

The redevelopment project of the Mail François Mitterand was undertaken with a final cost of 9.000.000 Euros. It was selected by Landezine as one of the best landscape projects, being nominated for the Landscape International Landezine Award (LILA) 2018 for the following reasons: «*The François*

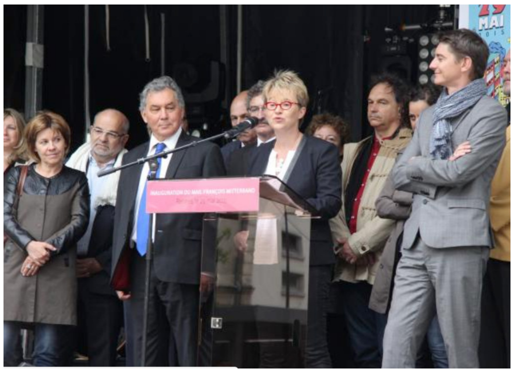


Figure 47: The inauguration of the new "Mail" on May 29th 2015, in the middle of the image the Mayor Nathalie Appere. Source: Ouest-France.fr

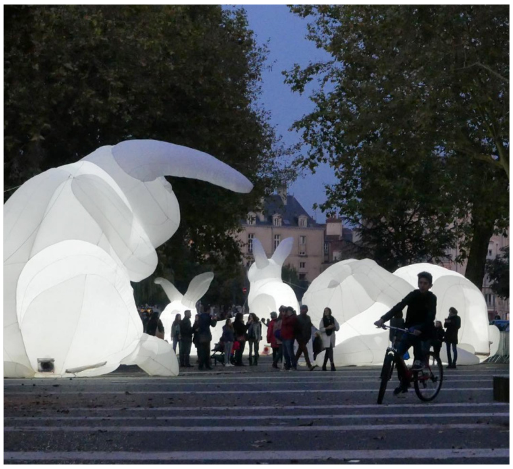


Figure 48 : Night view of the "Maintenant" festival that took course along the Strip in 2017. Source: Courtesy of Mutabilis.

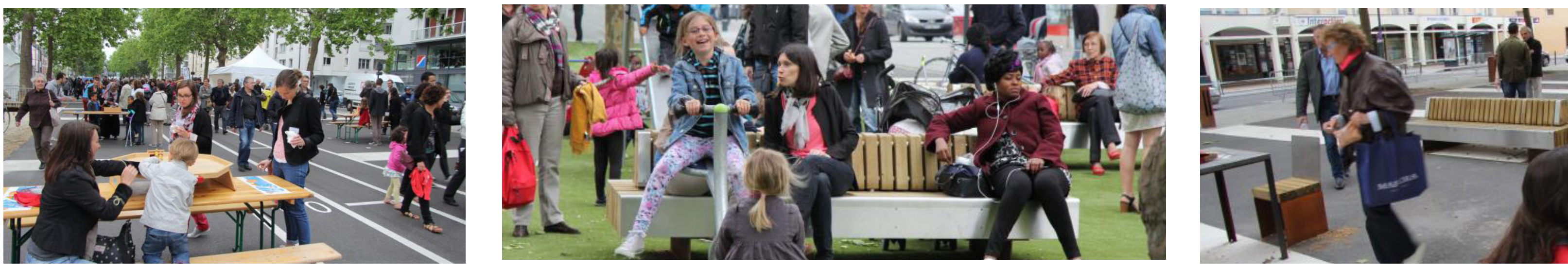


Figure 46: Images taken during the inauguration of the renovated Strip in 2015. Source: Ouest-France.fr

Mitterrand strip is thus in the process of becoming a major public space again, that is welcoming and comfortable, as it once was. The project was the trigger for a real urban transformation of this part of the city. It now offers to the inhabitants a large open space where they can find various uses, where they can meet, picnic, walk, go to an organic food market, play, go to concerts, rest in the sun […] The city of Rennes has supported this place since the inauguration, contributing to making it even more alive» (Landezine-award.com).

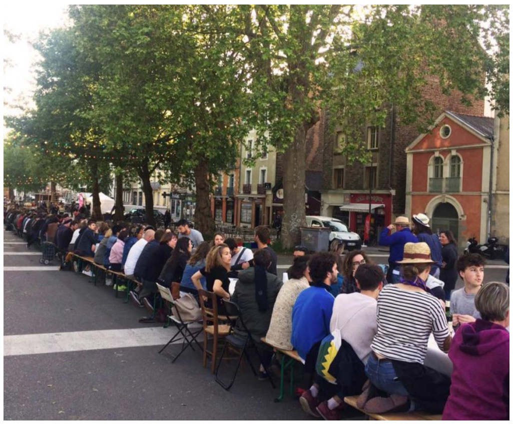


Figure 49: Citizens having lunch on the "New" Mail. Source: Courtesy of Mutabilis.

The project triggered new strategies of development for the public space of the City of Rennes, fuelling, in particular, its willingness to place its waterways at the heart of urban policy and its sustainable development strategy. The real estate projects along the river Ille and the Canal Saint-Martin are emblematic of this strategy: at the confluence of the Ille and Vilaine, a new project will aim to redevelop the Islet of the Grant at the end of the mail François Mitterrand facing the Confluence Garden, where three buildings of 135 homes and a place on the shore will be built in 2020. Ultimately, the banks will also host 1,000 m2 of businesses; MVRDV Rotterdam was chosen to carry out this project (Paoli-Lebailly, 2016).

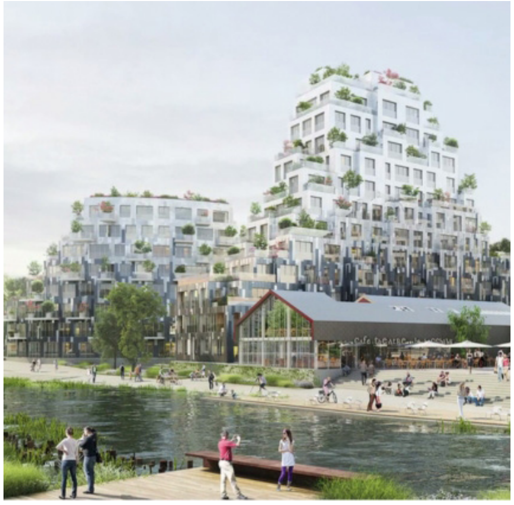


Figure 50: Project rendering of the new "Ilot de l'Octroi". Source: Giboire.com

In the neighbourhood of the "Ilot de l'Octroi" 135 new housing units will be built, composed of curved buildings with staggered heights, which will accentuate the openness of the confluence space and the view of the Jardin (Fig. 50). This project is called "Ascension paysagère" and was developed by a team consisting of the MVRDV agency (Winy Maas, Jacob van Rijs and Nathalie de Vries, Rotterdam, the Netherlands), ALL (Agence Laurent Lagadec, architects, Rennes), Giboire (promoter), SNC Lavalin (technical studies office) and Franck Boutté (environmental engineer), winners of the public contest launched by the Rennes Municipality in spring 2016, with the aim of developing the new profile of the Ilot de l'Octroi. This will ratify the completion of the redevelopment of this area of the city.

INTERVIEW WITH RONAN GALLAIS

Your studio groups together a team of 15 people between landscape urban planners, landscape designers, architects, engineer-landscape designers, dealing with a great diversity of projects with the purpose of "changing what needs to be changed" (Fig. 51); How does this philosophy influence your projects? how would you define your design approach?

M*utatis mutandis* is something that has been found after several years of experience; it is not an imposed philosophy, but one revealed by our work and our approach, which is always based on the principle of avoiding ready mades… That means that, we realized, we are often called by subjects that are totally different, the program is very consequent, very complicated and very ambitious… But sometimes places are already quite good and changing a few things would be enough. In fact, we always adjust the proposals according to the clients, obviously, but also according to places!

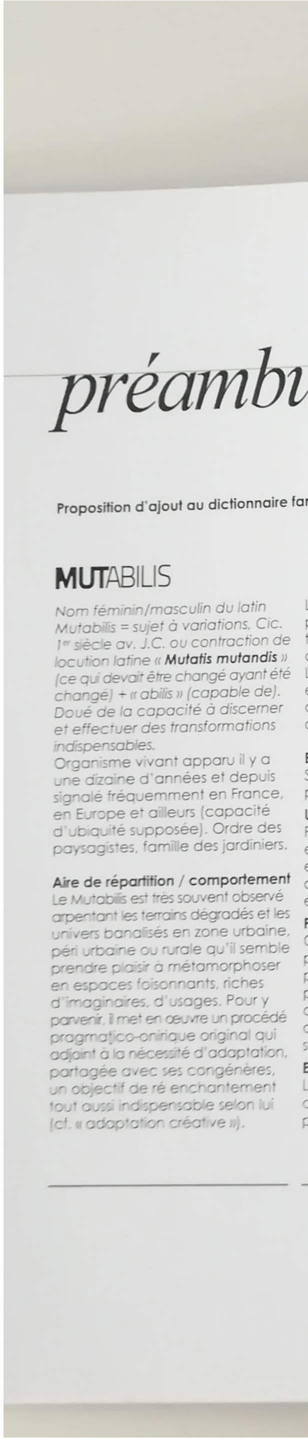
When we arrive on a site, we normally have a program, but it's during the discussion meeting between the clients and the manufactures of the projects, that the correct answer can be found, most of the times it can be found in some things to reveal, that are already there.

So, our design approach comes from this general observation: there are some projects that we wanted to design in a quite minimalist way, claiming a more profound work on the development of the environment and on the restitution of the flora and fauna habitat…sometimes, just the creation of a path, can be enough to make an habitat emerge and enhance its quality. There are other times where the site is so complex and so saturated that the program, instead, serves us to tell a new story, out of context.

Mutatis mutandis it's really the study of the understanding of the program and of the site at the same time, with a fair dosage of the two, we make good answers to the problems we deal with!

The Francois Mitterrand Strip is a major historic site for the city of Rennes, which has been heavily transformed during the centuries. What were the constraints of the area?

The context of the project is in Brittany, an historic site of built heritage, at the confluence of the Ille and Vilaine rivers, and a large infrastructure that crosses the city and its rivers. The area is very close to the town centre, but the commercial activities were random and the place was like a gigantic car park, with two streets on each side.



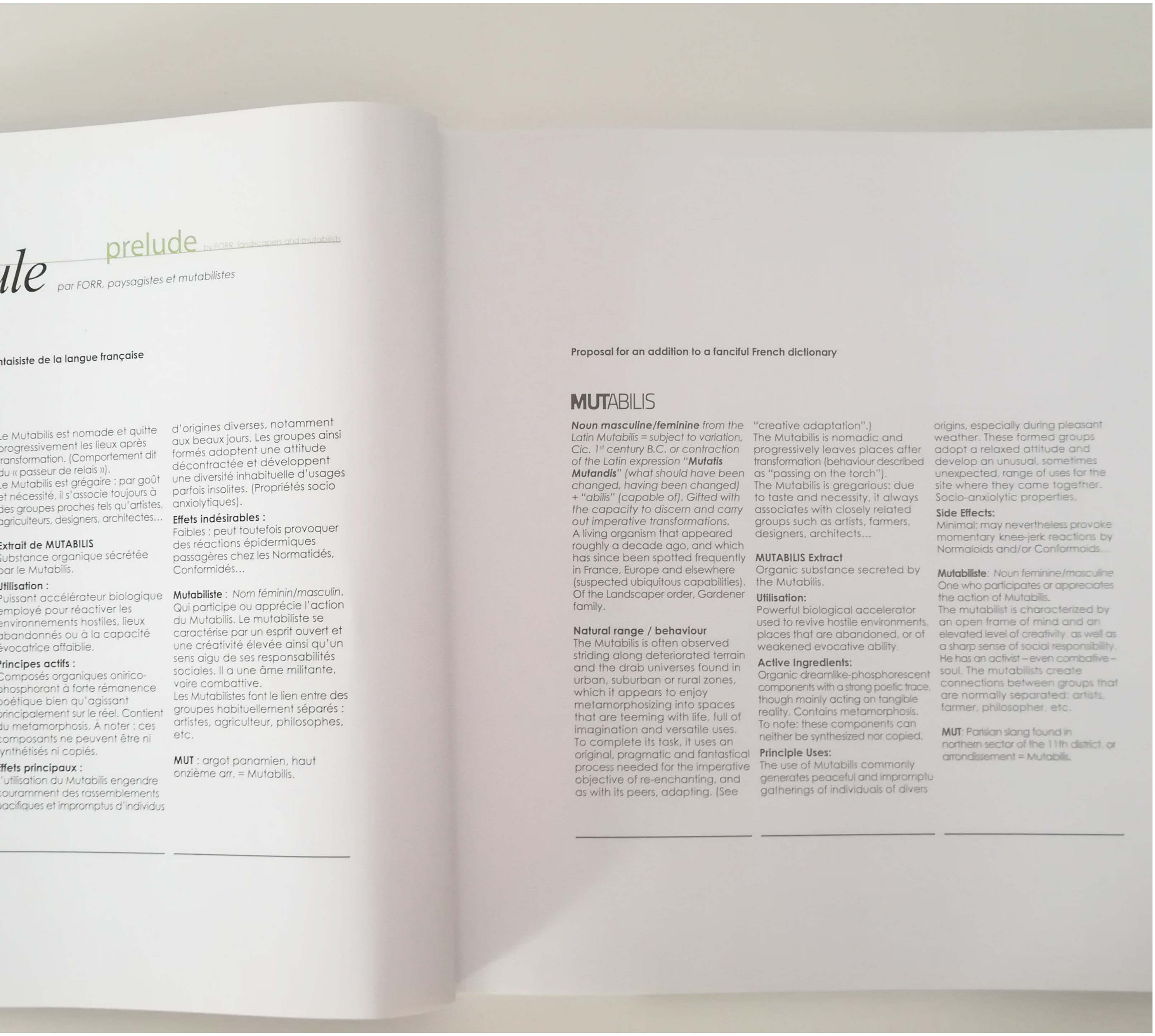
préambu

Proposition d'ajout au dictionnaire fa

MUTABILIS

*Nom féminin/masculin du latin Mutabilis = sujet à variations, Cic. 1er siècle av. J.C. ou contraction de locution latine « **Mutatis mutandis** » (ce qui devait être changé ayant été changé) + « abilis » (capable de). Doué de la capacité à discerner et effectuer des transformations indispensables.*
Organisme vivant apparu il y a une dizaine d'années et depuis signalé fréquemment en France, en Europe et ailleurs (capacité d'ubiquité supposée). Ordre des paysagistes, famille des jardiniers.

Aire de répartition / comportement
Le Mutabilis est très souvent observé arpentant les terrains dégradés et les univers banalisés en zone urbaine, péri urbaine ou rurale qu'il semble prendre plaisir à métamorphoser en espaces foisonnants, riches d'imaginaires, d'usages. Pour y parvenir, il met en oeuvre un procédé pragmatico-onirique original qui adjoint à la nécessité d'adaptation, partagée avec ses congénères, un objectif de ré enchantement tout aussi indispensable selon lui (cf. « adaptation créative »).



ule

prelude by FORR, landscapers and mutabilists

par FORR, paysagistes et mutabilistes

ntaisiste de la langue française

.e Mutabilis est nomade et quitte
progressivement les lieux après
ransformation. (Comportement dit
du « passeur de relais »).
.e Mutabilis est grégaire : par goût
et nécessité, il s'associe toujours à
des groupes proches tels qu'artistes,
agriculteurs, designers, architectes…

xtrait de MUTABILIS
ubstance organique sécrétée
par le Mutabilis.

Jtilisation :
Puissant accélérateur biologique
employé pour réactiver les
environnements hostiles, lieux
abandonnés ou à la capacité
évocatrice affaiblie.

rincipes actifs :
Composés organiques onirico-
phosphorant à forte rémanence
poétique bien qu'agissant
principalement sur le réel. Contient
du metamorphosis. À noter : ces
composants ne peuvent être ni
ynthétisés ni copiés.

ffets principaux :
'utilisation du Mutabilis engendre
couramment des rassemblements
pacifiques et impromptus d'individus

d'origines diverses, notamment aux beaux jours. Les groupes ainsi formés adoptent une attitude décontractée et développent une diversité inhabituelle d'usages parfois insolites. (Propriétés socio anxiolytiques).

Effets indésirables :
Faibles ; peut toutefois provoquer des réactions épidermiques passagères chez les Normatidés, Conformidés…

Mutabiliste : *Nom féminin/masculin.* Qui participe ou apprécie l'action du Mutabilis. Le mutabiliste se caractérise par un esprit ouvert et une créativité élevée ainsi qu'un sens aigu de ses responsabilités sociales. Il a une âme militante, voire combattive.
Les Mutabilistes font le lien entre des groupes habituellement séparés : artistes, agriculteur, philosophes, etc.

MUT : argot panamien, haut onzième arr. = Mutabilis.

Proposal for an addition to a fanciful French dictionary

MUTABILIS

Noun masculine/feminine *from the Latin Mutabilis = subject to variation, Cic. 1st century B.C. or contraction of the Latin expression "**Mutatis Mutandis**" (what should have been changed, having been changed) + "abilis" (capable of). Gifted with the capacity to discern and carry out imperative transformations.*
A living organism that appeared roughly a decade ago, and which has since been spotted frequently in France, Europe and elsewhere (suspected ubiquitous capabilities). Of the Landscaper order, Gardener family.

Natural range / behaviour
The Mutabilis is often observed striding along deteriorated terrain and the drab universes found in urban, suburban or rural zones, which it appears to enjoy metamorphosizing into spaces that are teeming with life, full of imagination and versatile uses. To complete its task, it uses an original, pragmatic and fantastical process needed for the imperative objective of re-enchanting, and as with its peers, adapting. (See "creative adaptation".)
The Mutabilis is nomadic and progressively leaves places after transformation (behaviour described as "passing on the torch").
The Mutabilis is gregarious: due to taste and necessity, it always associates with closely related groups such as artists, farmers, designers, architects…

MUTABILIS Extract
Organic substance secreted by the Mutabilis.

Utilisation:
Powerful biological accelerator used to revive hostile environments, places that are abandoned, or of weakened evocative ability.

Active Ingredients:
Organic dreamlike-phosphorescent components with a strong poetic trace, though mainly acting on tangible reality. Contains metamorphosis. To note: these components can neither be synthesized nor copied.

Principle Uses:
The use of Mutabilis commonly generates peaceful and impromptu gatherings of individuals of divers origins, especially during pleasant weather. These formed groups adopt a relaxed attitude and develop an unusual, sometimes unexpected, range of uses for the site where they came together. Socio-anxiolytic properties.

Side Effects:
Minimal; may nevertheless provoke momentary knee-jerk reactions by Normaloids and/or Conformoids…

Mutabiliste: *Noun feminine/masculine*
One who participates or appreciates the action of Mutabilis.
The mutabilist is characterized by an open frame of mind and an elevated level of creativity, as well as a sharp sense of social responsibility. He has an activist – even combative – soul. The mutabilists create connections between groups that are normally separated: artists, farmer, philosopher, etc.

MUT: Parisian slang found in northern sector of the 11th district, or arrondissement = Mutabilis.

Figure 51: Preface of the book "Mutatis Mutandis: changing what needs to be changed" (edited by Juliette Bailly Maitre and Ronan Gallais), illustrating the major projets of Muabilis Paysage et Urbanisme. Source: Author.

The project was commissioned from your practice after a public consultation, what was your proposal about?

The project is part of a broader scheme of Rennes local council, which has decided to reinvest in these spaces, starting in the 90's with a big project, by Alexandre Chemetoff, concerning the requalification and densification of the residential areas south of the Mail.

We started with the idea of reclaiming the space on the whole area of the strip for the public! The major constraint for this axis was the east-west bus line, and the desire to conserve one road to be separate from regular traffic. The Strip, 50 meters wide and the 850 meters long, was supposed to contain cars in the northern area, buses in the south and a central median lane for pedestrians.

After comparing the results of this layout we suggested moving the pedestrian median strip to the north, instead, so as to offer better contact between the pedestrian space and the commercial one on the ground, thus favouring a southern exposure. This principle was decisive in winning the commission for the project, but not easy to accept! Getting into politics and transport was very risky, it was important to balance the use of busses and cars well… Finally, the municipality understood our proposal!

The Mail is literally on of the doorstep of the city centre, so it was necessary to create a landscape with urban uses there…a garden and the idea of putting plants where vehicles had been, frankly, didn't seem to suit the location, we needed to create a versatile space, capable of conversion, in case of needing to install a farmer's market or other events. So, we proposed a sort of gradient of the intensity of uses, and a gradual change of pavements…from a very mineral one... until things mix a little more and finally a large part in lawn on the west side, which is the *Jardin de la Confluence,* where the contact with the water is re-gained.

What kind of historical investigation did you conduct while drawing up the design?

The historic design, at the beginning of the nineteenth century was a large perspective planted with trees alignments and a stabilized space at the center. It was a well known promenade where people liked to stroll. Our project proposed to keep what was truly the heritage of the site, essentially the historical trees, reinforcing the linear dynamic of the Mail, the perspective on the monuments in the old city, finally reshaping the area as true a promenade, a place where people can walk, play, have fun and meet.. A place of uses.
Now that this public space has been reclaimed, people realized that there are not enough of those kind of spaces, especially in the city centre…

What about the identity of this rich historical urban landscape?

The Bretons are very proud of their landscape and culture…So we found inspiration in the Breton flag and we played with it! The black and white colours, references to Brittany, were the basis of a very funny, playful graphic design we laid out on the surface of the public space.

That is to say that with these two colours we managed to recall the identity of the place as well in a very poetic way, drawing animals onto the surface, like the ermine which it is the symbol of Brittany, but we also used white lines to expand or narrow down spaces, giving them measurements and rhythm.

Did you draw up any sustainable urban drainage solutions for the project?

The project includes two relatively different parts: the first is the *"promenade du Mail François Miterrand"* which is quite urban, as I said before. The second part of the projet is le *"jardin de la confluence"* which is the confluency of two rivers, the Vilaine and the Ile. This garden was a piece of land, a kind of lost garden: closed, without identity and without contact with water although it is surrounding by water... We greatly transformed the banks of the site, opening the site on its environment and finding a new use for the space.

Today, it's a nice place where people like to sit, to picnic, a place where biodiversity came back. The garden is occasionally submerged, that is to say we gave back to the environment the wetlands biotope. There are no Sustainable Urban Drainage Systems except the management of the banks; the south side is much more natural, while the north one a little more architectural with a deck for boats. We created a very pleasant habitat for ducks and fishes, and we planted a lot of *taxodium*, a tree characteristic of wetlands which turn red and orange during winter.

What about the design of the furniture?

We designed almost all the furniture of the project. Benches, fences... The graphic identity of every of our project is higly curated.
In the garden and along the strip we placed three gazebos that we designed as landmarks: people meet there and enjoy the landscape or some shade.
The project is made of little simple details...which we elaborated with an artist, Stephanie Buttier, who made the metal braiding on the upper part.

We like to work with artists during the conception of project, it's one of our characteristic. We integrate their work in our design so that they are not simple addings in the project, although we still control the global design.

Was the budget enough to carry out the project proposal?

We had a budget that was comfortable enough to realize some parts with stone but we had to make choices anyway. We couldn't have such a high quality on all the surfaces. We reserved granite stone for the pedestrian structure but proposed asphalt in the middle part which is less expansive but also an interesting material. We thought that a "black board" would enable us to create a very strong iconography…
A shimmering asphalt concrete for the centre of the strip was the perfect material to allow diverse uses (to play, to bicycle, for a market, for events...) but at the same time gave us the opportunity to use black and white as the reference colors for this landscape.

What were the phases of the design program?

In the context of projects and contracts, we always have a schedule to respect, depending on the size of the project…although the phases are almost the same for small or big projects.
For the Mail F. Mitterrand, we first did "an offer" which is a process a bit different than a competition because it deals with design and economic offer at the same time.

After that, when we won the project, on each step, from the first design to the realisation, we worked many hours at the studio, making many sketches and gradually finalizing the design. On each phase, the project management has to valid the progression...

Have public participation strategies been implemented?

We see our projects in a very social dimension... we work for people, so our visions always try to fulfil the needs of the people who lives there…of course some will be more satisfied than others... but we always design according to the different communities involved…

We proposed a kind of educational dialogue with children and then we developed their suggestions in our project! They came to the site for a few days and we gave them a questionnaire to know what they wanted to see in the future and what they thought was missing in this sector. They were given a pedagogical approach to the space, measuring it with their bodies and they had very innocent desires... that we tried to incorporate as much as possible into the project.

The project was the trigger for a real urban transformation of this part of the city, and the multi-functionality of the new space created is certainly one of the aspects that made this transformation possible. There are many videos on Youtube showing how this "strip" has now become a centre for events and a meeting point for citizens.

Have you developed an implementing strategy of events for the area with the municipality, or the neighbourhood associations, or was this appropriation of the site "spontaneous"?

The Mail François Mitterrand is a success considering all the uses now and we are happy about it! More than what we expected and what we organised, it has become a space for the most far-fetched uses one could imagine! It is a space able to host many functions which can superimpose.
Uses are necessarily guided more or less by the political will and also, for sure, by the structure of the project. But in fact , after the delivery of the project, both the municiplaity and the local communities took advantage of the all place. The township put up an organic market, not competing with the one nearby and the wellknown "Marché des Lices" in the old city…
New shops were put in place and there is an association called the "Mail Association" which hosted, for example, a dinner with 400 guests there! I guess the space is very adaptable and it leads people to do activities! Today the Mail F.Mitterrand is a very trendy neighborhood..

Has the project given rise to further urban regeneration strategies? If so, which ones?

I'm not aware of it… but what I know is that, today, the Mayor, Nathalie Appéré , uses the François Mitterand Strip as an example of transformation for the city, to say that the strategy is to reclaim outdoor spaces, which is really necessary!

How would you define the new landscape of the François Mitterand strip? Is there something you would do differently?

Urban, festive and reconciliatory! No, we are very happy with it!

In your opinion, can this project be defined as a source of knowledge for the transformation processes of urban spaces in terms of the process of designing, reading and preserving historical and geographical traces, sustainability, flexibility and multifunctionality of urban space?

Sure! It sounds pretentious…but I would love it to be so! The project is a success, but we are responsible for it just in part…we are a small part of a bigger chain. From the moment we took over the project we worked as hard as we could… this, for sure, can be considered an exemplary approach!

How would you define your design approach?

We never try to monopolize the program, we try to transcend it… In this project, like in many others, we never got set on fixed ideas…Everything is in the right proportion because we discussed every single intervention a lot. The François Mitterrand Strip and the park of Chemin de l'Ile, are both beautiful examples of our approach...our heart, hope and enthusiasm is there! It benefits the projects because they live and breathe it!

Did you work on any similar project?

Yes, the Garden of the Giants in Lille (Fig. 52), a very unusual garden built to replace a car park, where invented a story to give back an identity to the place.

The site is very peculiar… a giant car park, next to the train station and at the foot of the urban community of Lille. We created a garden of emotions and exceptions, a super- ambitious project with a very good budget, (it was five million Euros for about 3 Ha). We reconfigured the urban mosaic creating a new surface above the car park, divided into three different parts… we got inspired by Italian gardens…especially Villa d'Este. Once the layout of the spaces was defined, we invented a story to be told to the visitors...we conceived an allegorical garden to evoke the story of Giants, who dug into the lifeless soil and found the water necessary for fertility and the life of a new landscape!

Paris, May 4th 2018.

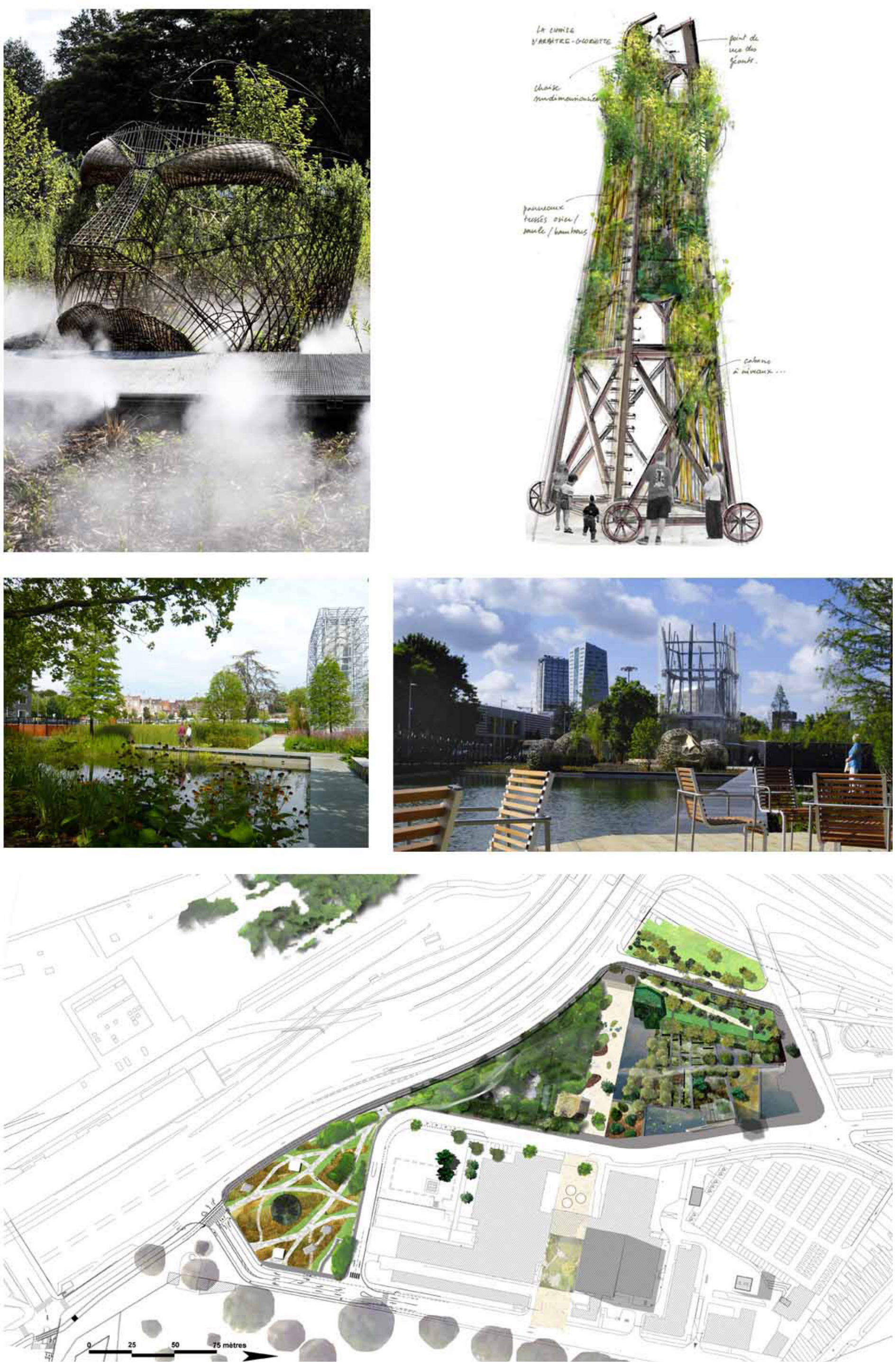
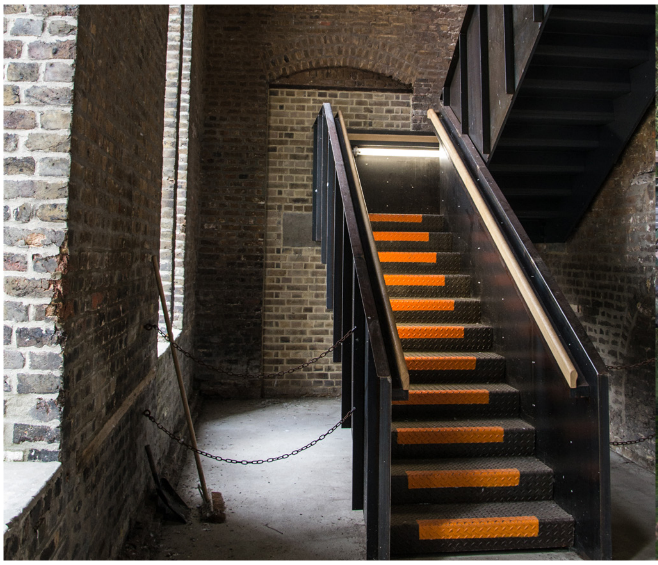

LA CHAISE D'ARBITRE-GLORIETTE
point de vue des Géants.
chaise surdimensionnée
panneaux tressés osier / saule / bambous
cabane à niveaux ...
0
25
50
75 mètres

Figure 52: Details, views and plan of the "Jardin des Geants". Source: Courtesy of Mutabilis.



3.5 LANDSCAPE AS INFRASTRUCTURE

Case Studies

Chemin de l'Ile Park

Walthamstow Wetlands

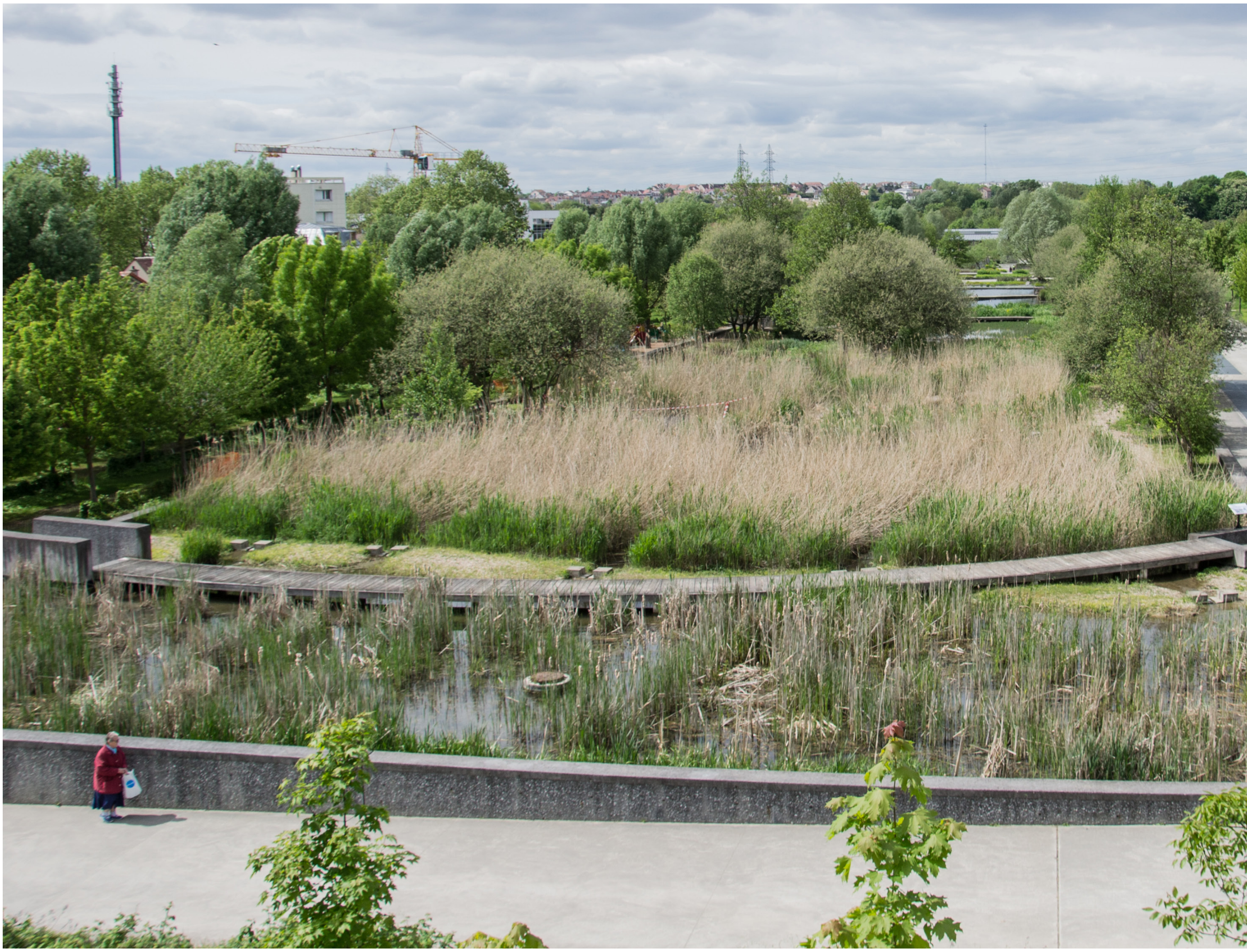


Figure 1: View of Chemin de l'Ile Park. Source: Author, 2018.

CHEMIN DE L'ILE PARK

PROJECT DATA

Location:

Nanterre, France.

Client:

EPASA (owner), Conseil Régional d'Ile de France, Conseil Général des Hauts-de-Seine (leading contractor), Ville de Nanterre.

Budget:

25,2 Million euros VAT for 39 ha,

Effective Cost of the Development:

11 Million euros VAT for 14,5 ha

Design Period:

Competition: 1999

Construction Period:

2004-2006

Total Area included in the Competition: 39 ha

Tranche 1: 14, 5 ha

Meadow Surfaces: 71.000 m2

Planted Trees: 25.000

Community Gardens Surfaces: 6.500 m2

Basins and Reedbeds: 17.500 m2

Designers:

Landscape Architecture:

Guillome Geoffroy-Dechaume and MUTABILIS paysage et urbanisme (Project representative),

Gilles Clement (Contractor Consultant)

Architecture:

Chemetov et Huidobro C+H

Hydraulic Studies:

SOGREAH

Ecology:

CEPAGE

Hydraulic systems and Consultancy on the Renaturalization of the River Banks:

SITE ET CONCEPT

SITE ANALYSIS

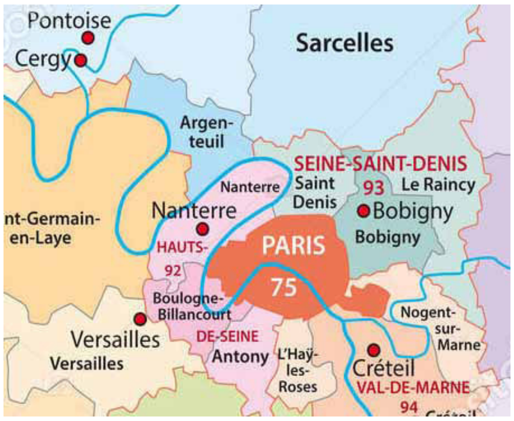


Figure 2: Map of the political boundaries of the Ile de France.

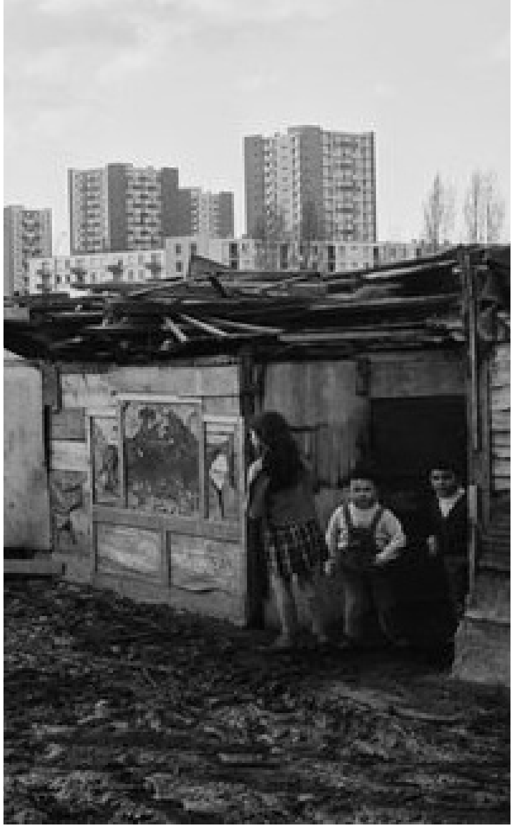


Figure 3: Nanterre, the "Pâquerettes" shantytown, adjacent to the Nanterre prison and the construction of the Canibout district in the background between 1959 and 1968. Source: quieora.ink

Geographical and Historical Context

The municipality of Nanterre is located in the north-west suburbs of Paris. It is in the Hauts-de-Seine Département in the Île-de-France region and is the second most populous city in both the Département and the region (Fig.2). The alluvial territory of the meander of the Seine to the north-west of Paris, where the city of Nanterre is located, was already occupied by Celtic populations at the end of the 4th century BC because of its strategic position, which made it possible to control river trade while taking advantage of its fertile soils.

The area corresponding to the current district of Chemin de l'Île and the old town centre have a long history of human occupation. Land use remained predominantly agricultural until the development of the railway line in 1837, which connected Paris to Saint-Germain-en-Laye. Rail transport fuelled large-scale urban development near the station, leading to the creation of large residential neighbourhoods of popular houses for the inhabitants of Paris, whilst promoting the process of dislocation of the poorest residential districts in the district of Chemin-de-l'Île. At Nanterre, industrialists found large and inexpensive land far from the residential area of the old town, which was ideal for the installation of several docks along the river Seine.

Following the 1914-1918 war, there was a process of industrial development that was dedicated to several sectors: chemistry, perfumery, pharmaceuticals, metallurgy, foundries, food and, finally, the automotive industry, making Nanterre an industrial manufacturing centre of great national importance. In the 1960s, the district of Chemin de l'Île became known for its "slums" (Fig.3).

In 1968, there were nine shantytowns in Nanterre, the two largest of which covered the entire current extension of the district of Chemin de l'Ile and numbered 5,233 inhabitants. These shantytowns, built by the inhabitants themselves, were occupied by Portuguese, Spanish and North African people, who provided abundant unskilled labour at a very low price. The real estate crisis in France led the government to build social housing, largely constructed by the inhabitants of the shantytowns. It took almost 40 years to completely eliminate the shantytowns of Nanterre and relocate all the inhabitants (Legris, 2005).

The shantytowns surrounded the paper factory going by the name of "Papeterie du Petit Parisienne" (Fig. 4), which obtained its water from the Seine and remained operational from 1904 to 2011, occupying an area of 16 hectares (Nanterre info, May 2004).

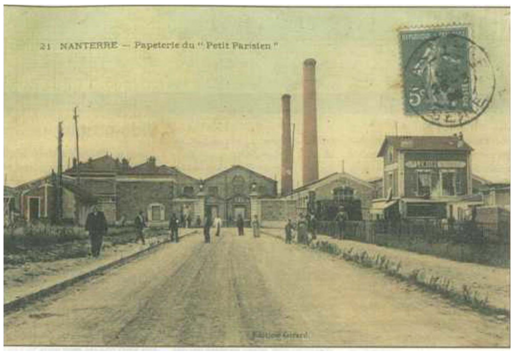


Figure 4: Historical photo of the entrance to the "Papeterie de la Seine". Source: Nanterre Info, May 2004.

In the second half of the twentieth century, the presence of the slums and the factory on the banks of this stretch of river made this district one of the most dangerous in the Parisian metropolitan area.In 1972, with the implementation of the RER network of metropolitan railway services and finally with the creation of the A14 motorway in 1996, the industrial area and the land once occupied by the slums became a wasteland, enclosed between the Seine and the transport infrastructure (Fig. 5).

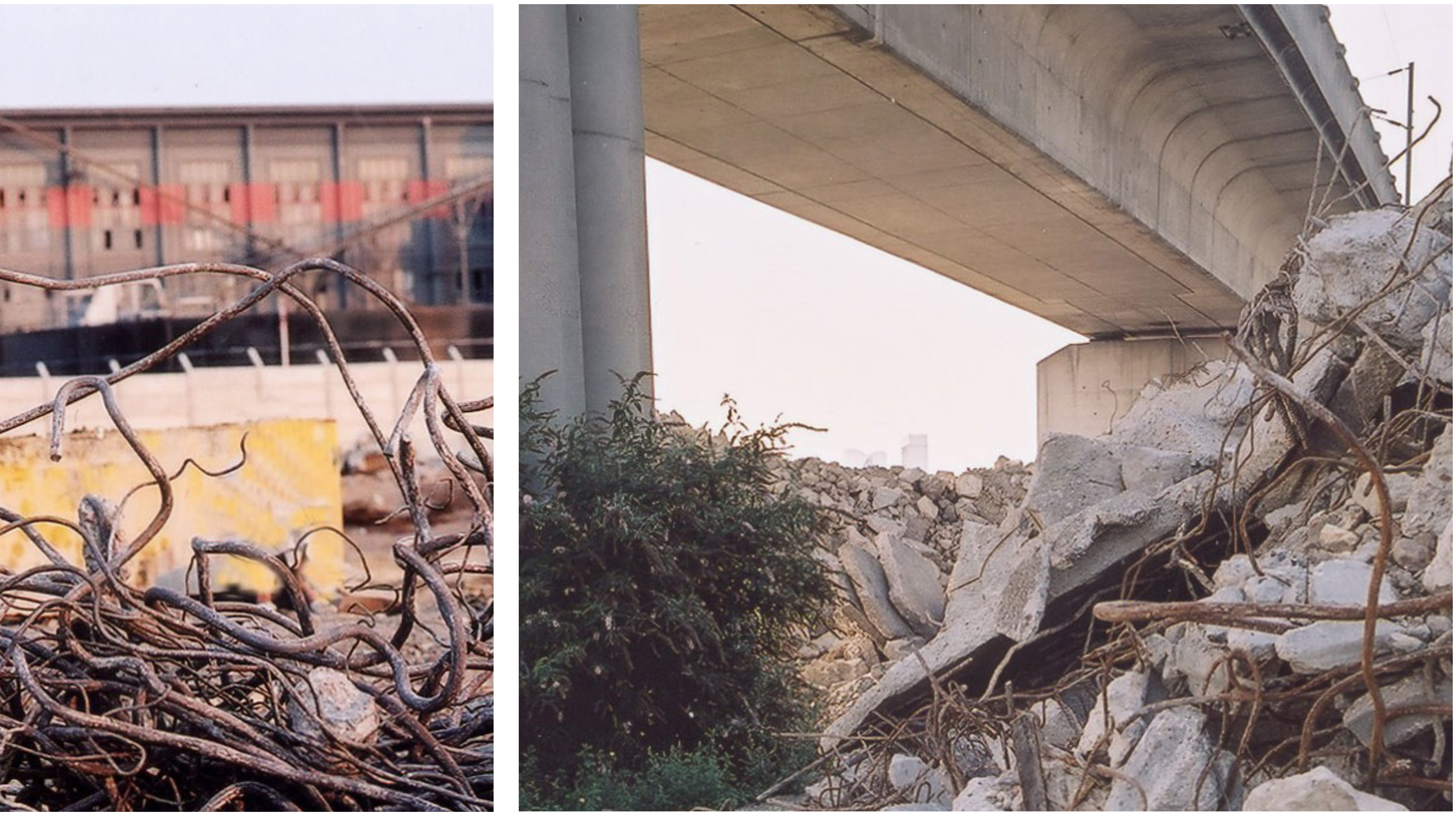


Figure 5: Left: Materials of construction of the viaducts left on the area of construction of Chein de l'Ile Park, in the background the ex paper factory's building stands out; Right: the area below the viaduct of the A14 before the park's project completion. Source: Courtesy of Mutabilis.

DESIGN, DEVELOPMENT AND DECISION-MAKING PROCESS

The site of the former *Papeteries de la Seine* is laden with environmental constraints, indicated by the Local Urban Plan of Nanterre (PLU 2016). The project area is isolated from the rest of the city owing to the presence of the motorway junction A14-A86, which causes noise pollution in the residential district facing the Hauts-de-Seine prison (Fig. 6).

Although the site perfectly illustrates «*the devastating consequences of the construction of infrastructure without respecting the territories in which they are established*» (Nanterre.fr), the area holds countless opportunities for transformation. The development area is located in a strategic area of urban development and landscape continuity: at the intersection of the Seine and the "Louvre-Defense" axis, the project area is an outpost that prefigures the urban development of "La Defense" towards Nanterre (Bailly-Maitre, Gallais, 2014).

At the time of the pre-design stage (Fig. 7): «*the site along the Seine River is near the Nanterre prison, bordered by a closed Paper Factory, criss-crossed all over by infrastructure from local transportation (RER D /A14 / A86) and utilities (gas pipes, aerial power lines, etc.), with only one single fringe in contact with a residential neighbourhood*» (Bailly-Maitre, Gallais, 2014, p. 38).

Key Objectives of the Chemin de l'Ile Park project:

The ambitious vision for the creation of an urban park was promoted through a public competition, in 1999, organized by four partners, specifically for the creation of the park, respectively: the Municipality of Nanterre, the General Council of Hauts-de-Seine, the public management institution Seine Arche (EPASA), and the Agence des Espaces Verts of the Ile de France Region (www.hauts-de-seine.net). «*The creation of the urban park of Chemin de l'Ile is part of a large program characterized by a common theme: sustainable development*» (Bailly-Maitre, Gallais, 2014, p.38).

This program included the creation of a public urban park for Chemin de l'Ile and the creation of offices and accommodation on the A14 roof cover, with the final ambition of creating a consistent area of continuity (Fig. 8), expanding from the Grande Arche de la Défense to the banks of the Seine (David, Chateigner, 2012).

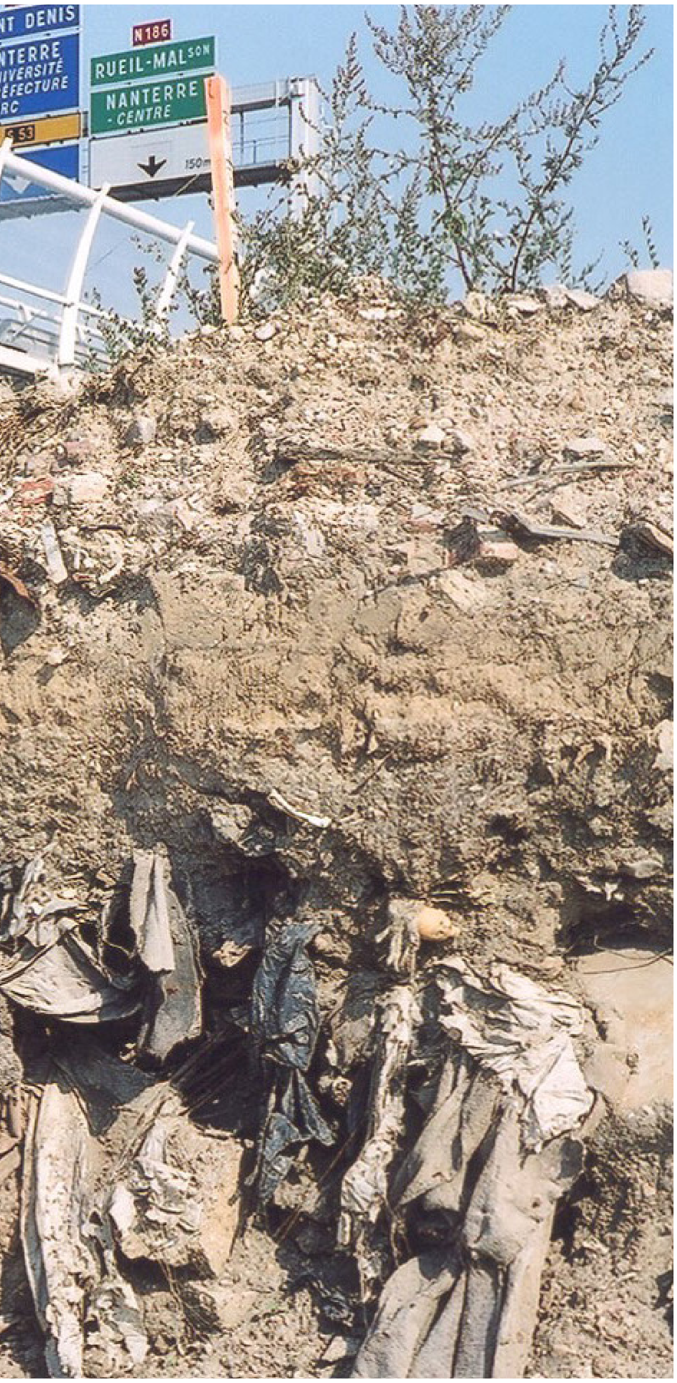

NT DENIS
NTERRE
IVERSITÉ
ÉFECTURE
RC
N186
RUEIL-MALSON
NANTERRE
- CENTRE
150m

Figure 7: Image of the area before the beginning of the construction works of the park. Source: Courtesy of Mutabilis.

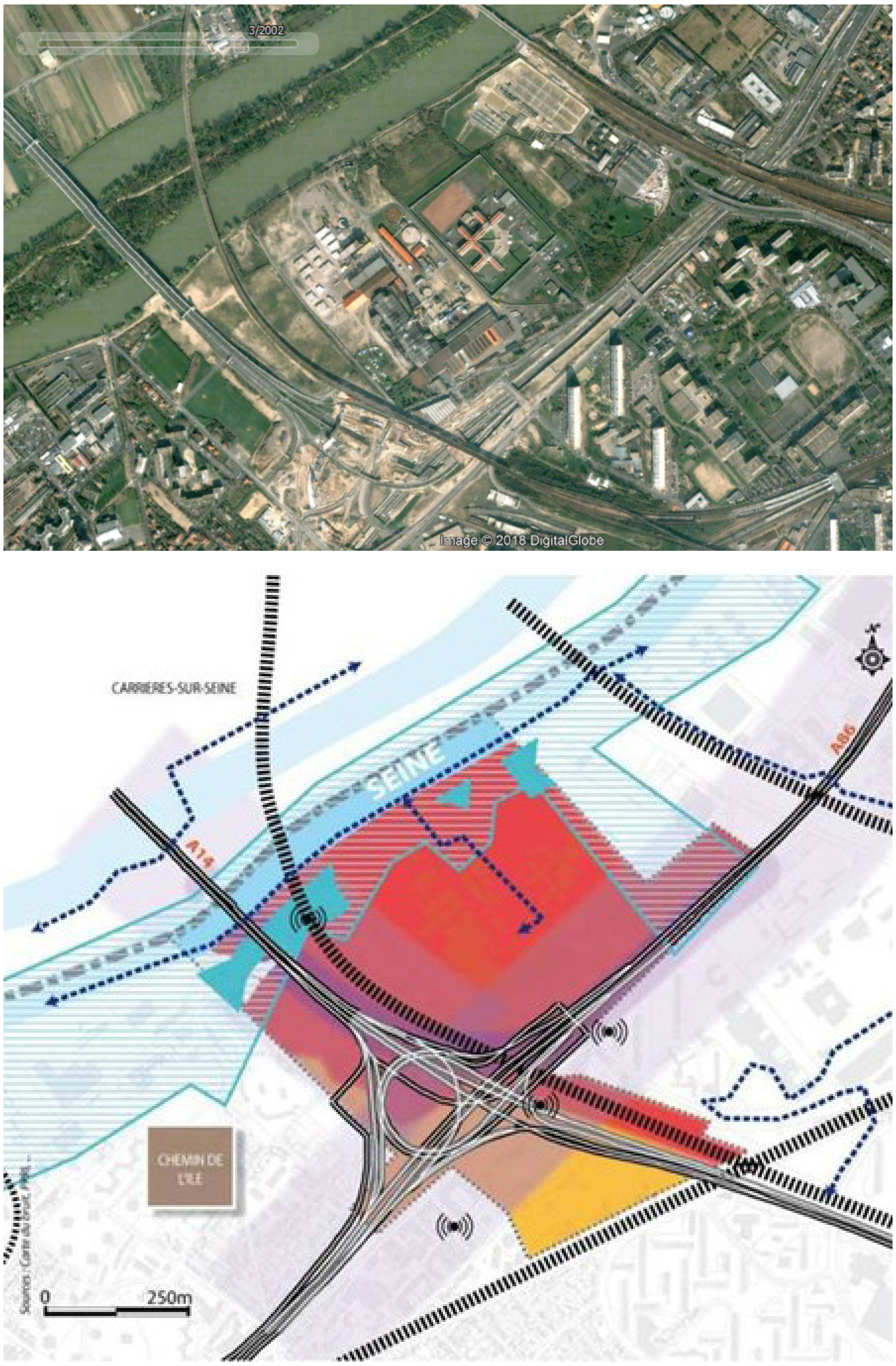

3/2002
Image © 2018 DigitalGlobe
CARRIERES-SUR-SEINE
SEINE
A14
A86
CHEMIN DE L'ILE
0
250m

Figure 6: Top: satellite image of the area of the Parc du Chemin de l'Ile and the "Papeterie" taken in March 2002; Bottom: extract from rom the map of environmental restrictions of PLU 2016 (Plan Local d'Urbanisme) of Nanterre. Source: Nanterre.fr

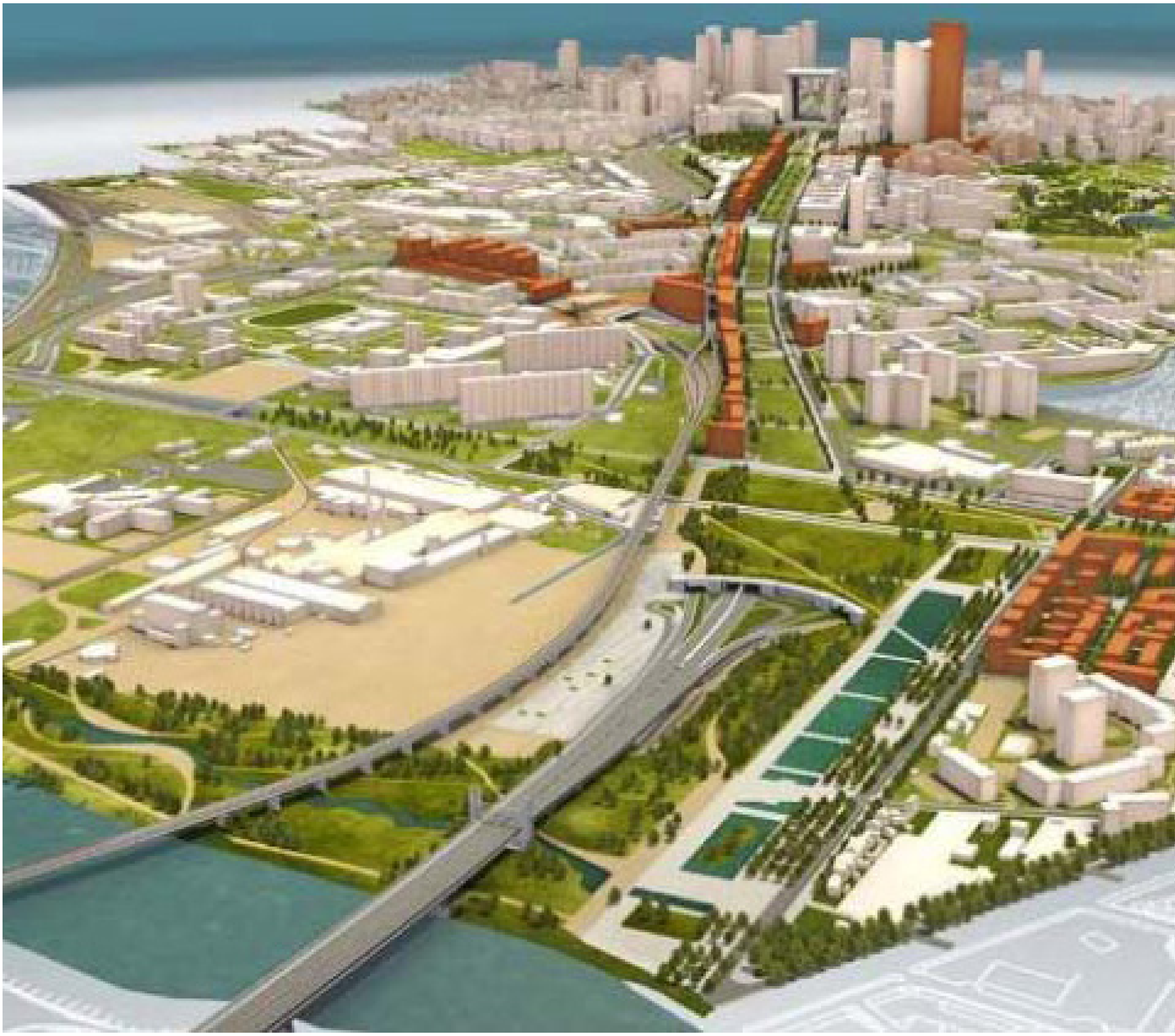


Figure 8: Rendering of the area transformation program, with the Chemin de l'Ile Park and the green continuity axis with the La Defense Arch, in orange the new buildings envisaged by the program can be noticed. Source: David, Chateigner, 2012).

Design Process:

The public competition for ideas was announced in 1999 and won, that same year, by the Landscape Architect Guillaume Geoffroy-Dechaume. The proposal put forward during the competition proposed exchanging a lot of land from part of the disused paper factory for other land, thereby gaining 500 additional meters of parkland in contact with the banks of the river Seine (David, Chateigner, 2012, Bailly-Maitre, Gallais, 2014).

The partnership between EPASA (leading contractor) and the general council of Hauts-de-Seine (responsible for carrying out operations) enabled the assignment of the ownership of the municipal land to the Département of the Seine and EPASA, in order to fund the re-naturalization of the banks along the river Seine. The final project was drawn up by an interdisciplinary team of professionals: landscape designers Guillome Geoffroy-Dechaume and Gilles Clement, Paul Chemetov for architecture (C + H +) and Atelier Cépage for ecology. When landscape architect Guillaume Geoffroy-Dechaume died, during the end of the study phase, the studio Mutabilis Paysage et Urbanisme, led by Juliette Bailly-Maitre and Ronan Gallais, was entrusted with the development of the winning project proposal (Interview with Juliette Bailly-Maitre, 2018).

The area identified for the creation of the urban park was amorphous and heavily altered in its topography due to the large amount of soil that was dumped on it during the construction of the railway and road transport infrastructures (Fig. 9). For these reasons, the Landscape Architects Ronan Gallais and Juliette Bailly-Maitre (Mutabilis Paysage et Urbanisme) opted for a strong "guiding principle" for the construction of the Chemin de l'Ile park: «*accepting existing factors at hand, instead of trying to erase them and also to make the best use of resources already present on the site […] From a physical angle, the resources included water from the Seine, industrial remnants which have survived on the site, or which were buried there, and an Anthropocene geological epoch, brought about by the slow stratification of the city*» (Gallais, Bailly Maitre, 2014, p. 38).

Nevertheless, Guillome Geoffroy-Dechaume wanted to «*consider nature as an ally and not as a guest*».

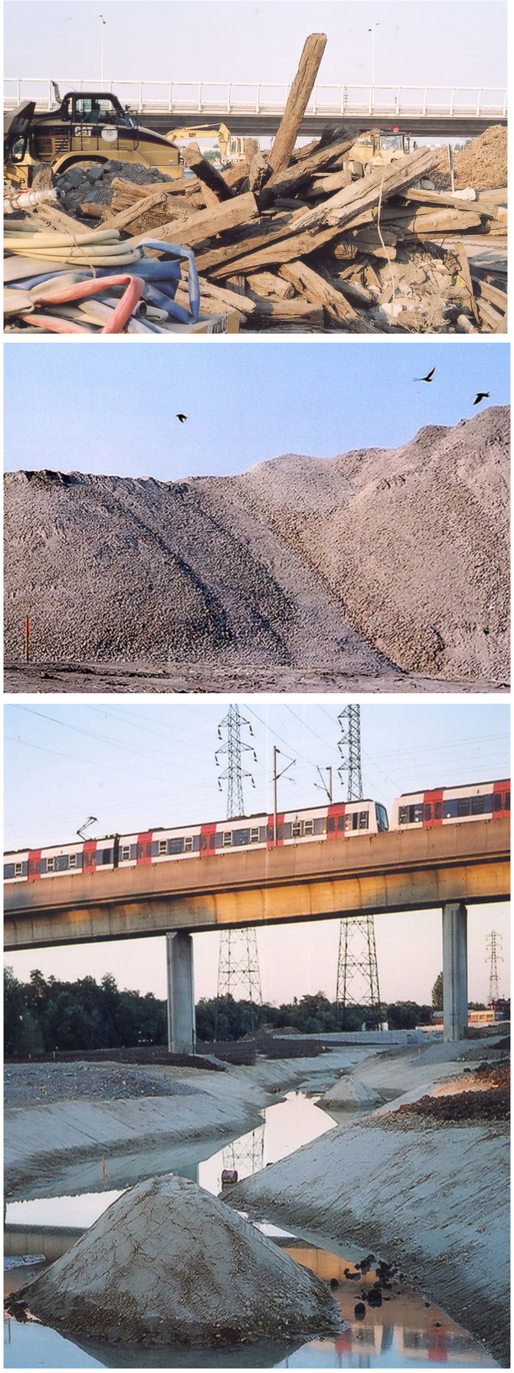


Figure 9: Images of the project area before the construction of the park. Source: Courtesy of Mutabilis.

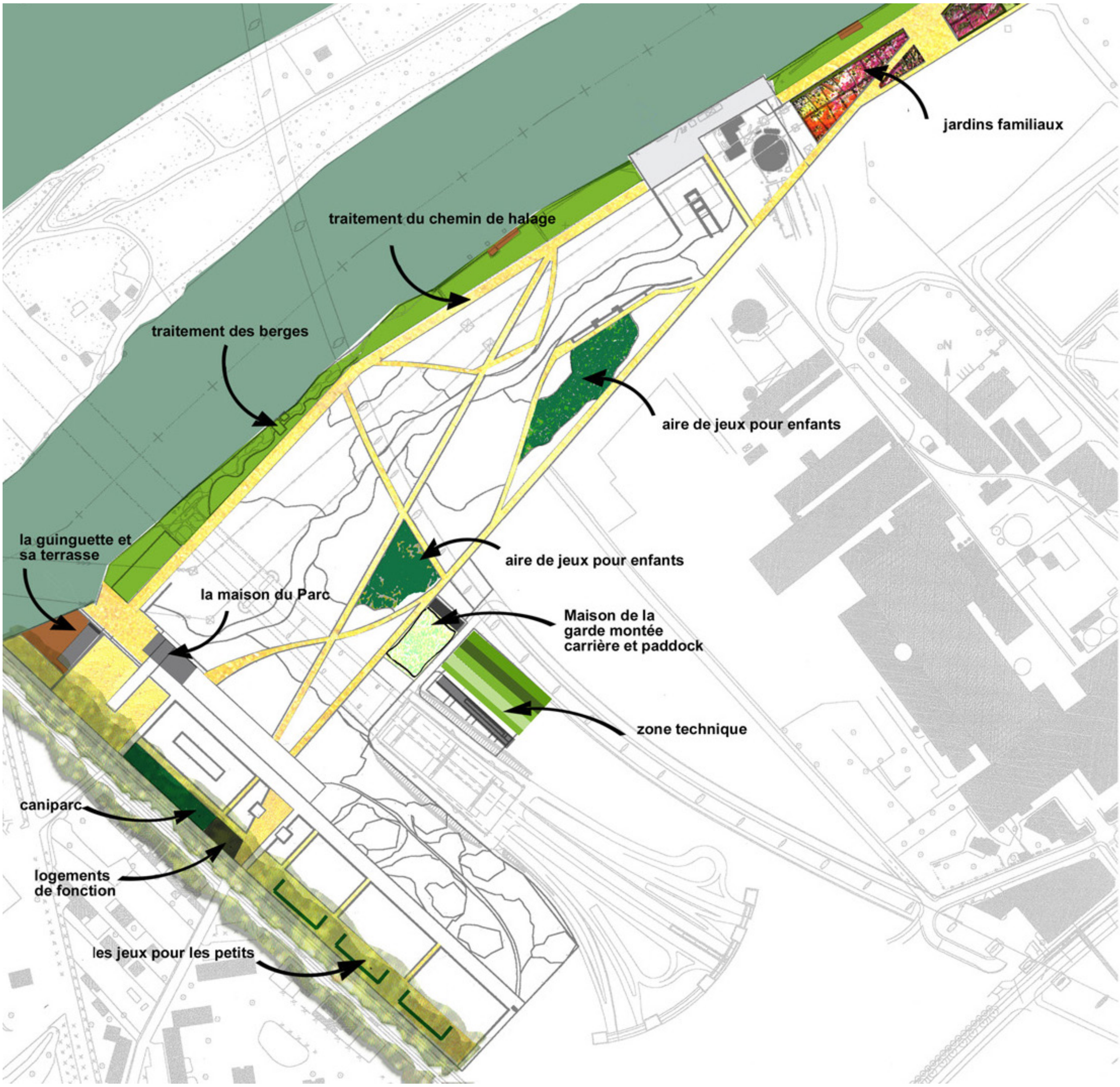

jardins familiaux
traitement du chemin de halage
traitement des berges
aire de jeux pour enfants
la guinguette et sa terrasse
aire de jeux pour enfants
la maison du Parc
Maison de la garde montée carrière et paddock
zone technique
caniparc
logements de fonction
les jeux pour les petits

Figure 10: Plan and Program elements of the project. Source: Courtesy of Mutabilis.

Program Elements

Reuse of existing materials: The first key element of the design program was the re-use of existing in situ materials; recycling of materials made available during construction phases made it possible to limit the impact on the environment, permitting the adoption of multiple technical solutions. On site, during the construction phases, recycling of materials was systematically used as a method to limit waste and transportation of agricultural equipment necessary to shape the park topography. The materials used were chosen for their neutral impact on the environment.

Transformation of Edges and Vegetation: The *Chemin de l'Ile* park is located in front of the "Ile fleurie", an island that constitutes a rich biological reserve; this favourable position for the urban park underlined its great potential for the rapid colonization of the banks by indigenous fauna. In order to respect the ecological balance and the spontaneity of the vegetation, large park areas were given over to the creation of annually mown grasslands, while local species were chosen for the remaining areas (Fig. 11).

Multiplicity of Uses: The increase in uses of the park area was the primary aim in making the transformation from wasteland into a liveable and functional urban park tangible. To this end (Fig. 10), the park project envisaged the creation of:

A green area for dogs

Three different play areas for children of different ages, namely,

Toboggan et compagnie: For children aged 2 to 6 years, under parental supervision, in the park area adjacent to Avenue Hoche (the only urban road that runs along the park)

The *parcours remue-méninges*, in the eastern area of the park, dedicated to children aged 6 to 12, without parental supervision. The route passes through an obstacle trail (low walls, banks, mounds) and appropriate routes were designed to cross it. The area is also provided with a climbing path to stretch the physical and mental agility of children (Hautes-de-Seine.com).

Les cabanes des petits grimpeurs: Wooden huts on wooden trees, to rest or play, for children aged 5 to 12 and under parental supervision (in front of the entrance from Avenue Hoche).

A terrace viewpoint on the bank of the river Seine

Family Gardens: public gardens initially available to workers from the former paper factory, completely redeveloped by expanding the quantity to 21 lots, to be assigned to the inhabitants of Nanterre.

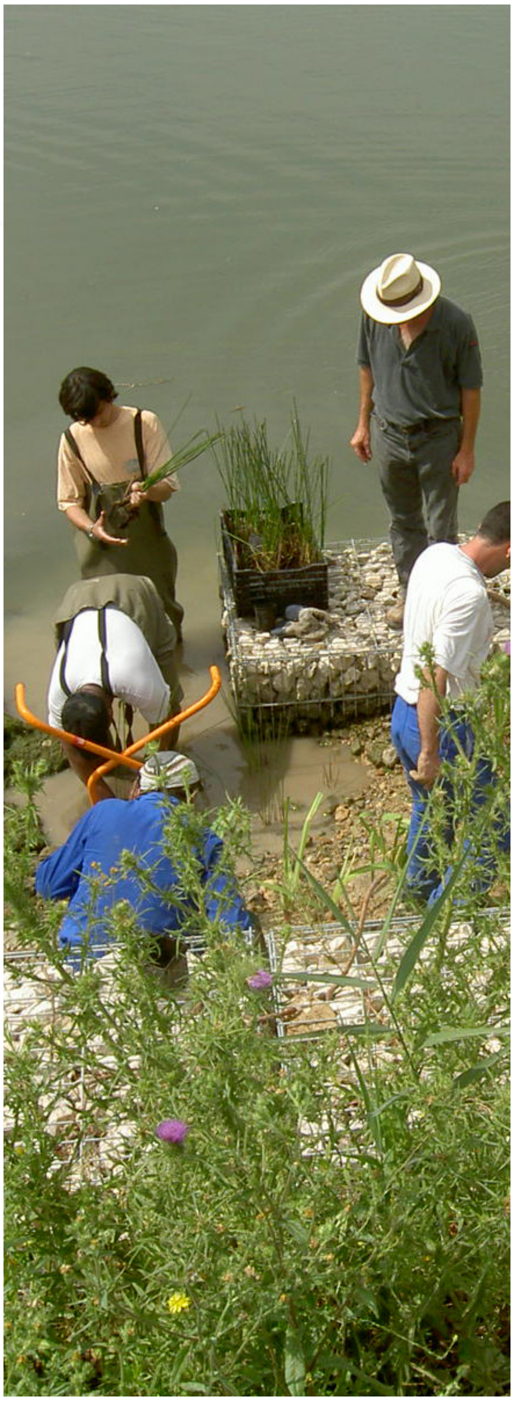
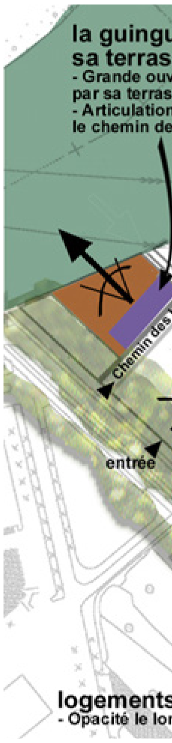


Figure 11: The plantation phase for the re-naturalization of the banks of the river Seine. Source: Curtesy of Mutabilis.

- Four HQE[212] buildings (Fig. 12): one administrative building, the "ginguette" on the banks of the Seine, the equestrian guard's building, and stables (unrealized) and the "Maison du parc", visitor reception center with bar and meeting point for school visits[213].

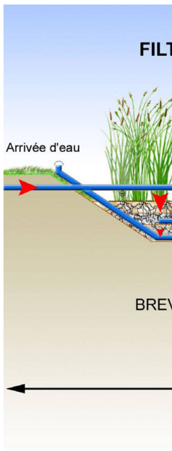
Water: «*The water constitutes the skeletal outline of the area*» (Gallais, Bailly Maitre, 2014, p. 42).Water is the connection between nature and the city as it crosses the inside of the park, being carried in by the river and then continuing its course through different elements before being reintroduced to the Seine. Water provides the context for an educational narrative along this route.



Technical Solutions

Archimedes' Screws: Five Archimedes' screws pump water from the Seine in successive phases and transport it to the highest point of the park;

Jardins Filtrants®: Water continues along its course through seven filtering water basins called Jardins filtrants®. The concept was developed by *Phytorestore* (Fig. 13). There are seven artificial wetlands contained in concrete basins, which have both a phyto-purifying function and a landscape function: the first basins receive the pure water from the Seine, loaded with organic matter and suspended solids (David, Chateigner, 2012), which are then eliminated by the aquatic plants.



The plants that adorn the basins were selected according to the evolution of water quality while being treated: the first basins are vegetated with lesser bulrush (*Typha angustifolia*) and common reeds (*Phragmites communis*) which reduce organic loads; the second basins contain horsetail (Equisetum fluviatil) and yellow iris (*Iris pseudacorus*) and blue iris (*Iris sibirica*) to destroy germs; the last basins hold oxygenating plants: water lilies (*Nymphea alba*), fake lotus (*Water lily petalata*), Great Manna Grass (*Glyceria aquatica*); the last purification tanks, closer to the Seine and therefore containing purified water, are, unlike the previous ones, built above ground, located at ground level making it possible for them to be touched more easily. This choice was made because, in the "entry" phase, the water from the Seine is full of organic components such as nitrogen, phosphorus and germs (water quality class 3) , while at the exit phase the water reaches an equal level of purification to the "quality of bathing water" (class 1B).

The Jardins filtrants® structure processes 860 m3 of water per day on a total surface of 18,000 m2; biomass, produced in the tanks, is collected once a year and reused in the form of compost or mulch.

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[212] HQE™ is the French certification awarded to building construction and management as well as urban planning projects. HQE™ promotes best practices, sustainable quality in building projects and offers expert guidance throughout the lifetime of the project (www. Hqe.com).

[213] Which are now regularly organized, with the aim of increasing awareness of the problems of environmental protection and in particular of the protection of water resources (Hauts-de -Seine.com).

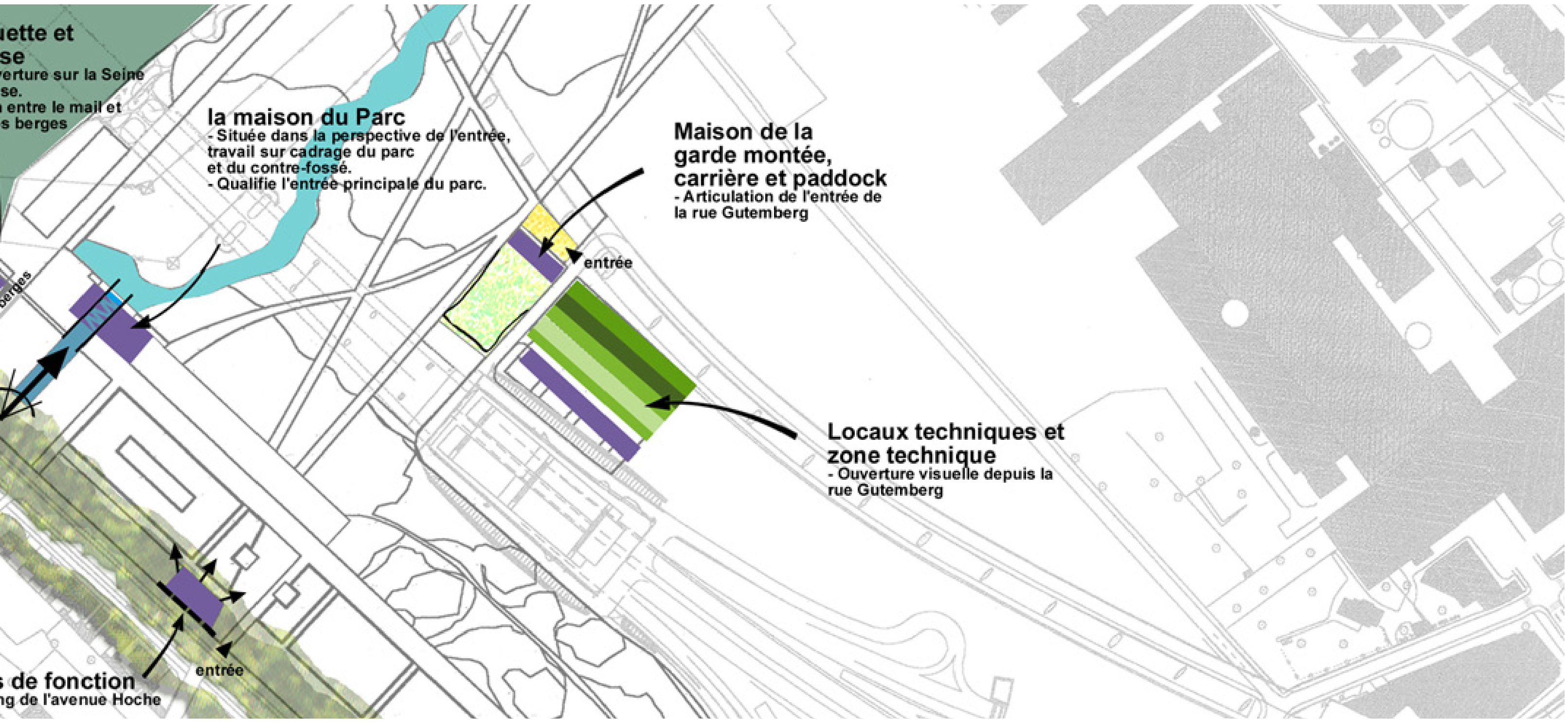
uette et
se
verture sur la Seine
se.
entre le mail et
s berges
la maison du Parc
- Située dans la perspective de l'entrée, travail sur cadrage du parc et du contre-fossé.
- Qualifie l'entrée principale du parc.
Maison de la garde montée, carrière et paddock
- Articulation de l'entrée de la rue Gutemberg
entrée
berges
Locaux techniques et zone technique
- Ouverture visuelle depuis la rue Gutemberg
s de fonction
ng de l'avenue Hoche
entrée

Figure 12: Project plan of HQE buildings. Source: Courtesy of Mutabilis

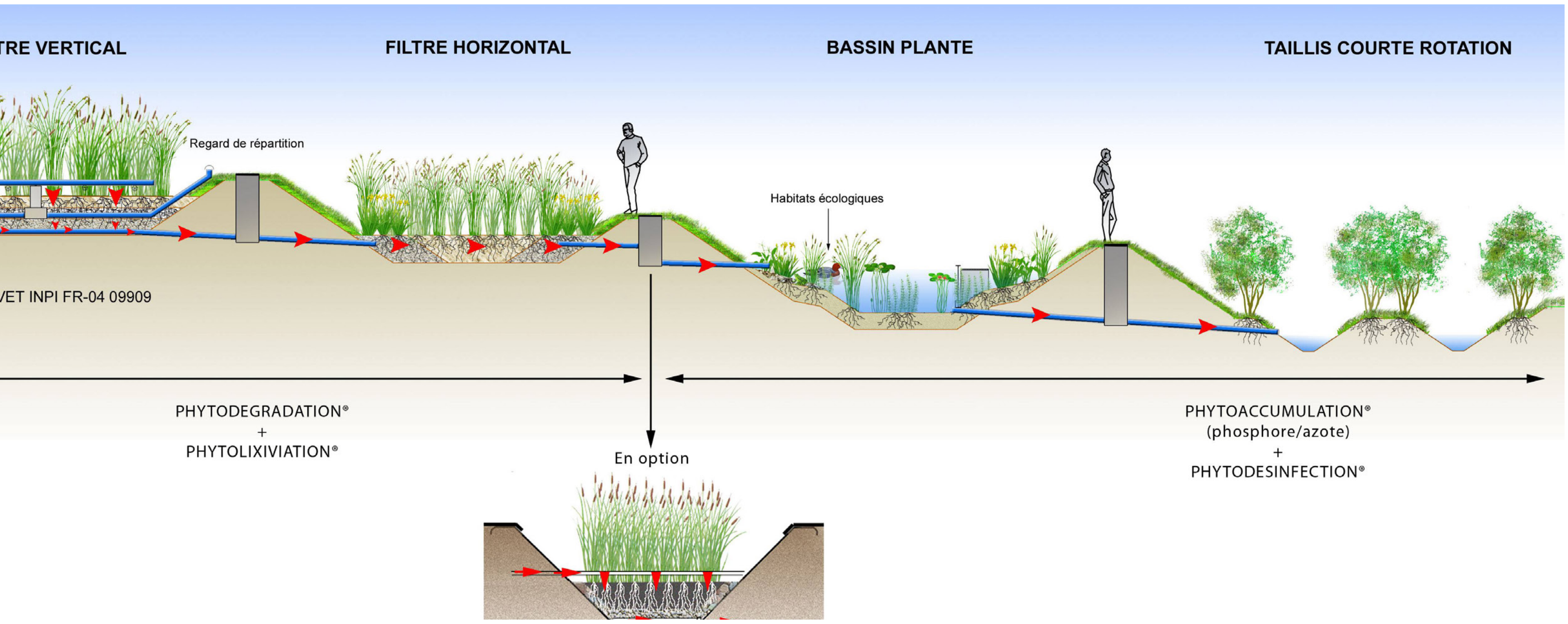
TRE VERTICAL
FILTRE HORIZONTAL
BASSIN PLANTE
TAILLIS COURTE ROTATION
Regard de répartition
Habitats écologiques
VET INPI FR-04 09909
PHYTODEGRADATION®
+
PHYTOLIXIVIATION®
En option
PHYTOACCUMULATION®
(phosphore/azote)
+
PHYTODESINFECTION®

Figure 13: Type section of the functioning of the Jardin Filtrants. Source: Phytorestore.com

The Jardins filtrants® were also used in areas adjacent to the counter-ditch for the purification of partially polluted soils, while a different type of Jardins filtrants® designed for air quality were created to cover the rooftop of a tract of the highway (still under construction) and the parking areas of the exit ramp A14 / E86 (Fig. 14).

To complete the filtration and purification of water resources, the project involved the installation of phytodegradation systems for the air treatment of the areas of the park over which the highway runs above: the polluted air is channelled and recovered in liquid form from contact with water, then directed to an organic support base on which specific plants, able to fix and degrade the polluting molecules, are planted.

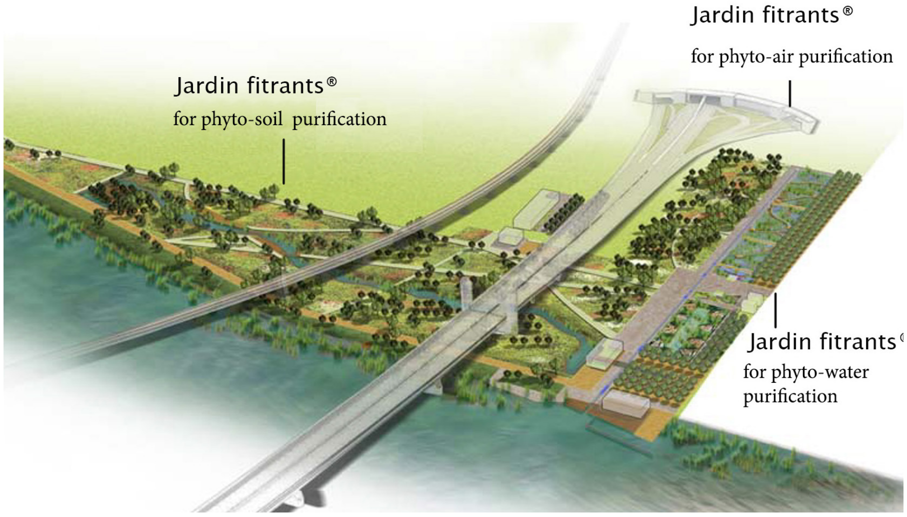
Jardin fitrants®
for phyto-air purification
Jardin fitrants®
for phyto-soil purification
Jardin fitrants
for phyto-water purification

Figure 14: Graphic representation of the Chemin de l'IlePpark and of the use of the Jardins filtrants®. Source: Phytorestore.com

Counter-ditch: The digging of a counter-ditch was one of the ideas suggested during the competition which made it possible to triple the linear surface of the river banks. On the initially level ground of the area the Landscape Architect Guillome Geoffroy-Dechaume proposed the development of artificial contours, to create a varied and pleasant landscape to travellers looking down from above (David, Cahteigner, 2014). Most of the purified water is redirected into the Seine through the ditch, while the rest is used to water the park and family gardens using a wind turbine (www.hauts-de -seine. net). The purified water before joining the bed of the river, flows through various ecological habitats: breeding grounds, habitats for green frogs, tritons, small insects, which have become established in this area thanks to the quality of oxygenation of water, superior to that of the Seine (Fig. 15).

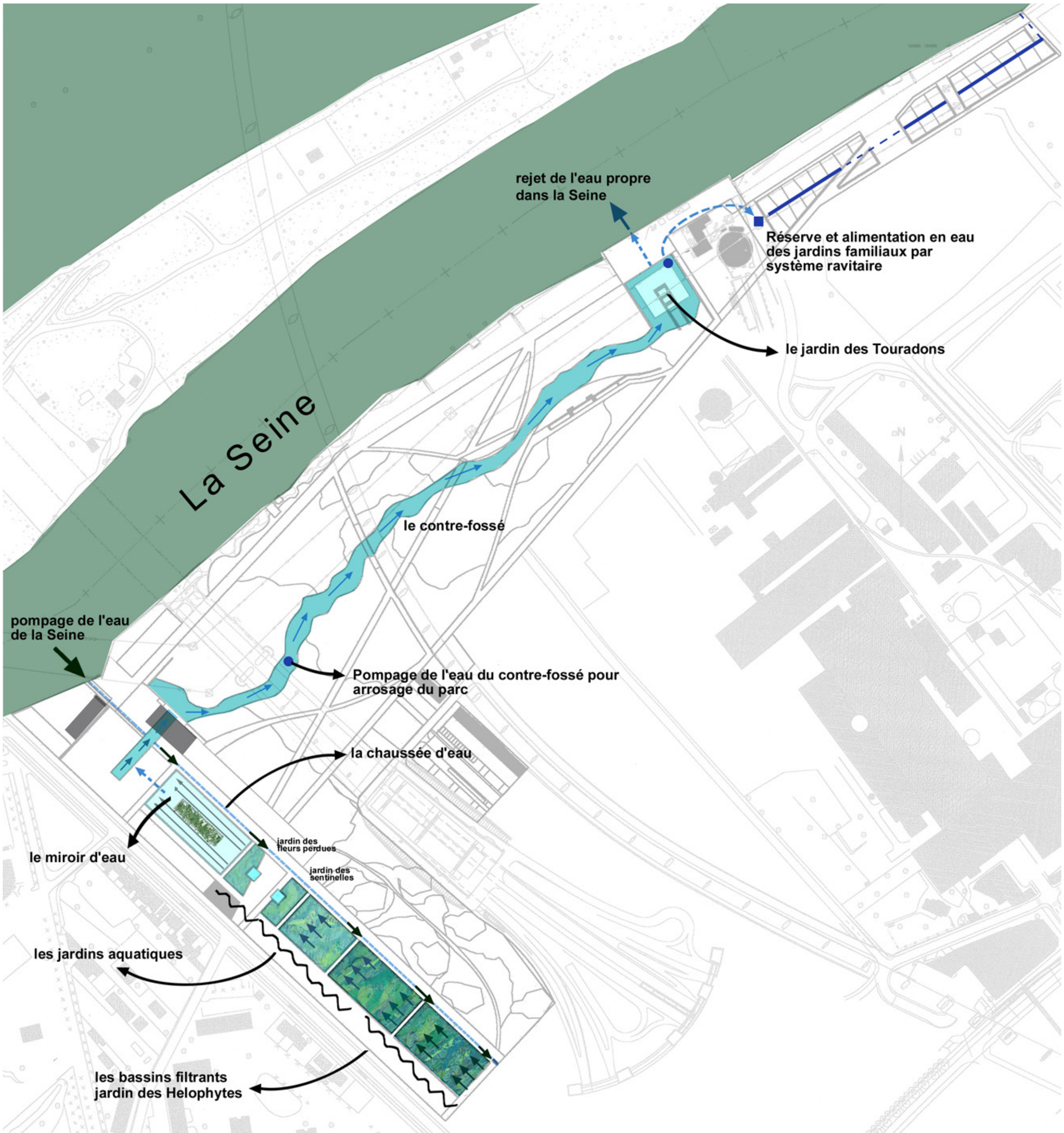
rejet de l'eau propre
dans la Seine
Réserve et alimentation en eau
des jardins familiaux par
système ravitaire
le jardin des Touradons
La Seine
le contre-fossé
pompage de l'eau
de la Seine
Pompage de l'eau du contre-fossé pour
arrosage du parc
la chaussée d'eau
le miroir d'eau
jardin des
fleurs perdues
jardin des
sentinelles
les jardins aquatiques
les bassins filtrants
jardin des Helophytes

Figure 15: Design study of the water cycle and its elements inside the Chemin de l'Ile park. Source: Courtesy of Mutabilis.

Rainwater Recycling: All rainwater (cover, outflow) is infiltrated or discharged into green areas, basins or counter-ditches, or returns into the river, thus favouring the creation of spawning areas for fish (Takacs, 2010).

This global water management of the site made it possible to comply with the sustainability requirements. This way, the park does not consume water during the year, but rather re-introduces it into the fluvial course in better condition than it had been before (David, Chateigner, 2014).

Resource Recycling: The clay found during the excavation of the counter-ditch was reused I think you mean "to shore up" the banks and for the waterproofing of the water basins, 80% of which covered by the use of "these"? clay deposits present in the field (Takacs, 2010).

The old concrete enclosures were crushed and then re-used as the foundations of the paths through the park; the shrubs and trees that were removed during construction were turned into mulch (www.hauts-de-seine.net).

As a result of the site history, the land in the project area was partially polluted; with the exception of some rare hydrocarbon pockets, the type and quantity of pollutants discovered enabled the reuse of the soil in landscaping and developing an unprecedented topography for the park (Fig.16).

Topography: A total of 100,000 m3 of land was excavated and remodelled with the technical aim to limit the impact of possible flooding from the River Seine towards the inhabited areas of the district (Bailly-Maitre, Gallais, 2014).

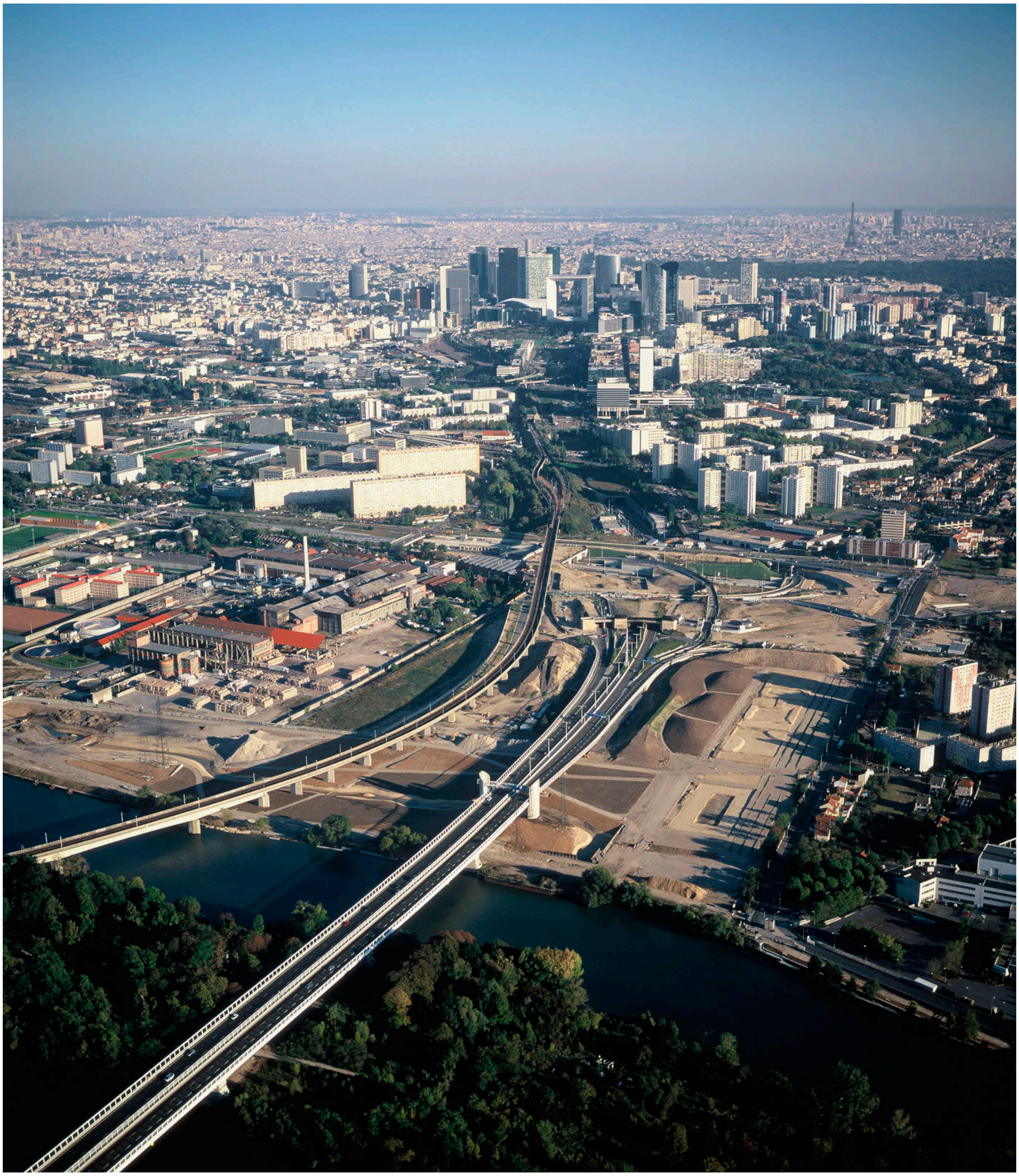

Figure 16: Aerial view of the construction of the Chemin de l'Ile park during the land modeling phase. Source: Courtesy of Mutabilis.

GRAMMAR, POETICS AND PERCEPTION OF THE SITE

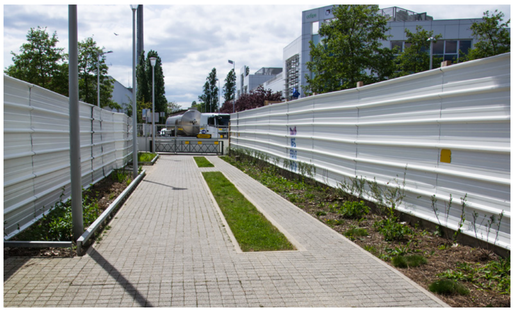

Figure 17: Part of the construction site of the Chemin de l'Ile park equipped with "rain gardens". Source: Author, May 2018.

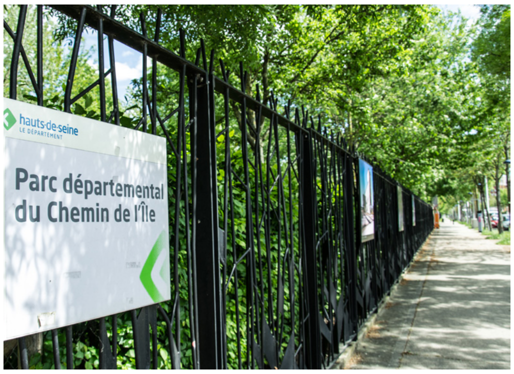

Figure 18: View of the perimeter of the park from Avenue Hoche, the only urban road that runs along the park. Source: Author, May 2018.

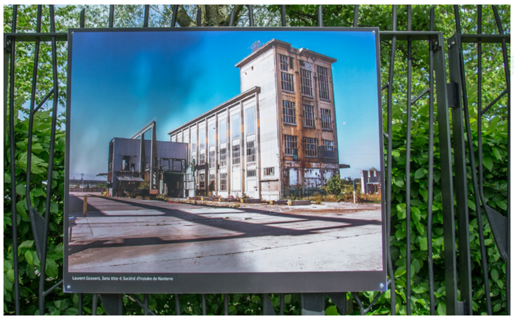

Figure 19: One of the exhibited photographs taken by Laurent Grossent, with the collaboration of the Société Historique de Nanterre. Source: Author, May 2018.

The Nanterre railway station has visible signs indicating the direction to take in order to get to the Chemin de l'Ile park. Walking along a long tree-lined avenue with residential villas, approaching the course of the river Seine, the landscape changes abruptly into that of a huge construction site, for although the park was opened to the public in 2006, the rest of the surrounding area is still today in full transformation (Fig.17).

Along the perimeter of the park, ten photographs of the park area remind the visitors of the state of the area before its transformation. The pictures were taken by the amateur photographer Laurent Grossent[214] and are hung on the fence designed by the Mutabilis practice (Fig.18). The photographic exhibition is the result of four years of urban exploration of the 18 ha of land occupied by the "Papeterie", which closed in 2011 (Fig. 19).

The main constraints of this project were the traces of the exploitation of this territory for both industrial reasons and infrastructural ones, which had to be merged into a single identity (Takacs, Gallais, Geoffroy-Dechaume). The same constraints represented the strong starting point from which to develop the identity of the urban park.

The park can be divided into two main areas: the first more formal and geometric, where the water begins its path, and the second over the viaduct of the A14, which is more naturalistic in its forms.

The main entrance to the park is on Avenue Hoche, the only urban road along its perimeter. After passing through the dog-friendly area on the right, the water at the centre of the park immediately catches the visitor's attention. A long pool, home to water lilies, leads the eye towards the inside of the park, beyond the line of the A14, hidden in thick vegetation.

To the north of the water lily pond (Fig. 20) is located the "Pavillon de Berges", the restaurant area for the park consisting of a wooden building on the banks of the Seine.

The park is also dotted with artworks: near the water lily basin, a sculpture can be seen in the distance which on first sight appears to be a sailboat, but later reveals itself to be the skull of an animal; the artwork was made by the sculptor

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[214] The exhibition began in October 2017 and was originally intended to last for one year but was prolonged due to its high popularity among the general public and visitors to the park, who enjoy being able to understand the history of the site in such a user-friendly fashion (Livois, 2017).

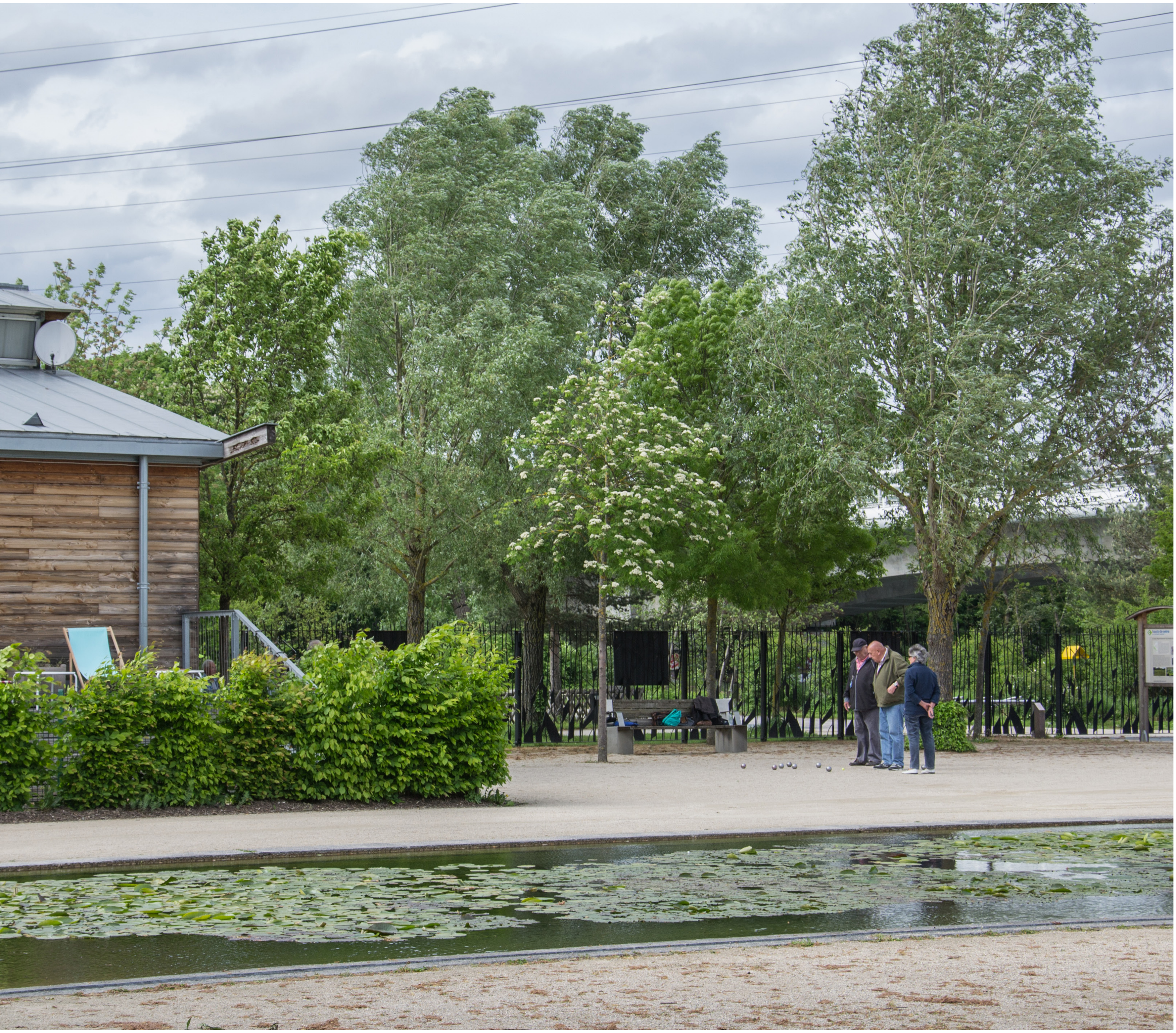


Figure 20: View of the Waterlilies basin at the entrance to the park in front of the "Pavillon de Berges", besides it people playing bocce-ball can be noticed. Source: Author, May 2018

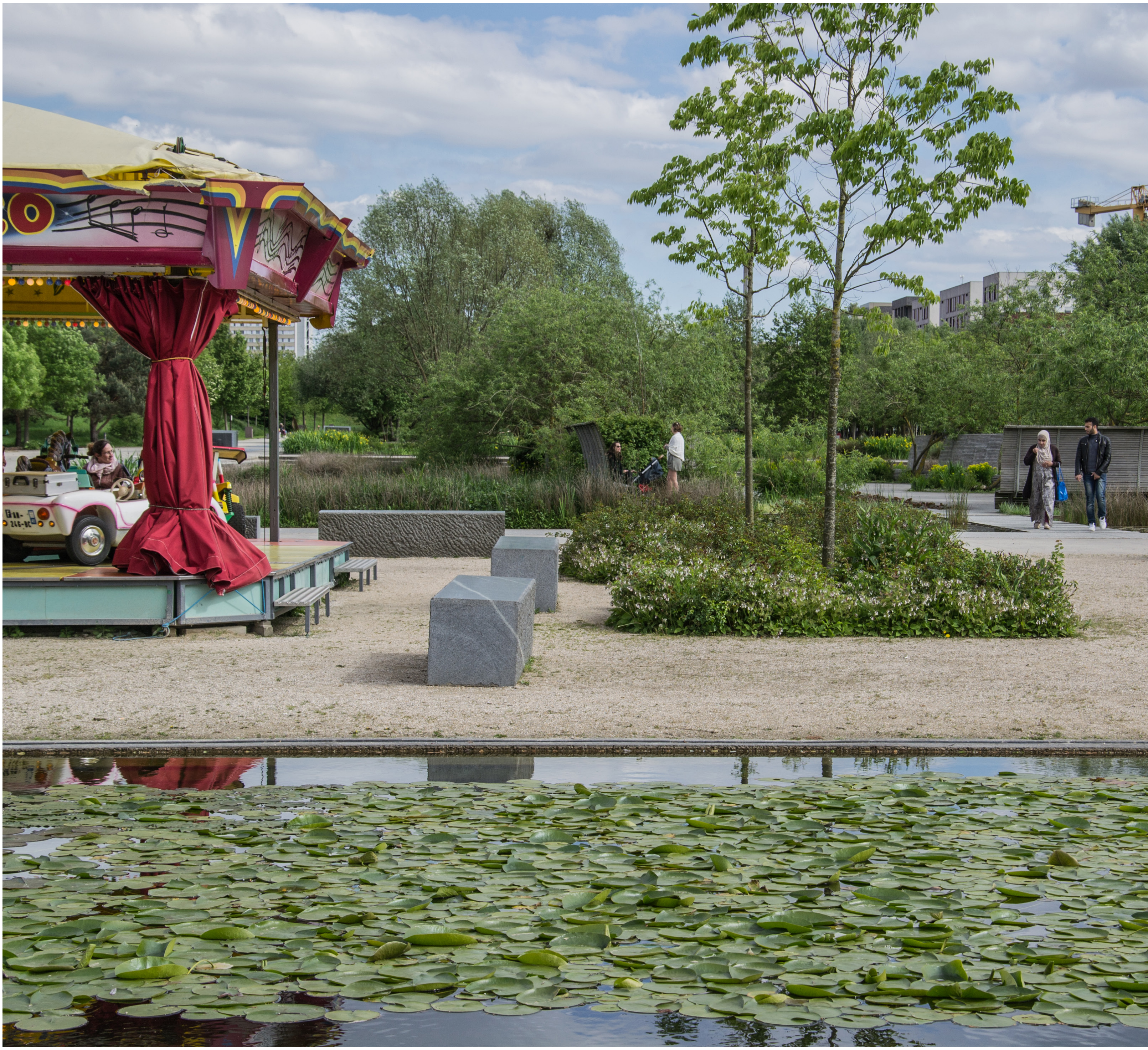


Figure 21: View of the Waterlilies basin, on the right the sculpture at the entrance to the Chemin de l'Ile park. Source: Author, May 2018

Quentin Garel (Fig.21 and 21b).

Water is the common thread that guides the visitor through a series of different aquatic landscapes.

The visitors' attention is captured by the different settings that the water and the vegetation create, thus confirming the educational attitude of the project.

Looking towards the south the water tank can be crossed by walking on a path of concrete slabs, leading to intimate "living rooms" which follow one another up to the water purification tanks.

The presence of the A14 is almost imperceptible, the dense arboreal vegetation almost totally mitigating the noise and visual pollution, making it possible to glimpse the passing vehicles just through a few sections of the vegetation (Fig.22*)*. The sustainable development aspect is truly an integral part of the project, as from a "wasteland", the park has now become extremely rich in biodiversity.

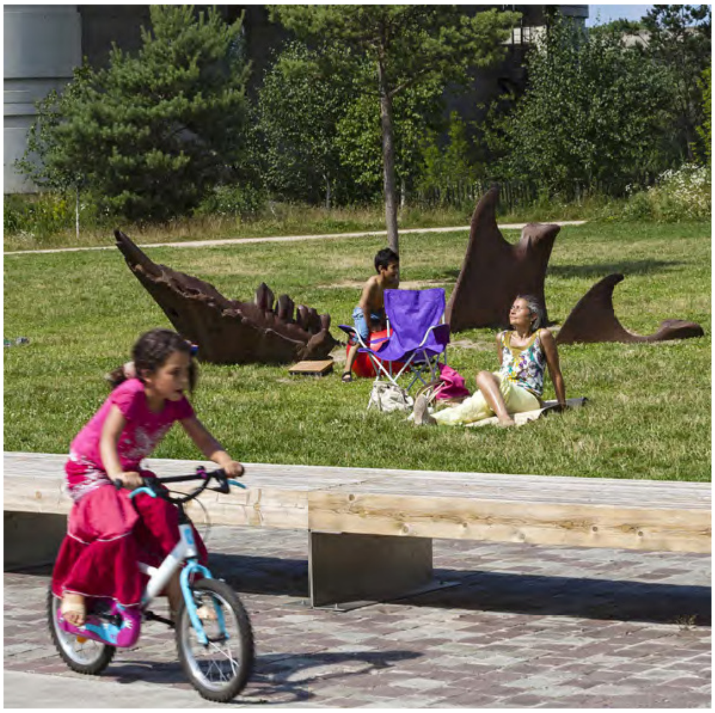


Fig. 21b: View of one of the meadows under the A14 viaduct. Source: Courtesy of Mutabilis

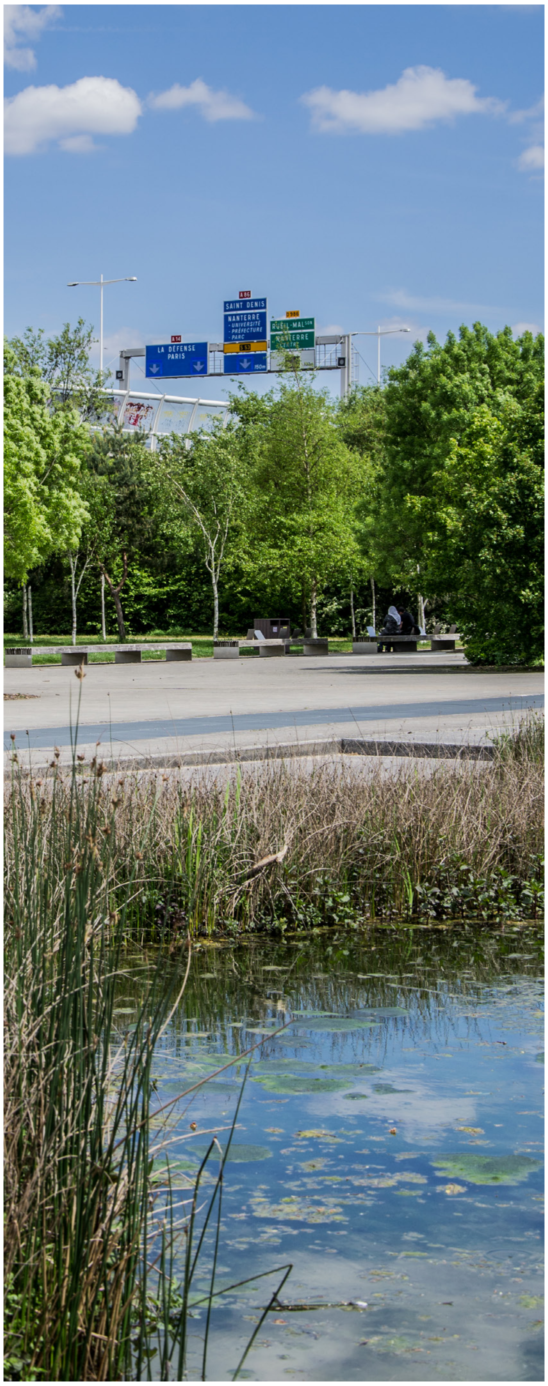


Figure 22: Detail of one on the water basins placed at the entrance to the park, in the background the viaduct of the A14. Source: Author, May 2018.

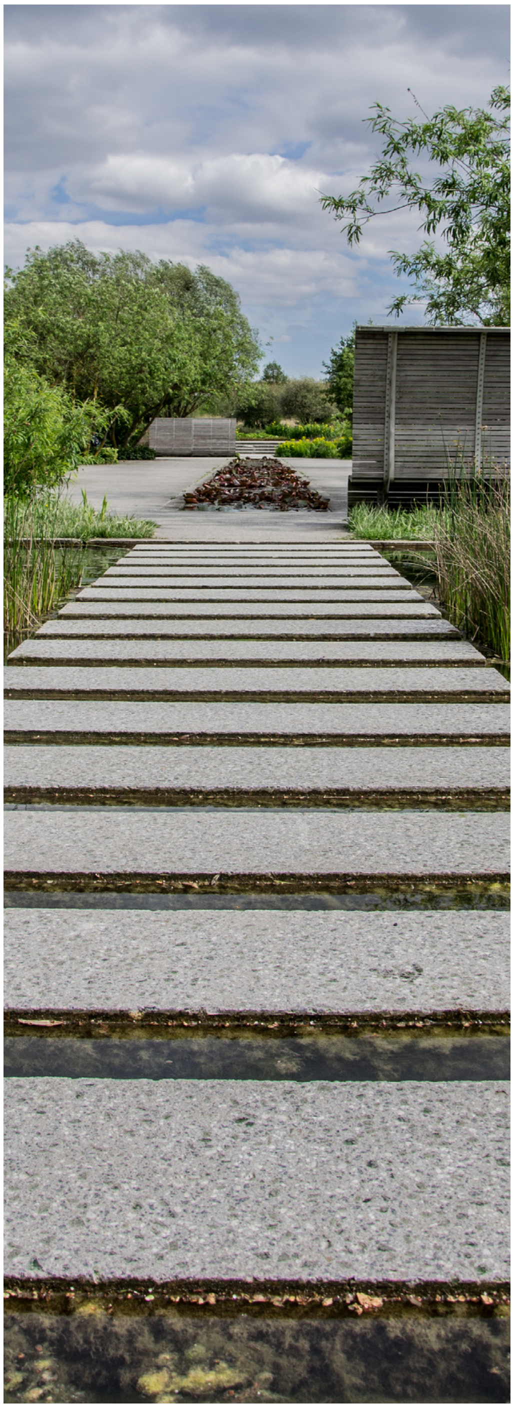
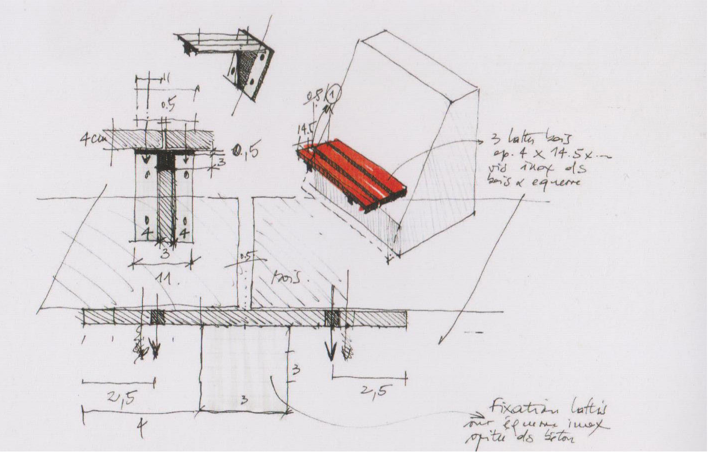


Figure 23: Detail of the of the first water tank of the "Jardin filtrants", in the background the gardens inside its central surface. Source: Author, May 2018.

The noise reduction of the transport infrastructures that constantly cross the park is particularly effective, and is effectively rendered by the new topography shaping the park. Although the new landscape is visibly a designed one, the visitor has the immediate impression of being surrounded by lush nature. The area of the water tanks is characterized by the starkly geometric design of the paths (Fig. 23), of the water tanks and of the spaces dedicated to children's entertainment.

All the elements are lent structure by the orthogonal paths that surround the tanks, receding towards the north as they depart from the course of the river Seine. The attention to detail is highlighted by the clean and geometric lines of the main paths which create a kind of perspective illusion to emphasize the size of the park (Fig. 24). The geometry of the concrete main paths and the pools of water is broken by the sinuosity of the shapes of the wooden elements that follow each other throughout the water gardens (Fig. 25).

The quadrangular stone seating along the main avenues is transformed into the "living rooms" of the "mirror of water" (first water tank) in benches designed by landscape architects Juliette Bailly-Maitre and Ronan Gallais. The curvilinear shapes of these seats(Fig. 26) are repeated in the design of the suspended paths of the subsequent water purification tanks (Fig. 27). There, the water taken from the Seine is pumped in successive stages to the highest point of the park and continues its journey through the seven artificial wetlands, which filter and purify it.


4cm
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3 lattes bois ép. 4 x 14.5x…
vis inox ds bois & equerre
fixation lattis sur équerre inox
spitée ds béton

Figure 25: Details' sketch of the furniture of the park. Source: Courtesy of Mutabilis.

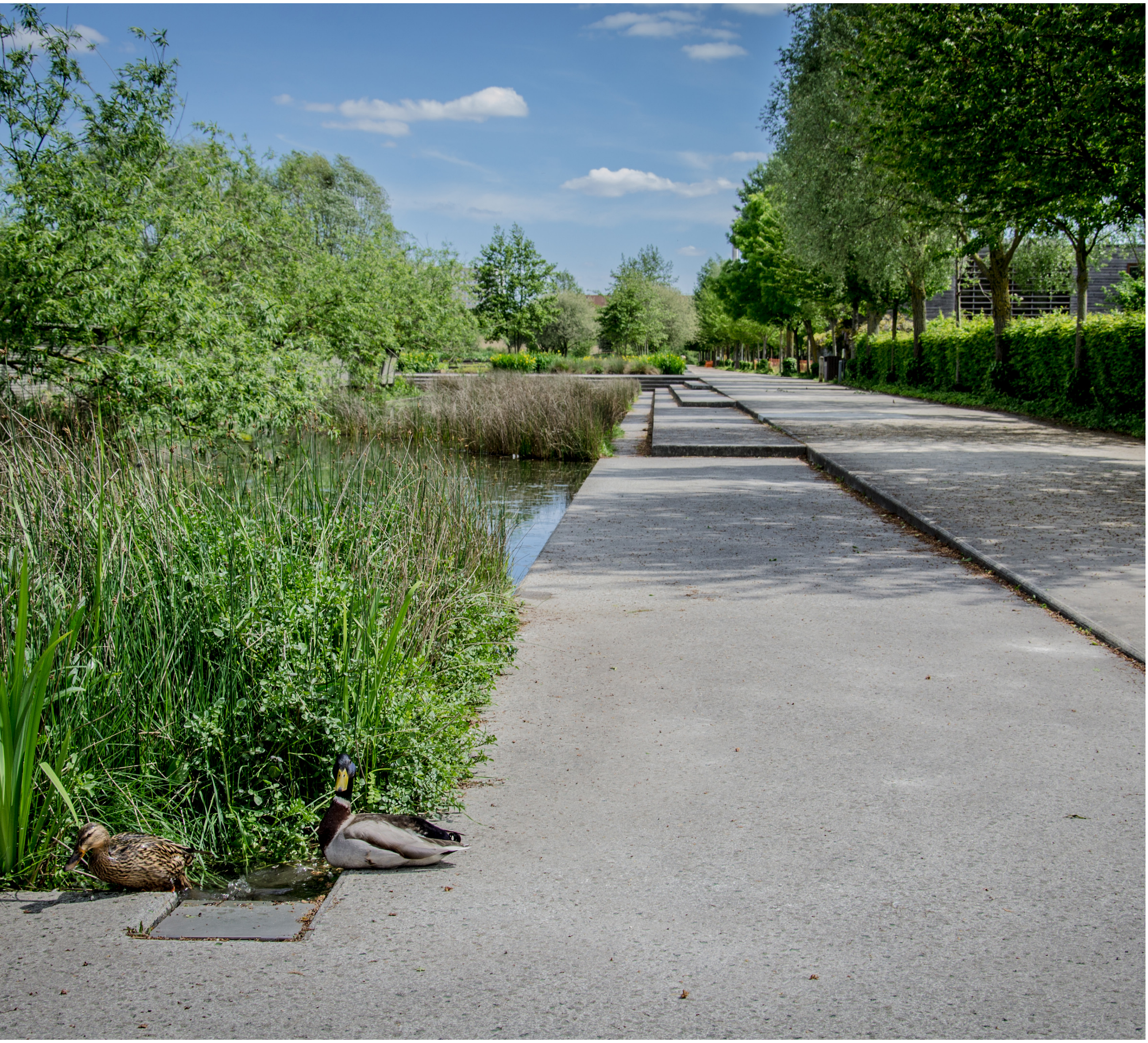

Figure 24: View towards south of the path that runs along the first phyto-purifying gardens. Source: Author, May 2018.

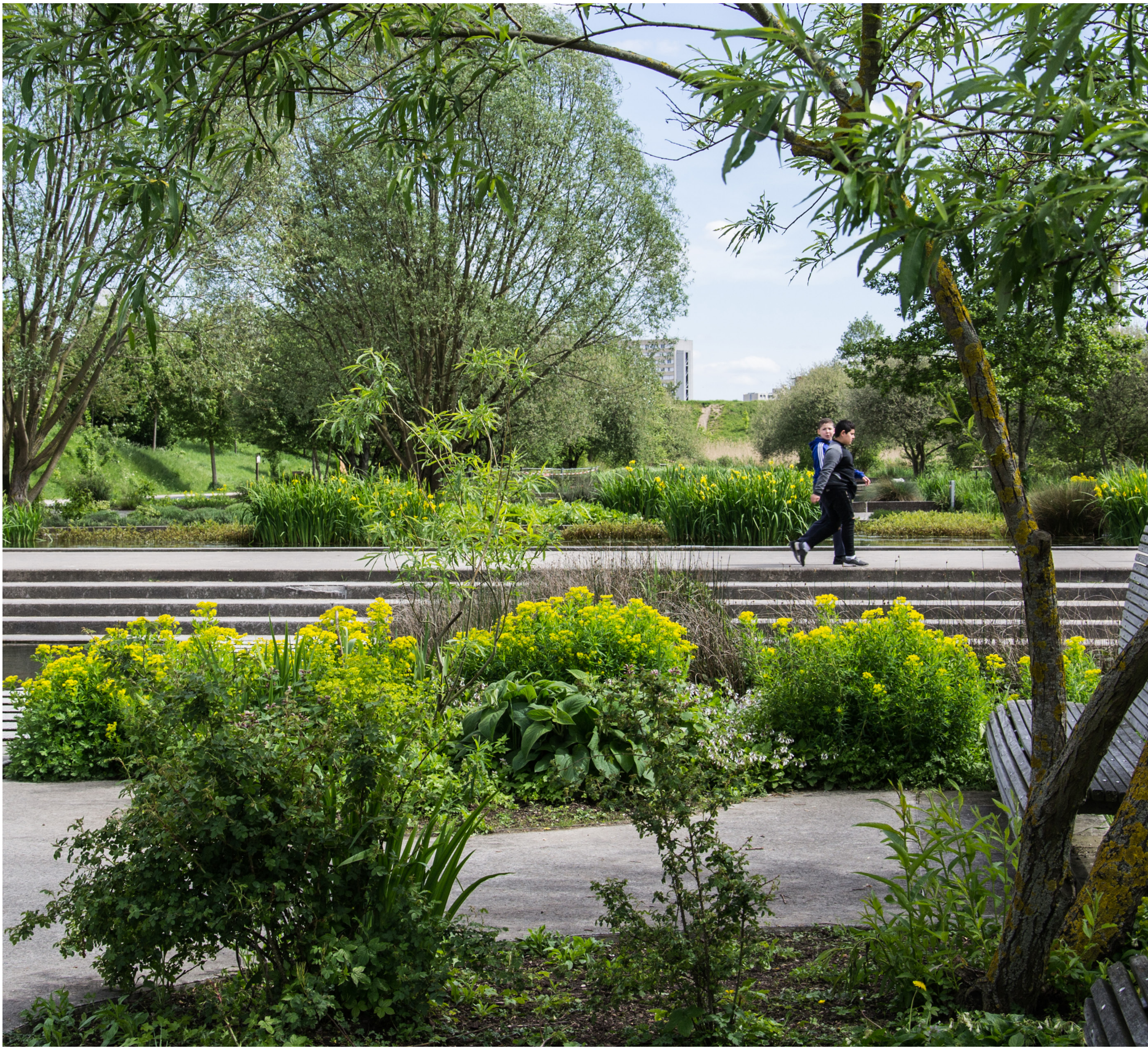

Figure 26: View of the "mirror of water" from the island inside of it, in the background the first of the seven purifying tanks. Source: Author, May 2018.

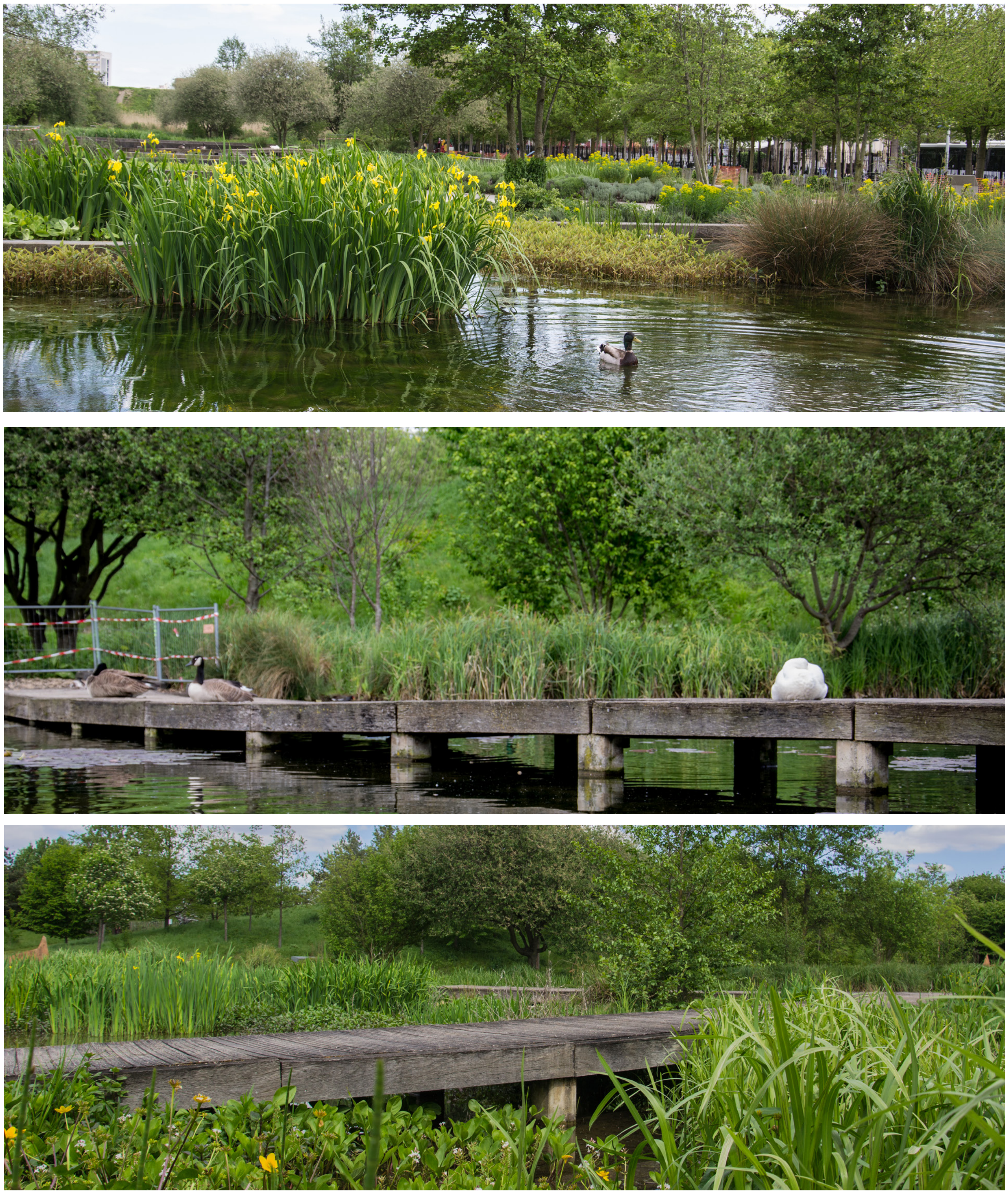

Figure 27: Details of the wooden paths that run through the phyto-purifyng gardens. Source: Author, May 2018.

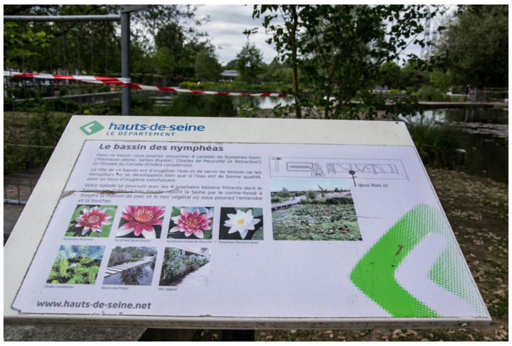

Figure 28: Detail of one of the information's panels of the phyto-purifying gardens. Source: Author, 2018.

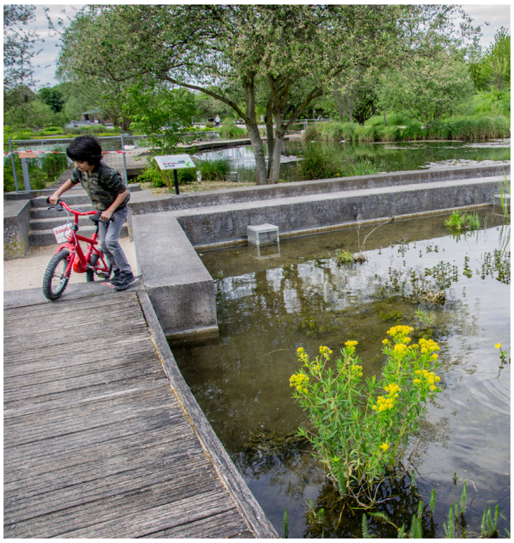

Figure 29: Alexandre and the beginning of the "adventure path" along the water purification tanks. Source: Author, May 2018.

Each of the seven phyto-purifying gardens contains a different aspect that illustrates the different natural phases of water filtration and its pollution by the plants. The vegetation is mature and lush and the edges of the pools, which get ever lower as they get closer to the course of the river Seine, are almost imperceptible to the eye.

Since the water is phyto-purified, it is returned to the visitor as an educational element and is at the same time a bearer of scenic visual continuity (Fig.28).

Each tank is accompanied by an explanation of its workings and by educational signs that list the plant and animal species that can be identified and what role the plants play in its purification. The oxygenation basin is one of the most populated, with swans and families of ducks, but, due to the acidity of their excretions, the oak walkway crossing point has had to be substituted[215] (as noticeable in Figure 27); In this tank there are more than four varieties of *Marliacea albea* and *Eloidea canadiensis*.

The more the water is purified, the more it becomes possible to get in touch with it: the last three purification tanks host small "islands" inside them, where the visitors can stop or play in contact with the water.

Children of all ages are eager to explore the paths on them and photograph the different varieties of flowers, while their parents watch them sitting on the raised edges of the pools and shaded by the tree-lined avenues that surround them.

During my visit to the park, a child offered to show me how to play. His name was Alexandre, he was from Nanterre and comes to the park every day with his mother and brothers; the game consisted of an adventurous journey through the last two purification tanks, carrying a bicycle on the wooden path, proving how the design of the tanks are also capable of stimulating children's imaginations (Fig. 29 and 30).

North of the perimeter of the purification tanks, one's attention is grabbed by the loud noise of water: it is the underground channel covered by a grate which withdraws water from the Seine through five Archimedes' screws (Fig.31 and 32).

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[215] See Interview with Bailly-Maitre, 2018.

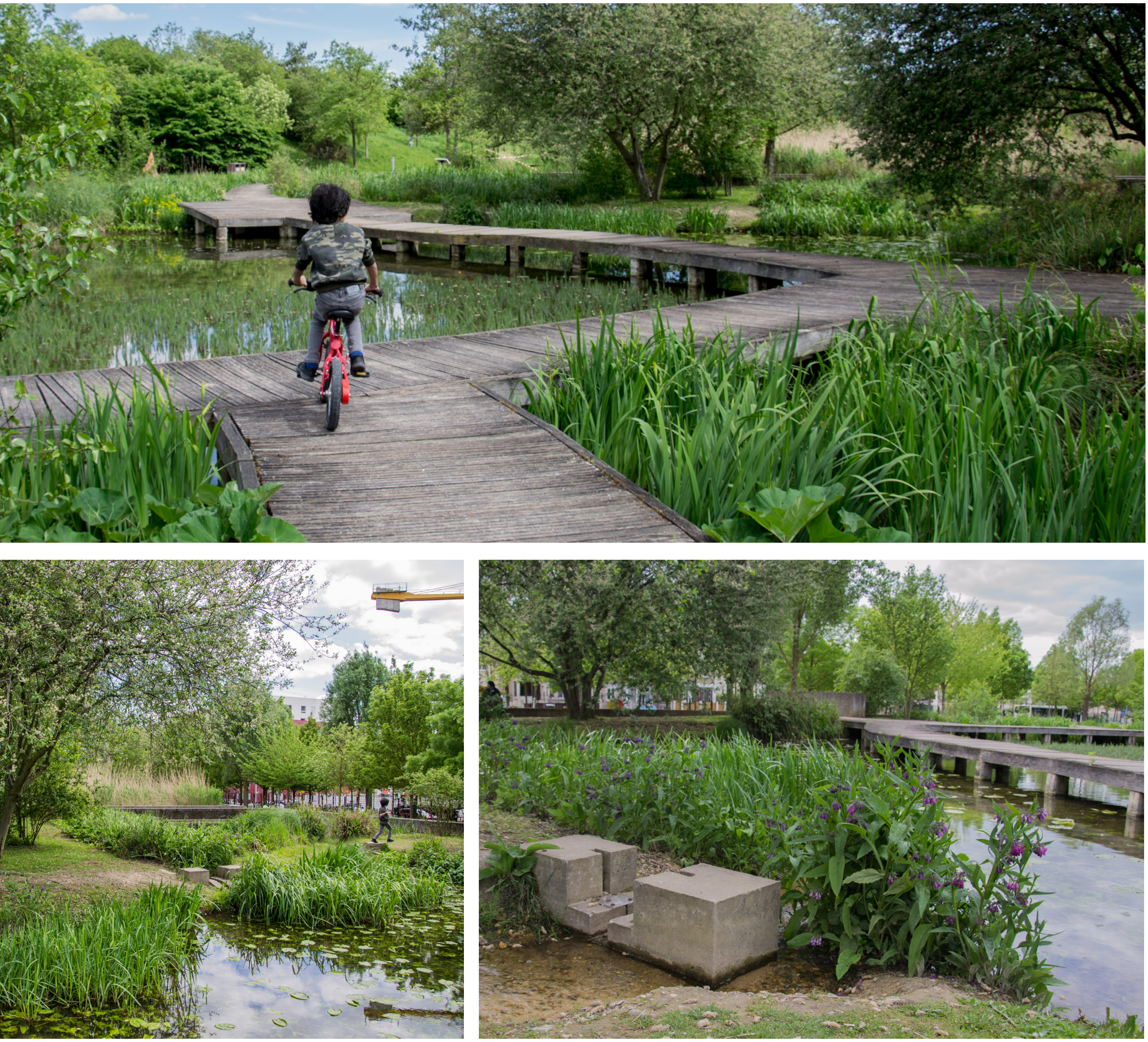


Figure 30: Images of the "adventure path" thrugh the phyto-purifying gardens. Source: Author, May 2018.

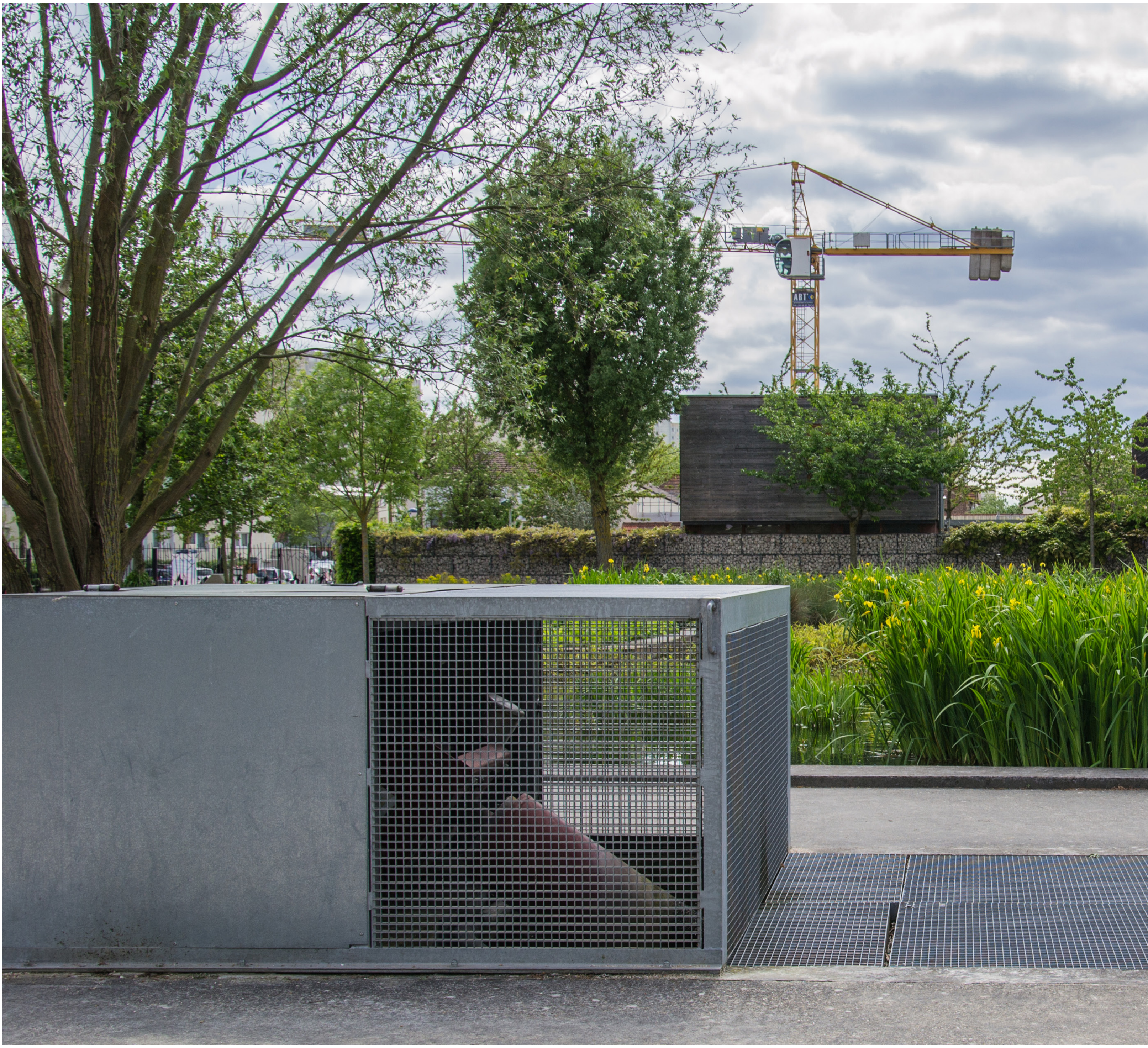
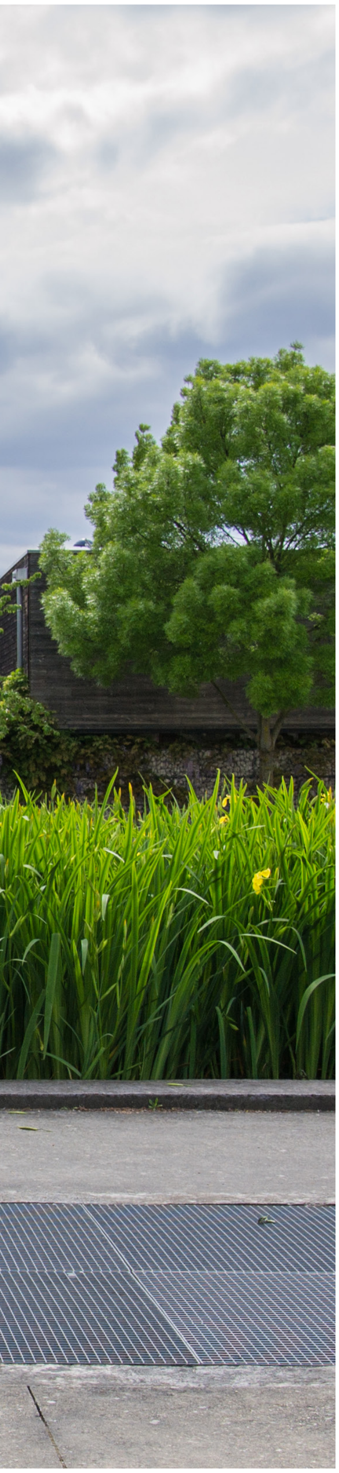


Figure 31: View of the Archimedes' screw no. 5 and of the underground pumping channel. Source: Author, May 2018.



The passage of water, although almost invisible, is marked by the sculptures of the artist Francis Ballu recalling the sails of ships (Fig. 33).

Behind them stands a very high hill made of soil left over from the construction of the A14 motorway, which is now almost completely covered in spontaneous vegetation. It is not an integral part of the design of the park; in reality it is the border that marks the perimeter of the areas still to be redeveloped, with which connect to the Defense Arch. Upon this hill one can clearly see the traces left on the ground by visitors (like me), who climbed it to obtain a better view of this system of hydraulic engineering and of the park area, and see the viaduct of the A14 and the railway (Fig. 31 and 32).

Continuing the visit to the park, along the viaduct of the A14 motorway the morphology of the terrain suddenly changes, turning into an wooded path, bordered by two hills, which isolates visitors acoustically from the noises of the traffic

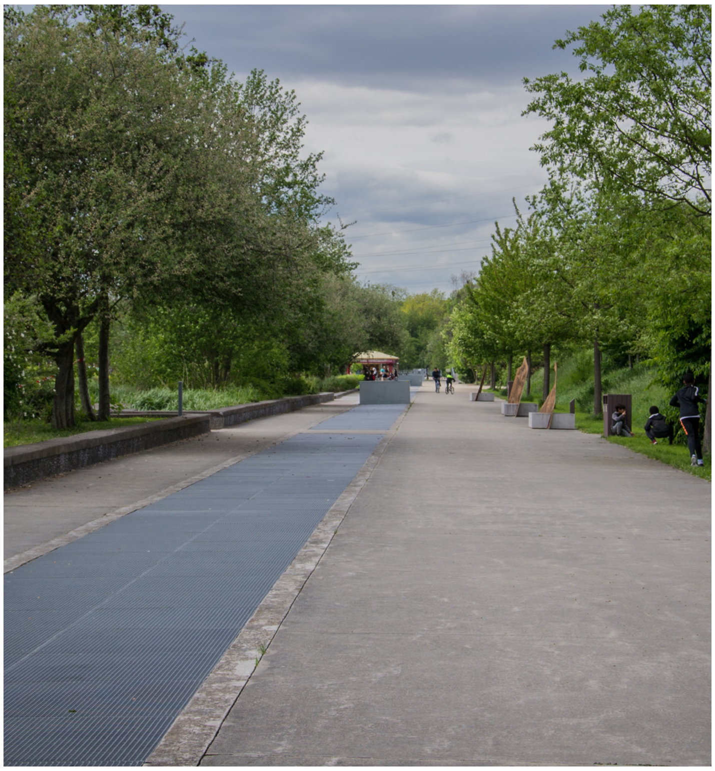


Figure 32: View of the grates covering the undergorund course of the water that is pumped up from the Seine river by the Archimede's screw.; Source: Author, May 2018.

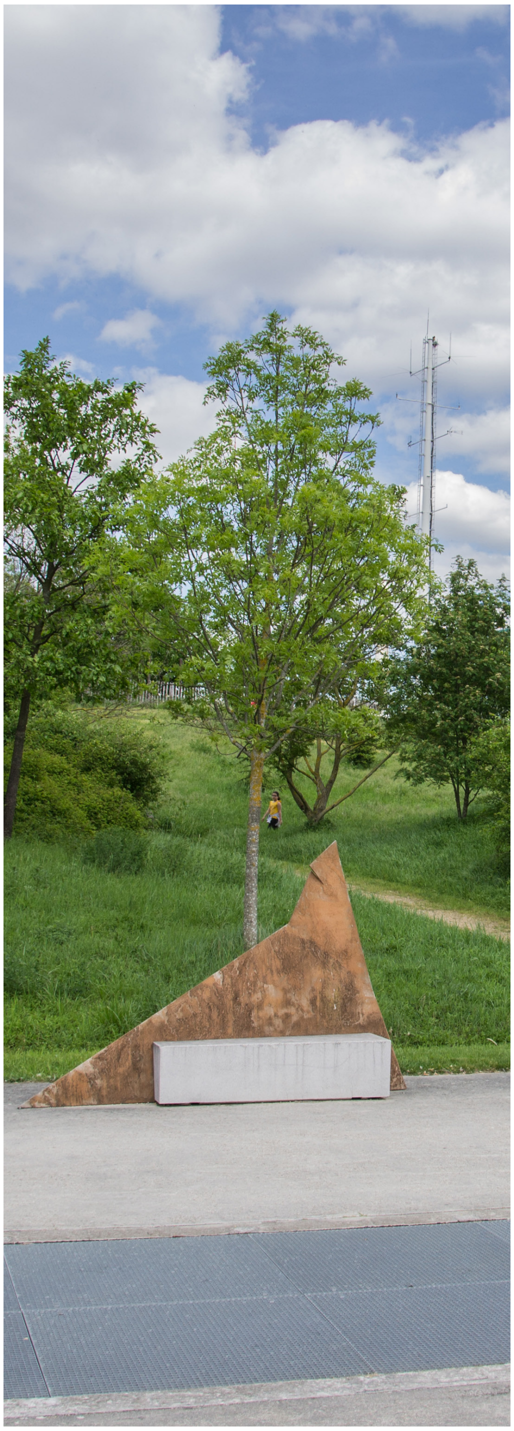


Figure 33: Detail of one of the culptures made by Francis Ballu. Source: Author, May 2018.

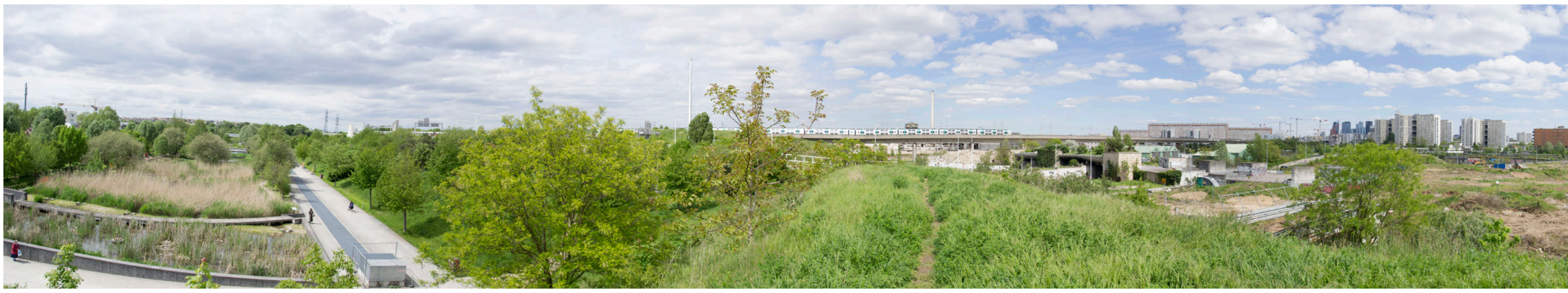


Figure 34: Overview taken from the northern border hill of the Chemin de l'Ile Park, on the left side the phyto-purifying gardens can be noticed, on the right side the non-redeveloped "urban void" can be noticed.Source: Author, May 2018.

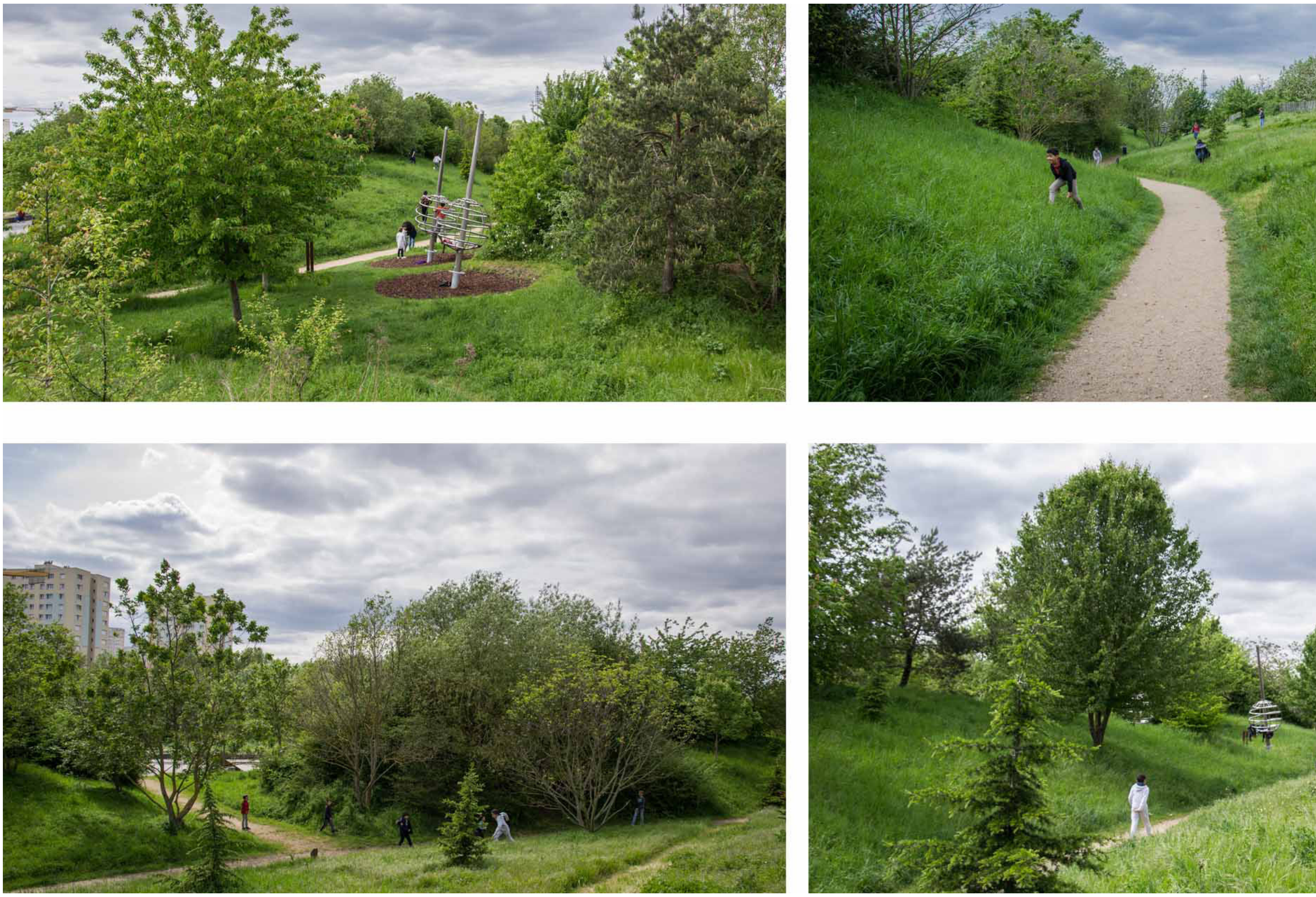


Figure 35: Images of children playing "hide and seek" in the section of the park between the phytho-purifyng gardens and the A14 viaduct. Source: Author, May 2018.

flows of the A14 motorway and hides the formal area from the view of the park where the Jardin Filtrants are located (Fig. 34). This area of the park is designed as a sort of transitional element between the two natures that make up the park: the formal and didactic one and the one with more landscaped features which opens up beyond the A14.

The modelling of the land used to build the highway allowed the designers to create a new morphology that succeeds, with great success, in significantly mitigating the acoustic and visual disturbance from the transport infrastructures.

The morphology of the territory and the abundant vegetation make this area of the park the perfect setting for children to play "hide and seek" (Fig. 35), using as "bases" the "nids cabanes", games/sculptures dedicated to children from five to twelve years, which are placed along the area (Fig. 36). The ecological features and the recycling of resources were the tools with which the designers managed to reconcile the infrastructures with the environment: the regular forms of the park, approaching the road infrastructures, give way to vast flowered meadows with perennial species, groves that offer shelter from the sun, and hedges of various species. Even the paving materials change transitionally: clay and wood are the only two elements of which the paths were constructed in this second area of the park (Fig. 37).

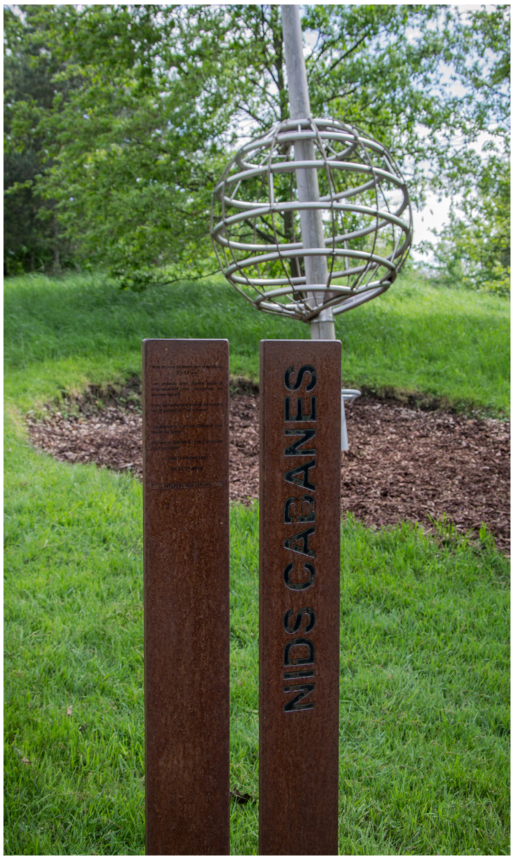


Figure 36: "Nids cabanes". Source: Author, May 2018.

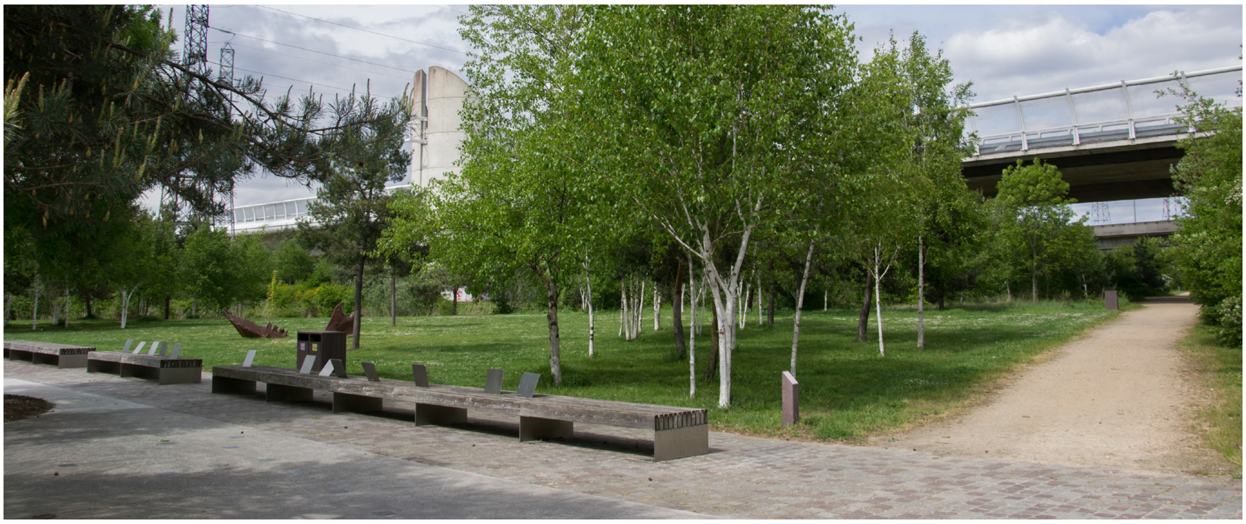


Figure 37: Detail of the aterial transition of the pavings materials, on the right the path to access the park area beyond the A14. Source: Author, May 2018.

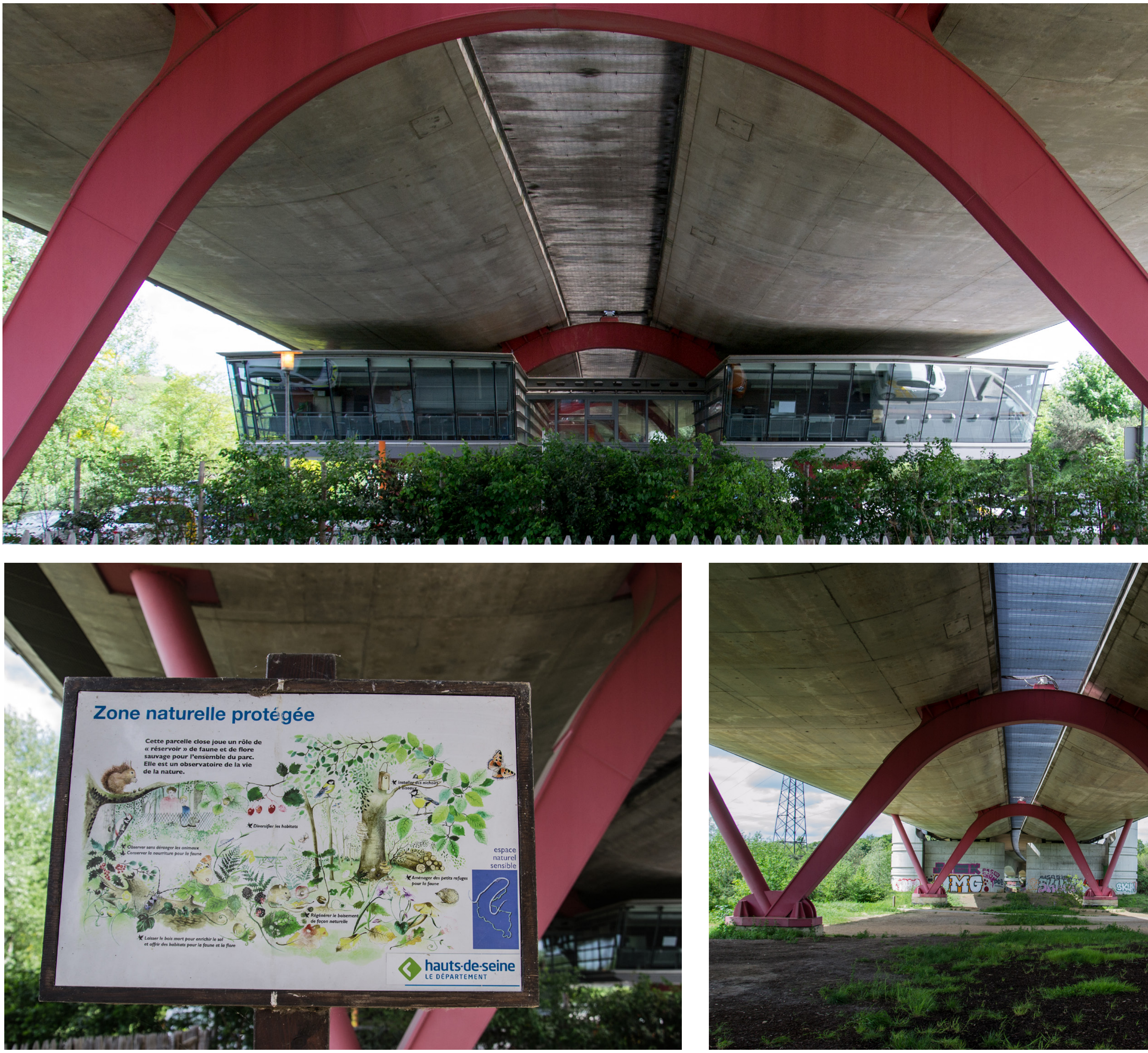

Zone naturelle protégée
Cette parcelle close joue un rôle de « réservoir » de faune et de flore sauvage pour l'ensemble du parc. Elle est un observatoire de la vie de la nature.
Diversifier les habitats
Installer des nichoirs à oiseaux
Observer sans déranger les animaux
Conserver la nourriture pour la faune
Aménager des petits refuges pour la faune
Régénérer le boisement de façon naturelle
Laisser le bois mort pour enrichir le sol et offrir des habitats pour la faune et la flore
espace naturel sensible
hauts-de-seine
LE DÉPARTEMENT

Figure 38: Top: view f the POlice Station; Bottom:Views of the "Protected Natural Area" below the A14 viaduct. Source: Author, May 2018.

Moreover, what is particularly surprising is how the viaducts and pylons of the electrical infrastructures do not constitute a disturbing element in the park, but rather gradually take on the role of a landmark, which allows the visitor to easily navigate the park. Underneath them there is no shortage of surprise elements such as the “protected nature reserve” and the local police buildings. The police regularly patrol the park, together with the maintenance staff (Fig. 38 and 39).

In the strip of land between the viaduct of the A14 and the RER viaduct, there is an area that was to have housed the stables of the police force, instead of which visitors come across an unexpected “educational farm” where the children can feed a tame donkey and a few sheep.

The fact that this lies between a railroad and a highway is unexpected because it is rather unusual to meet this kind of educational and recreational activity in the shadow of such imposing transport infrastructure (Fig.40).

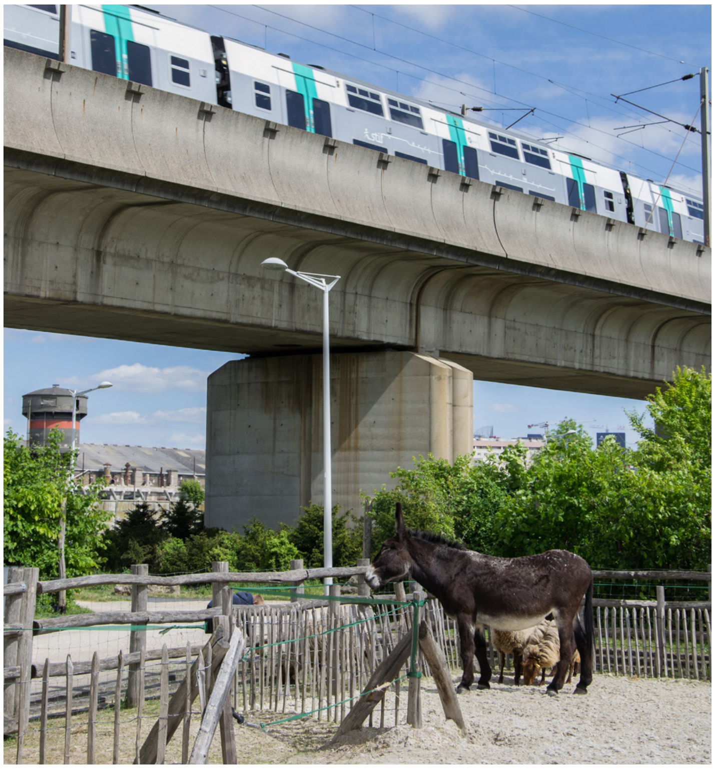


Figure 40: The educational farm between the viaduct of the A14 and the RER. Source: Author, May 2018.

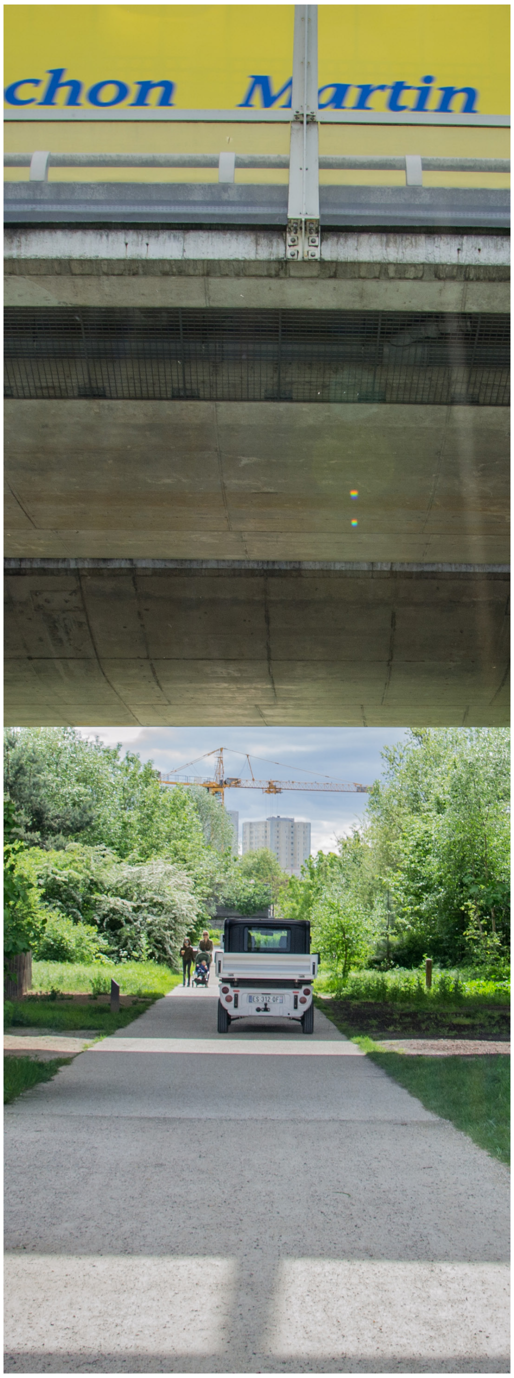


Figure 39: The perimetral path to the west of the park, in the background one of the cars used for the maintenance and control of the park. Source: Author, May 2018.

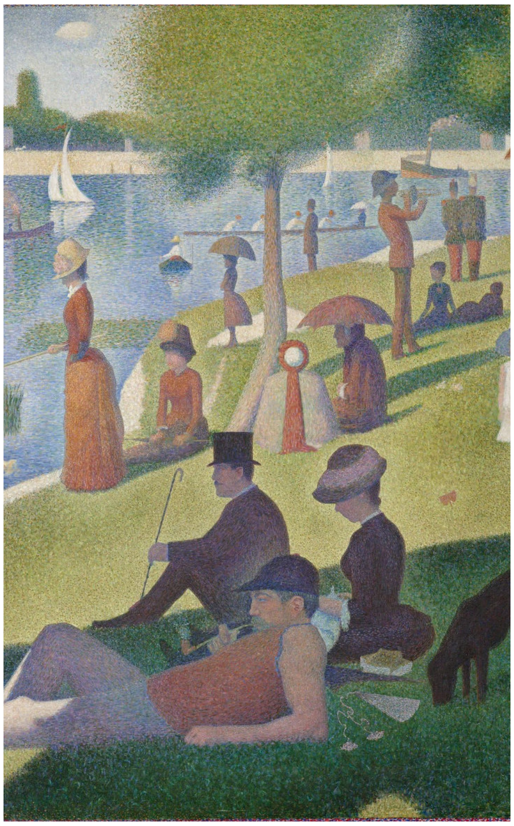


Figure 41: A part of George Seurat's painting "One Sunday afternoon at the Grande-Jatte island", 1884-1886, oil on canvas, 207 x 308 cm, exhibited at the Chicago, Art Institute.

Art is one of the aspects incorporated into the project both through the installations of artists who, over the years, have been called upon to contribute with the installation of sculptures or photographic exhibitions, and as a source of inspiration for the project, especially in the eastern area of the park and the treatment of the banks of the Seine.

The evocative images of the paintings by George Seurat (Fig. 41) were the inspiration for the re-naturalization of the banks of the Seine and for the design of the park area covered by the counter-ditch, on whose banks the citizens of Nanterre can finally enjoy the rediscovered city-river relationship.

Continuing the stroll along the wide boulevard and gravel, a large lawn with games dedicated to teenagers and "health trails" for adults opens out the view to the banks of the counter-ditch: the channel has the function of transporting purified water to the Seine and up to the pond of the "Jardin des Touradons" at the north end of the park.

The banks of the counter-ditch, created with clay present in the area is the point of utmost contact with the water, where the images of George Seurat materialize on oak walkways and drawbridges (Fig.42) and on the soft lawn areas along its banks dotted with sculptures (Fig. 43 and 44).

The park is mainly made up of large green areas and paths for walking and cycling and recreational activities.

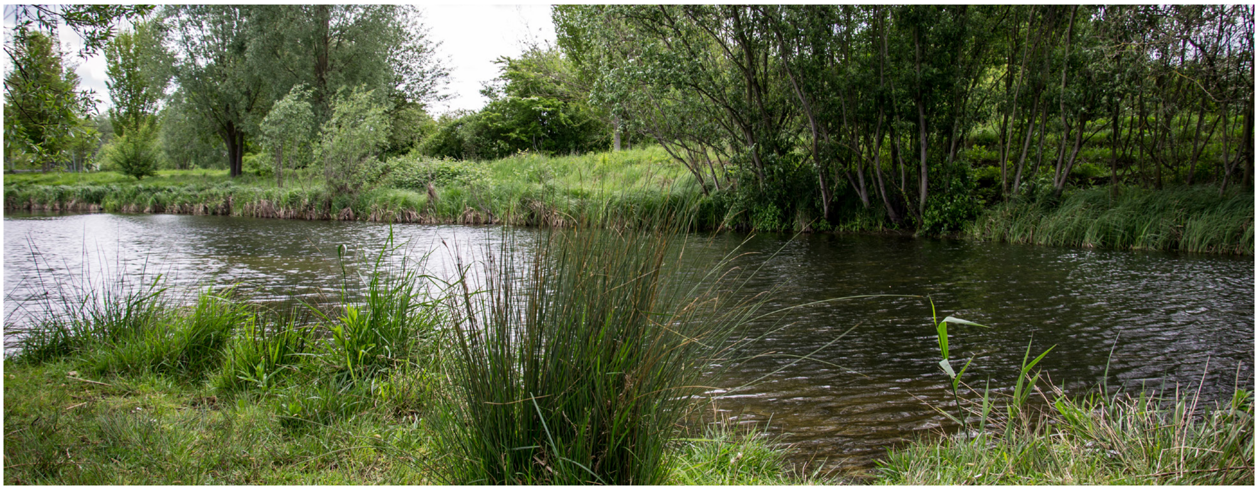
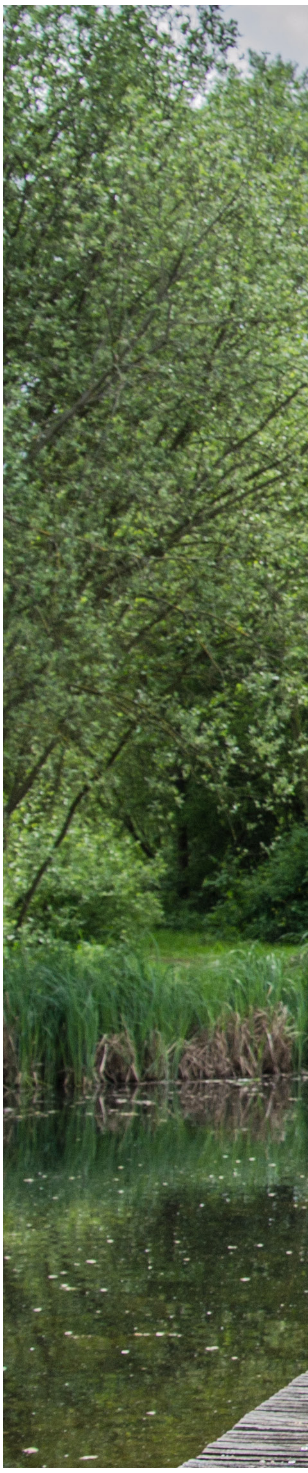


Figure 42: View if the banks of the "Jardin de Turandons" inspired to the painting Seurat in Figure 41. Source: Author, May 2018.



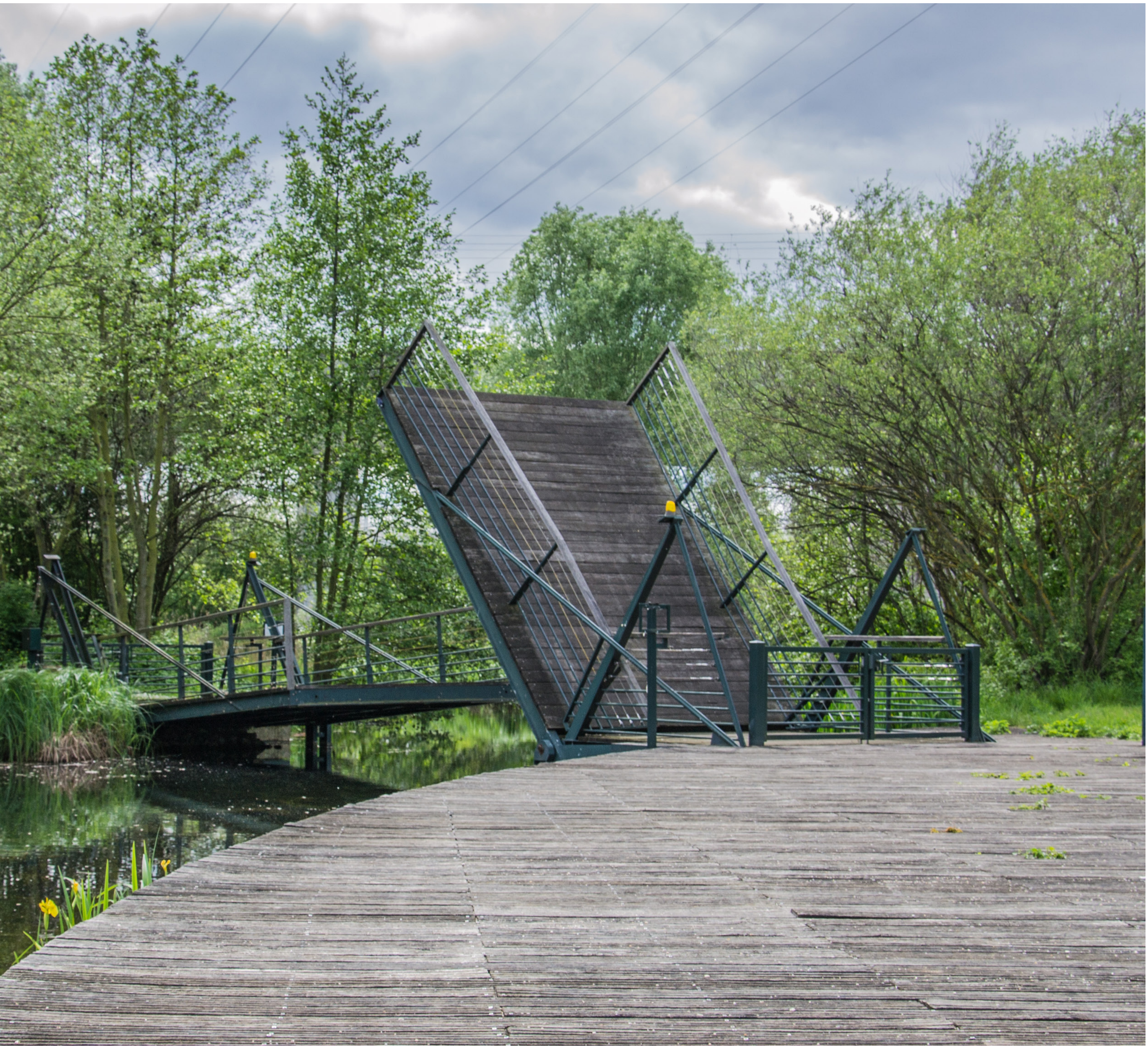


Figure 43: One of the oak wood decks on the banks of the counter-ditch provided with a drawbridge. Source: Author, May 2018.

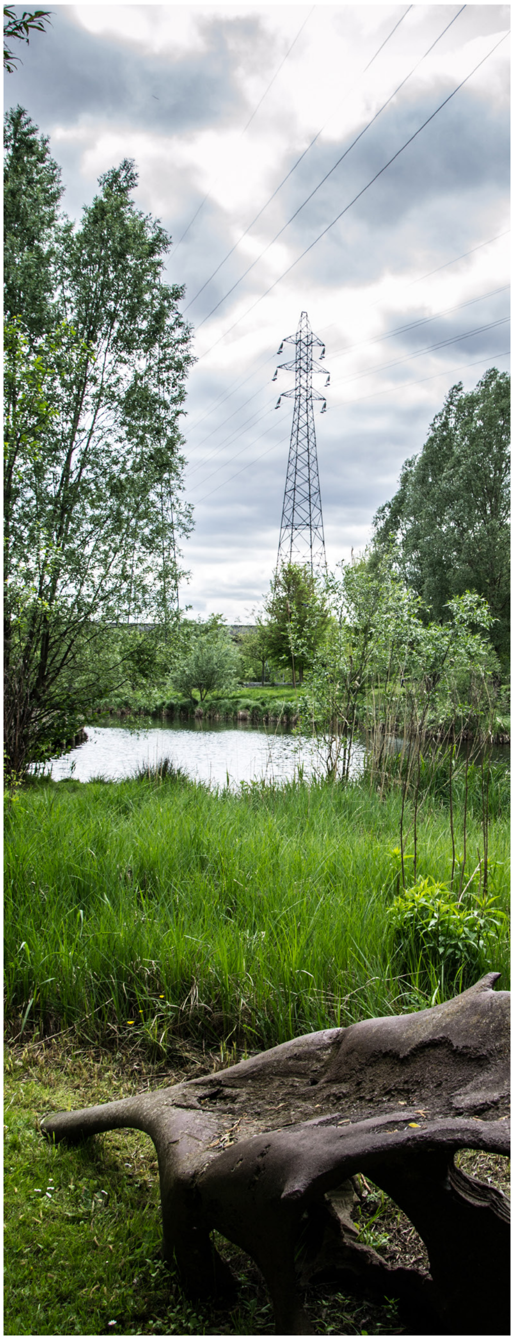


Figure 44: One of the sculptures by Quentin Garel placed on the banks of the counter-ditch. In the background, can be seen the electrical power lines towers that assume the role of landmark indicating the position of the entrance area of the park. Source: Author, May 2018.

Residents enjoy the pleasant public park and the long path along the Seine made of asphalt paving that allows skaters to use this relatively new public space along the river. The "*trame bleue, trame verte*", as the new promenade on the Seine has been named, is part of a broader connection strategy for the river banks currently being completed, which connects the "Parc des impressionists" to the "Parc Pierre Lagravere", passing through the Chemin de l'Ile park with a cycle route of about 10 km, which will complete a 39 km route along the Seine from Rueil-Malmaison to Issy-les-Moulineaux. (Fig. 45).

The design of the park of Chemin de l'Ile truly benefited the ecosystem of the "Ile Fleurie", a refuge for owls, bats and birds of prey, which to this day, like to rest under the pylons of the infrastructures that cross the park (Hauts-deSeine.fr). The audacity of the project led to the complete redevelopment of the site and the re-naturalization of the river banks, contributing significantly to the creation of natural habitats and favourable for the reproduction and maintenance of aquatic wildlife, both on the banks of the Seine and in the "Jardin de Touradons", where submerged cages create a shallow shoreline with aquatic vegetation formed by various substrates (Fig. 46), made up of plant structures of "ecological engineering" that restored "mini-ecosystems" (Takacs, 2010). In addition to the creation of "hotels" of mud for various insects and amphibians and the planting of aquatic vegetation, gravel cages were used as structures to favour the spawning activity of fish. Even the mowing of the meadows was a decision: it is a landscape dominated by wild herbs, accompanied by multiple flowering plants that attract many insects, such as bees and butterflies; during the summer the meadows are not mown so as to leave the many species of animals and insects the opportunity to thrive and to ensure the pollination of the flowers.Bringing water inside the park area was the fundamental tool to provide the variety of environments and the wealth of experiences it offers. Continuing in a north-easterly direction along the banks of the Seine, the park includes an area dedicated to urban agriculture, with 21 plots given over to vegetable cultivation for family use. Also in this case, water plays a fundamental role in sustaining the farming activities: a wind turbine draws water from the river and transports it to the family gardens where it is used for irrigation (Fig. 47 and 47b).

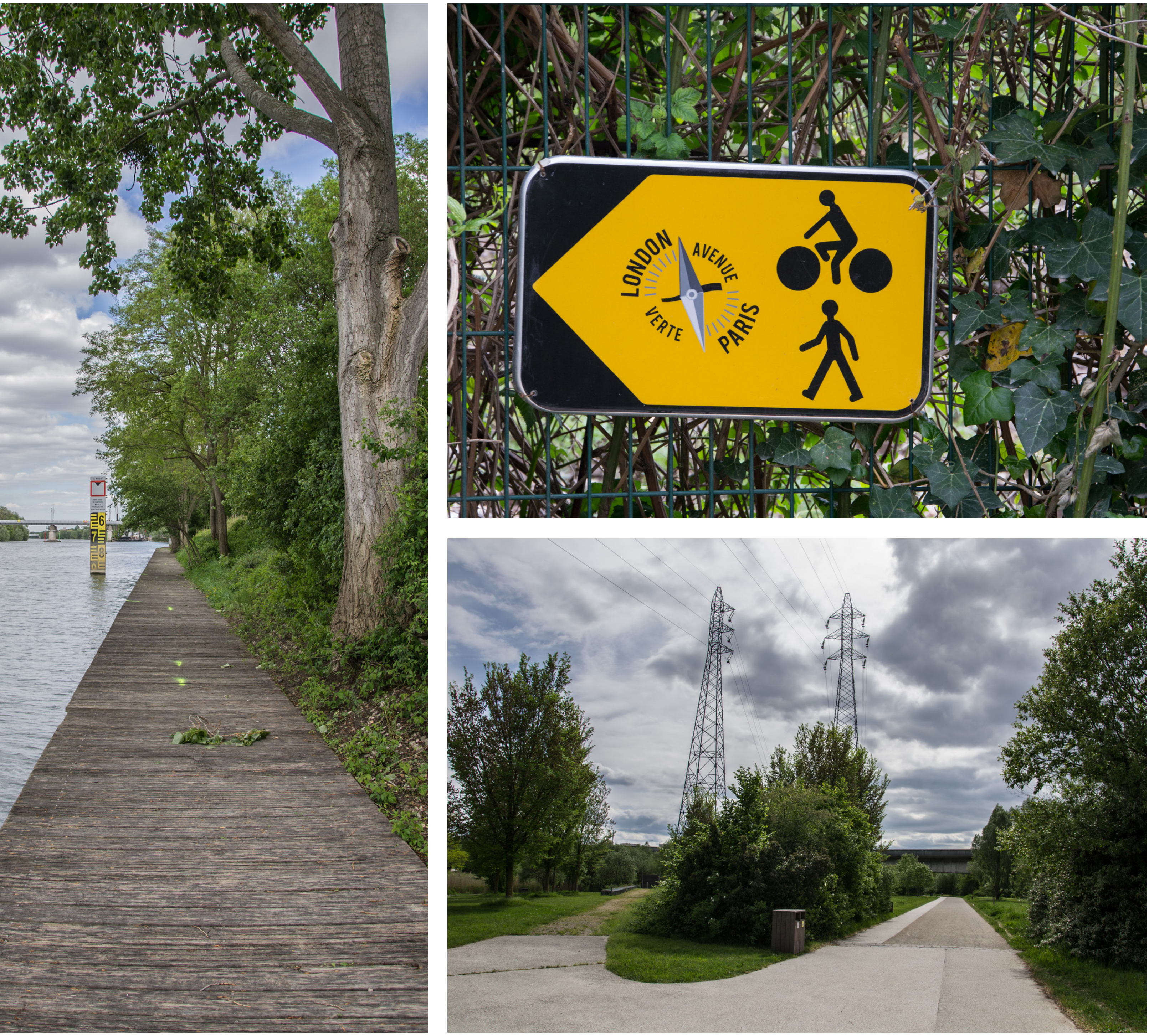


Figure 45: Left: view of the path along the bank of the Seine; Top right: the sign indicating the beginning of the “trame bleue, trame verte ”; Bottom right: View of the paths of the Chemin de l’Ile park along the river.Source : Author, May 2018.

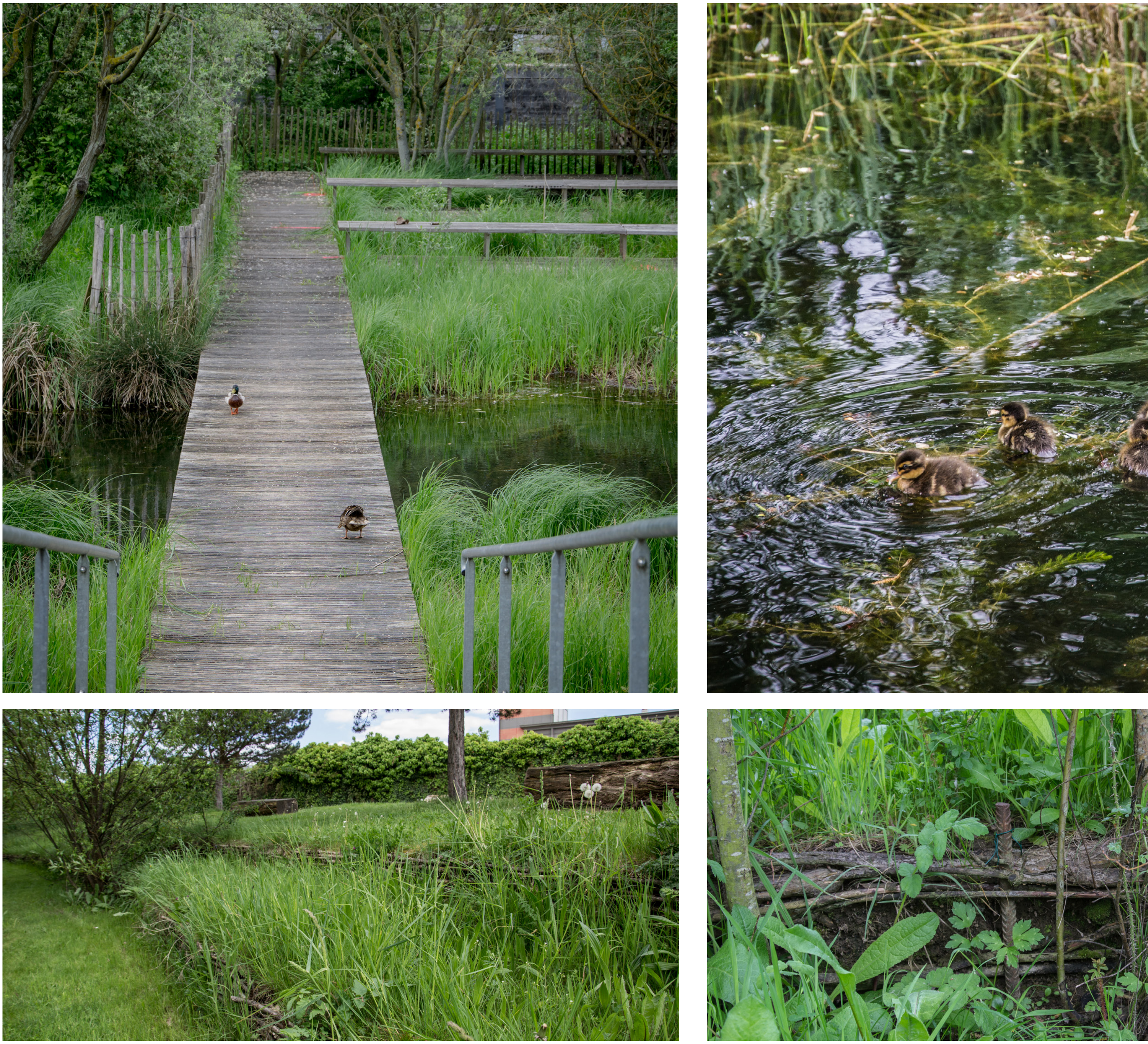
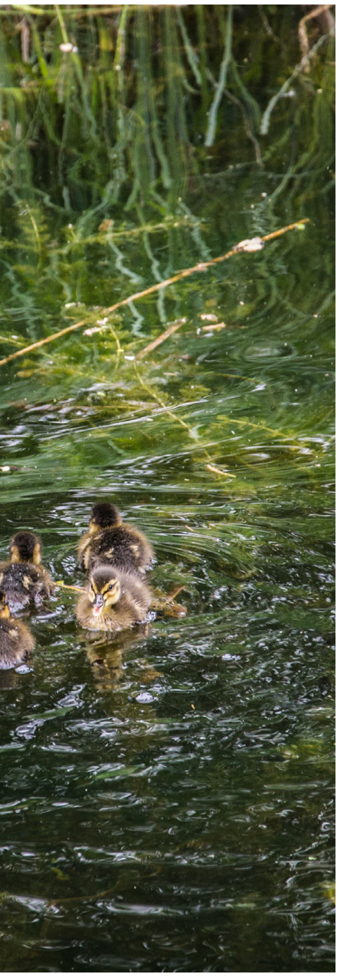


Figure 46: Top: views of the "Jardin de Turandons" and its biodiversity; Bottom: Details of the terraced structure of the garden. Source: Author, May 2018.



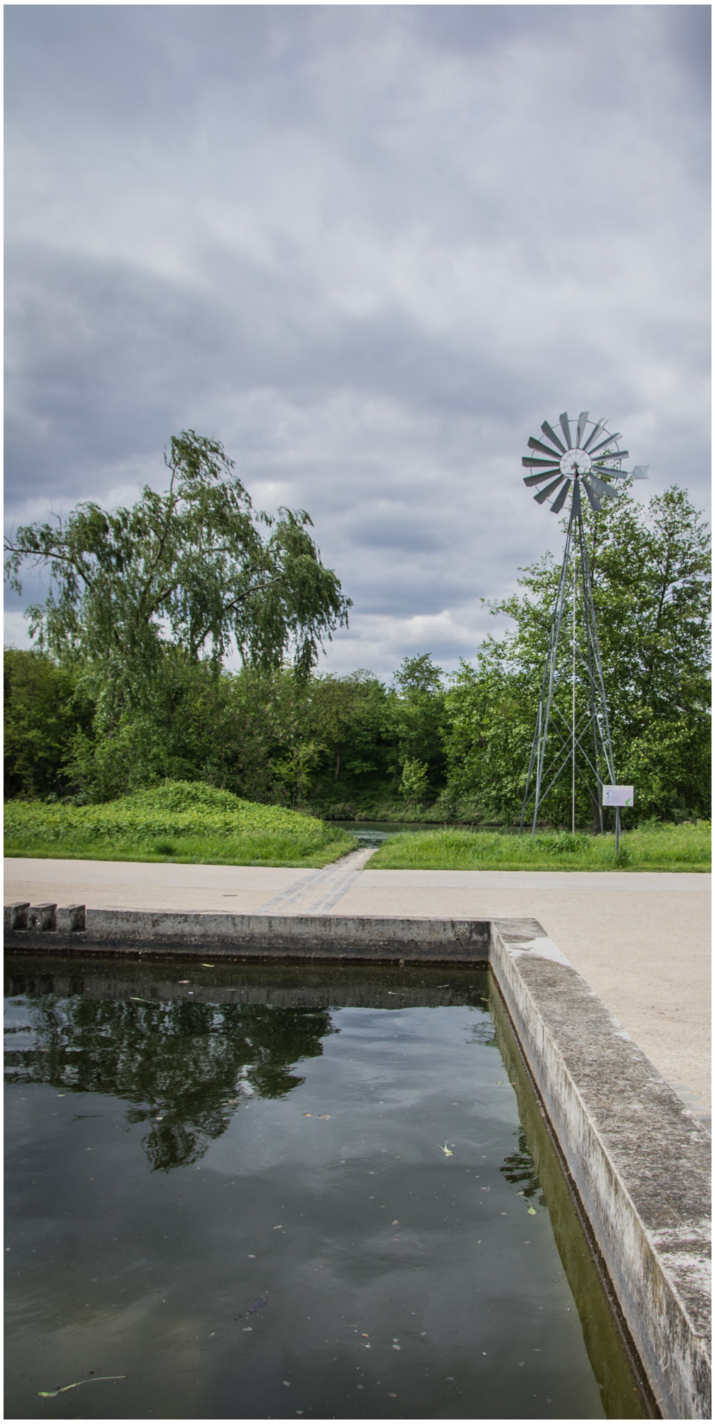
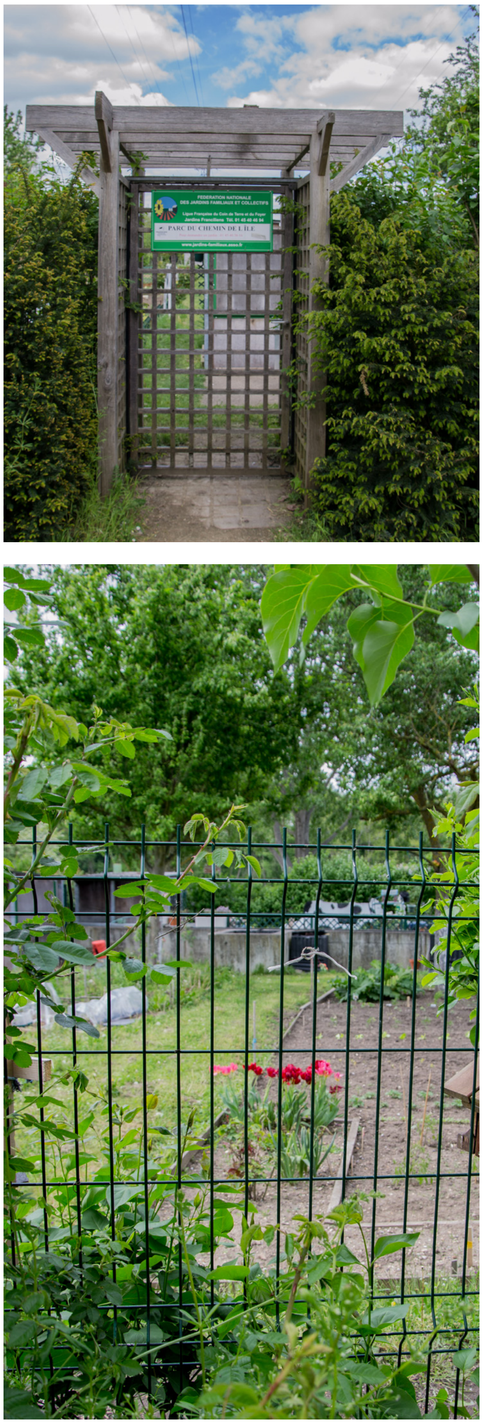


Figure 47: View of the turbine that pumps the Seine's water to the tank used for the irrigation of the Community's garden. Source: Author, May 2018.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Ligue Française du Coin de Terre et du Foyer
Jardins Franciliens Tél. 01 45 40 46 94
PARC DU CHEMIN DE L'ÎLE
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Figure 47b: Top: one of the entrances to the Community's gardens; Bottom: a glimpse of one of the community gardens. Source: Author, May 2018.

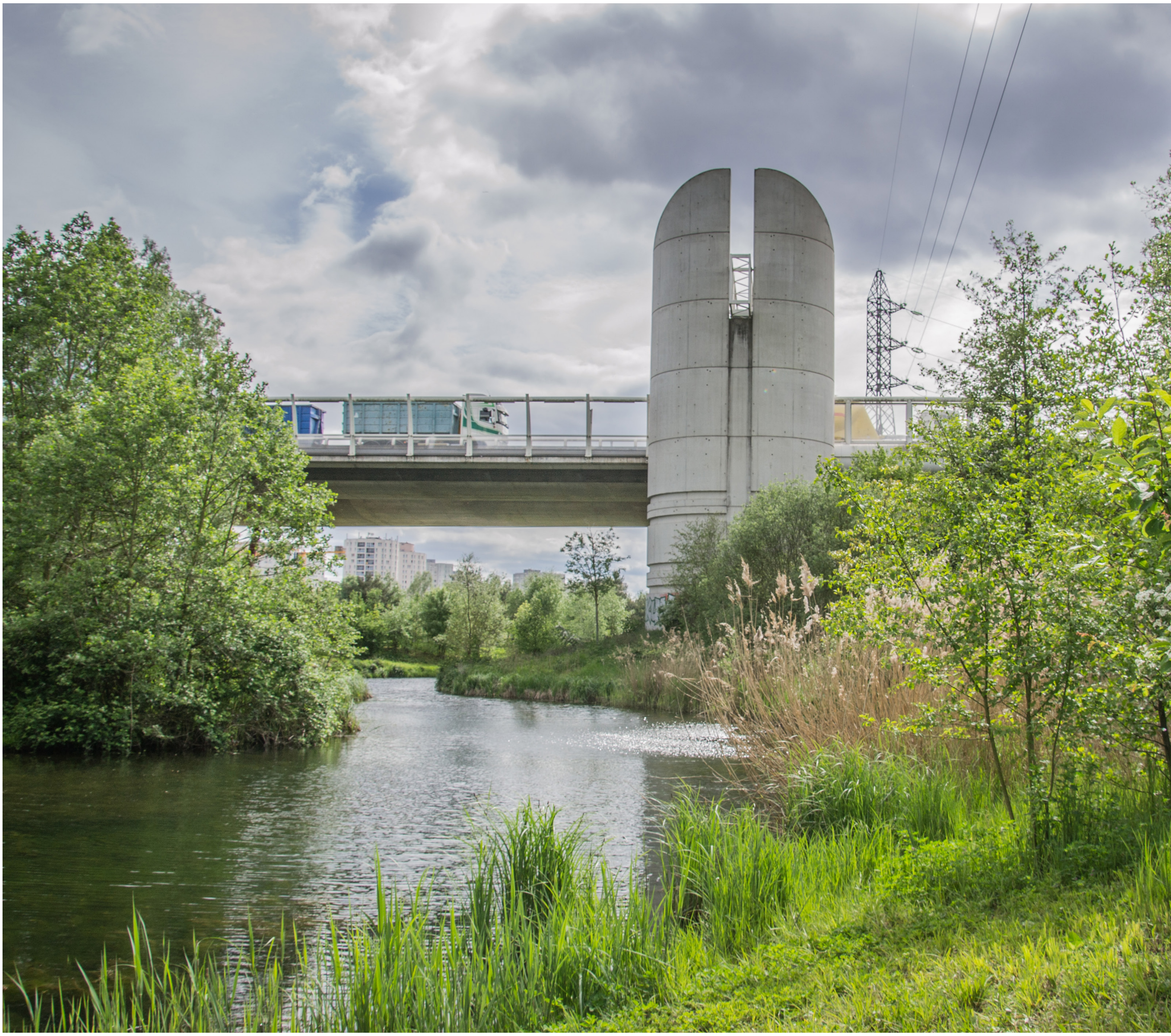
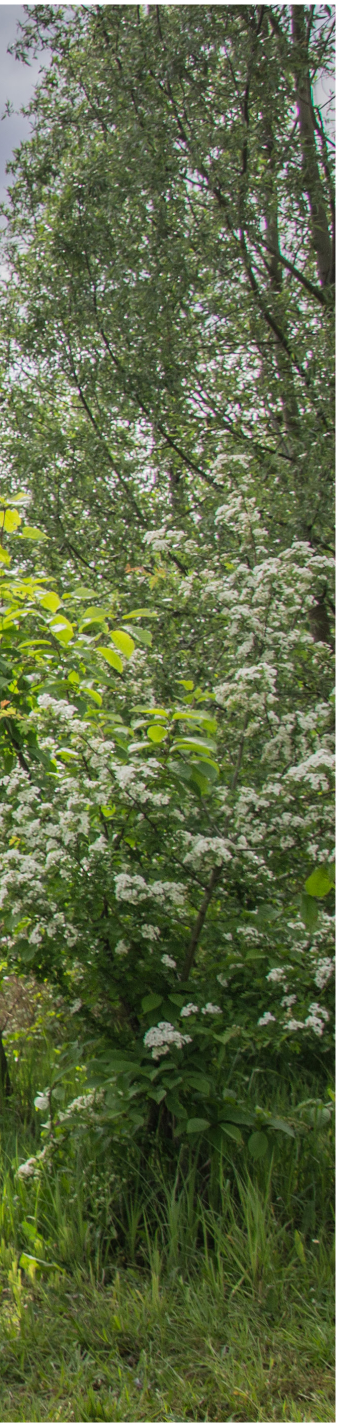


Figure 48: View of the viaduct of the A14 motorway, the picture was taken along the banks of the counter-ditch filled with the purified water drwan form the Seine by the Archimede' screws. Source: Author, May 2018.



Next to the cultivated plots, the park opens out onto meadows full of flowers, ponds, isolated trees, hedges, small woods with different ecological roles, and rest areas for visitors who can finally regain contact with the purified water of the counter-ditch (Fig. 48).

The Chemin de l'Ile park can certainly be defined as a model of connection between nature and urban public space that was able to develop, in a sustainable way, a spontaneous, but certainly varied, kind of nature. Every single landscape of the park is experienced by many visitors, who seem to really appreciate and enjoy the spaces, carrying on the most varied activities. Both from the point of view of design poetics and grammar and the use of principles and techniques related to ecology, this park, although it was completed in 2006, still constitutes an exemplary forward-looking project of urban regeneration.

The park, owned by the Conseil général des Hauts-de-Seine, also involved in its management, was conceived in an intelligent way, taking advantage of the characteristics of the environment, the spaces, the contours and the local flora and fauna. The sustainable development of this project was equivalent to the creation of a sustainable, resilient and multifunctional space, which exceeded the expectations of the designers and which was the input for a more profound transformation of the urban environment in which it is located (Fig. 49).

The district of Chemin de l'Ile has been undergoing a transformation for over ten years, right from the opening of the park: the city of Nanterre nominated this district to the National Agency for Urban Renewal, which selected Chemin de l'Ile as District as being suitable for the New National Urban Renewal Program (NPNRU) 2014/2024, now the subject of a major redevelopment aiming to improve the living environment of residents, including through the redevelopment of other public spaces in the district.

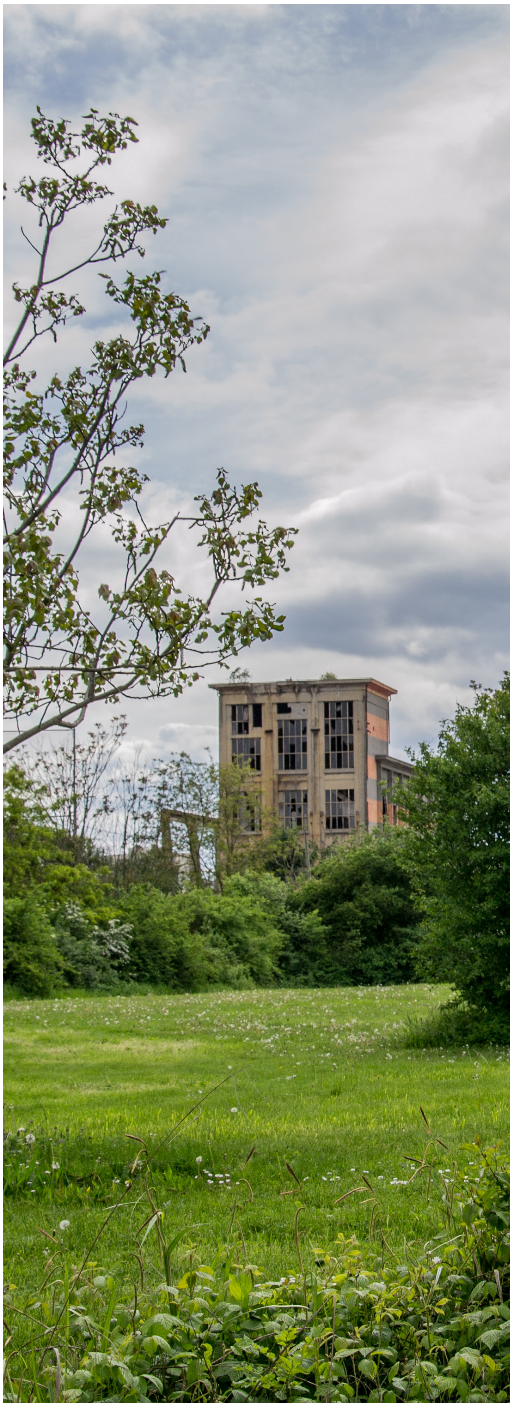


Figure 49: One of the meadows of the park, in the background one of the buildings of the former paper factory stand out. Source: Author, May 2018.

COSTS, BENEFITS, CRITICISM AND AWARDS

The total cost of implementation of the project was about 11 million Euros, lower than expected thanks to the reuse of resources in situ and the redefinition of the perimeter of the park.

The public funding partnership for the development of the project was formed by the General Council of Hauts-de-Seine and by the City of Nanterre and the Green Area Agency of the Ile-de-France region. Further financial contributions came from the Institute for public development "Seine-Arche", owner of the project and owner of the land where the park was built, and the water agency of Seine-Normandy.

The Chemin de l'Ile Park in the city of Nanterre was officially inaugurated on 10 June 2006. Designed as a link between the city and the river, this park was the flagship project of the "Program for the Development and Sustainable Management of the Seine and its Shores "(SAGE[216]), approved by the General Council of Hauts de Seine on February 24, 2006.

More than ten years after its opening, the Chemin de l'Ile park has proven to be a great success, both for the public and for the critics. Nevertheless, the designers themselves[217] have underlined how, initially, the project did not receive the attention its innovation at the time of implementation deserved. However, the Chemin de l'Ile Park has recently gained more attention thanks to various public communication strategies and further improvements that the General Council of the Hautes-de-Seine have finally put in place.

From June 2011 to May 2012, under the aegis of the "Promenade Bleu" project[218], the Council implemented an expansion that led to the creation of a vast 6,500 m² green plain and a walk lined with cherry trees along the Seine. In May 2014 the park received the Eve® mark as an "ecological plant space"; this certification was awarded for compliance, from the first year of opening to the public, with the following criteria: absence of chemical substances such as herbicides, plant protection products and synthetic fertilizers; a water saving policy with knowledge of consumption and implementation of a reduction plan; attention to the land, to be considered a living environment and not a simple resource: using mulching, organic substance intake, regular monitoring; actions in favor of biodiversity and maintenance of spontaneous plantlife[219].

Nevertheless, the project was lauded more recently on websites specialized in Landscape Architecture, as an exemplary project for "flood resilience and water features" (Landezine, october 2015).

216. Water development and management scheme (SAGE); In France, the water management and management plan (SAGE) declines the main guidelines defined by the SDAGE at the scale of a hydrographic unit or at aquifer system level. The main plans for the development and management of water resources (SDAGE) establish the basic guidelines for each large river basin to promote a balanced management of water resources among all users (citizens, farmers, industrialists).

217. Interview with Juliette Bailly-Maitre, 2018.

218. The "blue promenade" is a mixed path - pedestrian and cycle path - created by the Council of the Hautes-de-Seine, to be built along the shores as part of the departmental plan for sustainable management of the River Seine in 2006. The project is designed to constitute an ecological corridor of national interest and provide the inhabitants with a 66km continuous walking zone.

219. The Eve® reference system was developed by Ecocert in 2006 at the request of the local authorities and in collaboration with a panel of experts and professionals with a botanical and environmental background. www.ecocert.fr

INTERVIEW WITH JULIETTE BAILLY-MAITRE

How did you and Ronan Gallais open your practice?

Ronan and I went to the same university, Ecole Superieure du Paysage de Versailles. There we had the chance to learn from many very different people, from professionals, not necessarily academics, in fact we followed a well-balanced program that included many practical workshops. Today I notice that, in Versailles, there are fewer courses held by professionals and far more theoretical research, and I believe that it's better to always deal with reality, or people who are technically confronted with the subject every day. Indeed, we had the chance to meet fantastic people without ever having a great guru to follow! However, Ronan and I have done the training; I did artistic training, Fine Arts first and then Applied Arts at the Parisian school "Olivier de Serres" (ENSAAMA), so I am more of a visual artist of the architectural environment while Ronan had a more horticultural training. We have different approaches, but still, we work very well together because landscape is very complex. In all our projects we like to draw all the furniture…we design it while we structure the space we're working on, because we believe furniture is an integral part of the space. There are times when we are lucky enough to work on an exceptional space with exceptional history, like the Mail François Mitterrand, where we really had the chance to develop the character of a space!

Regarding the Chemin de l'Ile park, initially Ronan and I, the two partners of Mutabilis, we were not on the team during the competition. The design proposal that won the public competition was made by a team consisting of the landscape architect who conceived the project Guillaume Geoffroy Dechaume, the architect Paul Chemetov and Huidobro (C+H), Gilles Clement as a contractor consultant, the Ateleir CEPAGE for the ecology, Sogreah for the hydraulic studies, realized by the Atelier SITE ET CONCEPT. They won the competition with a very pedagogical didactic project of enhancement of the place. We joined the team right after the competition to develop the principles of the whole proposal and to work on the design and enrich the project until the final delivery of the works. This partnership is a little bit peculiar, because we really carried on the work of Guillaume which unofrtunately died during the studies phase, which Mutabilis had to finalize, beeing the responible team for the delivery of this wonderful project.

Would you define this design process as a transdisciplinary one?

Yes, totally.

What are the reasons that, in your opinion, made it possible to win the competition?

One thing that I think was decisive is that the parcels of the project was not the one we drew up, it was a little different and included a part of the grounds of the "papeterie"[220]. The proposal that was made was interesting because the design team proposed exchanging that land with others along the River Seine. We offered to give the territory along the river maximum continuity and I think that was decisive! This was a simple exchange, but very substantial because without this proposal, we would have had a very small strip of land along the river by now…This little change is what allowed us to define all the strategy of how to value and treat the water here in a very educational and didactic, demonstrative way!

How did you draft a proposal that could re-attribute identity to the area?

Water is the centre of this project in many ways and making the park the missing link between the Seine and the city. all the water system and especially the conter-ditch, qualify and give a fantastic identity to the park. Additionally they are not only made to guide the water through the spaces, but to act as a flood defence; on a daily basis, the water is pumped in the Seine, its quality is improved by passing first in the filtration gardens and returns to the Seine after having crossed the park slowly. In case of flood of the Seine, the surface of the park and the hollow volumes are available for the water and, in this case, the water of the Seine can enter the park.. So, a positive aspect of this project is that we created a totally resilient landscape with respect to the question of flooding.

The re-establishment of the environment was done through a very natural design compared to the work on the banks, due to the very stark and abrupt contact with the water of the Seine. We re-constructed this relationship with the water through spawning grounds for the fish and by replanting vegetation to bring back a biodiversity that is now exploding!

I think that the coherence and the relevance of the answer we offered, whether it is through the exchanges of land involved in the development of the banks of the Seine, or through respecting the environment, were key to the success of the new landscape.

The inspiration behind this new landscape are those fantastic images of very chic Parisians on the banks of the Seine, bathing and picnicking. We wanted to create that image from Georges Seurat painting, searching for a connection with the city and nature.

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[220] A cardboard recycling plant, a large industrial plot adjoining the park and still in operation at the time.

The site was tightly constrained by the presence of the industrial site of the factories of the Papeteries de la Seine and criss-crossed by several infrastructures and viaducts, and close to the Nanterre Prison. What were the fundamental aspects of the negotiation between architecture, the biodiversity agenda, the ongoing operations of depuration of the polluted soil and the transformation on the surface? Which technical solutions or analysis did you conducted?

I do not really believe that any historical analysis was done before, I forgot to say that the area suffered from very anarchic occupation and when we finally arrived on the site there were no open horizons or clear traces and the analysis wouldn't give us any answer, because it was a completely de-structured place, a construction site on a brownfield!

In fact, the history of the place is in its stratifications! We understood what the place was by digging into its different layers, and of course we had to deal with pollutants and polluted soils, we created a sort of memory of materials, and some of the ones we found were taken off and resold by the construction companies.

On the other hand, there are enormous infrastructures like the A14 that crosses the site and we had to deal with it. Regarding the amount of resources abandoned on site after the construction of the motorway, we were asked to manage all that soil that came from the construction site of the A14. There were huge mounds of earth everywhere, so we had to retrieve some of it, to carve a part of the park with it. The big hill that constitutes the south-east boundary of the park was left because the Hautes-de-Seine department had to decide on how to proceed further, but finally nothing was decided for the other side. This is a place that is interesting because many people climb the hill to have a great view of the park; sometimes we realize that, when we deliver a project certain usages are not predictable: in this case the heap of earth left has become a *belvedere* and a place to walk...

Have public participation strategies been implemented?

Not exactly. At the time we started the works the site was completely abandoned and unused. We organized some construction site meetings, but more for information than for dialogue.

On the other hand, there was a particular exchange with people who had vegetable gardens there, being a part of the restoration program: we redesigned and re-located gardens, working with them to define the right dimension of the plots, and where and how to create their sheds.

The competition involved 39 ha, but just 14 ha were developed. Why?

The competition initially concerned a larger part (39ha) which included the requalification of the A86 highway coverage. Those territories are very complicated and you can't manage such big area easily... it takes time to transform it; today the area is still under construction. The department complete step by step the park structure following more or less the first master plan. The first 14ha park was the first step to initiate the transformation...
This park was also an opportunity to complete the *trame bleue, trame verte* along the river la Seine, which aims to create a promenade at the scale of the enhancement of the banks of the river Seine.
What is important to say is that this park is very innovative and educationnal in comparison with its date of creation...today the department is broadcasting this kind of approach and we are happy to have been working succefully with ecology in such big area.

Did any problems come up in the implementation phase? Which? And how were they solved? Did the budget changed during work on the project? And if so, why?

The proposal we drew up was for 14 ha of territory with a 11millions Euro (ht) budget, which is not so much, because it included also some buildings to construct... It is actually, it's one of the things we're very proud of: the budget for the project was actually sufficient!
A relative big part of the budget has employed for the water systems, like for the Archimede's screws which is heavy engeneering..It was necessary to carefully dose where we intervened, so we decided to focus the design on what was important. The money finally concentrated in the fringe parts, the hardest one to deal with, but today the site is superb, the park has grown, that's for sure, and people have been using it in ways that we could not even imagine. My impression is that the most natural part is the most successful, there are areas where we never thought that people would go and sit, everywhere at the edge of the water, the kids are fishing, and families are picnicking! That's fantastic!

What are the lessons learnt from this project?

One of the interesting thing, to take a lesson from this project, is that the budget was kept within the framework partly because we managed to build the project in intelligence with the site. We worked this project with the sense of "le bon jardinier" (good garderner), saving ressources and working with it. This is how for example we managed to value clay that we found during earthworks using it as waterproofing material. We also used all the concrete existing, crushing it and using it for the path structures.

We did our best to use the ressources in place, trying to get the best out of them.

What would you change or do in a different way now?

Maybe we wouldn't use the same wood essence...This is feedback from technical experience that makes us say that we put a lot of emphasis on using oak wood without treatment to construct paths on water and after more than 10 years it suffers a lot. That's not drama and wood is a living material, we knew it, but we didn't imagine the environment would be so aggressive. Many people use the wood paths which are also in close contact with a fauna that has developed at full speed. All the ducks and their faeces are very aggressive, a lot of acidity goes into the wood and burst its fibers. Today most of the wood has to be changed.

In your opinion, can this project be defined as a source of knowledge for the transformation processes of urban spaces in terms of the process of designing, reading and preserving historical and geographical traces, sustainability, flexibility and multi-functionality of urban spaces?

Yes, I am literally convinced of it. The connection with the Seine is a fundamental concept but is not the only goal. This park is also pedagocial and supports the development of new uses, a new way of living our territory. Further more, I think that this park puts in place an essentiel first frame that can move and that can evolve in depth, leading effectively to the transformation of the area. Today the factory (la papeterie) is finally closed and has been created a new housing area instead...this way residents have the larger *Green Infrastructure* to their disposition.

Taking into account the continuous growth of infrastructural systems in a society that continues to pursue the autonomous transport model based on private vehicles, what do you think is the meaning of the accomplishment of this type of operations for the city of the 21st century? What are the causes of this renewed attention on the importance of infrastructural urban spaces, until now ignored by disciplinary and academic criticism?

I think there is a whole infrastructure policy that we still have not exploited. On one hand the lines of infrastructures are an integral part of landscape… and crossing a landscape means also that you can discover it thanks those infrastructures…It's obvious that infrastructures will always exist because they are part of the city, and it wil be vain and unconstructive to try to delete them by hook or by crook. On the other hand, what is clear is that we have gradually learnt that infrastructures must be connected to the city by participating in its dynamism...

I think we have to rebalance the car/pedestrian relation but without opposing black to white. The Chemin de l'Ile park site is located at the crossroads of big infrastructures (under the A14 highway and under the RER D railway, near the A86 highway), but also near big and not very friendly equipments (jail, factory..). We decided not to fight or try to hide them but to assume them...

It is a sort of resilience concept… Fight or hide would be without guarantee of failure, the guarantee of success is to compose with infrastructures and to transform them gradually!
Today, I think the main goal is to be able to understand that there are many mistakes that have been made and certainly we can live with them, but also we need improve them learning from our mistakes.

Do you think this project meets the following criteria?

Respect the fundamental principles of human existence and the power of archetypes.

Avoid taking a strongly sectoral and formal planning and design orientation.

Accept the existing and the isochronous. That is: to attribute the same value to historical and contemporary structures.

Promote and reinforce the mutability, feasibility and versatility of the structural networks.

Create multipurpose spaces in such a way as to allow the adoption of free structures.

Emphasize communication and structuring factors

I would not describe a landscape as a set of criteria, because I don't think some principles can make a good project. A project is a part of a story, each project has its history and constraints that cannot be solved or read just following a few criteria.

Paris, May 4th, 2018

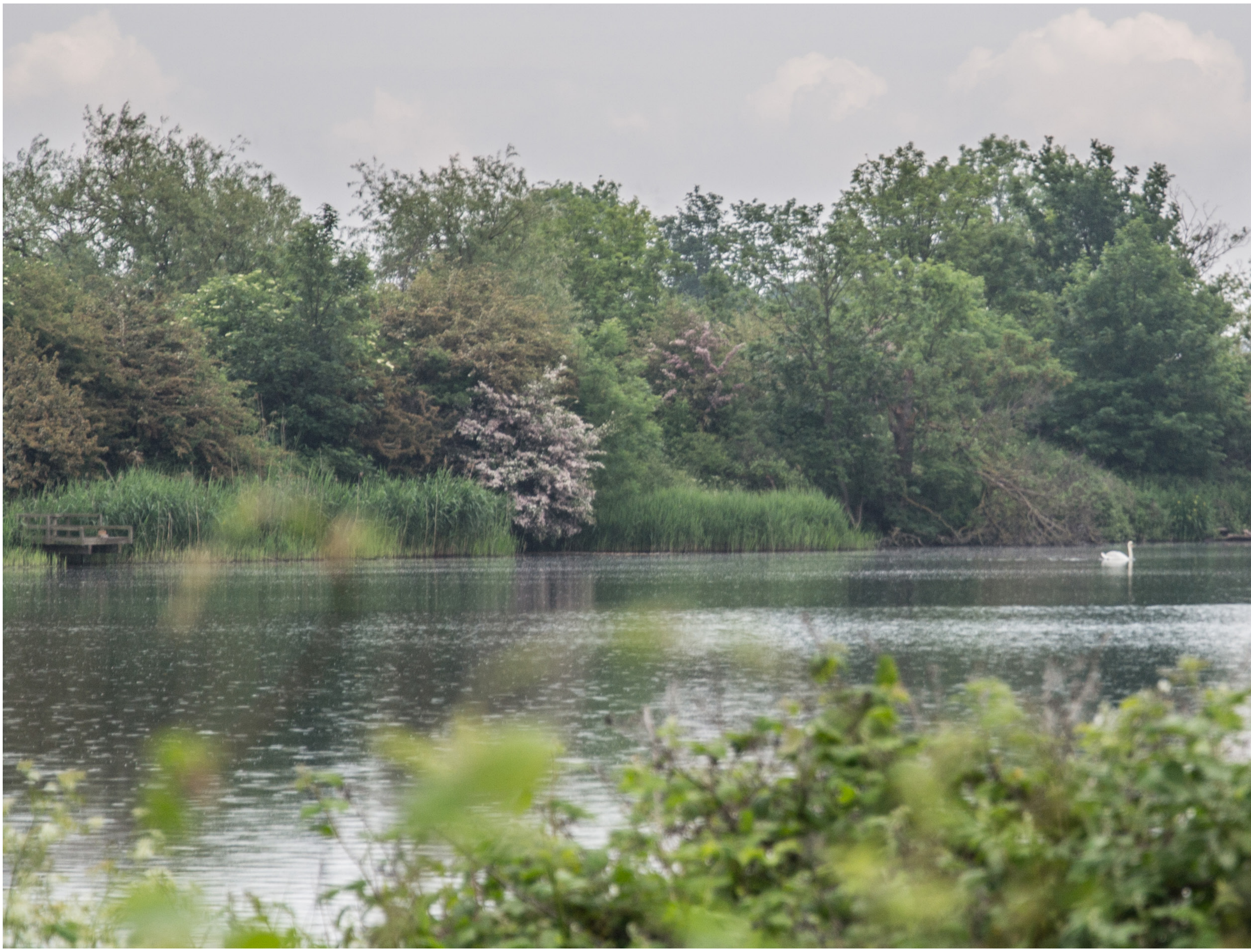


Figure 1: View of the "green core" of Walthamstow Wetlands. Source: Author, May 2018.

WALTHAMSTOW WETLANDS

PROJECT DATA

Location:

Walthamstow Reservoirs, Borough of Waltham Forest, London, UK.

Client:

London Borough of Waltham Forest, in association with Thames Water and London Wildlife Trust;

Supported by Heritage Lottery Fund.

Cost:

£8.7m (9.880.000 euro), of which:

£4.47m from the Heritage Lottery Fund,
£1.8m from Thames Water,
£1m from The Council's Growth Area Fund, £420k from the GLA Big Green Fund,
£330k from the GLA Outer London Fund

Design period:

2010 Upper Lee Valley Landscape Strategy, drafted by Witherford Watson Mann Architects e Jonathan Cook Landscape Architects;

2010-2011 All London Green Grid SPG, Chapter 5 for GGA01, ALGG Framework 1 (Lee Valley and Finchley Ridge), Project Cluster 1.3 (Walthamstow Reservoirs);

2013 The Upper Lee Valley Opportunity Area Planning Framework (OAPF), approved by the London Assembly and the Mayor of London;

2013-2016 Project design (Lead consultant: Kinnear Landscape Architect).

Construction Period:

2017

Scale:

Total Surface: 211 ha

Reservoirs: 10

Total length of pedestrian and cycle paths: 1,7 km

Surfaces of newly created Reedbeds: 1,8 ha

Wetland habitats: 2.4 ha

Restored buildings: 2

Neighborhoods affected by the project: Borough of Hackney, Borough of Waltham Forest and Borough of Haringey.

Designers:

Lead consultant and landscape architecture:

Kinnear Landscape Architects: Lynn Kinnear, Ben Smith, Katie La Touche, JJ Watters;

Architecture: Witherford Watson Mann Architects: William Mann, Stephen Witherford, Chris Watson, Hannah Schneebeli, Naidne Schuez, Bumsuk Chung;

Consultants:

Ecology: BSG ECology: O. Gabb, E. Austin; **Civil and Structural Engineering:** Entuitive: F. Miles; **Reedbed engineering:** Ramboll UK Ltd; **Quantity Surveyor:** Cinns: C. McDermott; **Business Planning:** Counter Culture: S. Escritt, T. Wilcox **Services and Drainage:** P3R: M. Popper, A. Mohammed, R. Gold; **Access Consultants:** People Friendly Design: T. Lister; **Highways Engineers:** Project Centre: B. Meekings, C. Hadwood, I.Daly; **Contamination and Environmental Services:** Capita Symonds: N. Greenwood; **Wayfindings:** Polimekanos: J. Kolmaier, S. Kraus, L. Stephanides; con Kinnear Landscape Architects; **Curator:** S. Swaby; **Exhibition Design:** Real Studios: A. McCaw, J. Hampshire; **Interpretation:** Polimekanos: J. Kolmaier, S. Kraus, L. Stephanides; **Lighting Design:** Studio Dekka: C. Stewart, J. Harrison.

Construction Companies: 29

SITE ANALYSIS

Geographical Context:

«The valley itself was carved by meltwaters from an ice lake in the Anglian glaciation, which diverted the Thames from the centre to the southern edge of its basin. The power of climate forces becomes palpable through these extremes and the landscape they have formed» (HLF Stage C Report, KLA, p. 39).

The intervention area goes by the name of "Walthamstow Reservoirs", in the northern area of the alluvial valley of the river Lee (or Lea), the largest tributary of the Thames and second most important river in the English capital. It is located just above the Lower Lea Valley, the site of regeneration for the 2012 Olympic and Paralympic Games and extends to the Enfield area to the north. The Lea Valley and the River Lea are part of a Green Belt branch linking the Hertfordshire countryside with the Thames river (Fig. 2). This alluvial valley is crossed by the ramifications of the river Lee, which converge in a single course at Three Mills, before entering the River Thames at a point opposite the Greenwich peninsula; it includes the districts of Tottenham Hale, Blackhorse Lane, Meridian Water in Central Leeside and Ponders End, extending for a total area of 3,900 ha (GLA, 2013). The valley is shaped by a number of highly specific landscapes, ranging from the vestiges of ancient landscapes relating to large-scale engineering, such as Walthamstow Marshes and the Chingford Water Reservoirs. The landscape subject to redevelopment counts vast stretches of river, basins, swamps and woods.

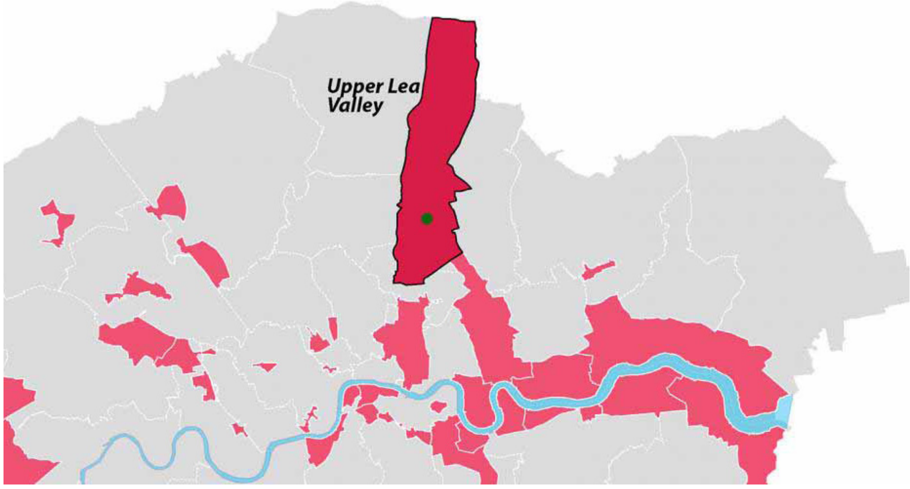


Figure 2: The Upper Lee Valley Opportunity Area Planning Framework (OAPF), 2013; In green is indicated the position of the project area. Source: London.gov.uk

Historical Context:

«*The valley edges and floor have yielded both prehistoric and historic archaeological finds (bronze cauldrons, bronze swords, Saxon armlets, log boats, crannog piles), a sign of the attractiveness of water edge sites for human life – now a global condition*» (HLF Stage C Report, KLA, p. 39).

Until the seventeenth century, before the river diversion, the Upper Lee Valley and specifically the area of Walthamstow Reservoirs was a natural area of marshes mainly used as common pasture land by the inhabitants of the local villages and for the cultivation of hay. In 1854, work began on building an aqueduct for water transport to the Essex and Middlesex filtration areas, «*with the aim of improving the quality of drinking water to reduce cholera epidemics*» (Kla, Stage C, p.8).

The basins were built on wetlands adjacent to the River Lea by the East London Waterworks Company. In 1863, the basins no.1 2 and 3 were built by digging out existing wetlands at ground level. The tanks number 4 and 5, on the other hand, were built above ground level after the draining of the marshes in the area.

The completion of the construction of the 10th basin took place in 1904, with the construction of the Lockwood reservoir. In 1954, the alluvial channel of the river Lee was built in order to increase the flood capacity of the area, significantly reduced due to the marsh draining operations (Fig. 3).

The river, which had been one of the main points of docking for commercial ships since the sixteenth century, and its valley, evolved hand in hand with the urban expansion of London, alternating the development of industrial uses to a «*persistent misalignment between large complexes of geometric buildings, designed to optimize land use with the irregular topography of the river meanders, bordered by transport infrastructure lines*» (Mann W., 2003, p. 6).

The rapid industrial, infrastructural and real estate development around the River Lee has completely transformed the landscape of this valley, which has lost much of its original character.

As declared in the "Upper Lee Landscape Strategy" «*the area suffers from significant fragmentation, a lack of visual and physical connectivity and unclear function, leading to a lack of a sense of place or strong unifying identity. A disconnected landscape, poor environment and low value land uses reinforce a poor image and an undervaluing of the area by local communities. Large sections of the local communities do not have access to quality open spaces. Transport*

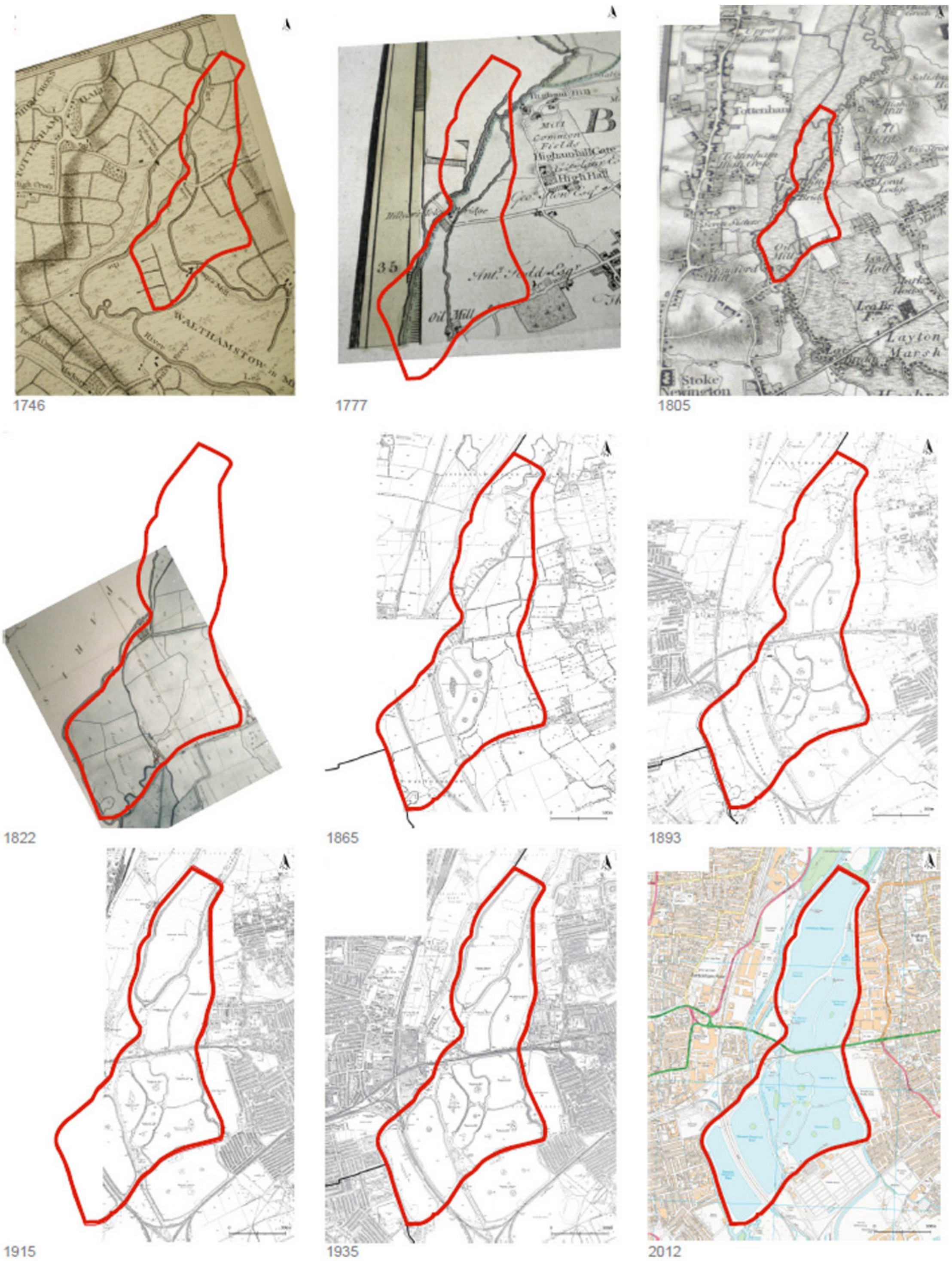

1746
1777
1805
1822
1865
1893
1915
1935
2012

Figure 3: Historical evolution of the project area. Source: Walthamstow Wetlands Stage C Report, KLA design team.

corridors, industrial areas and land owned by Thames Water act as barriers to the River Lea and the Regional Park with public access to the area made more difficult due to a lack of physical and/or easily legible routes and connections» (Upper Lee Landscape Strategy, 2010, p. 4).

Despite these serious issues, the Upper Lee Valley still contains green and open spaces that have the potential to significantly improve the quality of life of the inhabitants. In 1967, the Lee Valley Regional Park Authority was founded, as suggested by Sir Patrick Abercrombie in the Greater London Plan of 1944, with the aim of developing and preserving more than 4,000 hectares of green space and recreation grounds.

The Authority is also responsible for the regeneration of abandoned land in high-quality public open spaces and natural habitats of ecological importance, as well as preserving the historical value of the region (LeeValley.org.uk). Despite the 4,000-hectare park that runs the entire length of the valley, access to the park and the views on it are severely limited, including large areas along the river Lee and many other protected natural habitats that need improvement, such as the Lee Valley Special Protection Area and RAMSAR sites, which include the area subject to redevelopment called "Walthamstow Reservoirs".

DESIGN, DEVELOPMENT AND DECISION-MAKING PROCESS

Upper Lee Valley Landscape Strategy (2010)

«The impact of infrastructure upon the valley has created some of the most dramatic – and problematic – landscapes to be encountered. Reservoirs, railways, highways, waterworks and power plants and networks are omnipresent. Landscape treatments should seek both to mitigate their negative impact while accentuating and accessing their drama, elevation, habitat potential, historical significance and contemporary relevance. Additionally, the sites concerned are typically associated with plentiful areas of fringe under-utilised land for which new uses are possible» (Upper Lea Valley Landscape Strategy, 2010, p. 60).

In response to the original Lee Valley vision that was undertaken with the *Park Development Framework* in 2009, in February 2010 was published the *Landscape Strategy for the Upper Lee River Valley*[221] was published with the aim of developing a coherent landscape and public space, producing a priority action plan to define key interventions able to improve the Regional Park and creating a high quality *Green Infrastructure*, thus facilitating and accelerating the implementation of projects funded by public capital through the identification of parameters of sustainability and management for partners and stakeholders.

The study area extends for more than 14 km in length between the Olympic fringe and the M25 motorway, with a width of almost 5 km. On the basis of careful investigations and observations, the study identifies a number of highly valuable landscape assets within the area, which can be divided into three distinct units:

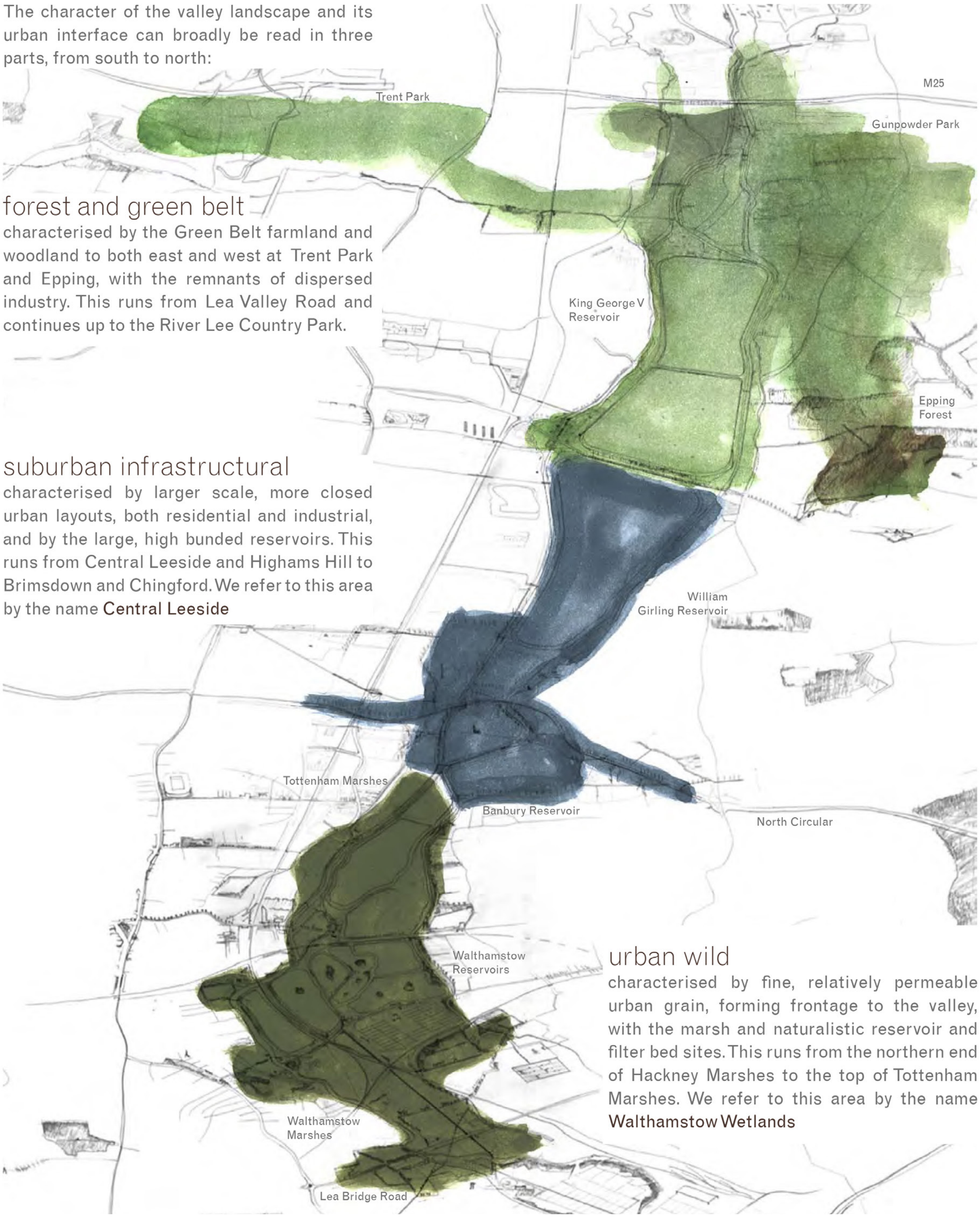
1 The urban wild from Lea Bridge Road to Tottenham Marshes, including Walthamstow Reservoirs, in this report going by the name of "Walthamstow Wetlands";

2 The suburban, infrastructural landscape of Central Leeside, the currently industrial and infrastructural areaaround the North Circular;

3 The rural fringe, north and east of Ponders End and Lea Valley Road, with Green Belt farmland and Epping Forest are close by.

Through this first strategic analysis the landscape unit going by the name of "Walthamstow Wetlands", also defined as "urban wild"(Fig. 4), was first defined. The principles of the landscape design and the management plan drawn up established a clear direction for the transformation and laid the foundations for the subsequent actions of planning and management of the area.

[221] Study commissioned by the Greater London Authority and carried out by: Witherford Watson Mann Architects, Jonathan Cook Landscape Architects, Peter Clark, Agricultural Consultant, Claire Pritchard, Food Consultant, British Waterways Rider Levett Bucknall, Cost Consultants Philipp Ebeling.



The character of the valley landscape and its urban interface can broadly be read in three parts, from south to north:

forest and green belt

characterised by the Green Belt farmland and woodland to both east and west at Trent Park and Epping, with the remnants of dispersed industry. This runs from Lea Valley Road and continues up to the River Lee Country Park.

suburban infrastructural

characterised by larger scale, more closed urban layouts, both residential and industrial, and by the large, high bunded reservoirs. This runs from Central Leeside and Highams Hill to Brimsdown and Chingford. We refer to this area by the name **Central Leeside**

urban wild

characterised by fine, relatively permeable urban grain, forming frontage to the valley, with the marsh and naturalistic reservoir and filter bed sites. This runs from the northern end of Hackney Marshes to the top of Tottenham Marshes. We refer to this area by the name **Walthamstow Wetlands**

Trent Park
M25
Gunpowder Park
King George V Reservoir
Epping Forest
William Girling Reservoir
Tottenham Marshes
Banbury Reservoir
North Circular
Walthamstow Reservoirs
Walthamstow Marshes
Lea Bridge Road

Figure 4: The characters of the landscapes of the "Upper Lee Valley". Source: "Distinct areas of the Upper Lee", extract of the "Upper Lee Valley Landscape Strategy", 2010, p.18.

The proposed transformative vision called “From Edge to Common Ground” took its cue from the existing heritage, with the aim of connecting the parks and waterways of the area in order to form a single wide open space, recalibrating the current mix of uses and landscapes and tying them to a network of public spaces, inclusive and flexible in their use and connected by a series of pedestrian and cycle paths and thematic routes (Upper Lee Valley Landscape Strategy, 2010).

The document suggests some basic principles of design (Fig. 5) to strengthen existing relationships, complete them or expand them. The identified interventions act on the following elements: «*open spaces, paths and cycle paths, places and activities of the park, water, productive landscapes and extension of the valley landscape*» (Upper Lee Valley Landscape Strategy, 2010, p. 42).

The overview of the identified interventions was aimed to inform the drafting of the projects to be envisaged in the next phase (63 projects, of which 40 were developed in greater detail as strategic elements for achieving the qualitative transformation of the three areas).

Valley wide network

The Landscape Strategy was developed in parallel with the “Mayor’s Opportunity Area Planning Framework” in order to incorporate this spatial strategy into the “OAPF Consultation Draft of the London Plan”, which, starting in July 2011 (Policy 2.18), «*promotes the provision of an integrated green infrastructure network and supports the extension of the Green Grid to the whole of London*» (ALGG, 2011, Area Framework 1, p. 2).

Both initiatives are aimed at informing the process of creation of the “East London Green Grid” as a distinctive and local network of open spaces, but simultaneously it has to be regionally linked through the All London Green Grid (Upper Lee Valley Landscape Strategy, 2010) which develops in even more detail the project objectives identified by the “Upper Lee Landscape Strategy” 2010.

Valley edge development

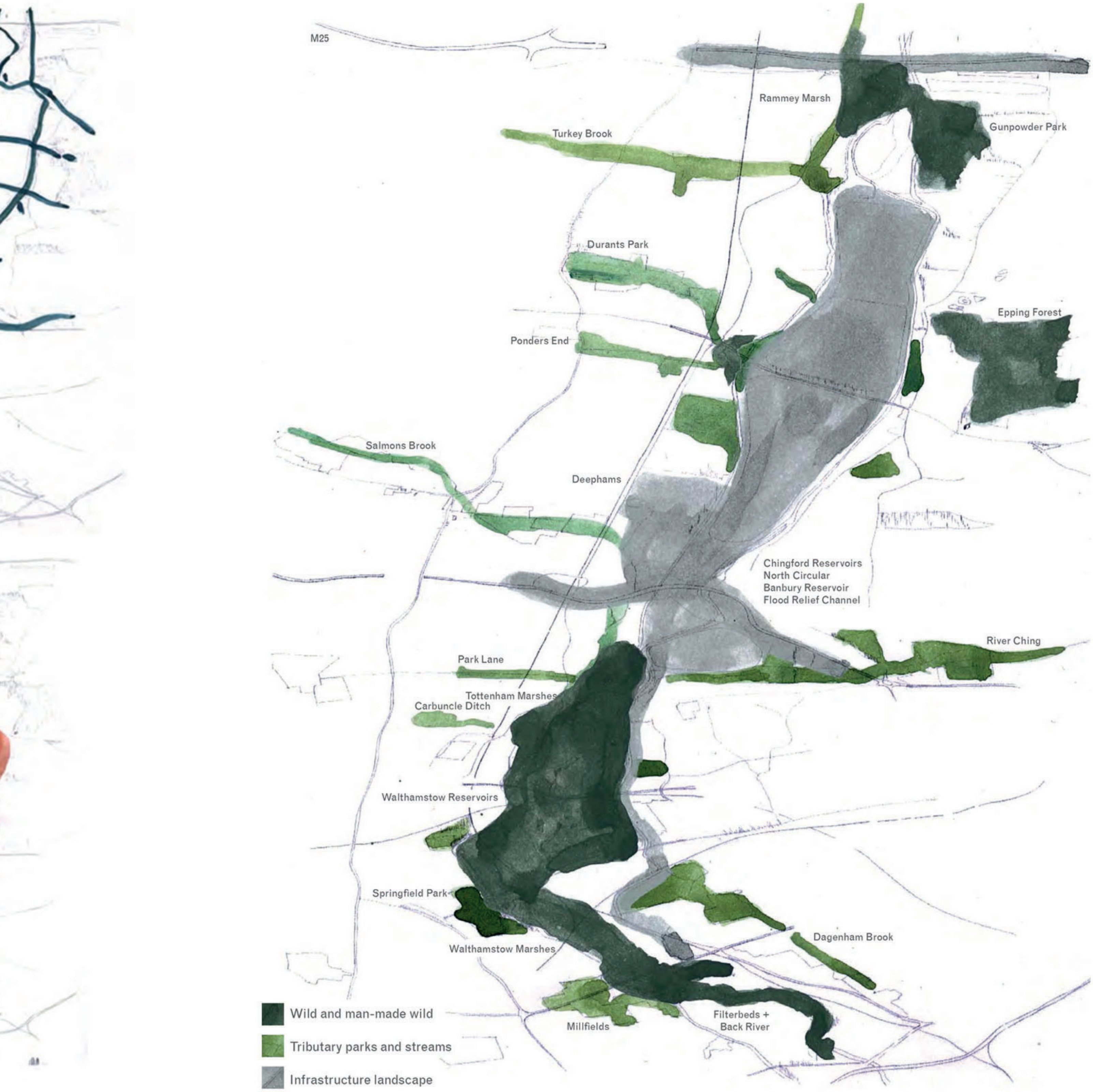

M25
Rammey Marsh
Gunpowder Park
Turkey Brook
Durants Park
Epping Forest
Ponders End
Salmons Brook
Deephams
Chingford Reservoirs
North Circular
Banbury Reservoir
Flood Relief Channel
River Ching
Park Lane
Tottenham Marshes
Carbuncle Ditch
Walthamstow Reservoirs
Springfield Park
Dagenham Brook
Walthamstow Marshes
Millfields
Filterbeds +
Back River
Wild and man-made wild
Tributary parks and streams
Infrastructure landscape

Figure 5: Descriptive diagrams of the design principles described in Figure 4. Source: "Upper Lee Valley Landscape Strategy", 2010.

Key objectives of the "All London Green Grid"

The A.L.G.G. constitutes an additional planning tool, with references to the benefits of creating a green urban infrastructure, to be achieved through the improvement and linking of existing green areas with urban green corridors (Greater London Assembly, 2011, 2012). The use of the word "Grid" (grid), derives from the terms commonly used in urban planning, such as "green network" or "green web" (Francis and Chadwick, 2013, Francis, 2014). In reality it does not define any substantial difference from the strategy commonly defined as "Urban Green Infrastructure"[222], in this way underlining the intention to *«move away from a city punctuated by green spaces, [and] to get closer to one composed of an infrastructure network of green spaces that is fundamental to the identity and the environment of the city, and which is multifunctional, reflective of the local character, well planned and managed»* (Greater London Assembly, 2012, p. 17).

The key objectives of the ALGG are to:

- adapt to climate change and promote green in the city
- increase accessibility to open space
- increase access to nature and conserve and improve biodiversity
- improve sustainable travel connections
- promote healthy living
- preserve and improve the characteristics of the heritage and character of the landscape
- improve distinctive destinations and increase the tourism economy
- promote planning, management, sustainability and maintenance
- improve the sectoral skills of green space and green infrastructure
- promote sustainable food production
- improve air quality and soundscapes
- improve the quality and access to the Greenbelt and the urban fringe
- conserve and enhance the spaces along the Thames river and its tributaries

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[222] See paragraph 2.4 of this research.

These objectives must be pursued throughout the *Greater London* territory, which has been divided into eleven "Green Grid areas" that identify different landscape units that cross the administrative boundaries of the metropolitan city. Each "Framework Area" is developed in four sections or processing steps:

1. **Strategy Area**: analysis of the context and basic conditions for the proposal of strategic opportunities in line with the basic vision of the ALGG;

2. **Project Identification**: creation of a program of project suggestions, mapped and described in detail;

3. **Phase Two Delivery:** Review and evaluation of the proposed projects and identification of the strategic objectives to be achieved in the subsequent phase;

4. **Forward Strategy:** Local authorities and design advisors must develop a financing strategy to proceed with the implementation of the projects.

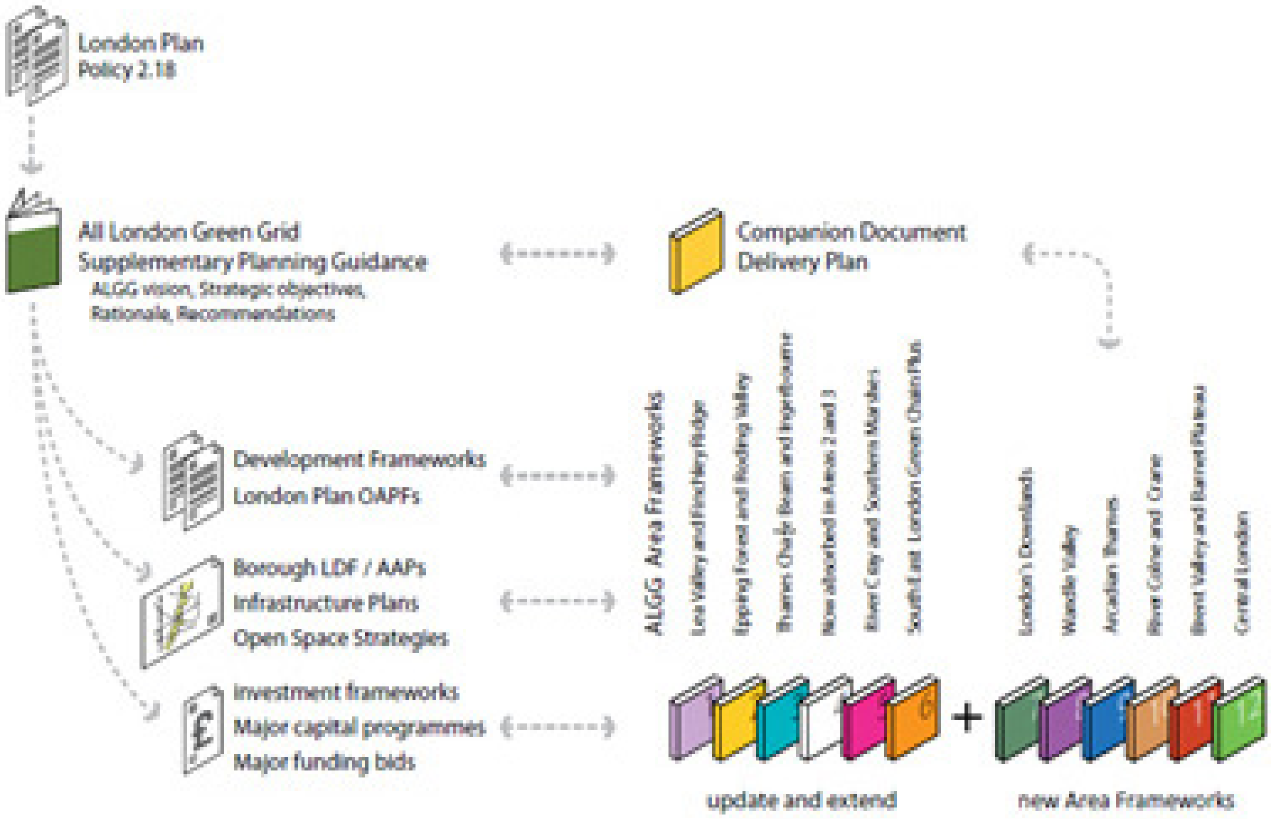

London Plan
Policy 2.18
All London Green Grid
Supplementary Planning Guidance
ALGG vision, Strategic objectives,
Rationale, Recommendations
Companion Document
Delivery Plan
Development Frameworks
London Plan OAPFs
Borough LDF / AAPs
Infrastructure Plans
Open Space Strategies
Investment frameworks
Major capital programmes
Major funding bids
ALGG Area Frameworks
Lea Valley and Finchley Ridge
Epping Forest and Roding Valley
Thames Chase Beam and Ingrebourne
Now allocated in Areas 2 and 3
River Cray and Southern Marshes
South East London Green Chain Plus
London's Downlands
Wandle Valley
Arcadian Thames
River Colne and Crane
Brent Valley and Barnet Plateau
Central London
6
+
11
12
update and extend
new Area Frameworks

Figure 6: Representative schematization of the functioning of the ALGG Planning and the development of the Area Frameworks. Source: GLA 2012, p. 4.

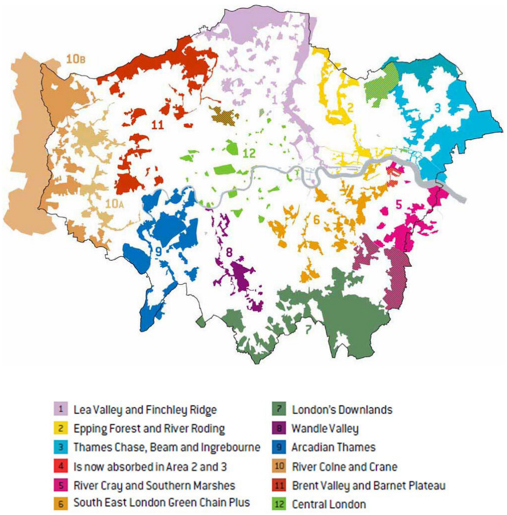

10B
11
12
2
3
10A
5
6
9
8
7
1 Lea Valley and Finchley Ridge
2 Epping Forest and River Roding
3 Thames Chase, Beam and Ingrebourne
4 Is now absorbed in Area 2 and 3
5 River Cray and Southern Marshes
6 South East London Green Chain Plus
7 London's Downlands
8 Wandle Valley
9 Arcadian Thames
10 River Colne and Crane
11 Brent Valley and Barnet Plateau
12 Central London

Figure 7: ALGG area Frameworks Areas, in violet the Area number 1 " Lea Valley & Finchley Ridge Area Framework ". Source: GLA 2012

The Area number 1 identified as "Lea Valley & Finchley Ridge Area Framework" (Fig. 7) includes the Lea Valley in its entirety and the suburban landscape of Finchley Ridge; This context is of strategic importance for the urban transformation that the All London Green Grid involves: *«The Lea Valley represents a rupture in London's urban grain - a corridor of relatively undeveloped land forming a 'clearing' between dense urban communities lying to the east and west, with much of this land protected as open space or industrial land»* (with ALGG, Lea Valley and Finchley Ridge Area Framework, GLA 2011, p. 8).

The strategic vision of transformation adopted by the Greater London Authorities , for the "Upper Lee Valley", consists of 6 objectives: (Fig. 8), specifically:

1. **From the M25 to the Thames**: preserving the character of a regional landscape resource as a continuous spine of open space (ALGG, Lea Valley and Fnchley Ridge Area Framework, GLA 2011, p.13);

2. **Connections across the Valley**: improving cross-sectional connections across the valley, thus eliminating physical traversing barriers and perceptual barriers, constituted by transport infrastructures on its margins and internal industrial zones (ALGG, Lea Valley and Finchley Ridge Area Framework, GLA 2011, p.13);

3. **Shaping Urban Regeneration**: the creation of a new network of open spaces associated with the Olympic Park.

4. **Water Landscapes**: Maximizing the quality and visibility of the water landscapes of the valley, transforming the accessibility to the Walthamstow water basins, exploring their potential for tourism.

5. **Green Belt**: promoting activities and strategies to encourage visits to these territories;

6. **A good local park network**: the various open spaces within the Finchley Ridge should be upgraded into a robust network of local parks, with good facilities and connections to the surrounding urban environment.

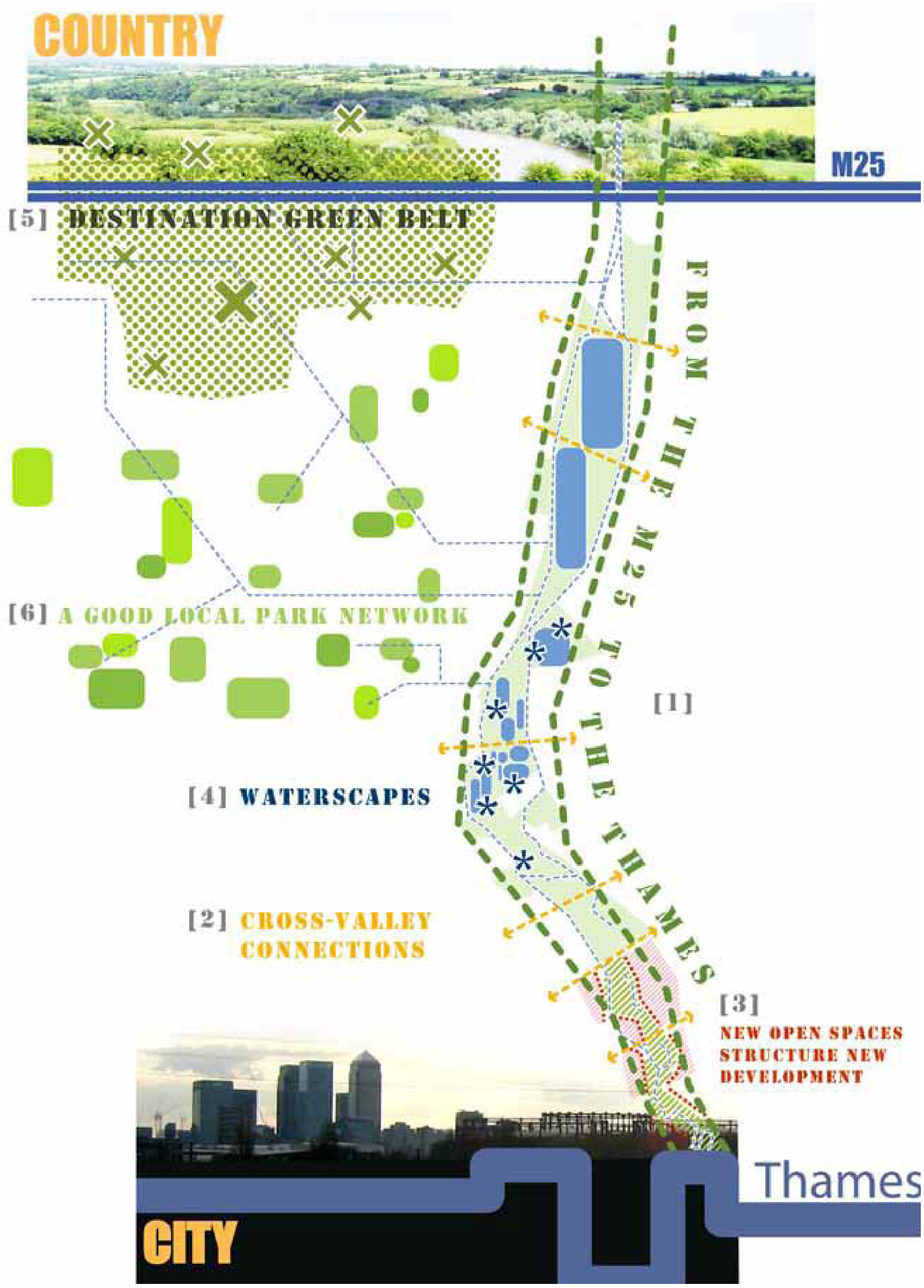

COUNTRY
M25
[5] DESTINATION GREEN BELT
FROM THE M25 TO THE THAMES
[6] A GOOD LOCAL PARK NETWORK
[1]
[4] WATERSCAPES
[2] CROSS-VALLEY CONNECTIONS
[3] NEW OPEN SPACES STRUCTURE NEW DEVELOPMENT
Thames
CITY

Figure 8: ALGG, Lea Valley and Finchley Ridge Area Framework; Source: GLA , Area Strategy Vision. Source: GLA 2011, p. 12.

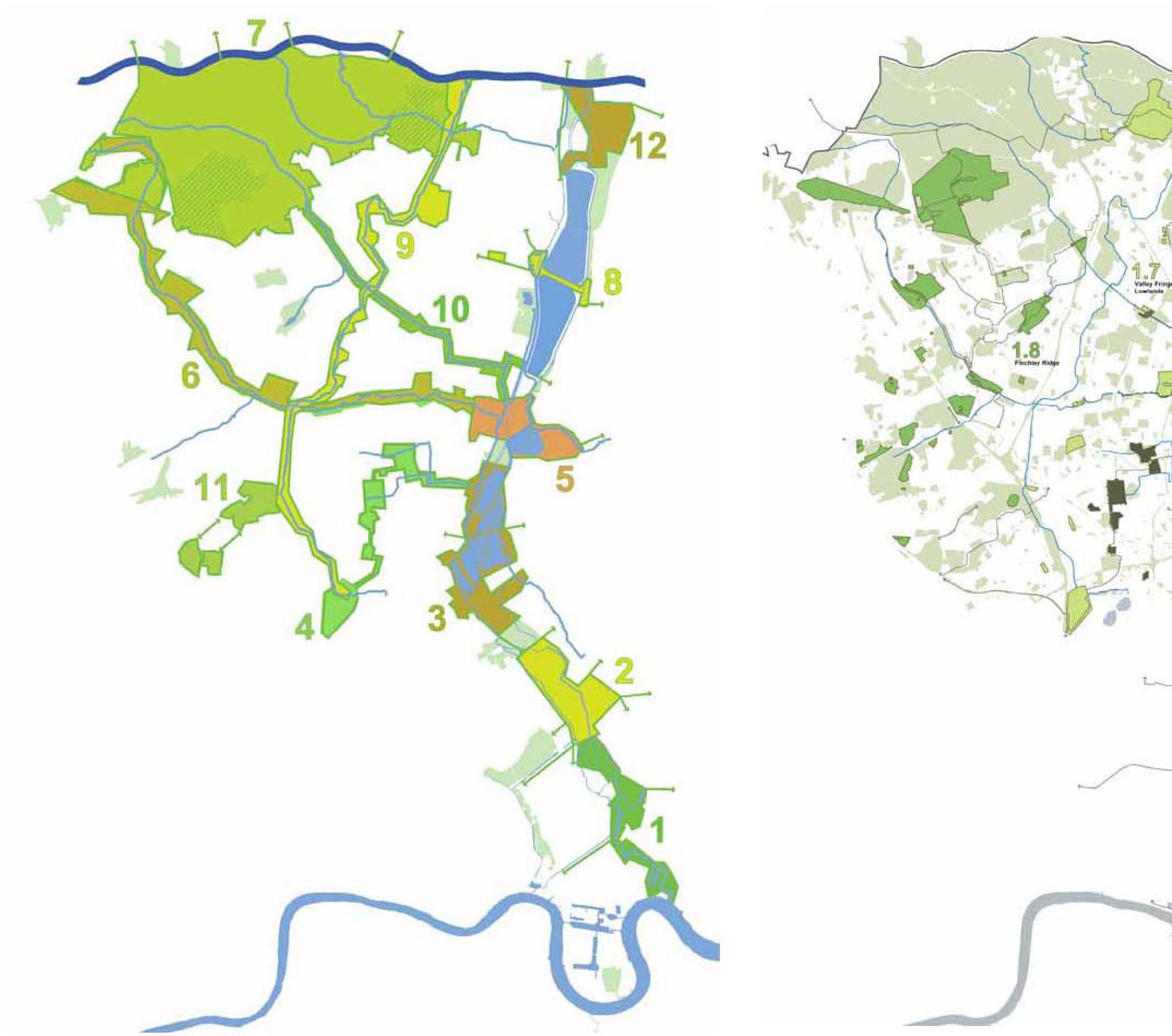
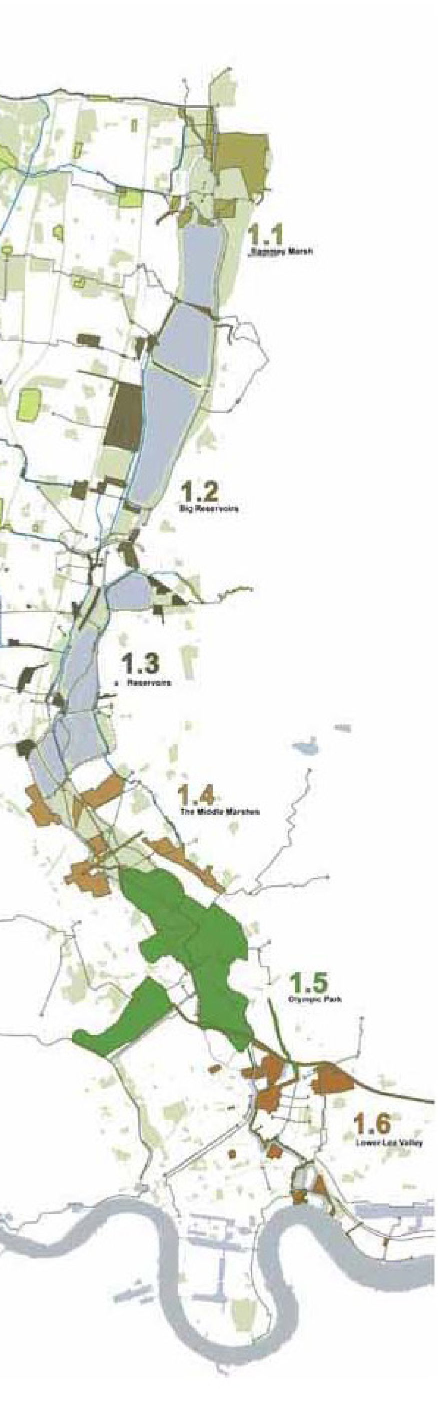

7
12
9
8
10
6
5
11
4
3
2
1
1.7
Valley Fring
Lowlands
1.8
Finchley Ridge

Figure 9: Top: Strategic opportunities identified by the ALGG (Area Strategy); Bottom: Identification of the project Clusters of the ALGG Framework Area 1; Source: ALGG, Lea Valley and Finchley Ridge Area Framework. Source: GLA 2011.


1.1
Rammey Marsh
1.2
Big Reservoirs
1.3
Reservoirs
1.4
The Middle Marshes
1.5
Olympic Park
1.6
Lower Lea Valley

The next level of intervention planning (Strategy Area) provides for the identification of strategic opportunities, containing the potential to enact the vision suggested in the aforementioned six objectives.

Strategic opportunity no. 3, concerns the opening of the "Walthamstow Reservoirs" (ten water reservoirs owned by Thames Water, north of the Olympic Park), so as to guarantee greater public access, converting them into an urban nature reserve (GLA, 2011). The strategic opportunities identified were then divided into different "clusters" (Project Identification), which identify the individual projects to be carried out to implement the transformation (Fig. 9).

The following phase of the study (Phase Two Delivery) developed in detail the projects identified in the strategic areas through the preparation of a "Feasibility Study" and an "Intervention Master Plan" (Fig. 10).

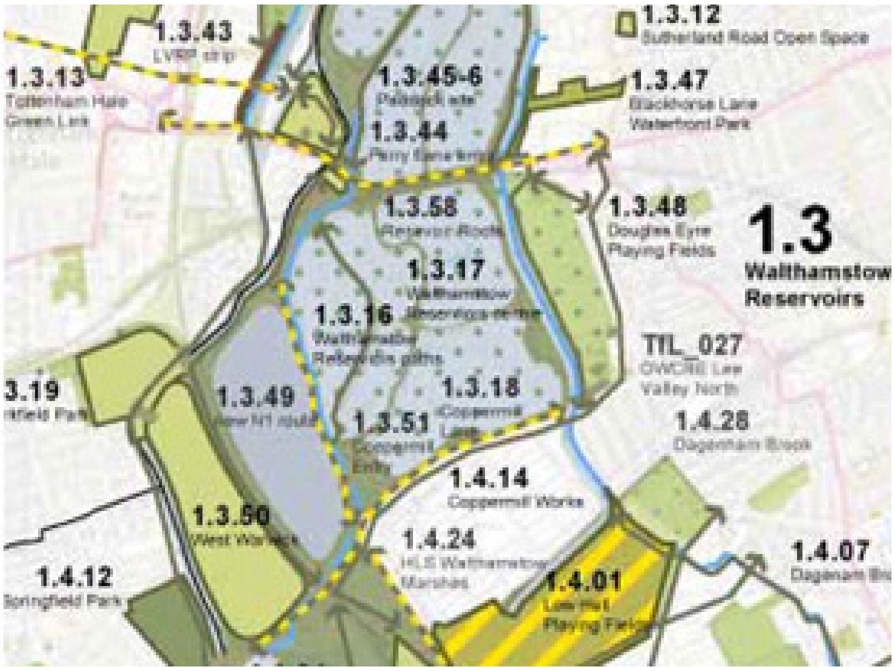
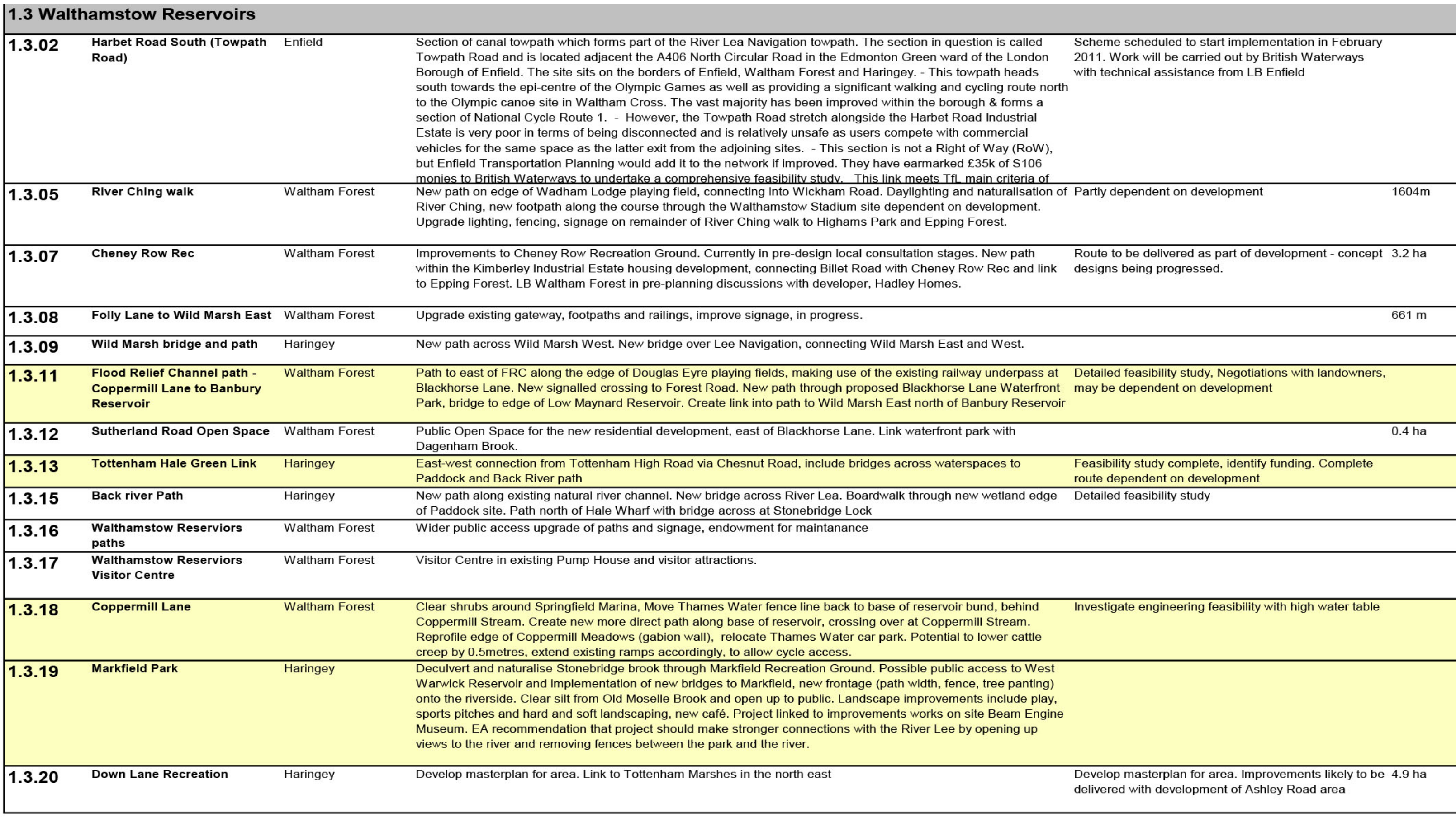

1.3.43
LVRP strip
1.3.12
Sutherland Road Open Space
1.3.13
Tottenham Hale
Green Link
1.3.45-6
Paddock site
1.3.47
Blackhorse Lane
Waterfront Park
1.3.44
1.3.58
Reservoir Roots
1.3.48
Douglas Eyre
Playing Fields
1.3
Walthamstow
Reservoirs
1.3.17
Walthamstow
1.3.16
TfL_027
OWCRE Lea
Valley North
3.19
1.3.49
New N1 route
1.3.18
Coppermill
Lane
1.3.51
Coppermill
Entry
1.4.28
Dagenham Brook
1.4.14
Coppermill Works
1.3.50
West Warwick
1.4.24
HLS Walthamstow
Marshes
1.4.07
1.4.12
Springfield Park
1.4.01
Low Hall
Playing Fields

Figure 10: Extract of the Masterplan depicting the area of Walthamstow Reservoirs, Source: ALGG, Area Framework 1. Source: GLA, 2011.

The aim of the transformation proposal was based on the principles suggested by the aforementioned "Upper Lee Valley Landscape Strategy" (2010) and consists of opening the ten water reservoirs owned by Thames Water to grant wider access to the public, because they are in a densely populated area of London characterized by a dire lack of access to nature.

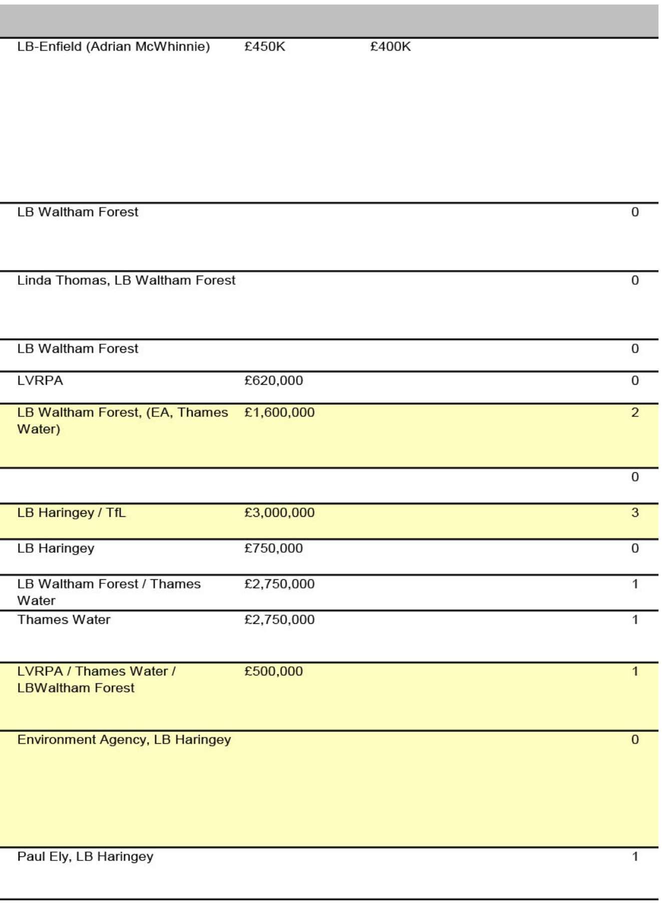
The feasibility study accompanying the Masterplan identified the possible partners and funders of the project, the type of governance to be adopted, as well as containing an estimate of the construction costs explained in detail in the relevant design documentation(Fig. 11).



1.3 Walthamstow Reservoirs

1.3.02	**Harbet Road South (Towpath Road)**	Enfield	Section of canal towpath which forms part of the River Lea Navigation towpath. The section in question is called Towpath Road and is located adjacent the A406 North Circular Road in the Edmonton Green ward of the London Borough of Enfield. The site sits on the borders of Enfield, Waltham Forest and Haringey. - This towpath heads south towards the epi-centre of the Olympic Games as well as providing a significant walking and cycling route north to the Olympic canoe site in Waltham Cross. The vast majority has been improved within the borough & forms a section of National Cycle Route 1. - However, the Towpath Road stretch alongside the Harbet Road Industrial Estate is very poor in terms of being disconnected and is relatively unsafe as users compete with commercial vehicles for the same space as the latter exit from the adjoining sites. - This section is not a Right of Way (RoW), but Enfield Transportation Planning would add it to the network if improved. They have earmarked £35k of S106 monies to British Waterways to undertake a comprehensive feasibility study. This link meets TfL main criteria of	Scheme scheduled to start implementation in February 2011. Work will be carried out by British Waterways with technical assistance from LB Enfield	
1.3.05	**River Ching walk**	Waltham Forest	New path on edge of Wadham Lodge playing field, connecting into Wickham Road. Daylighting and naturalisation of River Ching, new footpath along the course through the Walthamstow Stadium site dependent on development. Upgrade lighting, fencing, signage on remainder of River Ching walk to Highams Park and Epping Forest.	Partly dependent on development	1604m
1.3.07	**Cheney Row Rec**	Waltham Forest	Improvements to Cheney Row Recreation Ground. Currently in pre-design local consultation stages. New path within the Kimberley Industrial Estate housing development, connecting Billet Road with Cheney Row Rec and link to Epping Forest. LB Waltham Forest in pre-planning discussions with developer, Hadley Homes.	Route to be delivered as part of development - concept designs being progressed.	3.2 ha
1.3.08	**Folly Lane to Wild Marsh East**	Waltham Forest	Upgrade existing gateway, footpaths and railings, improve signage, in progress.		661 m
1.3.09	**Wild Marsh bridge and path**	Haringey	New path across Wild Marsh West. New bridge over Lee Navigation, connecting Wild Marsh East and West.		
1.3.11	**Flood Relief Channel path - Coppermill Lane to Banbury Reservoir**	Waltham Forest	Path to east of FRC along the edge of Douglas Eyre playing fields, making use of the existing railway underpass at Blackhorse Lane. New signalled crossing to Forest Road. New path through proposed Blackhorse Lane Waterfront Park, bridge to edge of Low Maynard Reservoir. Create link into path to Wild Marsh East north of Banbury Reservoir	Detailed feasibility study, Negotiations with landowners, may be dependent on development	
1.3.12	**Sutherland Road Open Space**	Waltham Forest	Public Open Space for the new residential development, east of Blackhorse Lane. Link waterfront park with Dagenham Brook.		0.4 ha
1.3.13	**Tottenham Hale Green Link**	Haringey	East-west connection from Tottenham High Road via Chesnut Road, include bridges across waterspaces to Paddock and Back River path	Feasibility study complete, identify funding. Complete route dependent on development	
1.3.15	**Back river Path**	Haringey	New path along existing natural river channel. New bridge across River Lea. Boardwalk through new wetland edge of Paddock site. Path north of Hale Wharf with bridge across at Stonebridge Lock	Detailed feasibility study	
1.3.16	**Walthamstow Reserviors paths**	Waltham Forest	Wider public access upgrade of paths and signage, endowment for maintanance		
1.3.17	**Walthamstow Reserviors Visitor Centre**	Waltham Forest	Visitor Centre in existing Pump House and visitor attractions.		
1.3.18	**Coppermill Lane**	Waltham Forest	Clear shrubs around Springfield Marina, Move Thames Water fence line back to base of reservoir bund, behind Coppermill Stream. Create new more direct path along base of reservoir, crossing over at Coppermill Stream. Reprofile edge of Coppermill Meadows (gabion wall), relocate Thames Water car park. Potential to lower cattle creep by 0.5metres, extend existing ramps accordingly, to allow cycle access.	Investigate engineering feasibility with high water table	
1.3.19	**Markfield Park**	Haringey	Deculvert and naturalise Stonebridge brook through Markfield Recreation Ground. Possible public access to West Warwick Reservoir and implementation of new bridges to Markfield, new frontage (path width, fence, tree panting) onto the riverside. Clear silt from Old Moselle Brook and open up to public. Landscape improvements include play, sports pitches and hard and soft landscaping, new café. Project linked to improvements works on site Beam Engine Museum. EA recommendation that project should make stronger connections with the River Lee by opening up views to the river and removing fences between the park and the river.		
1.3.20	**Down Lane Recreation**	Haringey	Develop masterplan for area. Link to Tottenham Marshes in the north east	Develop masterplan for area. Improvements likely to be delivered with development of Ashley Road area	4.9 ha

Figure 11: Extract from the table of projects planned for the transformation of the Walthamstow Reservoires; Source: ALGG, Area Framework 1. Source: GLA, 2011.



LB-Enfield (Adrian McWhinnie)	£450K	£400K	
LB Waltham Forest			0
Linda Thomas, LB Waltham Forest			0
LB Waltham Forest			0
LVRPA	£620,000		0
LB Waltham Forest, (EA, Thames Water)	£1,600,000		2
			0
LB Haringey / TfL	£3,000,000		3
LB Haringey	£750,000		0
LB Waltham Forest / Thames Water	£2,750,000		1
Thames Water	£2,750,000		1
LVRPA / Thames Water / LBWaltham Forest	£500,000		1
Environment Agency, LB Haringey			0
Paul Ely, LB Haringey			1

The project includes the restoration of a historic building in a multifunctional and educational space, as well as the creation of a refreshment area, the creation of new thematic routes and access points, the creation of a cycle path linking the valley of the river Lee to the Olympic Park in the south, the installation of external structures that promote the learning of nature and wildlife conservation, improving site habitats and site biodiversity, recognized as a "site of special scientific interest" (SSSI) and part of a protection zone special (SPA) for wildlife, as well as an international site designated as a wetland under the Ramsar Convention.

These design principles are also contained within the "Upper Lee Valley Area Planning Opportunity" (2013), which reiterates the importance of contributing positively to the protection, enhancement, creation and management of the nature reserve constituted by the Walthamstow Reservoirs area through the implementation of ecological connections:

«Developers will need to plan for nature from the beginning of the development process and take opportunities for positive gains for nature through the layout, design and materials of development proposals and appropriate Biodiversity Action Plans. Development should improve access to nature and assist in achieving the targets of Biodiversity Action Plans without adversely affecting the integrity of protected sites. It can promote landscaping that will naturalise the river banks, the river channel and improve the ecological value of the river corridor» (Upper Lee Valley Opportunity Area Planning Framework, 2013, Mayor of London, p. 88)

The partners and lenders chosen to finance the work on the project through a partnership were however identified in the ALGG Framework Area 1:

Leading Authority: London Borough of Waltham Forest.

Partners: Haringey, Hackney and Enfield Councils, Thames Water, Lee Valley Regional Park Authority, Environment Agency, Natural England, British Waterways, English Heritage and Design for London.

Key Objectives of the Tender Process for Walthamstow Wetlands

For the actual design and implementation of the transformation of the Walthamstow Reservoirs area, identified as "Walthamstow Wetlands" by the "Upper Lee Valley Landscape Strategy 2010", the London Borough of Waltham Forest (LBHF) started a collaboration with Thames Water, establishing Walthamstow Wetlands Partnership to develop the project, including as stakeholders the Environment Agency, Natural England, Greater London Authorities, the neighbouring boroughs of Hackney and Haringey, Lea Valley Regional Park Authorities and English Heritage.

In 2012, a two-step tender process was launched. The tendering process firstly identified the design team through an evaluation of the presented portfolios with an assessment weighted 70% on the quality of the works carried out and 30% on the estimated construction costs for the project.

The conditions for the financing and support of the project by the HLF (Heritage Lottery Fund) included: «*a competitive tendering process to be undertaken with a focus on securing providers who are highly skilled, experienced and qualified to ensure a high-quality heritage scheme is delivered*» (Walthamstow Wetlands Report, Executive Decision by the Deputy Chief Executive, Growth and Regeneration 22nd July 2014).

The strategic objectives for winning the tender process were defined as follows:

- Restoration and reuse of the Marine Engine House as a heritage visitors' centre and restoration of the rangers' building.

- Installation of a panoramic platform on the Coppermill Tower;

- Installation of a temporary observation platform at Forest Road;

- Landscape works, including four entrances, a parking area, a new path and the relative signage and interpretation; restoration of existing routes;

- Habitat improvements;

Further sustainability measures[223] were: Wetlands will have to serve to support people's health and well-being by providing access to 200 ha of open space.
The main energy efficiency measures must include: Low energy lighting; mechanical ventilation for heat recovery at the toilets; natural ventilation in general; temperature de-stratification fans in high spaces; automatic lighting control; intelligent heating control and zoning systems; preparation for the

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[223] Walthamstow Wetlands Report, Executive Decision by the Deputy Chief Executive, Growth and Regeneration 22nd July 2014, Point 7.5.

future installation of renewable sources, heat pumps to provide heating and hot water, using Coppermill Stream as a heat source; visitors to be encouraged to walk and cycle with four new entrances to the site, located close to the underground and to the above-ground stations; contractors to be required to define a waste strategy to minimize waste during construction.

The first phase of the tender process lasted one year, ending in February 2013 with the winning team led by Kinnear Landscape Architects, Witherford Watson Mann Architects, Tall Engineers, P£R Engineers, Project Centre Traffic Engineer and BSG Ecologists. The winning project team, in order to gain access to the next stage of the competition, was given the task of developing the Stage D (Design development) of the RIBA design model; the executive project was carried out by the project team together with the Walthamstow Wetlands Partnership.

Key Objectives of the Walthamstow Wetlands Project

The Walthamstow Wetlands Project focuses on opening Walthamstow basins to give them wider public access, allowing visitors to enjoy and learn about the site's natural and distinctive heritage, which derives from both the importance of the site as an operational historical landscape providing drinking water in London, and from the rich biodiversity of international importance, considering the large number of aquatic birds it attracts (KLA, Stage D Landscape Report).

This change was a process in which the construction work represented only the first step in building the site's hosting capacity: «*The first phase must provide a foundation for a broad-based movement, drawing in volunteers and a critical mass of interested participants*» (KLA, HLF Stage C Report).

From the study of the numerous documents produced during the tender phases can be clearly seen how the interdisciplinary planning team developed the project, basing its conception on some guidelines that can be summarized as follows:

- **Accessibility:** The public access to the reservoirs was aimed principally at allowing people to learn and appreciate the previously hidden natural areas and industrial heritage.

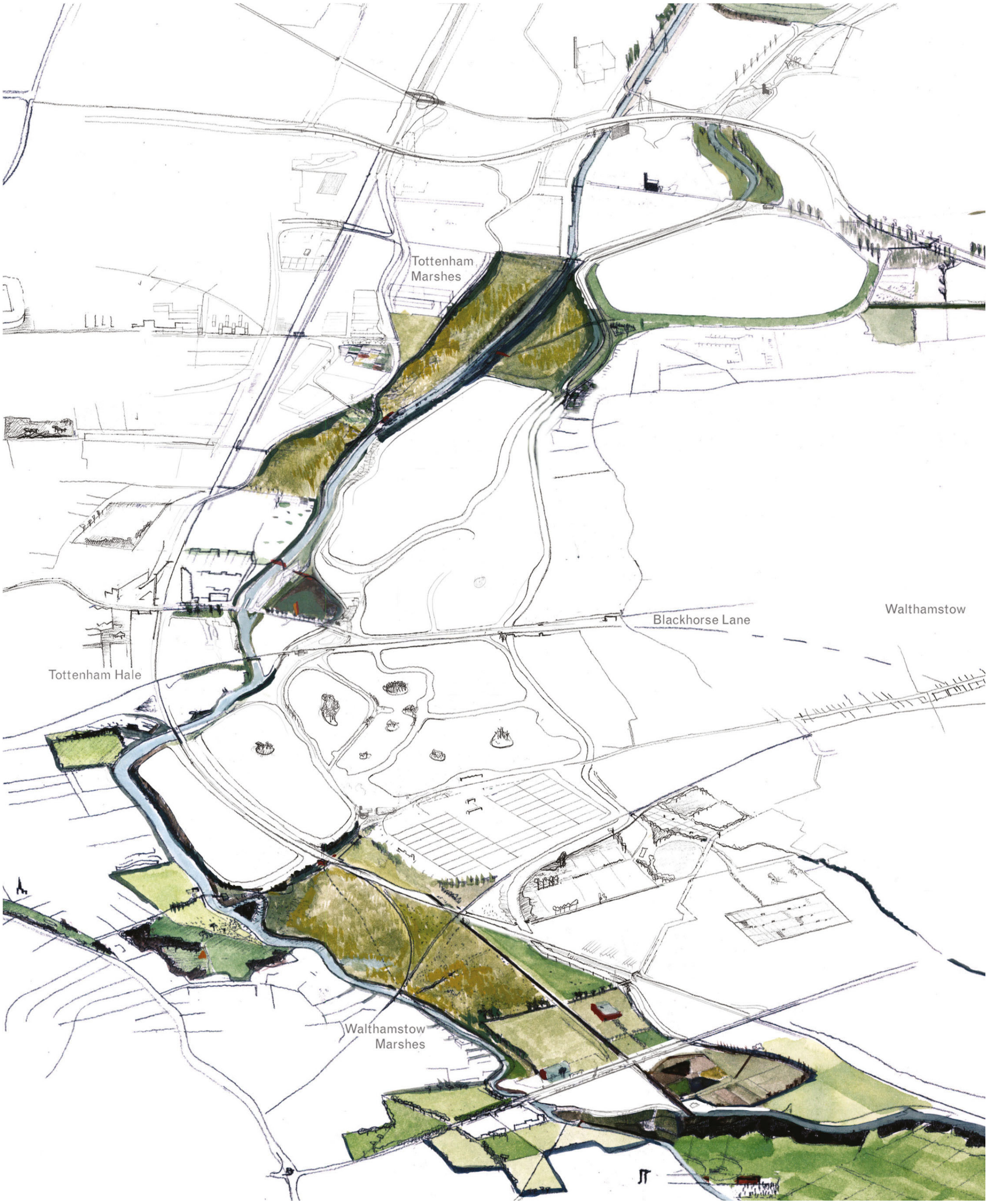

Tottenham
Marshes
Blackhorse Lane
Walthamstow
Tottenham Hale
Walthamstow
Marshes

Figure 12: Walthamstow's water basins before the realization of the project: as noticeable, the area is completely disconnected from the network of open spaces surrounding the place. Source: KLA, HFL Stage C Report.

The removal of “physical and intellectual barriers” (KLA, Stage D Landscape Report), together with the achievement of regional objectives to improve access to nature defined in the Mayor’s London Plan and in the All London Green Grid formed one of the project’s cornerstones (Fig. 12), aiming to provide a coherent and integrated landscape experience that made all the Walthamstow Wetlands accessible with Lea Valley’s largest open space network, while maintaining the sense of distinctiveness of the project.

- **Heritage:** The management, conservation and enhancement of the heritage on the site must guarantee its availability for future generations.

- **Pedagogy:** The creation of a learning centre, which includes architectural and landscape heritage, water sustainability and the role of Lea Valley in the history of London. The story of Walthamstow Wetlands must be told using creative and engaging methods to help people appreciate the historical, industrial and ecological importance of the site and fully understand the problems of global bird migration and the management of the water-birds populations in an urban environment.

- **Integration and participation:** The site must be integrated into the adjacent open spaces and the opportunities for economic renewal, environmental improvement (Fig. 13), social cohesion and improvement for the quality of life of citizens must be maximized by creating opportunities for involvement in the protection and enhancement of the natural and built heritage of Walthamstow Wetlands, through voluntary work and community participation programs for the existing and future public, thereby contributing to a fuller understanding of the site.

- **Conservation:** the natural and architectural heritage of the site must be preserved and improved, simultaneously trying to minimize the impact of greater access to existing natural habitats; the project involved the development of a sustainable organizational and management model of the area, which provided access and conservation management without taking away from the quality of the visitor experience (Fig. 14).

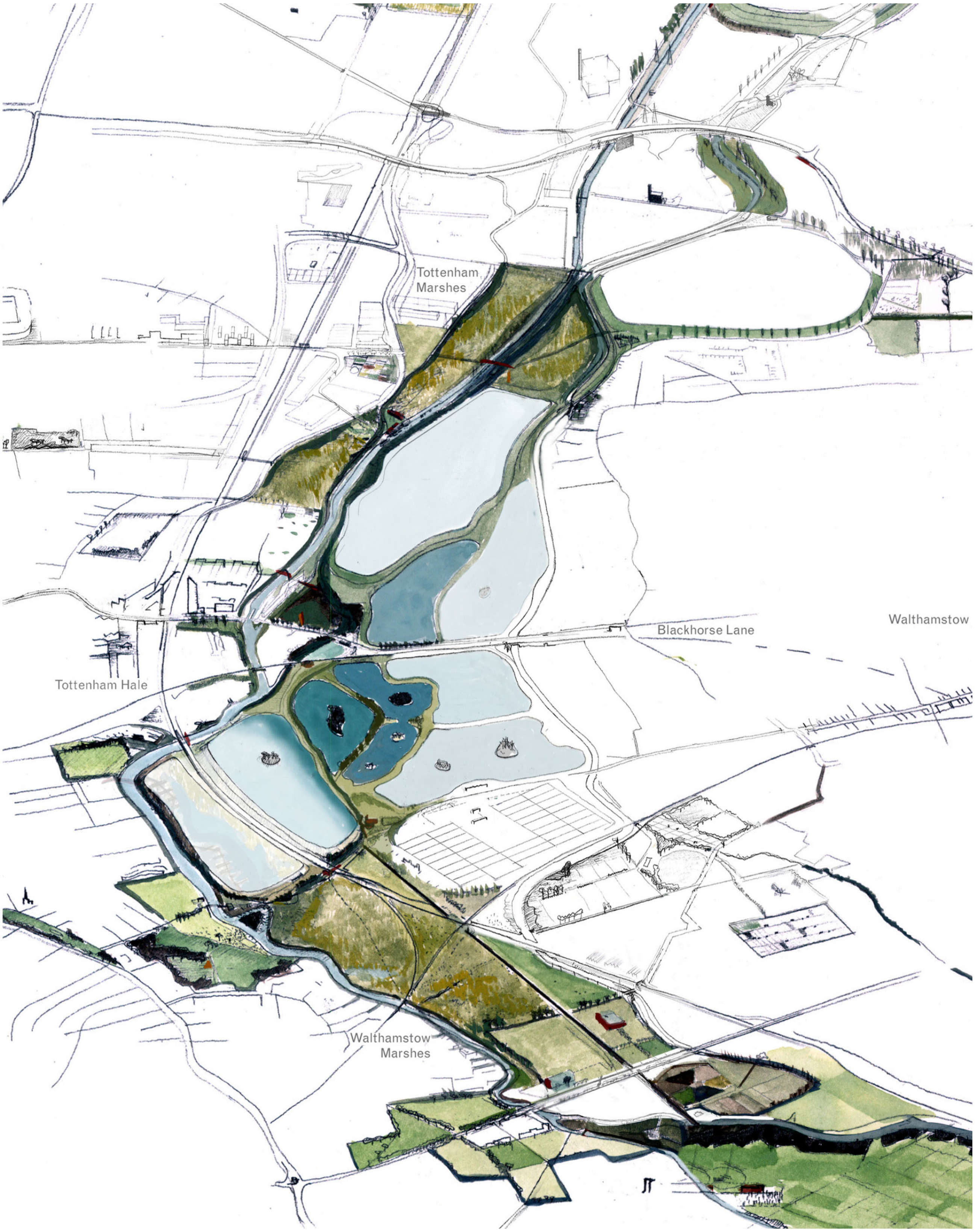

Tottenham Marshes
Blackhorse Lane
Walthamstow
Tottenham Hale
Walthamstow Marshes

Figure 13: Representative schematization of the site after the intervention: Greater access and a focal "green core" (Green Core) integrate the site into the network of surrounding open spaces. Source: KLA, HFL Stage C Report.

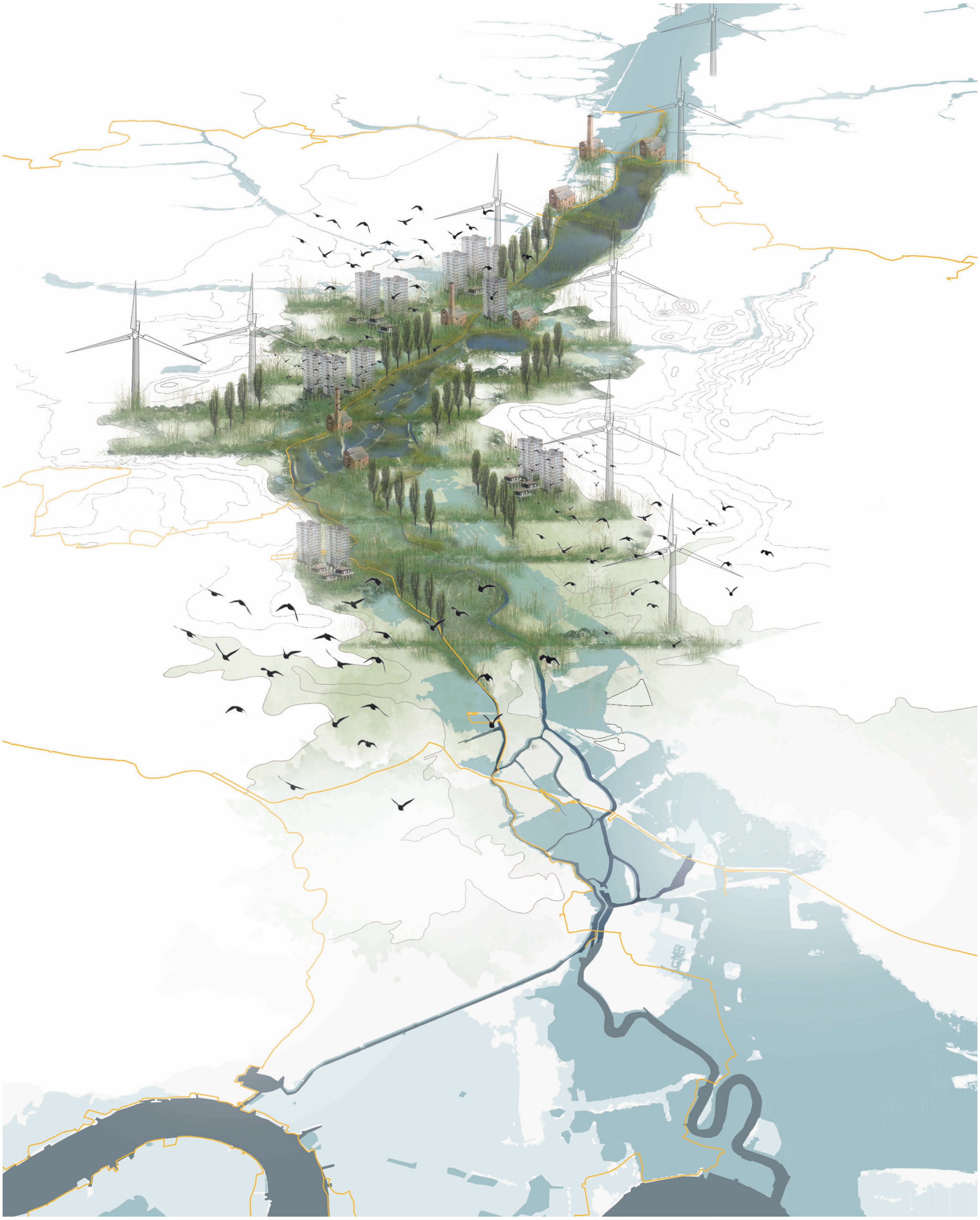
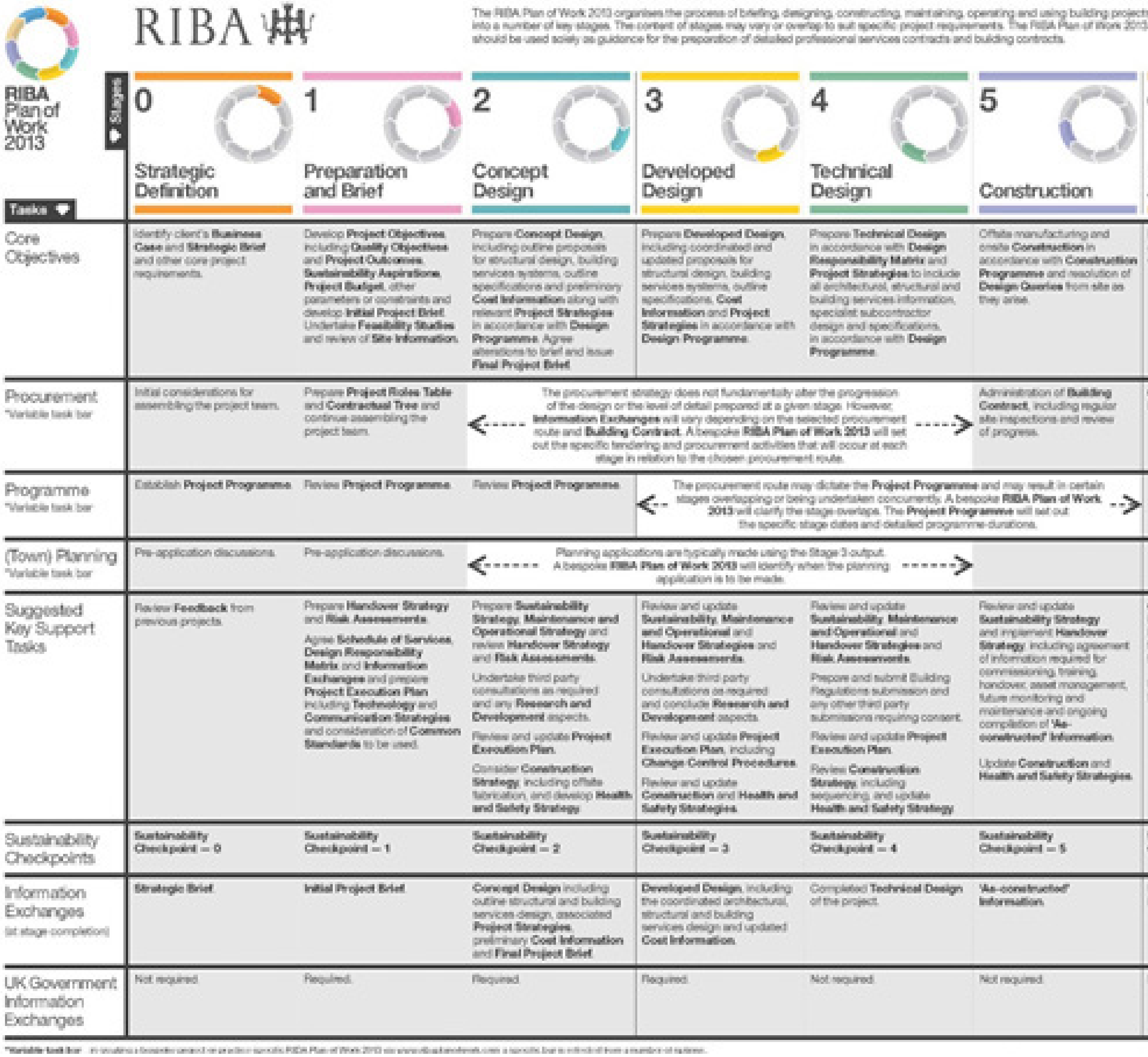


Figure 14: Representative schematization of the strategic vision for Wathamstow wetlands. Source: Courtesy of KLA.

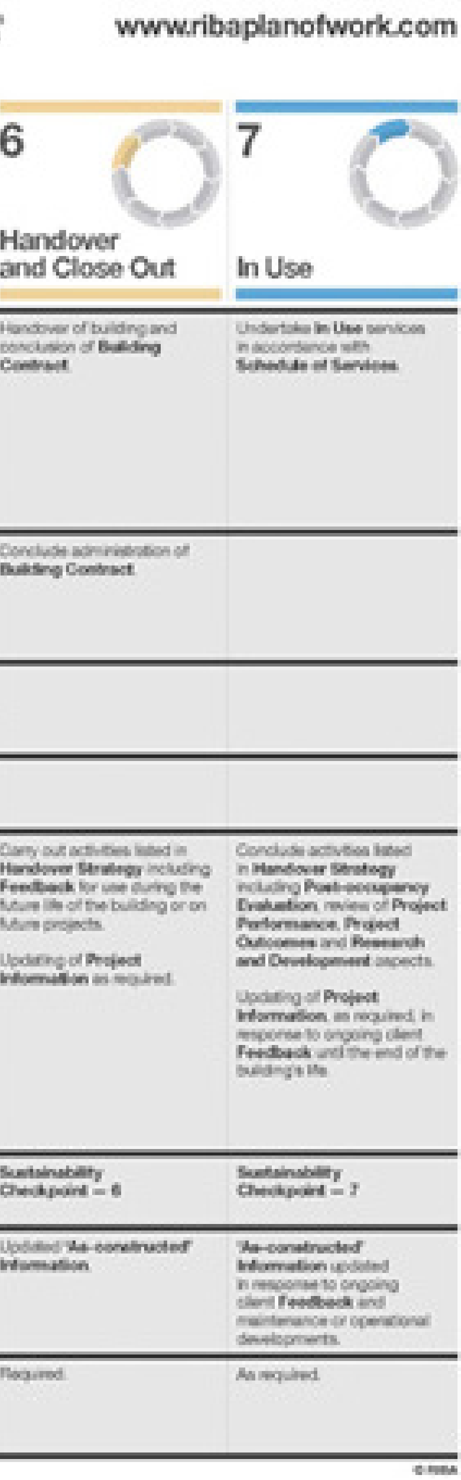

RIBA
RIBA Plan of Work 2013
Stages
Tasks

The RIBA Plan of Work 2013 organises the process of briefing, designing, constructing, maintaining, operating and using building projects into a number of key stages. The content of stages may vary or overlap to suit specific project requirements. The RIBA Plan of Work 2013 should be used solely as guidance for the preparation of detailed professional services contracts and building contracts.

Tasks	0 Strategic Definition	1 Preparation and Brief	2 Concept Design	3 Developed Design	4 Technical Design	5 Construction
Core Objectives	Identify client's **Business Case** and **Strategic Brief** and other core project requirements.	Develop **Project Objectives**, including **Quality Objectives** and **Project Outcomes**, **Sustainability Aspirations**, **Project Budget**, other parameters or constraints and develop **Initial Project Brief**. Undertake **Feasibility Studies** and review of **Site Information**.	Prepare **Concept Design**, including outline proposals for structural design, building services systems, outline specifications and preliminary **Cost Information** along with relevant **Project Strategies** in accordance with **Design Programme**. Agree alterations to brief and issue **Final Project Brief**.	Prepare **Developed Design**, including coordinated and updated proposals for structural design, building services systems, outline specifications, **Cost Information** and **Project Strategies** in accordance with **Design Programme**.	Prepare **Technical Design** in accordance with **Design Responsibility Matrix** and **Project Strategies** to include all architectural, structural and building services information, specialist subcontractor design and specifications, in accordance with **Design Programme**.	Offsite manufacturing and onsite **Construction** in accordance with **Construction Programme** and resolution of **Design Queries** from site as they arise.
Procurement *Variable task bar	Initial considerations for assembling the project team.	Prepare **Project Roles Table** and **Contractual Tree** and continue assembling the project team.	<-- The procurement strategy does not fundamentally alter the progression of the design or the level of detail prepared at a given stage. However, **Information Exchanges** will vary depending on the selected procurement route and **Building Contract**. A bespoke **RIBA Plan of Work 2013** will set out the specific tendering and procurement activities that will occur at each stage in relation to the chosen procurement route. -->			Administration of **Building Contract**, including regular site inspections and review of progress.
Programme *Variable task bar	Establish **Project Programme**.	Review **Project Programme**.	Review **Project Programme**.	<-- The procurement route may dictate the **Project Programme** and may result in certain stages overlapping or being undertaken concurrently. A bespoke **RIBA Plan of Work 2013** will clarify the stage overlaps. The **Project Programme** will set out the specific stage dates and detailed programme durations. -->		
(Town) Planning *Variable task bar	Pre-application discussions.	Pre-application discussions.	<-- Planning applications are typically made using the Stage 3 output. A bespoke **RIBA Plan of Work 2013** will identify when the planning application is to be made. -->			
Suggested Key Support Tasks	Review **Feedback** from previous projects.	Prepare **Handover Strategy** and **Risk Assessments**. Agree **Schedule of Services**, **Design Responsibility Matrix** and **Information Exchanges** and prepare **Project Execution Plan** including **Technology** and **Communication Strategies** and consideration of **Common Standards** to be used.	Prepare **Sustainability Strategy**, **Maintenance and Operational Strategy** and review **Handover Strategy** and **Risk Assessments**. Undertake third party consultations as required and any **Research and Development** aspects. Review and update **Project Execution Plan**. Consider **Construction Strategy**, including offsite fabrication, and develop **Health and Safety Strategy**.	Review and update **Sustainability**, **Maintenance and Operational** and **Handover Strategies** and **Risk Assessments**. Undertake third party consultations as required and conclude **Research and Development** aspects. Review and update **Project Execution Plan**, including **Change Control Procedures**. Review and update **Construction** and **Health and Safety Strategies**.	Review and update **Sustainability**, **Maintenance and Operational** and **Handover Strategies** and **Risk Assessments**. Prepare and submit Building Regulations submission and any other third party submissions requiring consent. Review and update **Project Execution Plan**. Review **Construction Strategy**, including sequencing, and update **Health and Safety Strategy**.	Review and update **Sustainability Strategy** and implement **Handover Strategy**, including agreement of information required for commissioning, training, handover, asset management, future monitoring and maintenance and ongoing compilation of **'As-constructed' Information**. Update **Construction** and **Health and Safety Strategies**.
Sustainability Checkpoints	**Sustainability Checkpoint – 0**	**Sustainability Checkpoint – 1**	**Sustainability Checkpoint – 2**	**Sustainability Checkpoint – 3**	**Sustainability Checkpoint – 4**	**Sustainability Checkpoint – 5**
Information Exchanges (at stage completion)	**Strategic Brief**	**Initial Project Brief**	**Concept Design** including outline structural and building services design, associated **Project Strategies**, preliminary **Cost Information** and **Final Project Brief**.	**Developed Design**, including the coordinated architectural, structural and building services design and updated **Cost Information**.	Completed **Technical Design** of the project.	**'As-constructed' Information**.
UK Government Information Exchanges	Not required.	Required.	Required.	Required.	Not required.	Not required.

***Variable task bar** – [illegible]

Figure 15: Riba Plan of Work 2013. Source: https://www.architecture.com



www.ribaplanofwork.com

6 Handover and Close Out	7 In Use
Handover of building and conclusion of **Building Contract**.	Undertake **In Use** services in accordance with **Schedule of Services**.
Conclude administration of **Building Contract**.	
Carry out activities listed in **Handover Strategy** including **Feedback** for use during the future life of the building or on future projects. Updating of **Project Information** as required.	Conclude activities listed in **Handover Strategy** including **Post-occupancy Evaluation**, review of **Project Performance**, **Project Outcomes** and **Research and Development** aspects. Updating of **Project Information**, as required, in response to ongoing client **Feedback** until the end of the building's life.
Sustainability Checkpoint – 6	**Sustainability Checkpoint – 7**
Updated **'As-constructed' Information**.	**'As-constructed' Information** updated in response to ongoing client **Feedback** and maintenance or operational developments.
Required.	As required.

© RIBA

Design Process

The vision of re-integrating the area into its context, transforming it into the Walthamstow Wetlands Nature Reserve with free public access, constituted a radical change, both for the site and for the people involved.

It was therefore necessary to adopt an iterative process of planning and involvement with the complex group of stakeholders (KLA, Walthamstow Wetlands Press Release). This process was carried out using the RIBA Plan of Work (Fig. 15).

The work plan organizes the design process by dividing it into phases of consultation, design, construction, maintenance, operation and use, allowing the variation and overlap of the various work stages. This design review process is a method widely used in the UK to facilitate timing and funding in the different phases of project approval, and was therefore used in the tender process for the construction of Walthamstow Wetlands. Corresponding funding from the Heritage Lottery Fund was allocated to the various work stages in the RIBA Plan of Work for the completion of the project.

Given the unusual nature of the project, which involves a cultural shift from private to public property, the initial phases focused on building a shared project vision between the site owners (Thames Water and the London Borough of Walthamstow Forest) and the other stakeholders (Thames Water Fisheries, The Environmental Agency, the London Wildlife Trust and Natural England), who provided their indications on what the project objectives should have been focused on. The first fundamental discussion and negotiation between the parties concerned ways in which the site would be used upon completion of the project.

The main difficulties to overcome were constituted by:

- the tension between the protection of certain species and ecosystems, associated with the public opening of the nature reserve;

- the need to reconcile public access with operational and safety requirements related to the supply of drinking water to the city.

The shared vision of the site evolved through numerous thematic workshops based on customer and stakeholder demands so that objective analysis could support decision making. This consensus was reinforced by the preparation of a maintenance and management plan (Conservation and Management Plan) which provided a basis for a detailed agreement, including guidelines and interventions for the future management of the site (KLA, Walthamstow Wetlands Press Release).

Program Elements

«*Our approach is to enhance and protect the existing habitats, allowing them to be used as a natural resource to educate visitors. Our long-term view is to expand and diversify the habitats on site, to emphasize the dynamic nature of the wetlands and bring this rich ecological heritage to the surface*» (Kinnear Landscape Architects, Stage C Report, 02).

The shared vision drawn up by the design team together with the area owners and stakeholders envisaged different levels of action, which were designed to provide: «*a new kind of landscape ecology for the city that reuses industrial remnants*» (HLF Stage C Report, Vision, KLA).

The levels of actions (Fig. 16) were:

- **Green Core:** with the function of attracting and mitigating the presence of numerous visitors. The identified area is the one adjacent to the Marine Engine House, which now constitutes the visitor centre and the bar.

- **Cross-cutting cycle path:** a main cycle path crosses the nature reserve from north to south, connecting the "Green Core" to the different entrances and routes. This path was conceived as «*a piece of landscape that extends through and above buildings*» (KLA, Press Release, p.4).

- **Landmarks:** This main route extends through the buildings, including the re-use of the "Copper Mill" building and Tower as a high observation point and the reconstruction of the Marine Engine House Tower, which is designed to constitute a habitat for bats. The towers offer views over the entire Lea Valley.

- **Water Thresholds**: Each access point establishes visual contact with water or entails crossing aquatic landscapes, thereby reminding visitors of the fact that they are entering a nature reserve and should modify their behaviour accordingly.

- **Engineering and Ecology:** «*The interface between the engineered landscape and the natural landscape constitutes the fundamental relationship in all the characteristics of the site heritage*» (KLA, HLF Stage C Report, p. 18).

This interface created the distinctive aesthetics of the site, embodied by the contrast between the raised banks of the engineered water reservoirs and the naturalized banks from the earliest reservoirs at the centre of the project area. It can therefore be said that the team's design approach focused on improving the distinction between industrial heritage and the natural landscape by replicating this symbiotic relationship in new aspects of the design scheme, such as the reuse of historical industrial features by transforming them into structures for nesting and ponds.

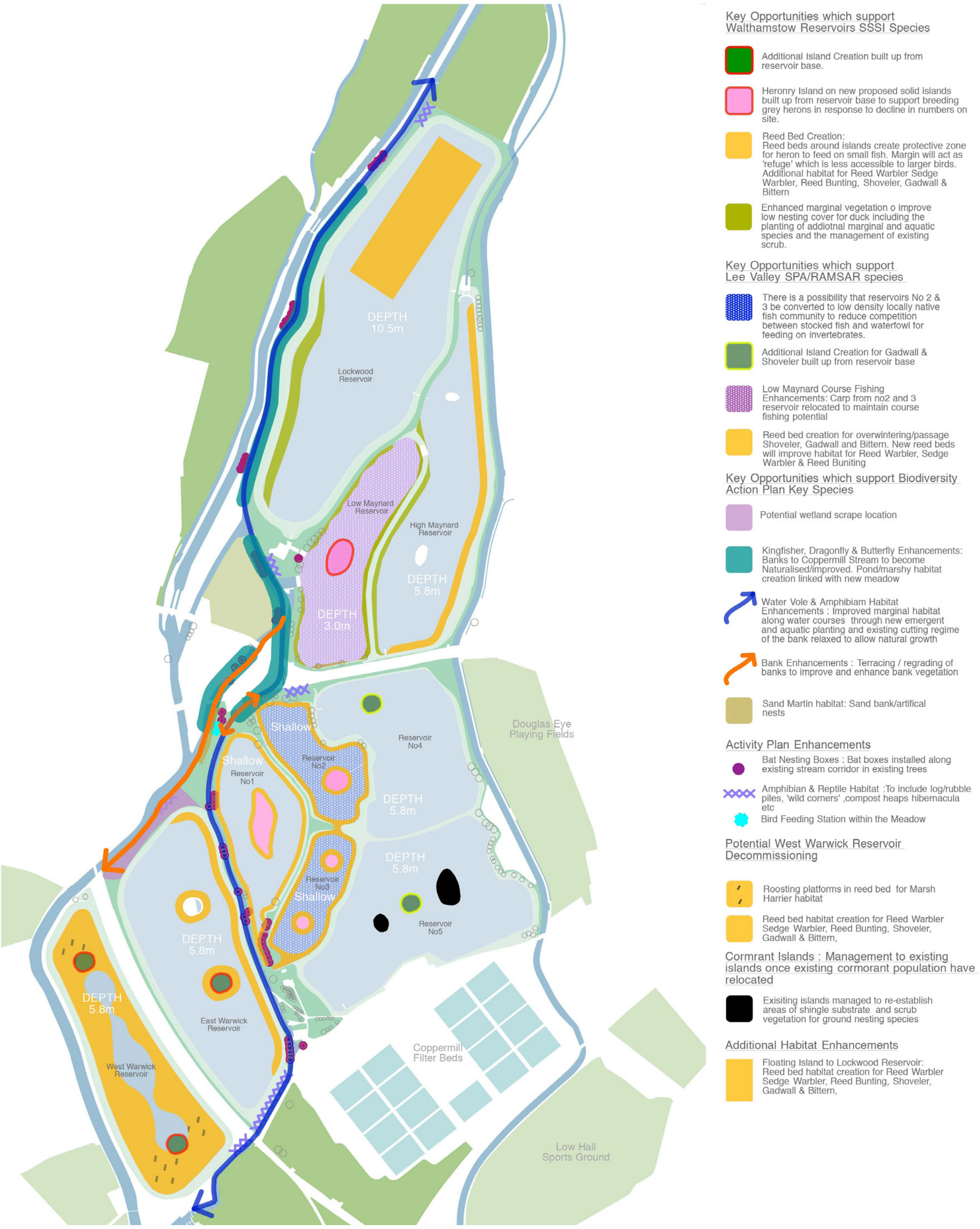

Key Opportunities which support Walthamstow Reservoirs SSSI Species
Additional Island Creation built up from reservoir base.
Heronry Island on new proposed solid islands built up from reservoir base to support breeding grey herons in response to decline in numbers on site.
Reed Bed Creation: Reed beds around islands create protective zone for heron to feed on small fish. Margin will act as 'refuge' which is less accessible to larger birds. Additional habitat for Reed Warbler Sedge Warbler, Reed Bunting, Shoveler, Gadwall & Bittern
Enhanced marginal vegetation o improve low nesting cover for duck including the planting of addiotnal marginal and aquatic species and the management of existing scrub.
Key Opportunities which support Lee Valley SPA/RAMSAR species
There is a possibility that reservoirs No 2 & 3 be converted to low density locally native fish community to reduce competition between stocked fish and waterfowl for feeding on invertebrates.
Additional Island Creation for Gadwall & Shoveler built up from reservoir base
Low Maynard Course Fishing Enhancements: Carp from no2 and 3 reservoir relocated to maintain course fishing potential
Reed bed creation for overwintering/passage Shoveler, Gadwall and Bittern. New reed beds will improve habitat for Reed Warbler, Sedge Warbler & Reed Buniting
Key Opportunities which support Biodiversity Action Plan Key Species
Potential wetland scrape location
Kingfisher, Dragonfly & Butterfly Enhancements: Banks to Coppermill Stream to become Naturalised/improved. Pond/marshy habitat creation linked with new meadow
Water Vole & Amphibiam Habitat Enhancements : Improved marginal habitat along water courses through new emergent and aquatic planting and existing cutting regime of the bank relaxed to allow natural growth
Bank Enhancements : Terracing / regrading of banks to improve and enhance bank vegetation
Sand Martin habitat: Sand bank/artifical nests
Activity Plan Enhancements
Bat Nesting Boxes : Bat boxes installed along existing stream corridor in existing trees
Amphibian & Reptile Habitat :To include log/rubble piles, 'wild corners' ,compost heaps hibernacula etc
Bird Feeding Station within the Meadow
Potential West Warwick Reservoir Decommissioning
Roosting platforms in reed bed for Marsh Harrier habitat
Reed bed habitat creation for Reed Warbler Sedge Warbler, Reed Bunting, Shoveler, Gadwall & Bittern,
Cormrant Islands : Management to existing islands once existing cormorant population have relocated
Exisiting islands managed to re-establish areas of shingle substrate and scrub vegetation for ground nesting species
Additional Habitat Enhancements
Floating Island to Lockwood Reservoir: Reed bed habitat creation for Reed Warbler Sedge Warbler, Reed Bunting, Shoveler, Gadwall & Bittern,
DEPTH 10.5m
Lockwood Reservoir
Low Maynard Reservoir
High Maynard Reservoir
DEPTH 3.0m
DEPTH 5.8m
Shallow
Reservoir No2
Reservoir No1
Reservoir No4
Douglas Eye Playing Fields
Reservoir No3
DEPTH 5.8m
Reservoir No5
DEPTH 5.8m
East Warwick Reservoir
DEPTH 5.8m
West Warwick Reservoir
Coppermill Filter Beds
Low Hall Sports Ground

Figure 16: Concept of the project, the graph indicates the improvements necessary for the achievement of the project objectives; Source: HLF Stage C Report, p.114, KLA.

Technical Solutions

The project tackles the symbiotic relationship between landscape and infrastructure, characteristic of the Walthamstow Wetlands territory. Given the presence of a vast architectural, industrial and ecological heritage, the study and understanding of the history and evolution of the area, constituted the fundamental step that gave rise to the project concept[224],allowing designers to develop a strategy that carefully combined ecological and natural habitat improvement objectives with the operational landscape of basins, all the while making it comprehensible and readable to the broader public.

Although the name of the project suggests that the site is a wetland area, the process of industrialization of the area eradicated the marshy lands long ago and replaced them with ten different basins that occupy about two thirds of the area, defined by the designers as “engineered landscape structures”[225].

The 200 hectares of land surrounding the basins hold great importance for the migratory bird populations at the regional, national and international level, which is in fact designated as one of the eight SSSI [226] of Lea Valley Regional Park, a Special Protection Zone for bird populations and a site registered in the Ramsar list [227] of wetlands of international importance, due to its populations of *Anas strepera*, *Anas clypeata*, *Aythya fuligula*, *Ardeidae* and *Phalacrocorax carbo*.

Lea Valley borders in the Tottenham Hale area and Blackhorse Road are located on the eastern and western borders of Walthamstow Wetlands, and are currently subject to heavy residential intensification and improvement of transport infrastructure networks and services [228]. The key objectives of the project were pursued through a series of specific studies dedicated primarily to the definition of access points to the Nature Reserve and secondly to the possible methods of crossing the roads (through suspended footpaths or at ground level).

Access Points: The first stages of project development concerned the study of the positioning of new accesses to Walthamstow Wetlands; This phase necessitated an intense negotiation process with the local authorities, due to the strategic positioning of the area at the crossroads between the three districts of Waltham Forest (Project Owner), Hackney and Haringey[229]. The negotiation strongly influenced the positioning of the new accesses, which were identified through the elaboration of a “PTAL study”[230]: a study of the transport network (Fig. 17) that provides data on the time needed to reach open spaces or green spaces for pedestrians, by comparing the data to their area of residence. This analysis made it possible to classify the different entrance options through logical criteria, identifying which were best able to increase access for residents close to the new Nature Reserve and at the

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224. Interview with Lynn Kinnear, 2018.

225. Walthamstow Wetlands, Press Release, KLA.

226. “Sites of Specific Scientific Interest" are notified under the Wildlife and Countryside Act 1981. For more informations see: designatedsites.naturalengland.uk.org

227. The Ramsar Convention on wetlands of international importance, especially as a habitat for water birds, was signed in Ramsar, Iran, on February 2nd 1971.

228. OAPC, 2013, Mayor of London Plan.

229. Interview with Lynn Kinnear, 2018.

230. “PTAL is a measure of connectivity by public transport, which has been used in various planning processes in London for many years. For any selected place, PTAL suggests how well the place is connected to public transport services. It does not cover trips by car” (http://content.tfl.gov.uk/connectivity-assessment-guide.pdf)

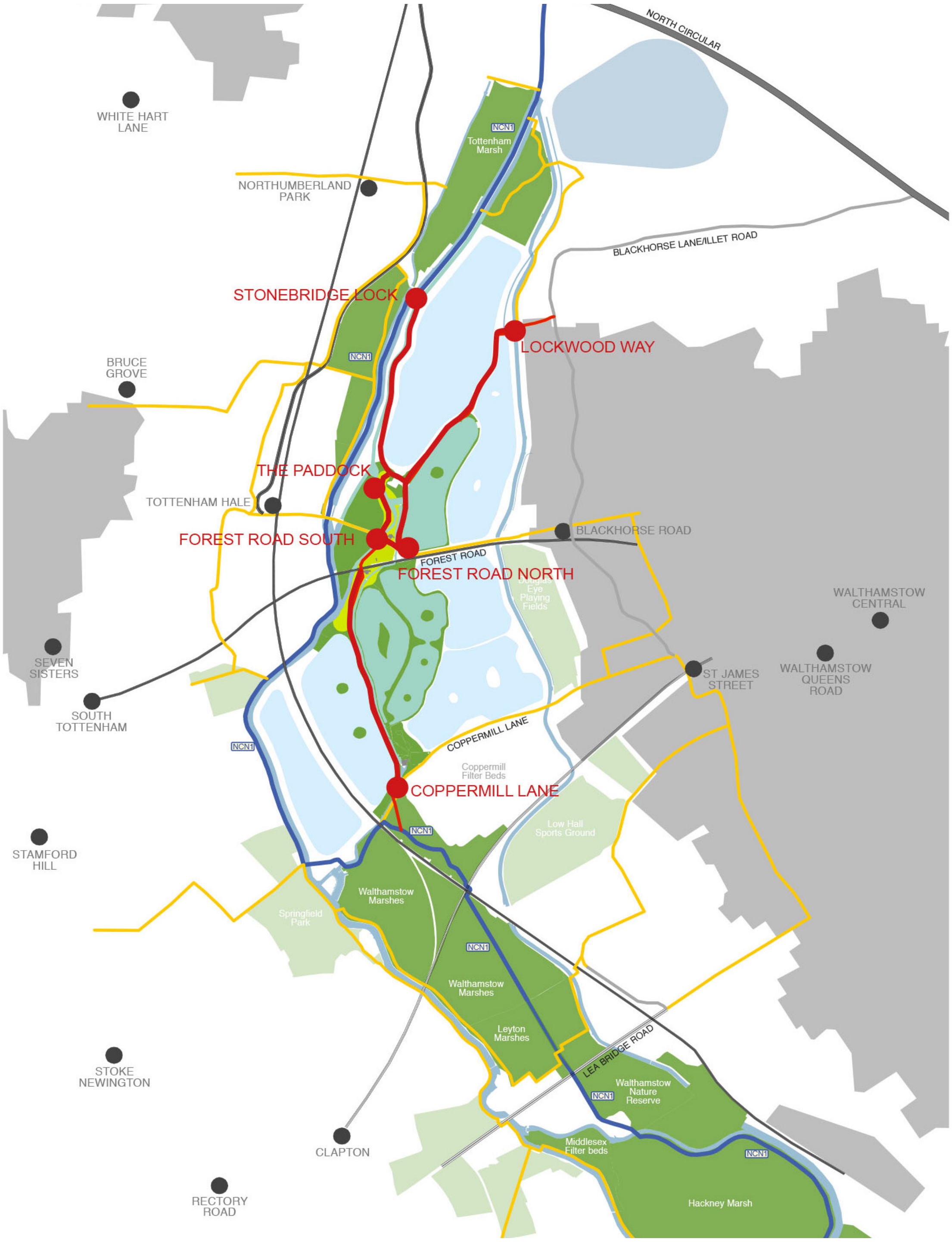

NORTH CIRCULAR
WHITE HART LANE
NCN1
Tottenham Marsh
NORTHUMBERLAND PARK
BLACKHORSE LANE/ILLET ROAD
STONEBRIDGE LOCK
LOCKWOOD WAY
NCN1
BRUCE GROVE
THE PADDOCK
TOTTENHAM HALE
BLACKHORSE ROAD
FOREST ROAD SOUTH
FOREST ROAD
FOREST ROAD NORTH
Douglas Eye Playing Fields
WALTHAMSTOW CENTRAL
SEVEN SISTERS
WALTHAMSTOW QUEENS ROAD
ST JAMES STREET
SOUTH TOTTENHAM
COPPERMILL LANE
NCN1
Coppermill Filter Beds
COPPERMILL LANE
Low Hall Sports Ground
NCN1
STAMFORD HILL
Walthamstow Marshes
Springfield Park
NCN1
Walthamstow Marshes
Leyton Marshes
LEA BRIDGE ROAD
STOKE NEWINGTON
Walthamstow Nature Reserve
NCN1
Middlesex Filter beds
NCN1
CLAPTON
RECTORY ROAD
Hackney Marsh

Figure 17: Representative schematization of the Access vision for Walthamstow Wetlands; The main railway and underground stations and the main driveways are shown in black, while the most frequented pedestrian crossings are yellow; in red the project proposal for access and crossing; The grey areas represent the urban areas with severe access deficits to open spaces or green areas. Source: HLF Stage C Report, KLA, p. 27.

same time attract a greater number of visitors thanks to their proximity to the public transport network and the cycle paths . Although the client was strongly convinced of the need for entry into the area adjacent to the Blackhorse Wood station, the Public Transport Accessibility Level study showed that the proximity to Tottenham Hale station was of greater importance both in order to increase accessibility to nature and also in terms of metropolitan interest. In addition, the study highlighted how the creation of a strategic north-south route connected to the Olympic Park pedestrian path, south of Walthamstow Wetlands, was of fundamental importance to increase the connection with the green space network of London.

The second problem concerned the opening of this protected area to a much higher number of visitors[231] without interfering with the populations of birds that occupy it or damaging their habitat.

Seasonal Routes:

The solution was provided by the data obtained from the study conducted on the protected areas closest to Walthamstow Wetlands, which made it possible to identify which species and habitats are present in an area of 25 square km near the site. This study made it possible to identify which types of habitats and/or species were already present on site and which ones could be introduced. Later analysis was focused at local level (Fig. 18) and made it possible to accurately identify which species of birds populate the different basins and in which season or period of the year these habitats become more sensitive in terms of disturbance caused by the presence of visitors and/or technical operations and the maintenance of the reservoirs.

In order to interfere as little as possible with the ecology of the site and to effectively mitigate the presence of visitors, two levels of practicability of the Nature Reserve were introduced. In addition, on-site circulation was assessed against habitat sensitivity, resulting in a series of seasonal and non-seasonal rules (HLF Stage C Report, KLA).

The four access points are connected by a single circulation route (the main route), which runs from north to south through the wetlands, connecting all entrances to the visitor centre located at the heart of the site. This primary route is suitable for pedestrians and cyclists, while secondary routes are only accessible on foot, with the exception of Thames Water Operation vehicles. The only areas in the wetlands for which access is forbidden to the general public are the north-east and south sides of basins nos. 4 and 5, protecting the *Aythya fuligula* nesting areas. In addition, this solution protects the privacy of five properties on the hill overlooking Coppermill Lane. The western edge of the Lockwood Basin, due to its remote location, can only be visited with a guide in order to ensure the safety of the place (Fig. 19).

Gadwall (*Anas strepera)*
Shoveler (*Anas clypeata)*
Tufted
fuligula
Little Egret
garzetta)
Gadwall (A
strepera)
Grey Heron
cinerea)
Kingfisher (*Alcedo atthis)*
Bat Species
Gadwall (*Anas strepera)*
Tufted Duc
(Aythya fu
Shoveler (*Anas clypeata)*
Wayer Vole (A
amphibius)
Bat Species
Kingfisher (Alce
atthis)

---

[231] With respect to the amount of people who, before the realisation of the project, had daily access to the area.

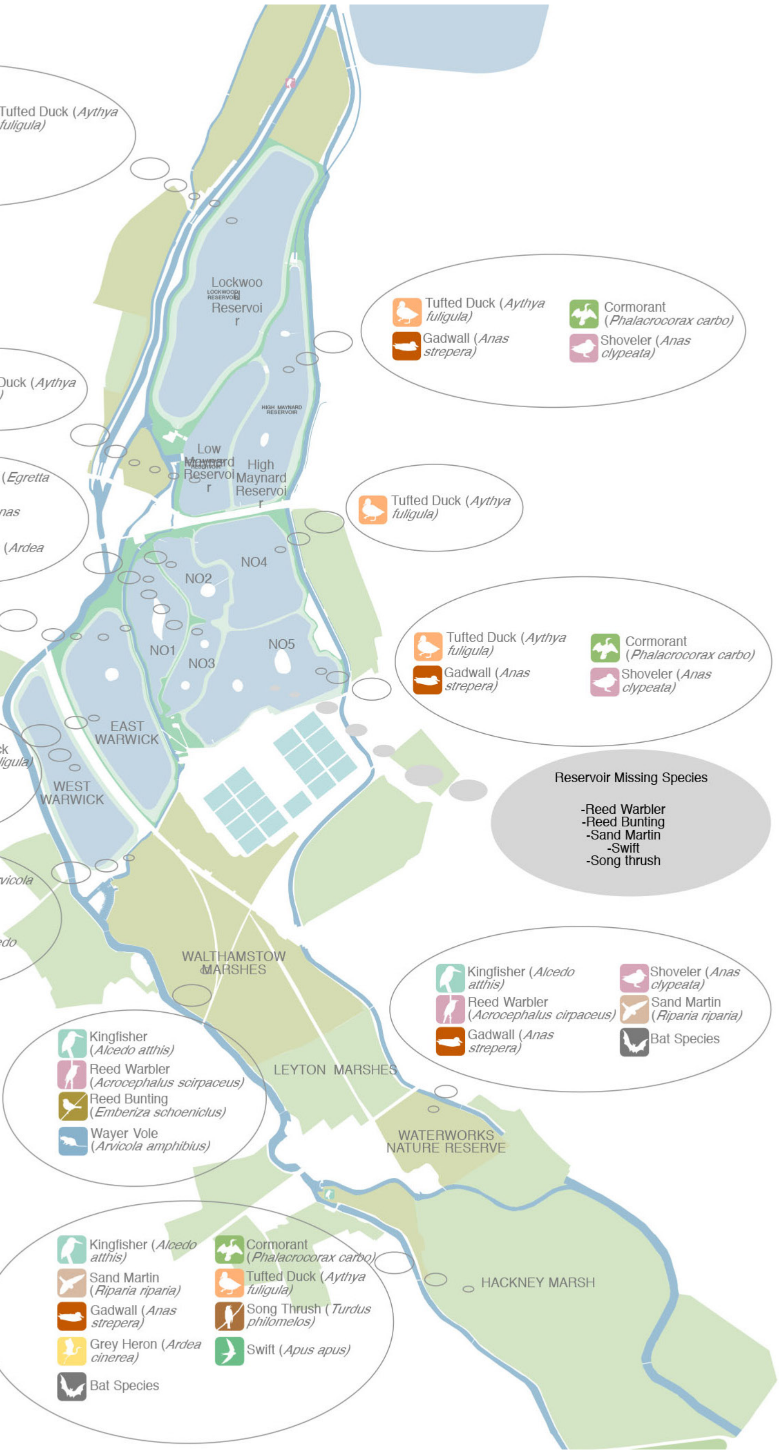

Tufted Duck (*Aythya fuligula)*
Duck (*Aythya*
(*Egretta*
nas
(*Ardea*
ligula)
vicola
edo
Lockwoo
LOCKWOOD RESERVOIR
Reservoi
r
HIGH MAYNARD RESERVOIR
Low Maynard Reservoi r
High Maynard Reservoi r
NO2
NO4
NO1
NO3
NO5
EAST WARWICK
WEST WARWICK
WALTHAMSTOW MARSHES
LEYTON MARSHES
WATERWORKS NATURE RESERVE
HACKNEY MARSH
Tufted Duck (*Aythya fuligula)*
Cormorant (*Phalacrocorax carbo)*
Gadwall (*Anas strepera)*
Shoveler (*Anas clypeata)*
Tufted Duck (*Aythya fuligula)*
Tufted Duck (*Aythya fuligula)*
Cormorant (*Phalacrocorax carbo)*
Gadwall (*Anas strepera)*
Shoveler (*Anas clypeata)*
Reservoir Missing Species
-Reed Warbler
-Reed Bunting
-Sand Martin
-Swift
-Song thrush
Kingfisher (*Alcedo atthis)*
Reed Warbler (*Acrocephalus cirpaceus)*
Gadwall (*Anas strepera)*
Shoveler (*Anas clypeata)*
Sand Martin (*Riparia riparia)*
Bat Species
Kingfisher (*Alcedo atthis)*
Reed Warbler (*Acrocephalus scirpaceus)*
Reed Bunting (*Emberiza schoeniclus)*
Wayer Vole (*Arvicola amphibius)*
Kingfisher (*Alcedo atthis)*
Sand Martin (*Riparia riparia)*
Gadwall (*Anas strepera)*
Grey Heron (*Ardea cinerea)*
Bat Species
Cormorant (*Phalacrocorax carbo)*
Tufted Duck (*Aythya fuligula)*
Song Thrush (*Turdus philomelos)*
Swift (*Apus apus)*

Figure 18: Study of the local habitats of Walthamstow Wetlands. Source: HFL Stage C Report, KLA.

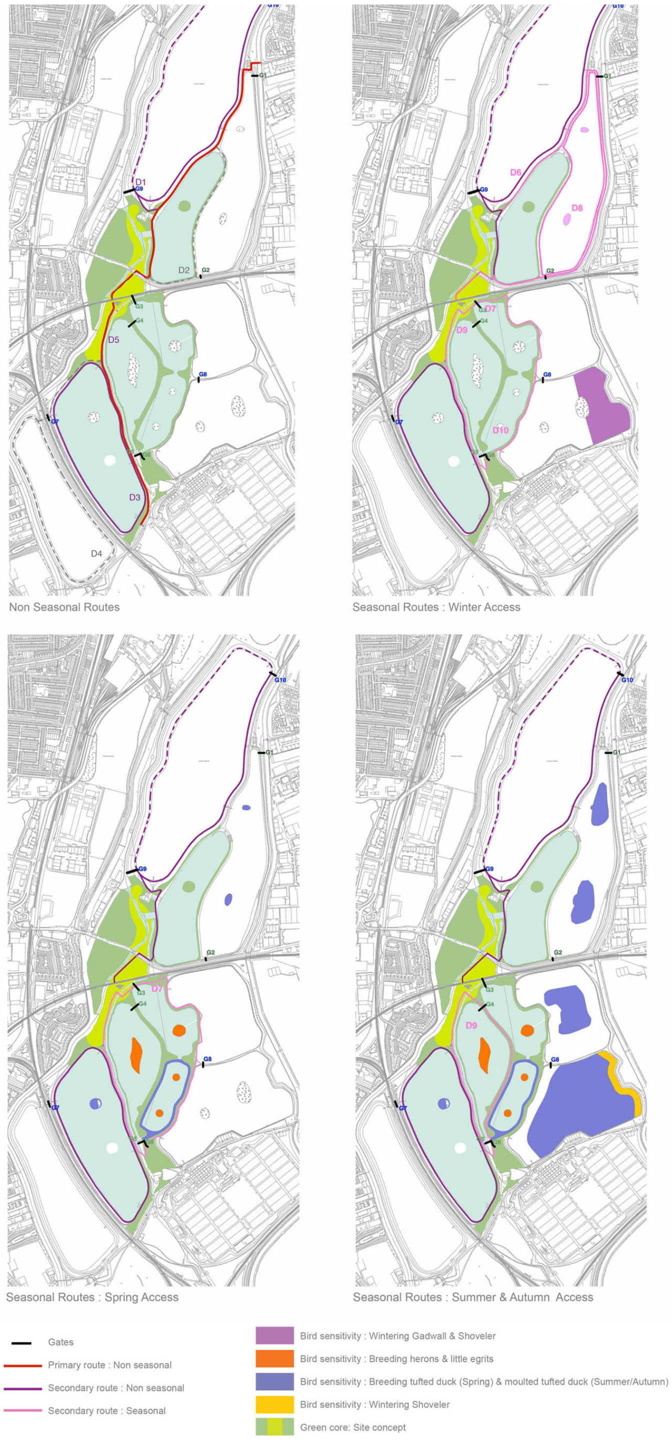

Non Seasonal Routes
Seasonal Routes : Winter Access
Seasonal Routes : Spring Access
Seasonal Routes : Summer & Autumn Access
D1
D2
D3
D4
D5
D7
D8
D9
D10
G1
G2
G3
G4
G6
G7
G9
G10
— Gates
— Primary route : Non seasonal
— Secondary route : Non seasonal
— Secondary route : Seasonal
Bird sensitivity : Wintering Gadwall & Shoveler
Bird sensitivity : Breeding herons & little egrits
Bird sensitivity : Breeding tufted duck (Spring) & moulted tufted duck (Summer/Autumn)
Bird sensitivity : Wintering Shoveler
Green core: Site concept

Figure 19: Graphs of the trails at Walthamstow Wetlands. Source: HLF Stage C Report, KLA pp. 53, 54.

The period of greatest receptivity of the Nature Reserve, in terms of the public, is winter, the season in which the bird populations are least sensitive to disturbance. In spring and summer, only the routes running through the tanks no.1, 2 and 3 can be visited, while the remaining ones are closed to guarantee the reproductivity of the species (HLF Stage C Report, KLA).

Operational Landscape and Ecological Enhancement

Considering the operational necessity of Thames Water for the basins, the design team identified a series of opportunities to meet the ecological vision of enhancing this operational infrastructure landscape.

The strategy adopted by the designers, led by Kinnear Landscape Architects, was to strike a sustainable balance, including in economic terms, among the interventions necessary to strengthen the biodiversity of the area by opening the site to the public in safety without affecting the productivity of the reservoirs and facilitating the technical activities of Thames Water.

The green areas on the diagram (Fig.20) show the space free from operational restrictions, which the project planned to use to create a much wider range of habitats than those existing before the design. The diagram shows the distinction between two types of basins: those with the green symbol are "non statutory reservoirs", built in the Victorian era by digging at ground level, which appear today more markedly naturalized, while those with the orange symbol are "statutory reservoirs", built with the most modern engineering techniques and characterized by prominent cantilever banks. This interface was identified by the design group as the one that gave rise to the distinctive aesthetics of the place; the contrast between the raised banks of the most recent basins and the naturalized banks of the oldest, located at the heart of the site .

The design team's approach also envisaged the improvement of this symbiotic relationship between industry and natural landscape. Thus, the designers accentuated the distinction by planting new reeds in the reservoirs that form the "green core" of the project. The study of construction techniques and maintenance of the two different types of reservoirs allowed them to identify solutions that could persuade Thames Water to pursue the designer's vision[232]: the silt that must be dredged from reservoir no.3 after periods of full volume or overflow can and must be reused as a stuffing material for the gabions, which make up the reedbeds of the new plant. This was a truly advantageous mechanism to propose since the benefits are not only ecological, but also economic for the owners of the site.

[232] Interview with Lynn Kinnear, 2018.

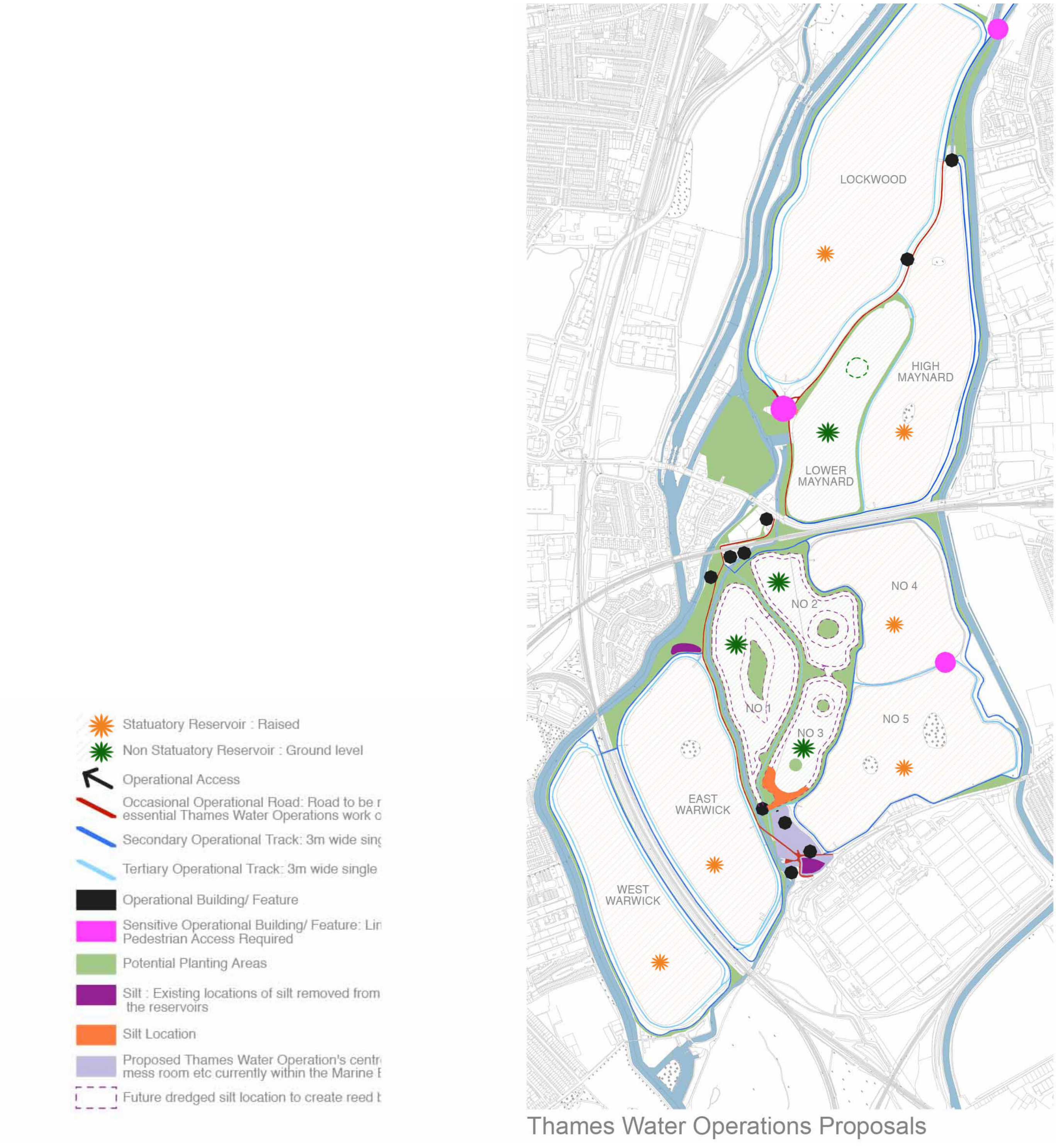

LOCKWOOD
HIGH MAYNARD
LOWER MAYNARD
NO 4
NO 2
NO 1
NO 3
NO 5
EAST WARWICK
WEST WARWICK
Statuatory Reservoir : Raised
Non Statuatory Reservoir : Ground level
Operational Access
Occasional Operational Road: Road to be r essential Thames Water Operations work c
Secondary Operational Track: 3m wide sinç
Tertiary Operational Track: 3m wide single
Operational Building/ Feature
Sensitive Operational Building/ Feature: Lir Pedestrian Access Required
Potential Planting Areas
Silt : Existing locations of silt removed from the reservoirs
Silt Location
Proposed Thames Water Operation's centr mess room etc currently within the Marine E
Future dredged silt location to create reed t
Thames Water Operations Proposals

Figure 20: Plan of intervention and management of the reservoirs. Source: Author, according to HLF Stage C Report, KLA.

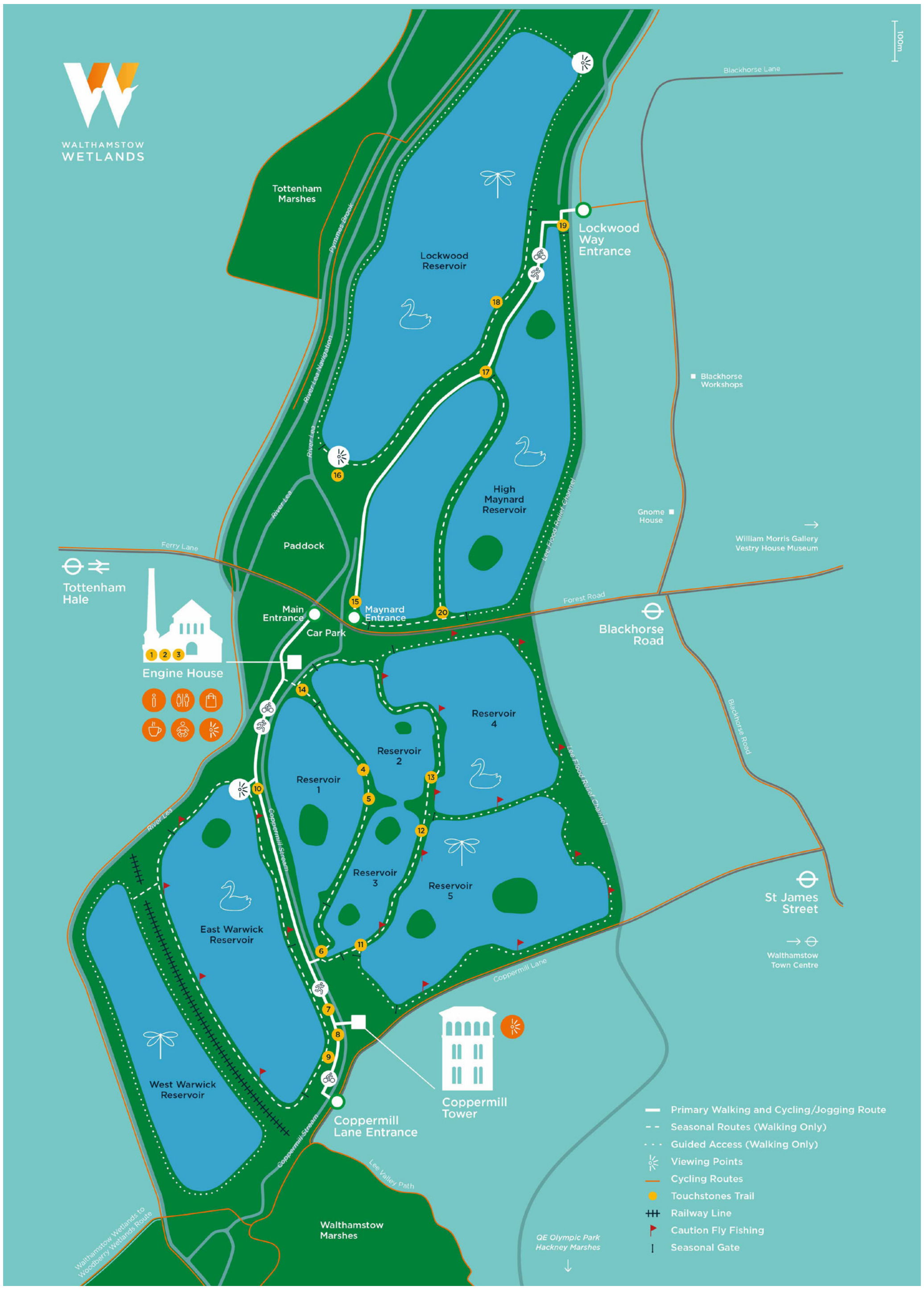

WALTHAMSTOW WETLANDS
100m
Blackhorse Lane
Tottenham Marshes
Pymmes Brook
Lockwood Reservoir
Lockwood Way Entrance
19
18
17
16
River Lea Navigation
River Lea
Blackhorse Workshops
High Maynard Reservoir
Lee Flood Relief Channel
Gnome House
William Morris Gallery
Vestry House Museum
Paddock
Ferry Lane
Tottenham Hale
Forest Road
Main Entrance
15
Maynard Entrance
20
Car Park
Blackhorse Road
1 2 3
Engine House
14
Reservoir 4
Reservoir 2
Reservoir 1
Blackhorse Road
4
5
13
10
12
River Lea
Coppermill Stream
Reservoir 3
Reservoir 5
East Warwick Reservoir
St James Street
6
11
Walthamstow Town Centre
Coppermill Lane
7
8
9
West Warwick Reservoir
Coppermill Tower
Coppermill Lane Entrance
Coppermill Stream
Lee Valley Path
Walthamstow Marshes
Walthamstow Wetlands to Woodberry Wetlands Route
QE Olympic Park
Hackney Marshes
Primary Walking and Cycling/Jogging Route
Seasonal Routes (Walking Only)
Guided Access (Walking Only)
Viewing Points
Cycling Routes
Touchstones Trail
Railway Line
Caution Fly Fishing
Seasonal Gate

Figure 21: Map of Walthamstow Wetlands. Source: WalthamstowWetlands.com

GRAMMAR, POETICS AND PERCEPTION OF THE SITE

As expected from the results of the studies of the Public Transport Accessibility Level investigation, Walthamstow Wetlands' most-used entrances are the two located in Forest Road (Fig. 21 and 22), one of the major arteries of entry and exit from the north-eastern part of London furnished with a two-way cycle path. Due to the proximity to the Tottenham Hale train and underground station, the main entrance to the Nature Reserve is the one opposite the restored Marine Engine House building, which is particularly suitable for moving north-south along the pedestrian/cycle path (Fig. 23).

The sign, made of Corten steel, signals the entrance to the reserve with a path leading to the visitor centre along the channel of expansion of the river Lee, dominated by the presence of wild flowers and willows. Separate access points have been set up for pedestrians, vehicles and service vehicles, including through the expansion of the existing parking lot. To underline the relationship between nature and infrastructures, the entrance to the visitor centre makes it necessary to go under a railway viaduct(Fig. 24), which reveals the restored building called the Marine Engine House, approached over a reclaimed cobblestone pavement surface.

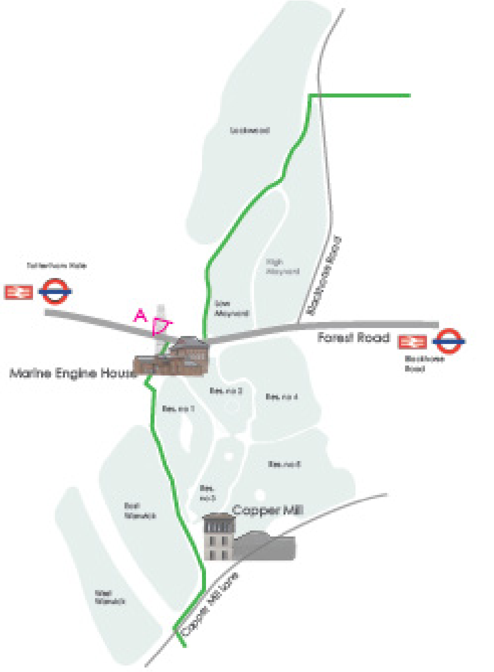

A
Marine Engine House
Forest Road
Blackhorse Road
Copper Mill
Coppermill Lane

Figure 22: Walthamstow Wetlands entrance plan for Forest Road. In green the north-south cycle path; Source: HLF Stage C Report, KLA

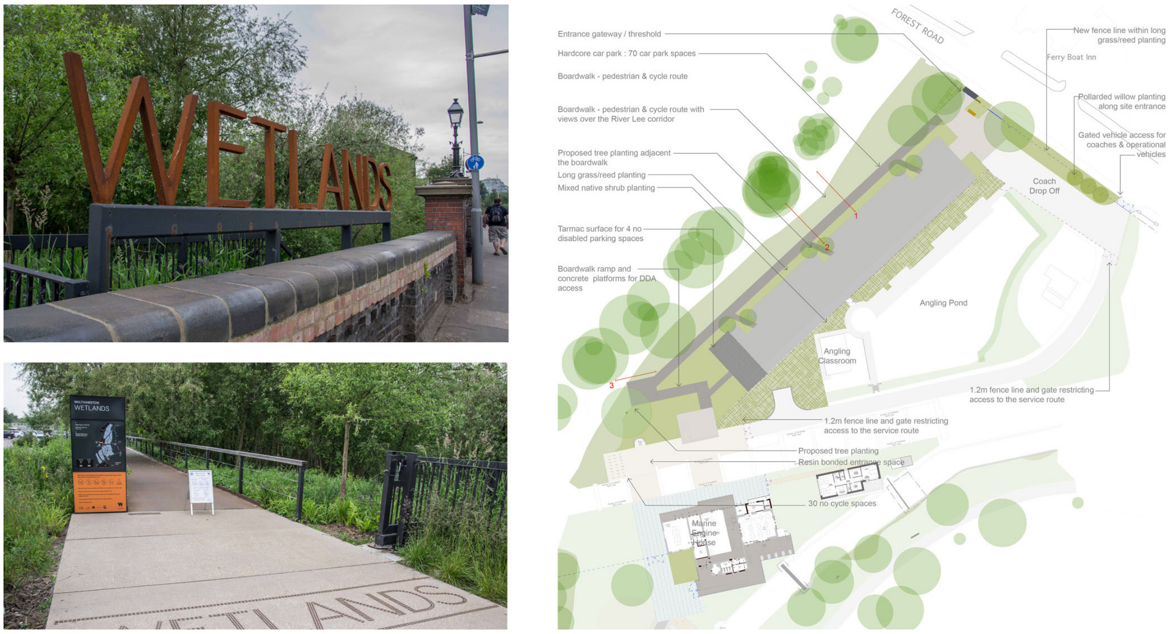

WETLANDS
WETLANDS
FOREST ROAD
Entrance gateway / threshold
Hardcore car park : 70 car park spaces
Boardwalk - pedestrian & cycle route
Boardwalk - pedestrian & cycle route with views over the River Lee corridor
Proposed tree planting adjacent the boardwalk
Long grass/reed planting
Mixed native shrub planting
Tarmac surface for 4 no disabled parking spaces
Boardwalk ramp and concrete platforms for DDA access
New fence line within long grass/reed planting
Ferry Boat Inn
Pollarded willow planting along site entrance
Gated vehicle access for coaches & operational vehicles
Coach Drop Off
Angling Pond
Angling Classroom
1.2m fence line and gate restricting access to the service route
1.2m fence line and gate restricting access to the service route
Proposed tree planting
Resin bonded entrance space
30 no cycle spaces
Marine Engine House
1
2
3

Figure 23: Left: images of the entrance south of Forest Road. Source: Author. Right: the project plan of the access' area of Forest Road South. Source: HFL Stage C Report, KLA.

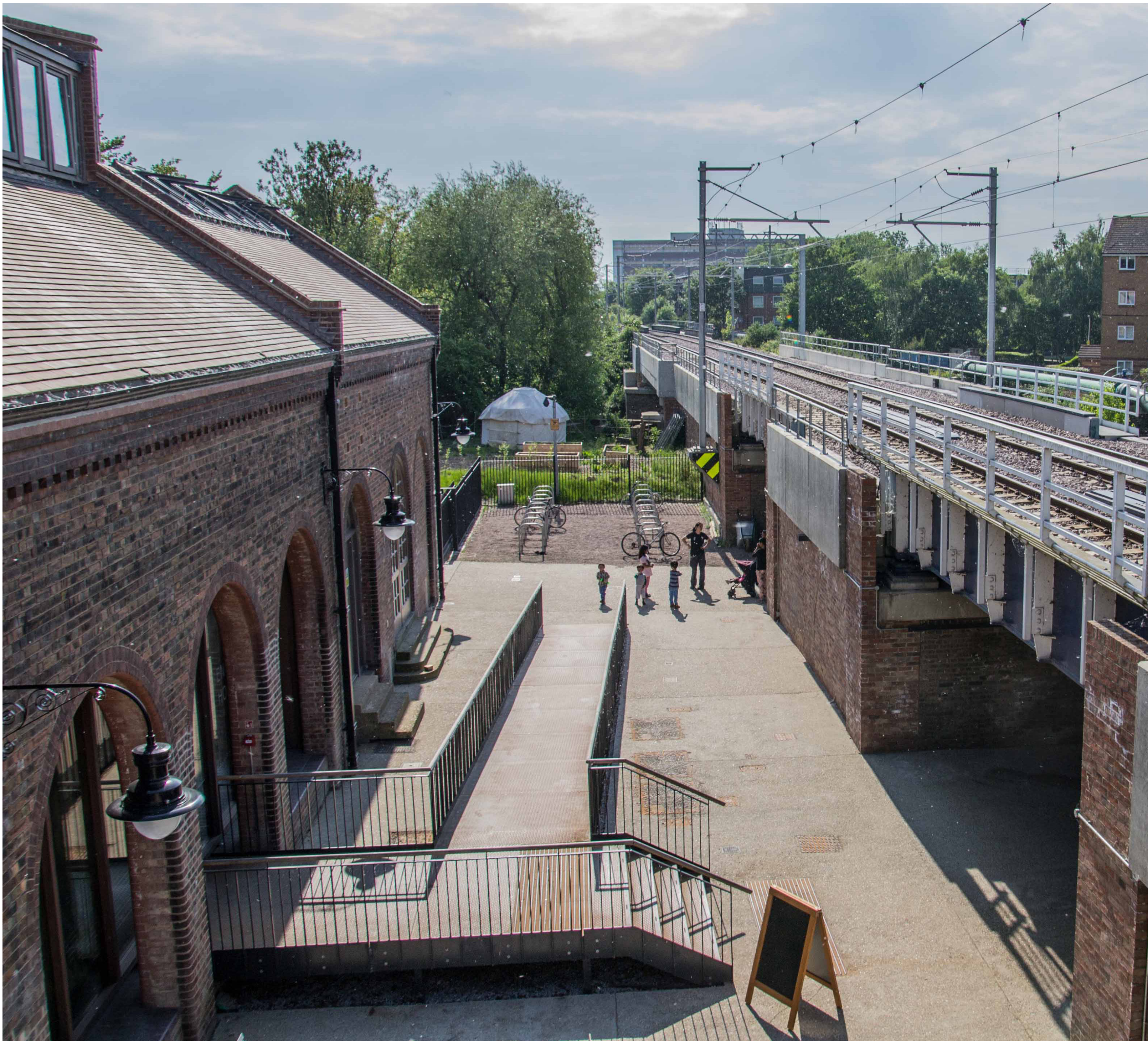
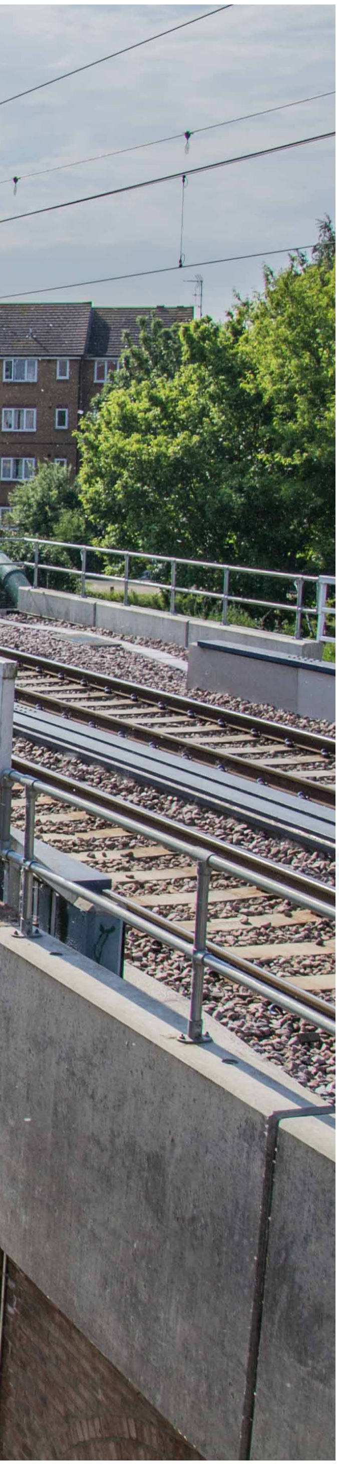


Figure 24: View of the railway viaduct from the "Marine Engine House" building. Source: Author, May 2018.



Marine Engine House

The reuse of existing materials and structures on site were one of the guiding principles of this project: the hydraulic pump house, dating back to the Victorian era, was converted into a visitor centre, which now hosts a bar, spaces for learning and events and a gift shop.

Restoration involved a delicate repair of the brick cladding and the insertion of a steel spiral staircase (Fig.25) leading to a scenic terrace located on the upper levels of the building, offering a wonderful view of the water landscapes of the reserve.

The delicate treatment of the restoration of these historic buildings with a simple palette of materials contrasts elegantly with the new steel bridge cranes, stairs and elevators to access the observation platforms (RIBA, 2018).

The most significant element of the restoration is the reconstruction of the chimney (Fig. 26 and 27), a prominent industrial feature of the building, demolished in 1960 after the pumping systems were converted from coal to electricity. The new 24-meter-high chimney, built on the existing basement, today houses 54 bat boxes and powerfully signals the transformation of the site from infrastructure to ecology, from place of industry to place of nature[233].

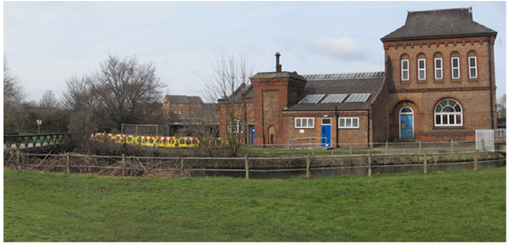


Figure 26: The Victorian pumping building before restoration. Source: HLF Stage C Report, KLA.

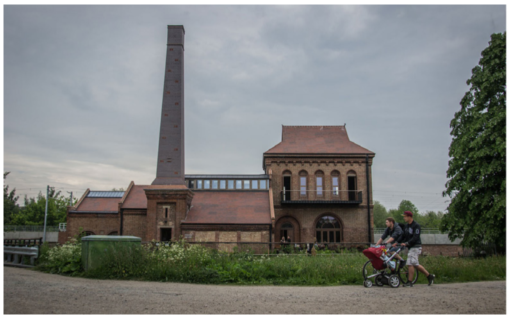


Figure 27: The restored building used as a café and visitor centre with the reconstructed chimney. Source: Author, May 2018

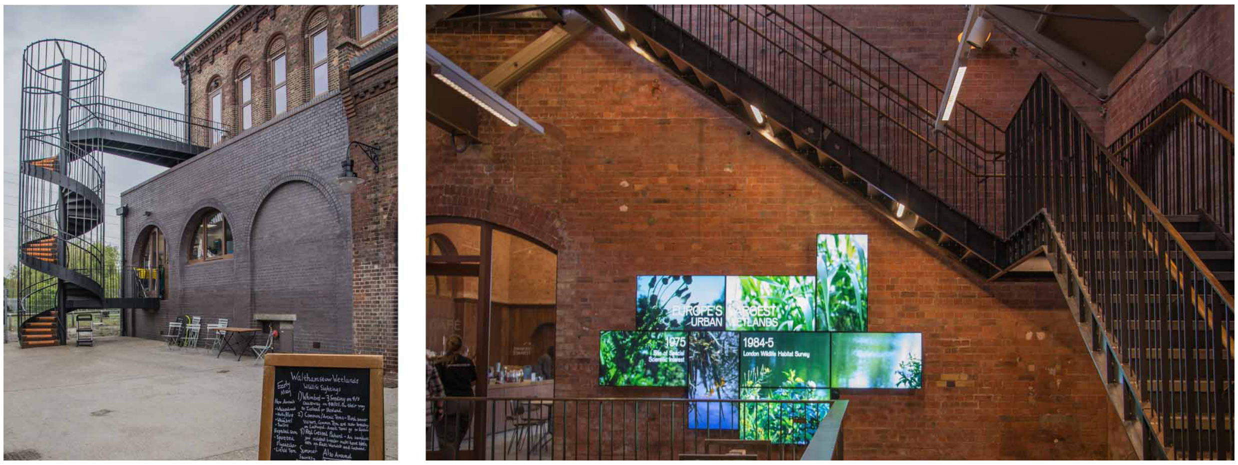

Walthamstow Wetlands
EUROPE'S LARGEST URBAN WETLANDS
1975
1984-5
London Wildlife Habitat Survey

Figure 25: Left view of the restored building and of the newly installed steel staircase; On the right: view of the inside of the restored Marine Engine House. Source: Author, May 2018

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[233] Interview with Lynn Kinnear 2018; http://www.wwmarchitects.co.uk/projects/wetlands

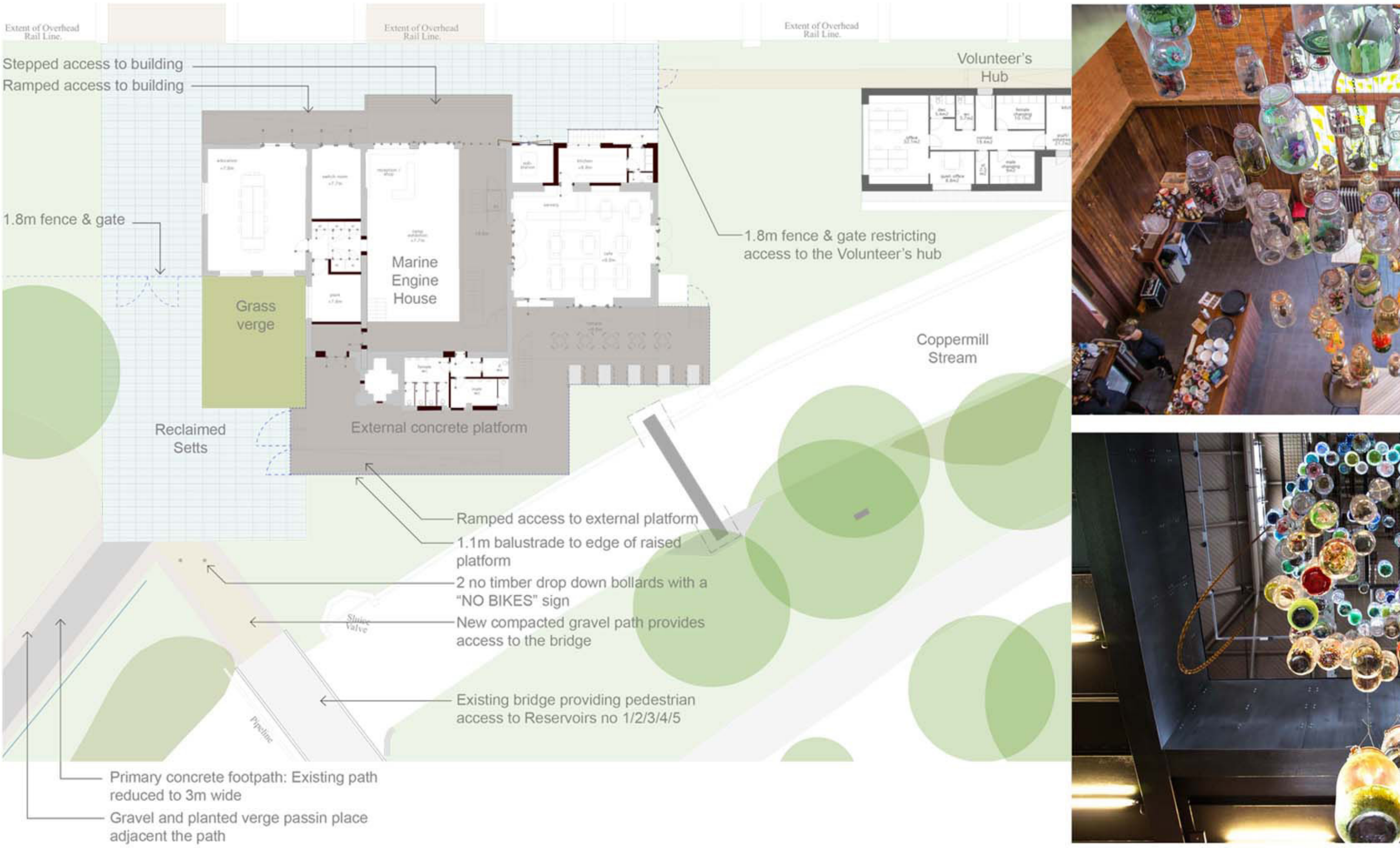

Extent of Overhead Rail Line.
Extent of Overhead Rail Line.
Extent of Overhead Rail Line.
Stepped access to building
Ramped access to building
Volunteer's Hub
1.8m fence & gate
Marine Engine House
1.8m fence & gate restricting access to the Volunteer's hub
Grass verge
Coppermill Stream
Reclaimed Setts
External concrete platform
Ramped access to external platform
1.1m balustrade to edge of raised platform
2 no timber drop down bollards with a "NO BIKES" sign
Sluice Valve
New compacted gravel path provides access to the bridge
Pipeline
Existing bridge providing pedestrian access to Reservoirs no 1/2/3/4/5
Primary concrete footpath: Existing path reduced to 3m wide
Gravel and planted verge passin place adjacent the path

Figure 28: Left: Plan of the restoration project of the Marine Engine House building environments, (HLF Stage C Report, KLA); Top right: the view of the cafeteria from the upper floor of the building, Bottom right: the sculpture inspired by the themes of the permanent exhibition. Source: Author, May 2018.

The structure hosts a permanent exhibition (Fig. 29 and 30) which has as its goal on-site education and interpretation, supported by temporary exhibitions aimed at creating an artistic curatorial project in the Wetlands that continually researches and explores the site and its cultural and social context (HLF Stage C Report, KLA).

This process is designed to sensitize visitors to the complexity and dynamism that both management and respect for the planet's water resources require. To facilitate the cultural understanding of the place and the heritage it contains, the Activity Plan developed in collaboration with LWT identified a series of key themes to organize the different range of narratives that correspond to the main research topics that designers dealt with while developing the project:

- How changing climatic conditions built and shaped the Lee valley?
-Migratory patterns of species found at the reservoirs;
-Human Settlement - these wetlands have long been settled
-Multiple uses of the different branches of the River Lee for transport, power and drinking water;
-The exponential growth of Victorian London and the challenge of urban sanitation;
- Fluvial flooding now mitigated by the Flood Relief Channel l along the edge of the site;
- Contemporary problems of toxicity;
- Water Conservation.

These themes are the focus of the various permanent and temporary exhibitions hosted in the building. In addition to the "Triple Engine Room", in the centre of the building, the former "Boiler Room" functions as a reception, a shop, an information point and holds a permanent exhibition linked to the "Industrialization of Water". From this room the former "Turbine Hall" can be reached , which is now used as an educational space in which various activities dedicated to all the themes under discussion are carried out, including through practical learning activities guided by the volunteers of the London Wildlife Trust.

The machinery and technical control systems were kept inside the room as a permanent exhibition on the operation of the building and on the evolution of the site.

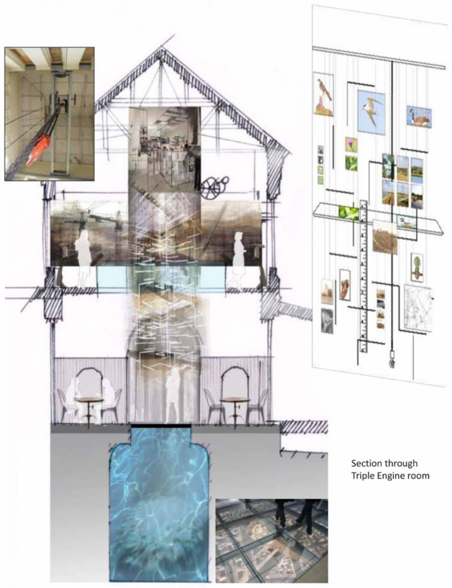

Section through
Triple Engine room

Figure 29: Graph for the interior design of the "Triple Engine Room" containing the permanent sculpture. Source: HFL Stage C Report, KLA

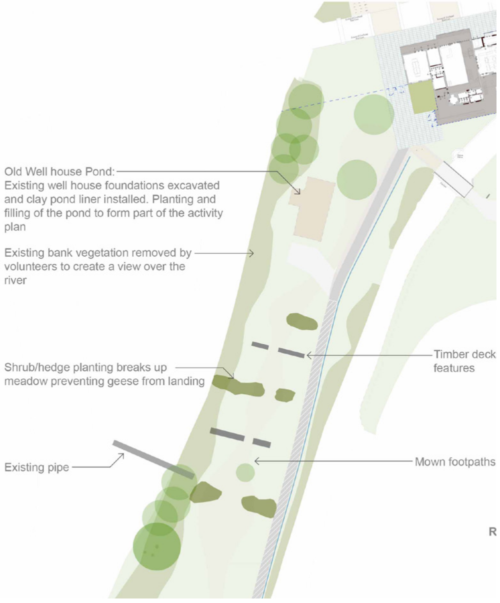

Old Well house Pond:
Existing well house foundations excavated and clay pond liner installed. Planting and filling of the pond to form part of the activity plan
Existing bank vegetation removed by volunteers to create a view over the river
Timber deck features
Shrub/hedge planting breaks up meadow preventing geese from landing
Existing pipe
Mown footpaths
R

Figure 31: Extract of the plan of the lawn and of the external educational space. Source: HLF Stage C Report, KLA.

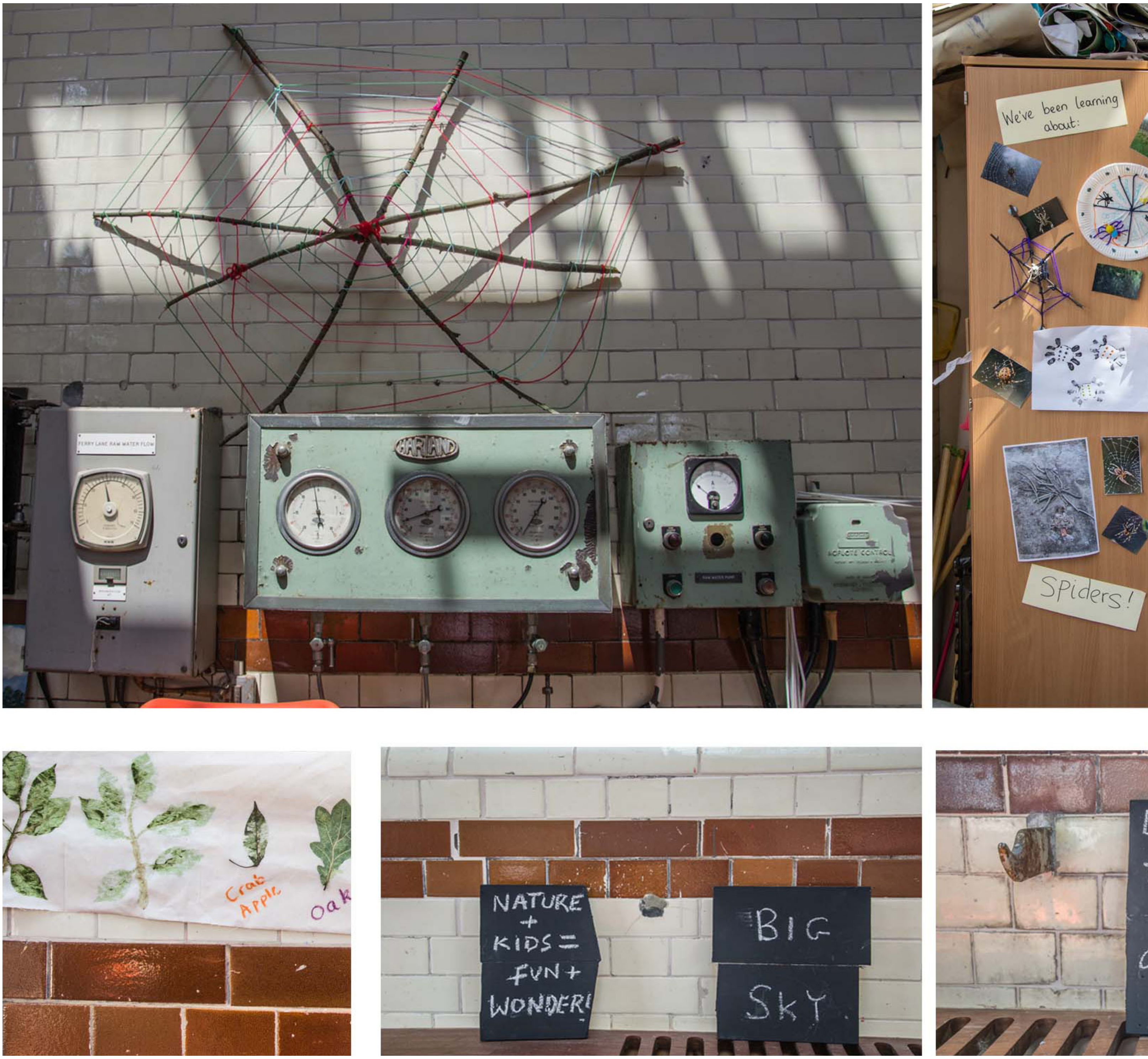

FERRY LANE RAW WATER FLOW
HARLAND
We've been learning about:
Spiders!
Crab Apple
Oak
NATURE + KIDS = FUN + WONDER!
BIG SKY

Figure 30: Details from the interior of the Turbine Hall. Source: Author, May 2018.

12 WAYS
TO HELP WILDLIFE
ALL YEAR ROUND
Butterflies!

Learning
from
colleagues
and
volunteers

Leaving the visitor centre behind, the main concrete route continues south along the "East Warwick" reservoir until it connects with the nearby Walthamstow Marshes. To the west of the Marine Engine House, as part of the HLF proposals, the foundations of the Old Well House had to be excavated to allow the construction of a pond as part of the Activity Plan (Fig. 31).

This part of the project could not be completed for lack of funds, notably affecting the careful reading and communication of the existing heritage drawn up by the design team. Today the London Wildlife Trust is building the pond in the immediate vicinity of the Marine Engine House(Fig. 32). Despite this loss in terms of the reading of some historical traces present on the site, the basic design objectives for this area have been achieved: the lawn and the outdoor teaching space extend from the south from the Marine Engine House to the shore north of the basin of "East Warwick", the main concrete path being accompanied with a rich habitat and a space suitable for informal recreational activities and educational and voluntary activities. Areas of indigenous shrubbery create informal divisions within this space, while a series of reused wooden platforms are used to line the cycle path (Fig.33)

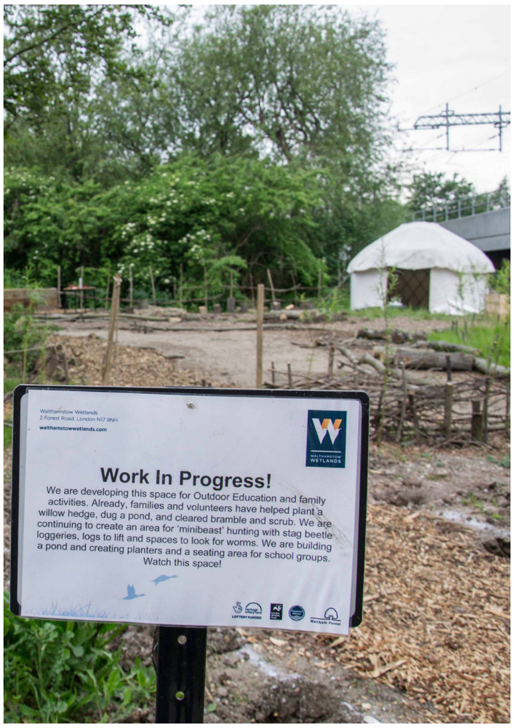

Work In Progress!
We are developing this space for Outdoor Education and family activities. Already, families and volunteers have helped plant a willow hedge, dug a pond, and cleared bramble and scrub. We are continuing to create an area for 'minibeast' hunting with stag beetle loggeries, logs to lift and spaces to look for worms. We are building a pond and creating planters and a seating area for school groups.
Watch this space!
WALTHAMSTOW WETLANDS

Figure 32: The pond construction area; Source: Author, May 2018.

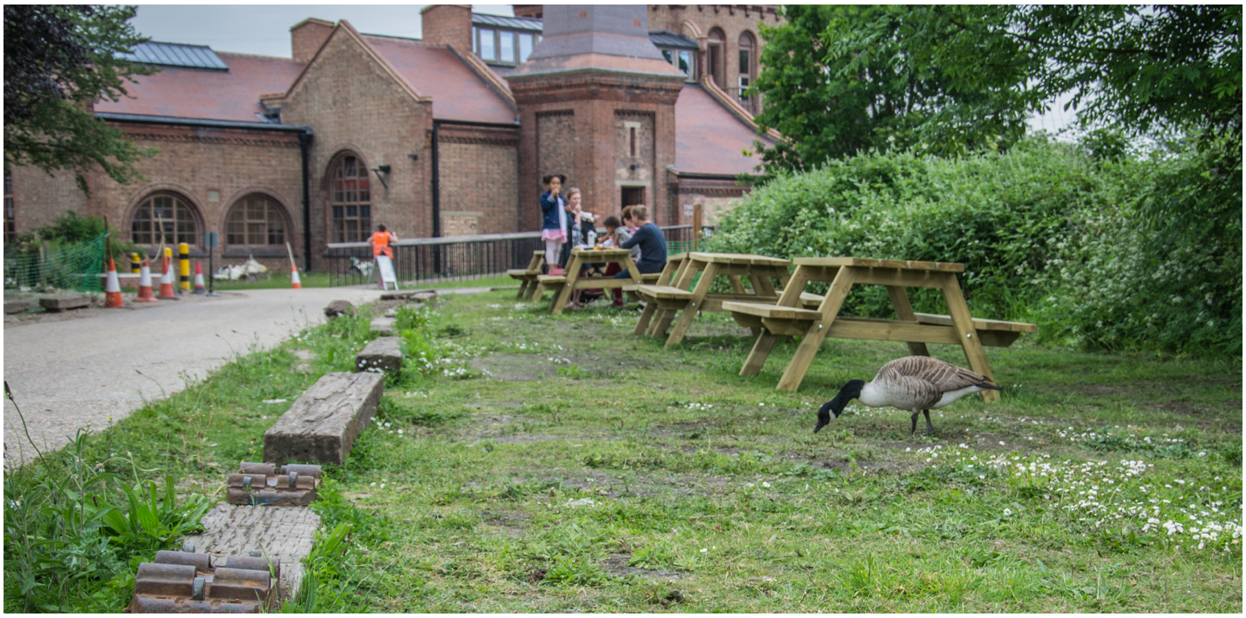


Figure 33: View of the Marine Engine House from the main path, on the side the wooden blocks marking the main pedestrian and cycle path, also acting as crossing traps for the geese are noticeable. Source: Author, May 2018.

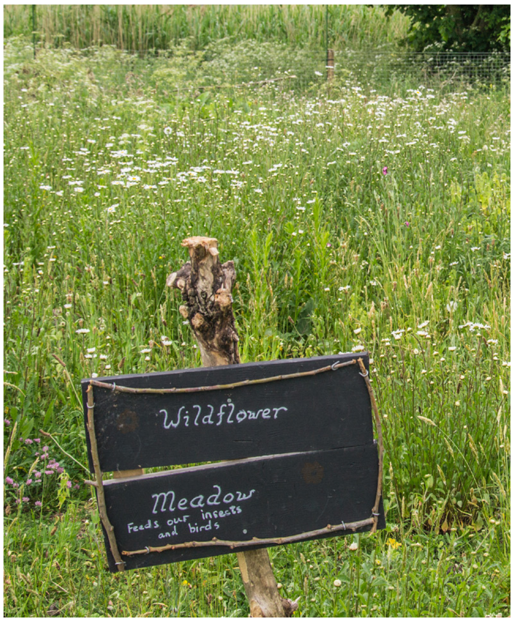


Figure 34: One of the meadows of the "green core" areas. Source: Author, May 2018.

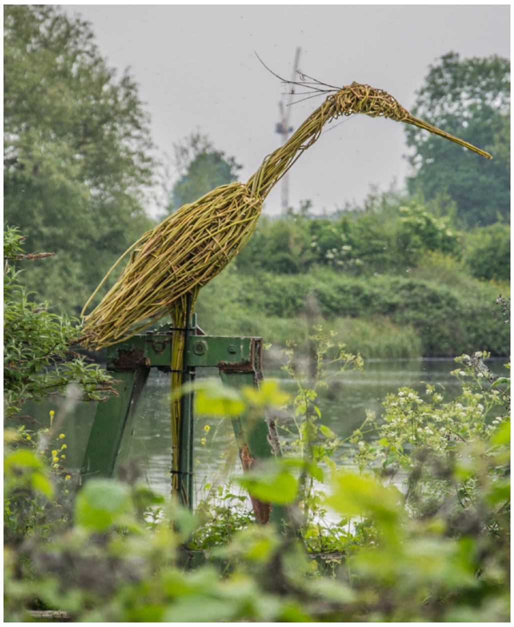


Figure 35: Ephemeral installation of the Chelsea Flower Show 2018, in the background the "green core" partially obstructed by vegetation stands out. Source: Author, May 2018.

Green Core

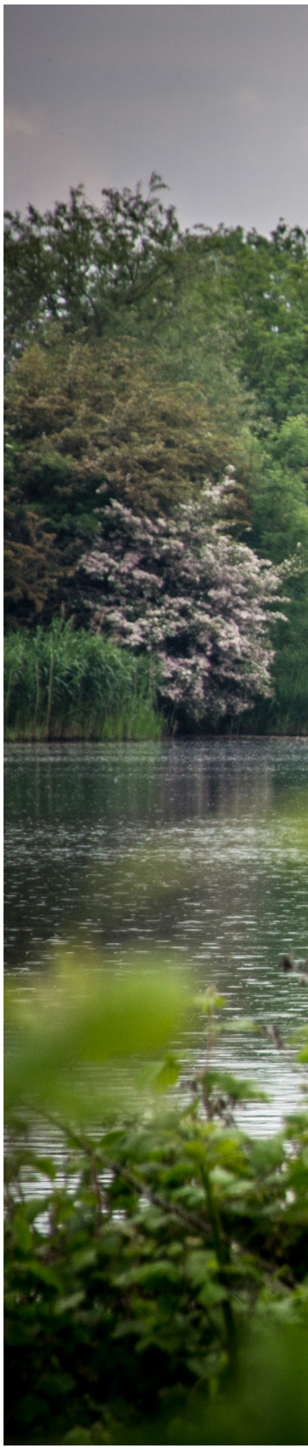
«*When they were built, these reservoirs were contorted to the watercourses and field lines, implanted with islands, and lined with trees – they are works of landscape design as much as of infrastructure*» (HLF Stage C Report, KLA, p.35)

The oldest and most naturalized reservoirs are located at the centre of the nature reserve in front of the Marine Engine House: These form the "green core" of the site and were designed to attract the greatest number of visitors. The green core includes the "non-statutory tanks", Low Maynard and reservoirs nos. 1,2 and 3.

The new space for outdoor education is linked to seasonal itineraries and to the main crossing route. The improvement of the "green core", was the fulcrum of the proposals. It concerned an increase in the habitats, as this area contains many of the ecological keys characteristic of the site and was designed to become the focal area of attraction for visitors (Fig. 34).

In addition to this visitor's noise mitigation function, the "green core" constitutes the project "concept", in other words the reclamation of the infrastructural landscape, which the authors described as «*a flat landscape already rich in life, whose habitats can be further improved in time thanks to the reduction of the constraints of infrastructures (no risk of breakage and flooding) and of the river's edges*» (HLF Stage C Report, KLA, p.35).

Therefore, the tanks were surrounded by several varieties of shrubs, subject to a more targeted management regime than those implanted around the entrances and the visitor centre. Along the existing banks of basins nos.1, 2 and 3 and the Low Maynard reservoir the vegetation creates an efficient visual protection for the water birds that populate the docks, hiding them from visitors, who can observe the "green core" only at certain established points, where the vegetation was designed to open up into large "windows" that allow for observation (Fig. 35 and 36).



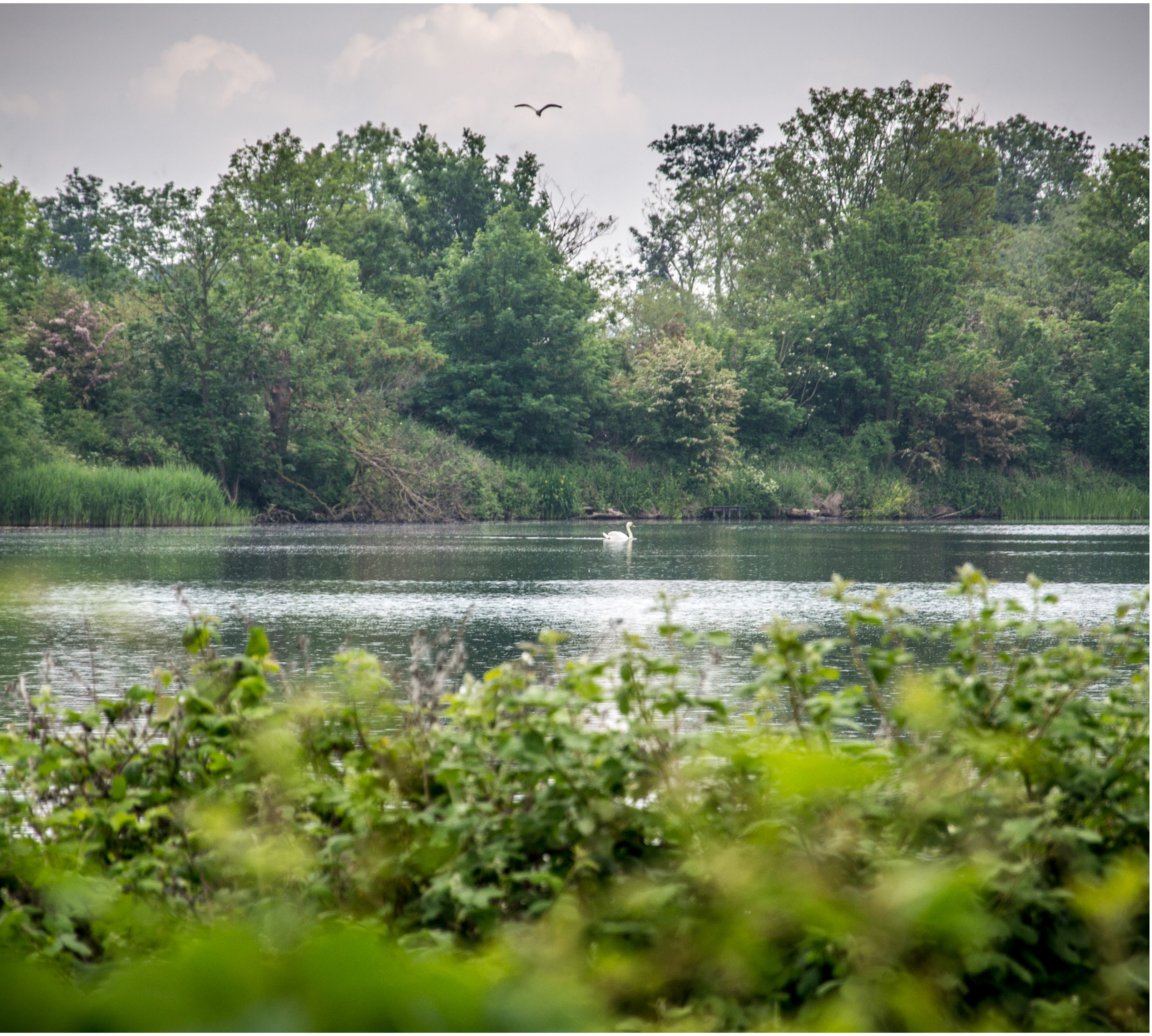
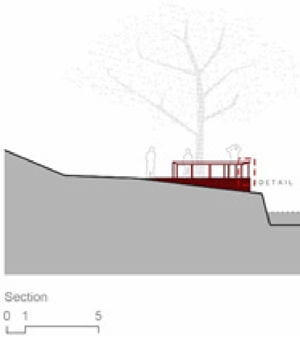


Figure 36: One of the views on the reservoir n.2 which constitutes the centre of the "green core". Source: Author, May 2018

Coppermill Tower

The waterways that run along the green core and the cycle/pedestrian path lead visitors south: the Coppermill stream leads up to the building called Coppermill Tower, the second of the two restored buildings in Walthamstow Wetlands (Fig. 37). The constraints on access to the Coppermill Tower led the designers to assess a range of options: the modest benefits of physical access to Coppermill significantly exceeded the costs of making the building safe and completely overhauling it (HLF, Stage C Report). It must be taken into consideration that none of the original structures had survived the passage of time unscathed, with the exception of a row of poplars (Fig. 38) which had been expertly maintained as a distinctive historical sign, as well as the Round House (Fig. 39) a structure belonging to the same formal Victorian garden, which was surrounded until the 1960s, by a roundabout built in a similar style to the Coppermill Tower building.



Although every trace of the garden has today disappeared, the old valves still serve as an interchange between tanks 1 and 3 (WalthamstowWetlands.com). The proposal of the design team stemmed from research conducted on the history of the building and the site, proposing the creation, in an abstract form, of a hydraulic wheel with a diameter of 5.5 meters, as a reminiscence of the last waterwheel registered at the mill in 1865. However, the scarcity of funds did not allow for the realization of this portion of the project.

The proposals of the Heritage Lottery Found, which were realised, include a new "gateway entrance" to Coppermill Lane with a new cycle bridge on the Coppermill stream, connecting to the main pedestrian footpath. Similarly to the other entrances of the site, a "threshold" was created, this time made of concrete, defining the entrance and signalling to visitors that they are entering a distinct space (Fig. 40). Inside, information on the history of the evolution of the place is displayed, while the steel staircase, reminiscent of the newly-installed spiral staircase at the Marine Engine House, leads to the top of the tower, from which a spectacular view of the surrounding aquatic and urban landscapes is to be had. Historical testimony to the different periods of development of the Walthamstow area of basins surrounds the building; beside the entrance to Coppermill Tower, repositioned by the designers, it is impossible not to notice the Wooden Wharf Loading Crane, a wooden loading crane belonging to the industrial past of this territory (Fig.41). The relic dates back to the second half of the 19th century, when copper was transported by sea from Wales and then transported on barges on the river Lea up to Coppermill Stream, where the mineral was worked until 1857. With the subsequent acquisition of land from part of the East London Waterworks Company, the site was converted into a pumping station for the first basins at Walthamstow.

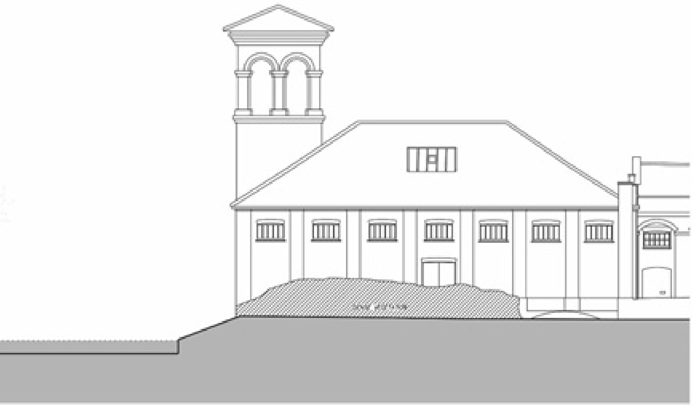


Figure 37: Project section of the restoration at the entrance to the Coppermill Tower building. Source: HLF Stage C Report, p. 11, KLA.

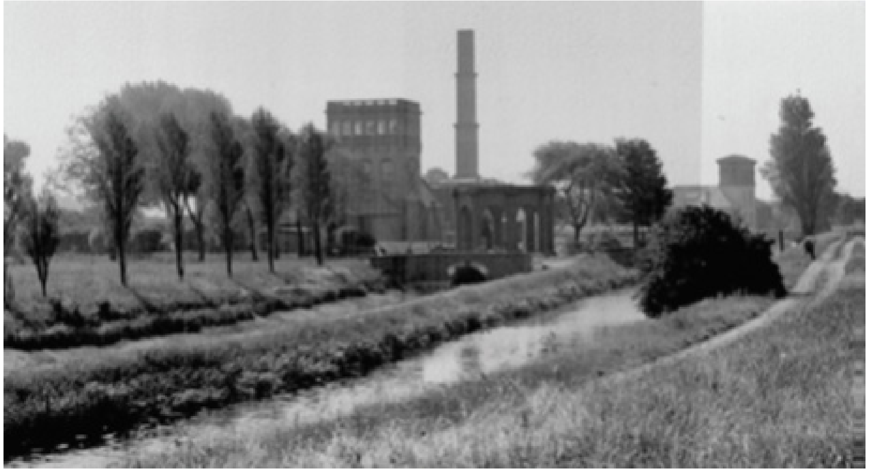


Figure 38: The Coppermill building before demolition with the row of poplars. Source: HLF Stage C Report, p. 7, KLA.

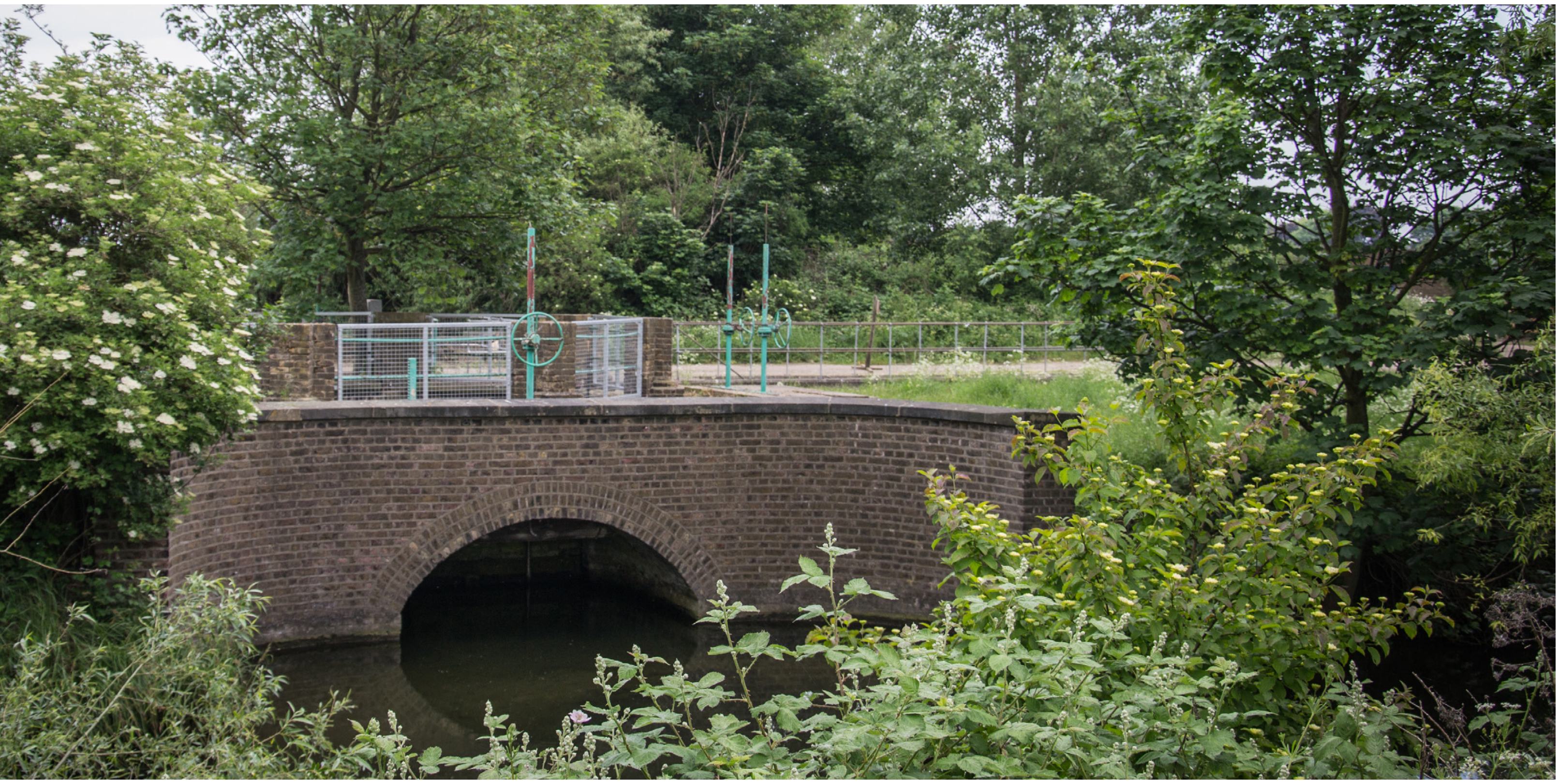


Figure 39: The structure of the "Round House" which today is used fot the management of reservoirs n. 1 and 3 as a reminder of the historical origins of this landscape. Source: Author, May 2018.

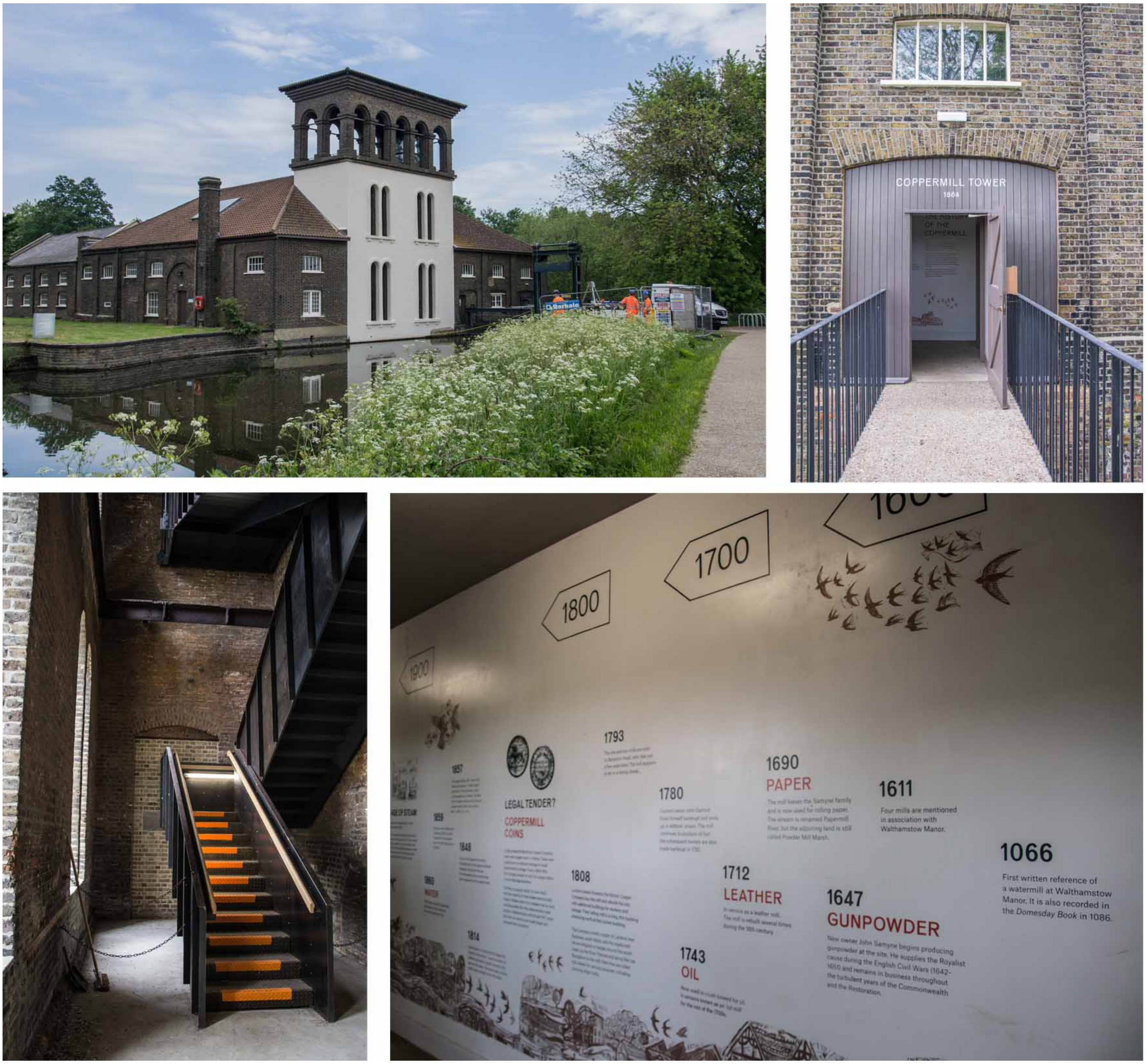
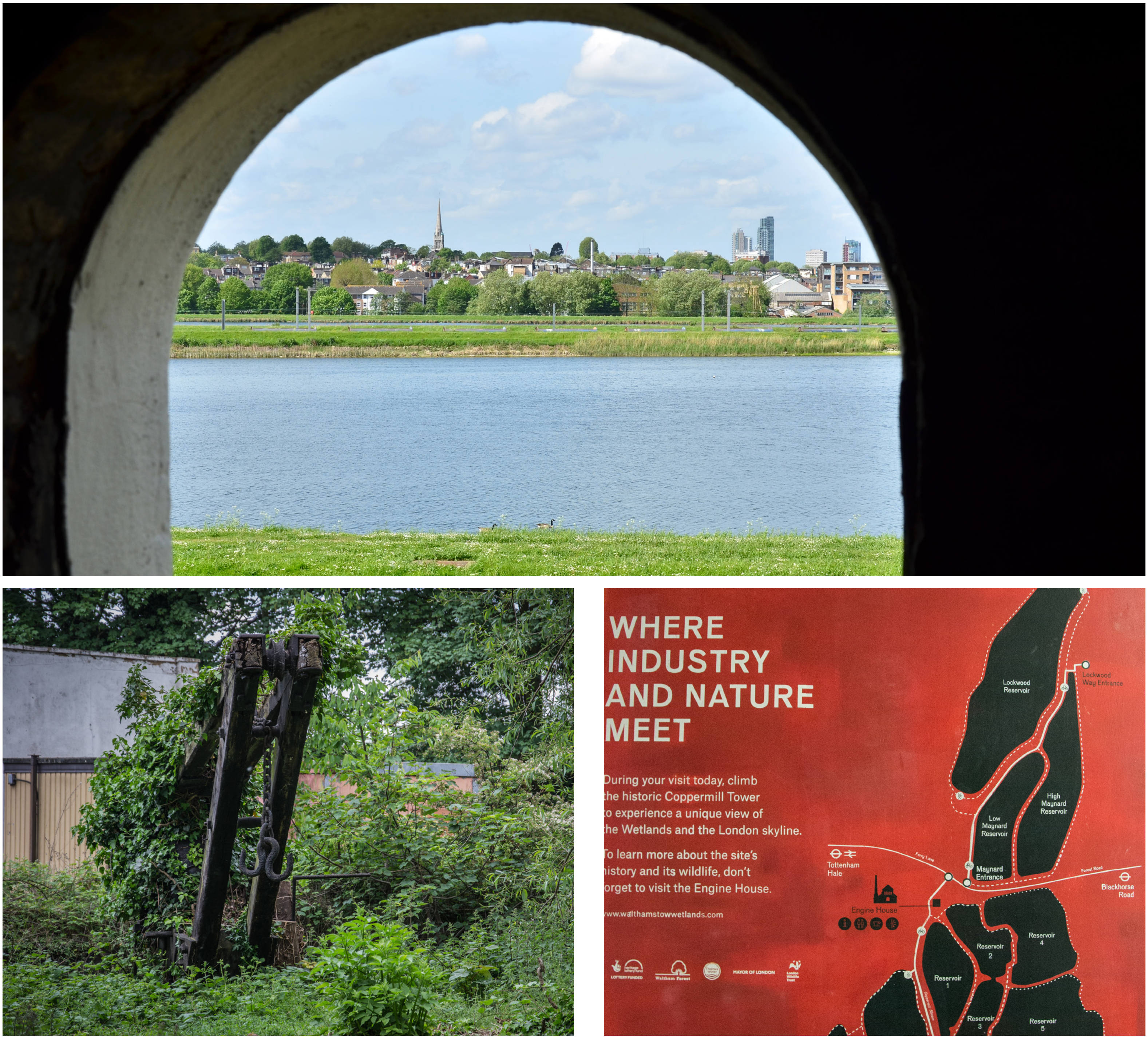

COPPERMILL TOWER
1864
1600
1700
1800
1900
1793
1857
LEGAL TENDER?
COPPERMILL COINS
1780
1690
PAPER
1611
Four mills are mentioned in association with Walthamstow Manor.
1066
First written reference of a watermill at Walthamstow Manor. It is also recorded in the Domesday Book in 1086.
1808
1712
LEATHER
1647
GUNPOWDER
New owner John Samyne begins producing gunpowder at the site. He supplies the Royalist cause during the English Civil Wars (1642–1651) and remains in business throughout the turbulent years of the Commonwealth and the Restoration.
1743
OIL
1814
1860
WATER
1848
1859

Figure 40: Images of the exterior and interior of the Coppermill building. Source: Author, May 2018.



WHERE INDUSTRY AND NATURE MEET

During your visit today, climb
the historic Coppermill Tower
o experience a unique view of
he Wetlands and the London skyline.

To learn more about the site's
istory and its wildlife, don't
orget to visit the Engine House.

ww.walthamstowwetlands.com

Lockwood Reservoir
Lockwood Way Entrance
High Maynard Reservoir
Low Maynard Reservoir
Tottenham Hale
Ferry Lane
Maynard Entrance
Forest Road
Blackhorse Road
Engine House
Reservoir 4
Reservoir 2
Reservoir 1
Coppermill Stream
Reservoir 3
Reservoir 5
LOTTERY FUNDED
Waltham Forest
MAYOR OF LONDON
London Wildlife Trust

Figure 41: Top: panoramic view from the Coppermill Tower, in the foreground the East Warwick Reservoir and in the background the view of the Harringay district are noticeable. Photo: courtesy of KLA; Bottom left: Wooden loading crane dating back to the second half of the nineteenth century; Bottom right: one of the maps inside the Coppermill building. Source: Author, May 2018.

The understanding of the various traces dotting the Nature Reserve is facilitated by a series of numbered Corten steel blocks, which point out the points of interest and indicate how to obtain more information.

The signposting of the paths is placed at the level of the walkways, in order not to visually interfere with the environment of the Nature Reserve (Fig.42) with the exception of wooden signs before the entrance to the internal paths to the "green core", informing visitors that there is no cycle access within this area of the site, and nor is any other activity that could disturb the local fauna permitted.

Leaving behind the Coppermill building, the material of the path changes, from concrete to gravel, signalling the entrance to the most sensitive areas of the reserve.

Upon entering the "green core", the symbiotic relationship between man and nature is immediately apparent: electrical and hydraulic infrastructures alternate with bird-watching houses and hollow trunks that have now become dwellings for birds and insects. The ancient row of poplars from the Victorian garden is reflected on the enormous expanses of water of the most modern basins giving rise to a landscape that is unique of its kind (Fig.43).

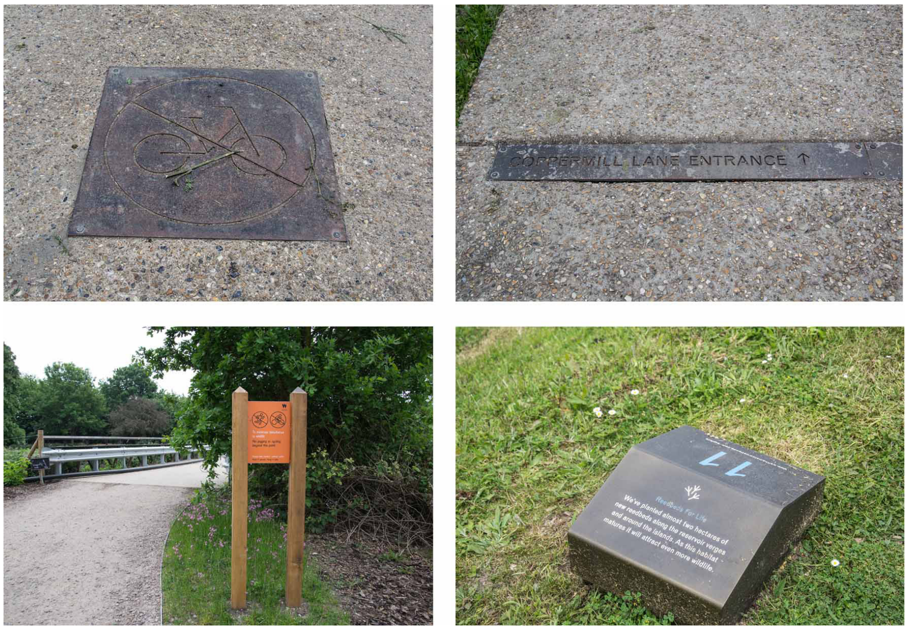


Figure 42: Horizontal and vertical signage in Walthamstow Wetlands. Source: Author, May 2018.

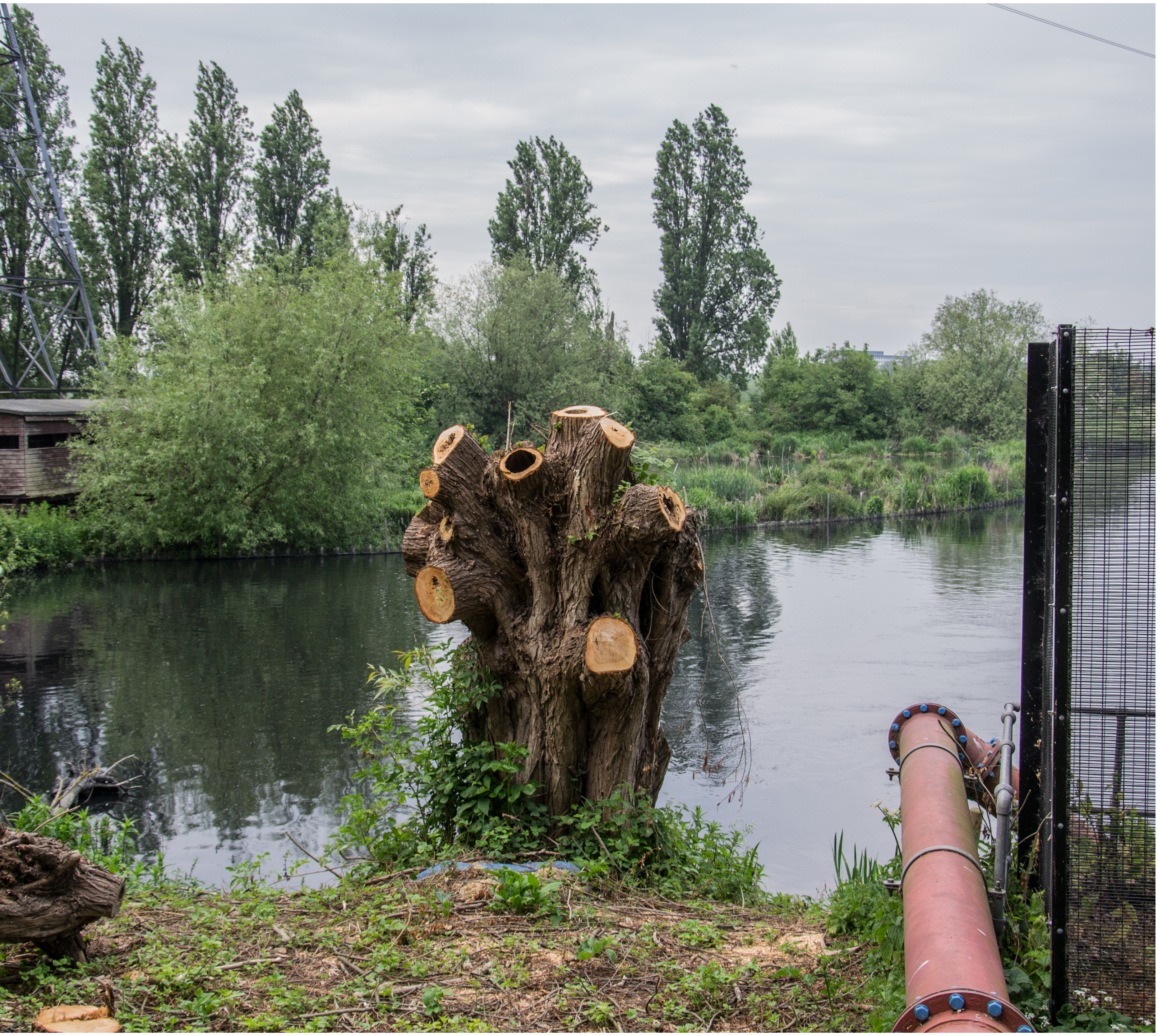


Figure 43: Northward view of the reservoir n. 1, in the foreground one of the bird-watching buildings, in the background the secular row of Poplars maintained as a trace of the historical origins of Walthamstow Wetlands. Source: Author, May 2018.

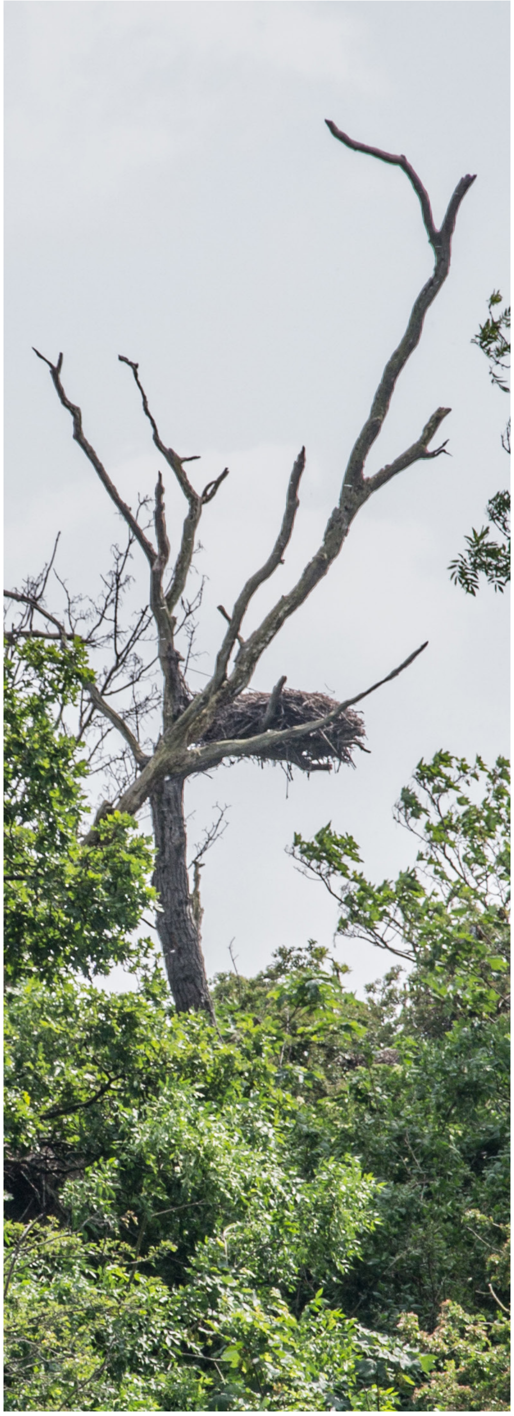


Figure 45: A heron's nest on "Heron Island", one of the birds for which the site has been designated as SSSI. Source: Author, May 2018.

Reed Beds

In basins nos. 1,2, 3 and 5, with a strongly natural appearance, almost 2 ha of reedbeds of *Phragmites australis* and other aquatic species were implanted, running throughout the basins and the islands inside them (Fig. 44 and 45).

The reedbeds were designed to be increased over the years through the reuse of the silt drained from the reservoirs. Now they are protected by metal nets which prevent the thriving wildlife from hindering the growth of the plants, with a view to attracting even more wildlife in the course in the coming years. (WalthamstowWetlands.com).

Many birds are attracted to the wetlands by the abundance of prey: swifts (*Apus apus*) migrate for 3000 km from the southern hemisphere to enjoy the temperate London summers and the basins also host birds from southern Africa and from the north pole, including some invasive species that multiply with global climate change (WalthamstowWetlands.com).

Another signal of climate change are the little egrets (*Egretta garzetta*), which have started to spend the winter in the Mediterranean area and have been sighted in Walthamstow during the summer. Sparrowhawks (*Accipiter nisus*) and kestrels (*Falco newtoni*) are regularly sighted in the hunting season, while falcons (*Falcus peregrinus*) use the nearby pylons as a convenient perch.

The path inside the "Green Core" offers an opportunity to approach the water on the banks of the basins of Victorian origin through the installation of wooden walkways (Fig.47), «*allowing visitors to interact with the ecology of the place in a more intimate way*» (HLF Stage C Report, p. 109, KLA).

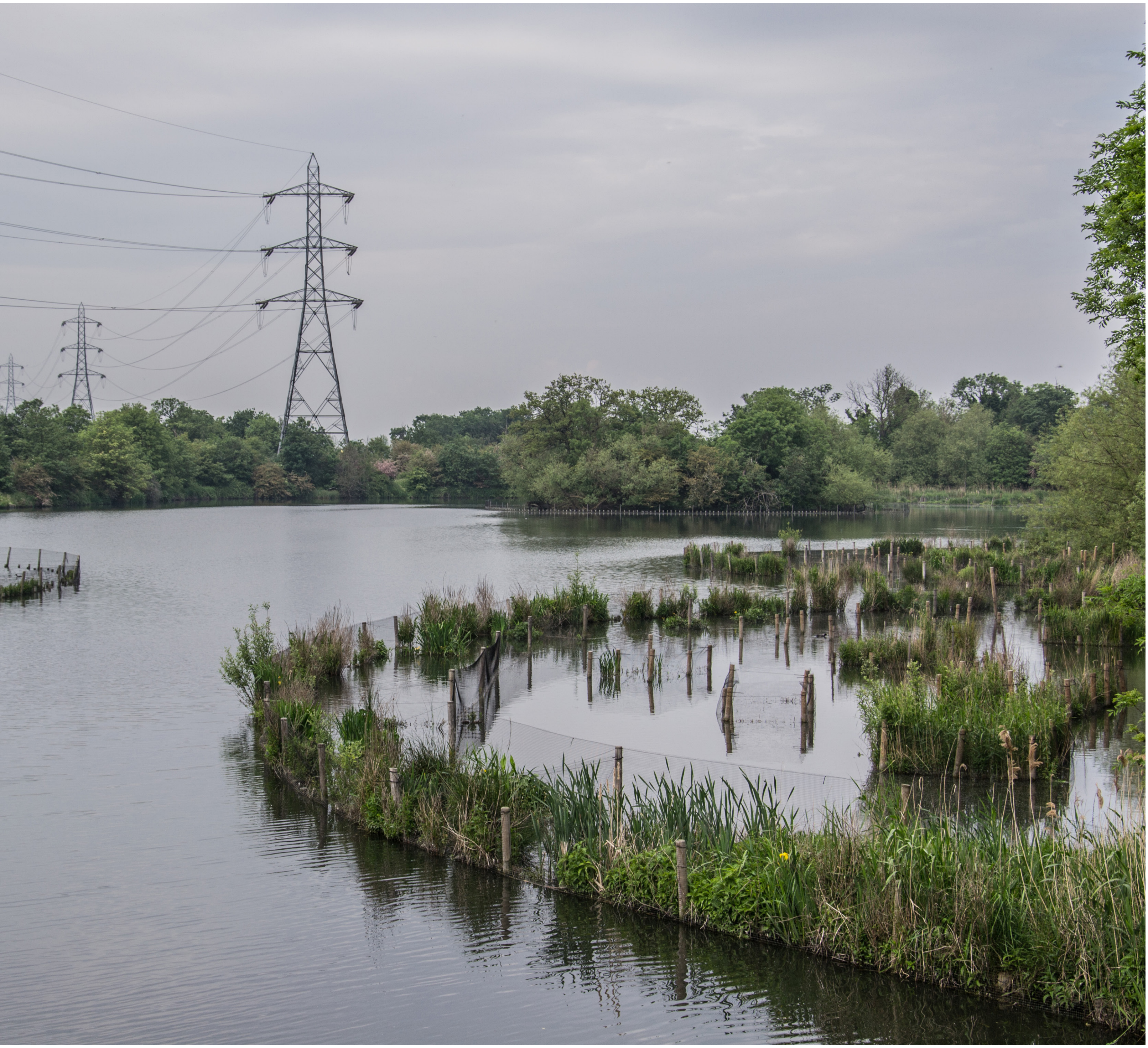


Figure 44: View of the reservoir no. 1 and its newly planted reedbeds. Source: Author, May 2018.

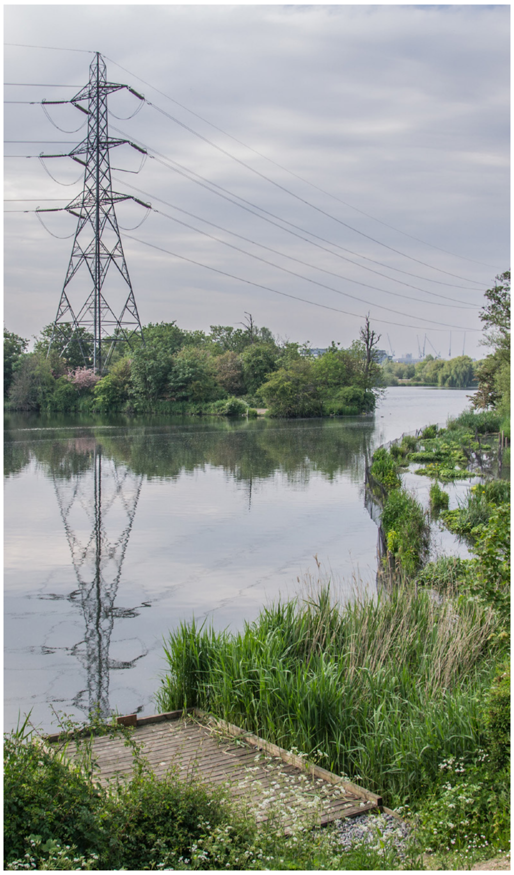


Figure 46: View of the reservoir no. 3 and of one of its wooden decks. Source: Author, May 2018.

Proceeding on the north path of the eastern side of the nature reserve, there is a stark contrast in the form of the rigid concrete edges of the recently constructed basins, which, unlike the oldest, do not allow contact with water (Fig. 48).

Reservoir no. 5 is home to two islands which stand out thanks to the presence of cormorants which began to nest in the wetlands in 1991. The colony grew rapidly to reach a peak of 360 nests in 2004 (about 159 were registered in 2015). Their conspicuous and constant presence makes the surface of the island almost completely white due to their guano (Fig. 49).

Continuing the exploration beside tank 4, one can observe tufted ducks (*Aythya fuligula*) gathering in large flocks.

There, during the late summer and early autumn, they simultaneously shed their flying feathers and do not leave the reservoir until these have regrown. During this moulting period, ducks are easily distressed, so access to these reservoirs is limited in order to reduce disturbance (WalthamstowWetlands.com).

ANGLER
PRIORITY

Figure 47: A family of geese on the banks of reservoir no.1. Source: Author, May 2018.

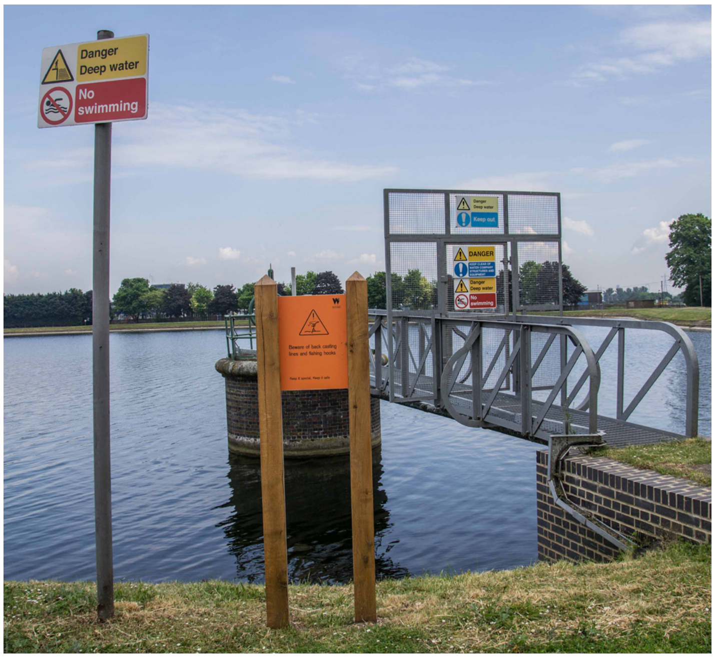
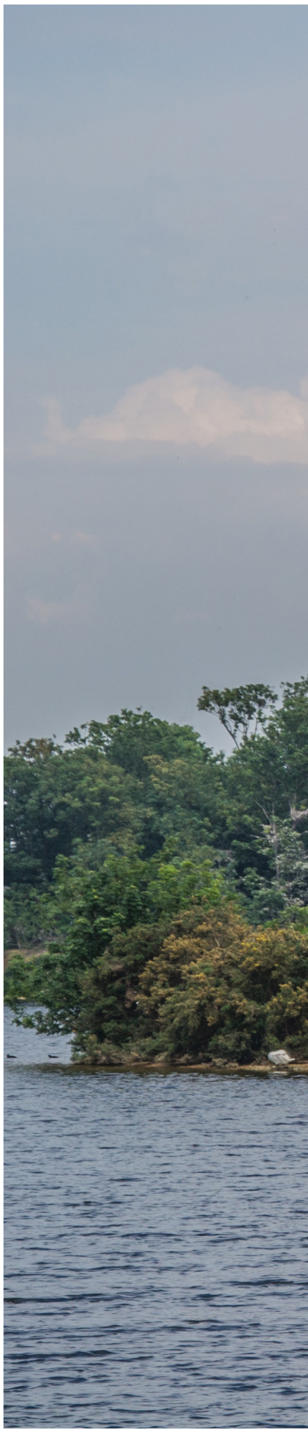


Figure 48: View of the reservoir no. 5. Source: Author, May 2018.



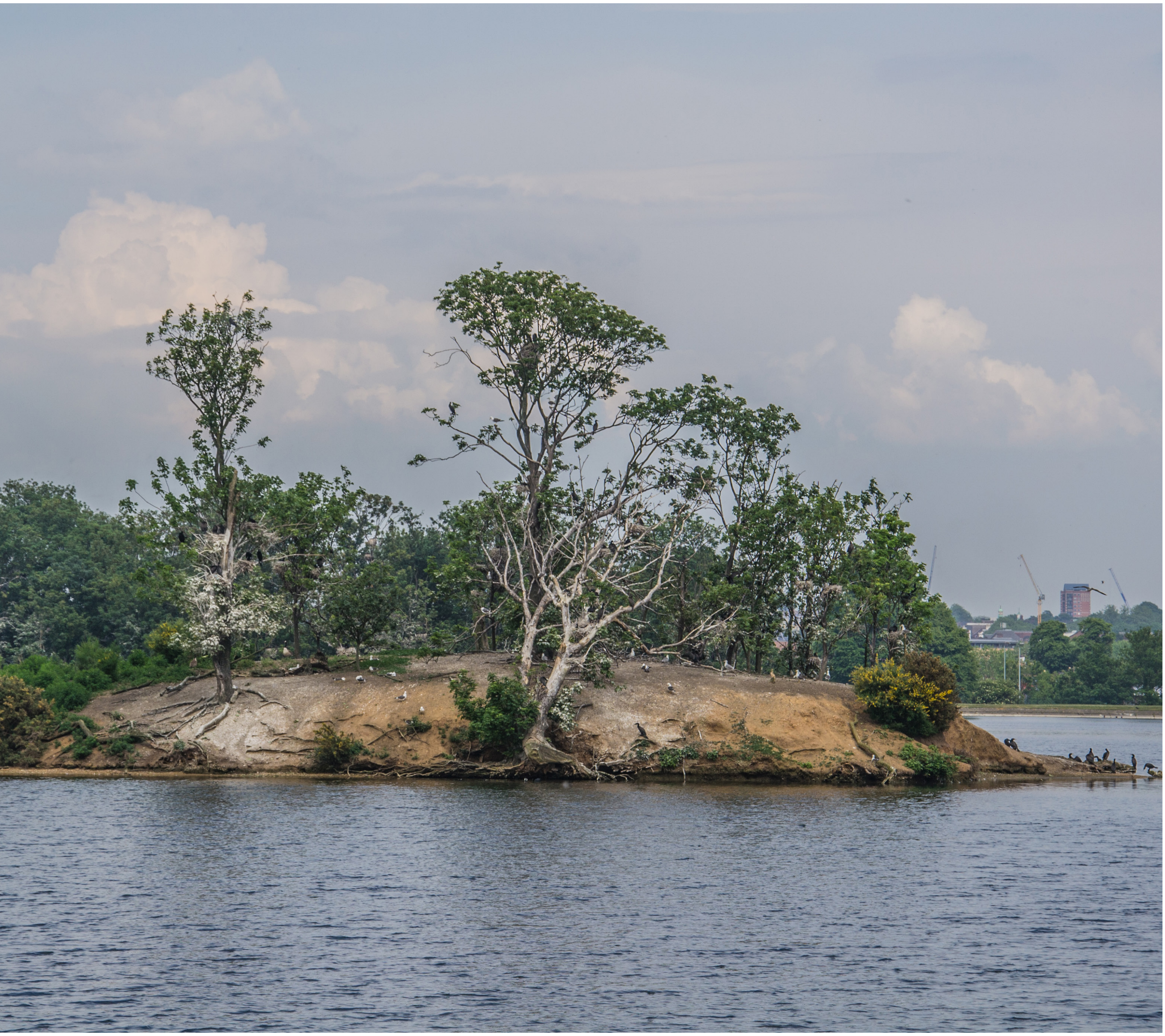


Figure 49: View of the cormorant's island in the middle of the reservoir no. 5. Source: Author, May 2018.

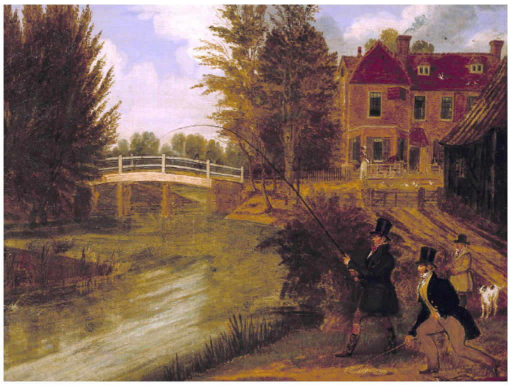


Figure 50: James Pollard's "Fly Fishing in the River Lee near the Ferry Boat Inn", exhibited at the Tate Britain Museum. Source: HFL Stage C Report, p. 14, KLA.

Fishing

The rich fauna of the basins does not only attract birds but also fishermen. The legacy of fishing in the Lee Valley is an important part of local history, particularly in Walthamstow Wetlands (Fig. 50).

Historical documents show that local fishermen had been coming for over a thousand years before the Norman conquest in 1066. Fine fishing on the Lea river is also celebrated in Izaak Walton's book, "The Complete Angler", first published in 1653 (WalthamstowWetlands.com). The place has a long history of use for fishing by the local population thanks to Walthamstow Fishery that still manages both the nursery and fishing activities. The fact that most of the habitual visitors to the nature reserve are fishermen makes fishing the key component in the site's recreational heritage and today remains of integral importance for the heritage, management and ecology of the wetlands (Fig. 51 and 52).

Fishing is one of the most popular activities especially in the area north of Forest Road, which includes three reservoirs of modern construction: The High Maynard reservoir, the Low Maynard reservoir and the Lockwood reservoir. Access to the area is made possible either from the south (Maynard Road Access) or north-east via Lockwood Way, which provides a key link to the residents of Walthamstow Forest, a key urban development area lacking in access to nature.

To the north-west, the project proposal included the creation of a further entrance from Stonebridge Lock, a popular destination in Lee Valley which would have provided a key connection to nature for Tottenham Hale residents (HFL Stage C Report, KLA). This proposal, part of the improvements to accessibility measures on the banks of the river Lee, was not carried out due to lack of funds. Before the entrance on Maynard road stands the Ferry Boat Inn, a Grade II listed building on the London sites and monuments record, built in 1620 as a home for the local ferryman, the ferry being the only way to cross the river Lea until 1760 when the Maynard bridge was built. Shortly after the building, the presence of imposing signs on the iron fence surrounding the area indicates the recent opening to motorists entering and leaving the capital (Fig. 53).

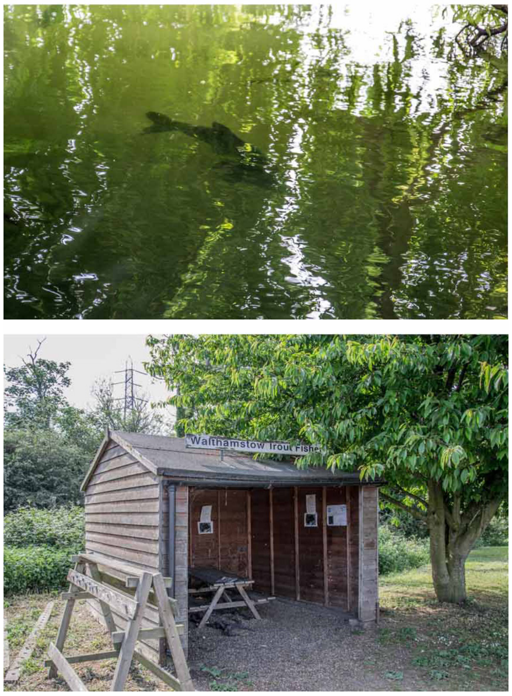


Figure 51: Top: A fish in the reservoir no.2; Bottom: The fishermen's hut in front of the reservoir no. 5. Source: Author, May 2018.

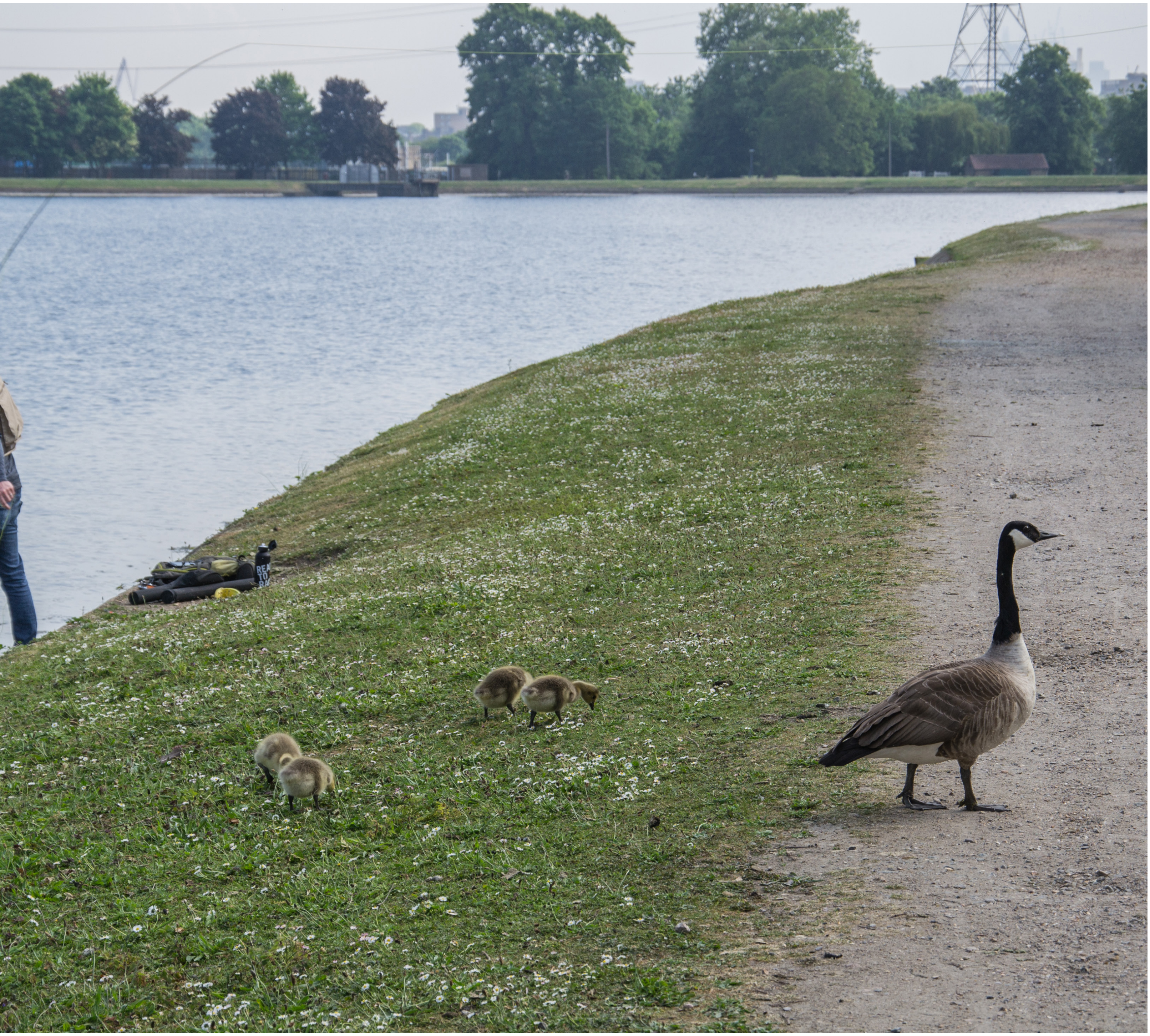


Figure 52: Fisherman at the reservoir no. 5. Source: Author, May 2018.

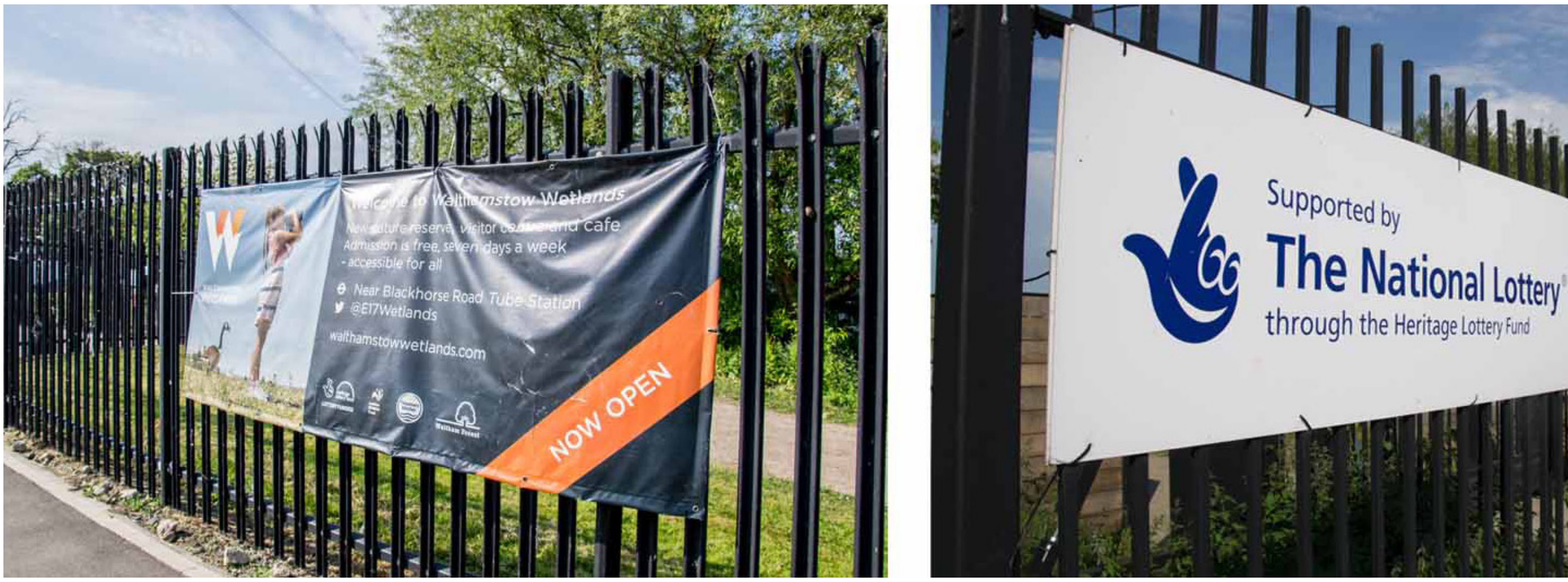

Welcome to Walthamstow Wetlands
New nature reserve, visitor centre and cafe
Admission is free, seven days a week
- accessible for all
Near Blackhorse Road Tube Station
@E17Wetlands
walthamstowwetlands.com
NOW OPEN
Supported by
The National Lottery
through the Heritage Lottery Fund

Figure 53: Signage at the entrance to the northern Walthamstow Wetlands in Maynard Road. Source: Author, May 2018.

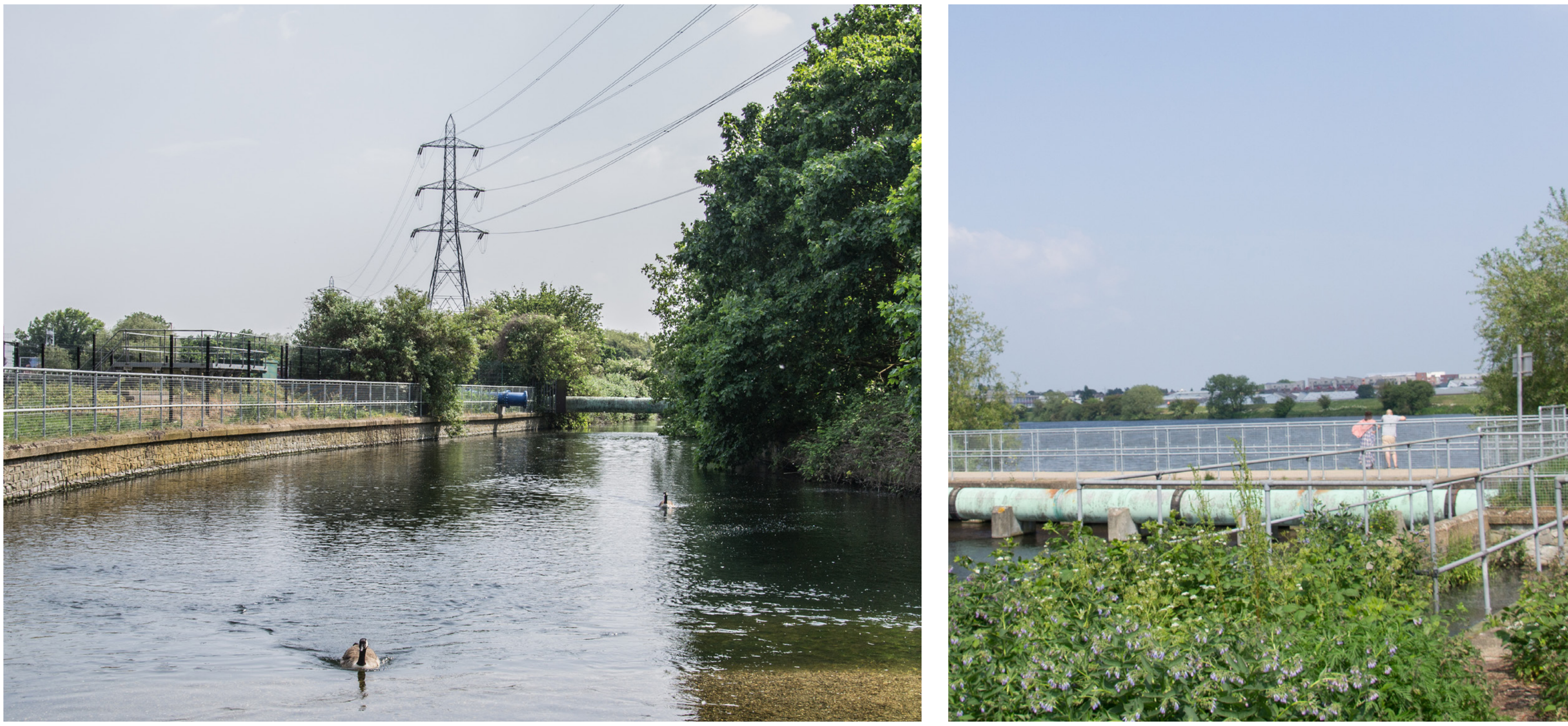


Figure 54: Images of the entrance areas of the reservoirs of the northern area of Walthamstow Wetlands. Source; Author, May 2018.

heritage lottery fund
30

The visual context of the northern area of the nature reserve is decidedly different from that of the southern area, being more hidden by the high vegetation present. The view becomes wider towards the flatter part of the area, from which the buildings under construction by the Borough of Waltham Forest stand out to the east.

As with any entrance to the Nature Reserve, visitors must cross a threshold of water, this time consisting of a concrete walkway which surmounts the ducts of regulation of the basins (Fig. 54).

Along the vegetated western shores of the Low Maynard Reservoir, beyond the bridge surmounting the sluice of the adjacent flooding channel of the river Lee, the embankments that form the boundary of the Lockwood Reservoir (Fig. 55) suddenly stand out. Lockwood Reservoir is the highest reservoir in the wetlands complex and offers beautiful views of the London skyline in the distance; due to its massive size, the basin offers shelter to numerous species of birds. When the Lockwood Reservoir was completed in 1903, two crenellated towers were built at its southern and northern ends. The towers (Fig.56) host valves that control the flow of water pumped between the River Lee and the tanks. On the walls there is still the inscription ELW, the sign of the East London Waterworks Company, the creators of the entire complex of tanks between 1860 and early 1900. Lockwood was the last reservoir in Walthamstow to be created, in 1903, and is also the largest, about 30 hectares in diameter and dug up to a depth of about 8 meters (WalthamstowWetlands.com). It is an important engineering enterprise for its time, which required a huge effort of work.

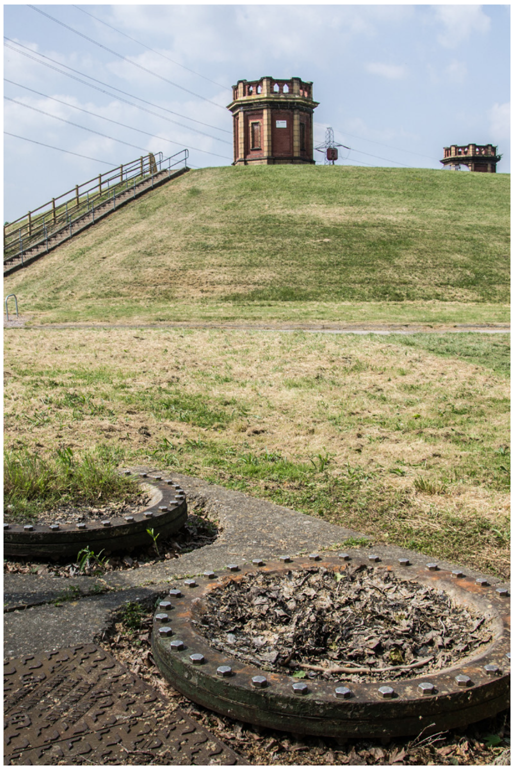


Figure 55: View of the Lockwood Reservoir with its embankments and the two control towers. Source: Author, May 2018.

The evolution of the engineering techniques for the construction of the basins corresponds to a historical period in which the population of London rose to about six million people and, consequently, the demand for water constantly increased throughout the city, prompting the need to build even more and larger tanks. Understanding the transformation of this territory and the reasons that led to certain transformations constitutes the main mission of the project from the pedagogical point of view, together with an understanding of the mechanisms of cohabitation between man and nature.

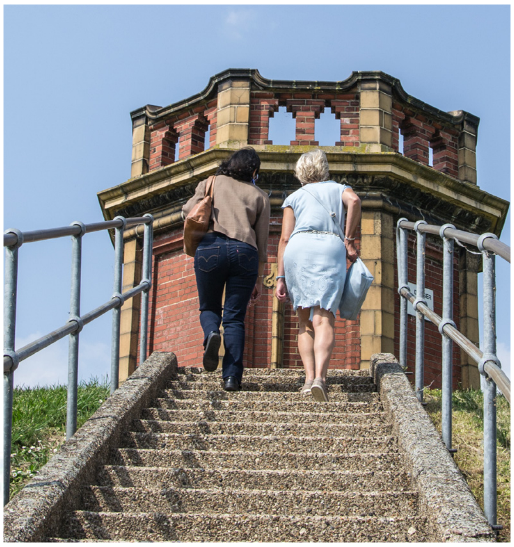


Figure 56: Tourists headed to the southern tower of the Lockwood Reservoir. Source: Author, May 2018.

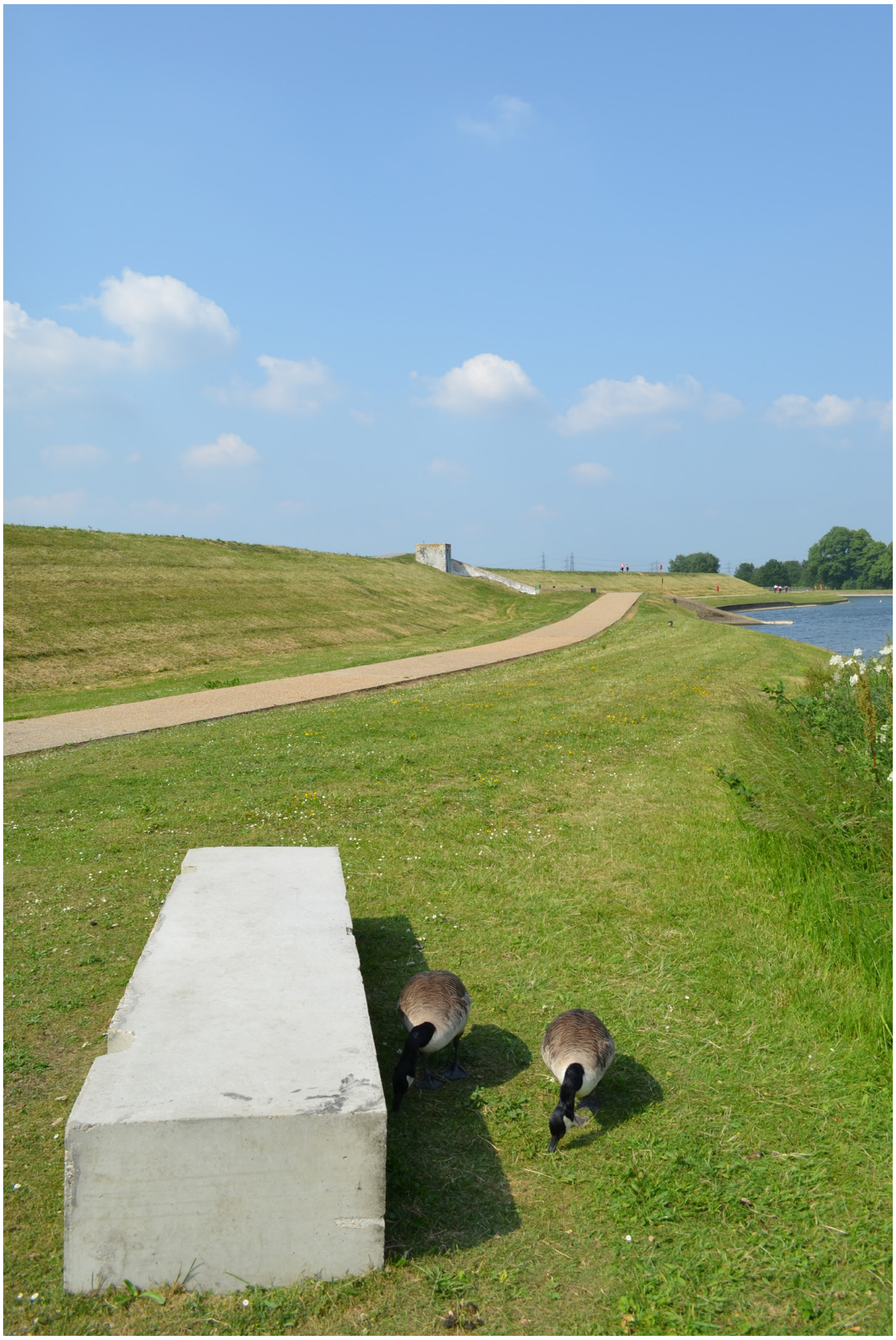


Figure 57: One of the concrete slabs seats along the Maynard Reservoir. Source: Sara Dei, 2018.

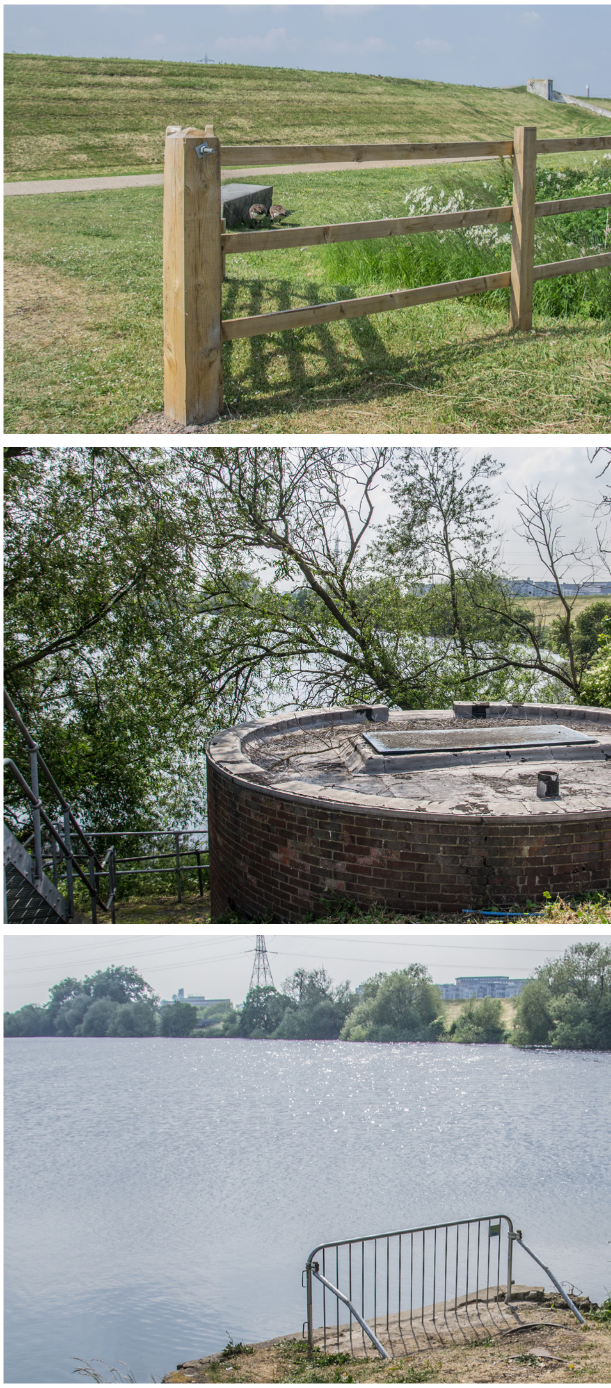


Figure 58: Top one of the gates of the seasonal paths; Middle: Det reservoirs; Bottom: a panoramic point on the Low Maynard Re 2018.

ail of a control structure of the eservoir. Source: Author, May

The landscape seems almost natural in appearance, but has been almost completely transformed by mankind over the centuries, and the design team sought to capture this industrial evolution by leaving the operating structures of the basins on show and creating stopping areas and observation points for visitors complete with materials of industrial origin (Fig. 57 and 58).

The benches are made of prefabricated concrete slabs, built to stand the test of time even during flooding from the basins, while the wooden gates that serve to close the paths during the different seasons of the year recall the fences inthe fields of the surrounding countryside, thus constituting reminiscence of the agricultural and pastoral landscapes which preceded the reservoirs.

Eight months after the official opening, Walthamstow Wetlands seems to enjoy considerable success, both from the point of view of critics and end-users, becoming one of the most popular destinations in London (Fig.59 and 60).

This success is certainly due, at least in part, to the Activity Plan (London Wildlife Trust, 2014) which defined strategies for learning, volunteering, training and public development. The program was preceded by a biennial pre-opening program facilitated by the community which used the construction period to build relationships with local schools, allowing the development of about 90 organized school visits focused on environmental education.

All the informal learning opportunities organized have increased public engagement with the wetlands heritage, thanks to the volunteering activities offered to the citizens. Walthamstow Wetlands, indeed, offers a calendar of weekly activities and seasonal events that take place throughout the year, which take place through a structured program that volunteers must follow annually in order to achieve the objectives set out in the Landscape masterplan.

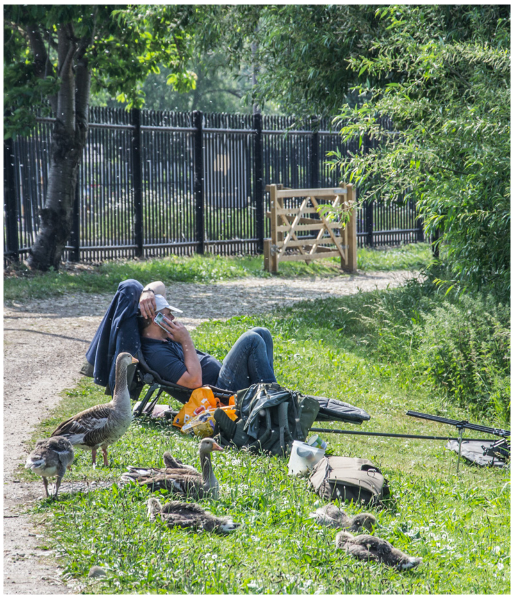


Figure 59: A fisherman relaxing in Walthamstow Wetlands. Source: Author, May 2018.

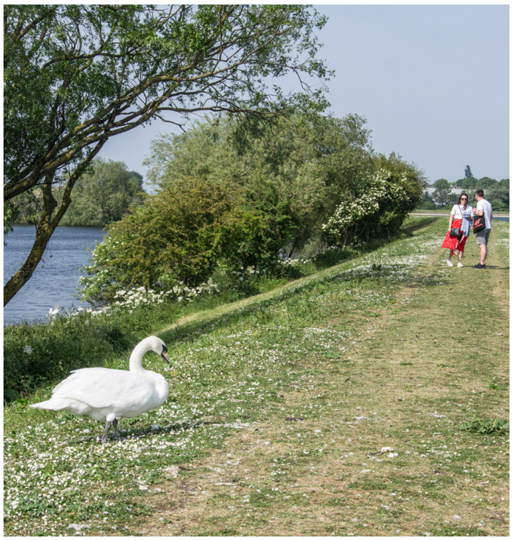
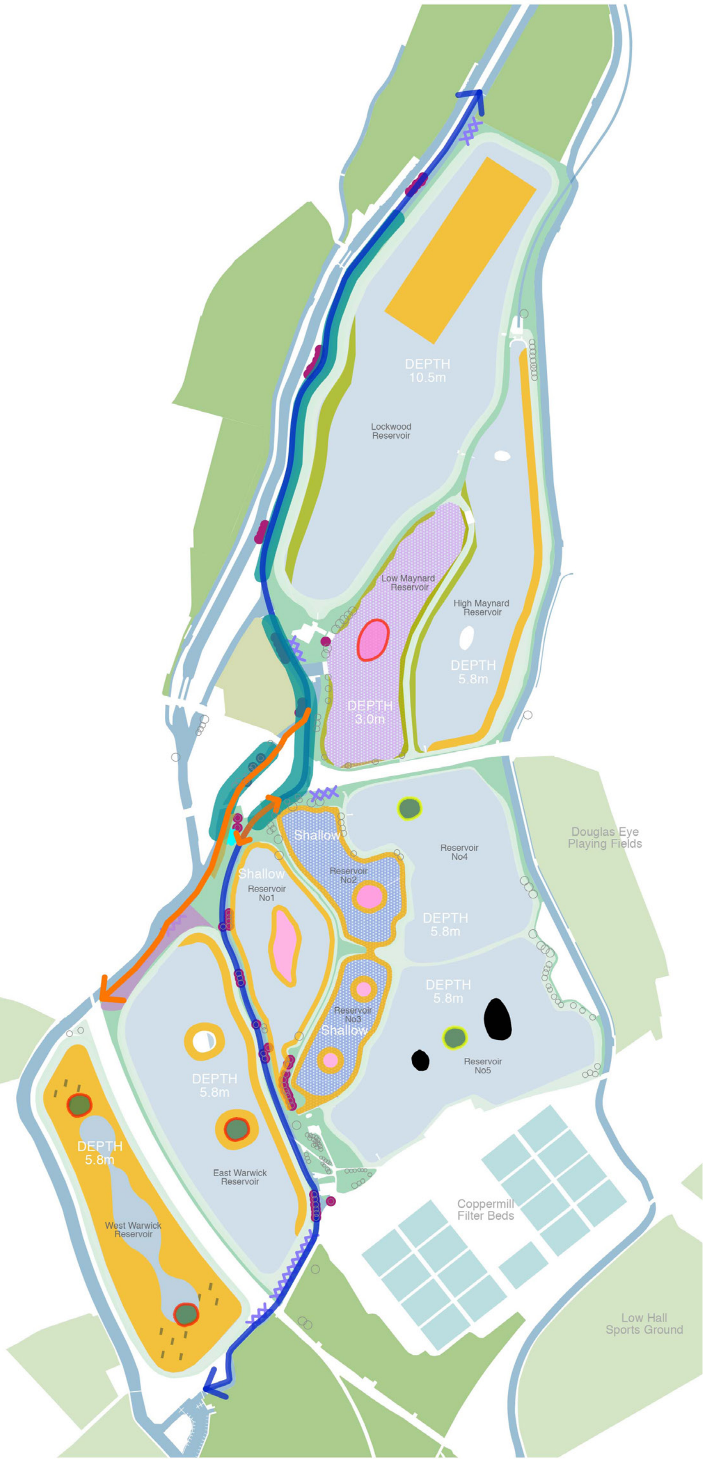


Figure 60: Tourists and a swan on the path between the High Maynard reservoir and the Low Maynard reservoir. Source: Author, May 2018


DEPTH
10.5m
Lockwood
Reservoir
Low Maynard
Reservoir
High Maynard
Reservoir
DEPTH
5.8m
DEPTH
3.0m
Shallow
Reservoir
No4
Douglas Eye
Playing Fields
Shallow
Reservoir
No1
Reservoir
No2
DEPTH
5.8m
DEPTH
5.8m
Reservoir
No3
Shallow
Reservoir
No5
DEPTH
5.8m
East Warwick
Reservoir
DEPTH
5.8m
West Warwick
Reservoir
Coppermill
Filter Beds
Low Hall
Sports Ground

Key Opportunities which support Walthamstow Reservoirs SSSI Species

🟩 Additional Island Creation built up from reservoir base.

■ Heronry Island on new proposed solid islands built up from reservoir base to support breeding grey herons in response to decline in numbers on site.

🟨 Reed Bed Creation:
Reed beds around islands create protective zone for heron to feed on small fish. Margin will act as 'refuge' which is less accessible to larger birds. Additional habitat for Reed Warbler Sedge Warbler, Reed Bunting, Shoveler, Gadwall & Bittern

🟩 Enhanced marginal vegetation o improve low nesting cover for duck including the planting of addiotnal marginal and aquatic species and the management of existing scrub.

Key Opportunities which support Lee Valley SPA/RAMSAR species

▦ There is a possibility that reservoirs No 2 & 3 be converted to low density locally native fish community to reduce competition between stocked fish and waterfowl for feeding on invertebrates.

■ Additional Island Creation for Gadwall & Shoveler built up from reservoir base

▦ Low Maynard Course Fishing Enhancements: Carp from no2 and 3 reservoir relocated to maintain course fishing potential

🟨 Reed bed creation for overwintering/passage Shoveler, Gadwall and Bittern. New reed beds will improve habitat for Reed Warbler, Sedge Warbler & Reed Buniting

Key Opportunities which support Biodiversity Action Plan Key Species

🟪 Potential wetland scrape location

■ Kingfisher, Dragonfly & Butterfly Enhancements: Banks to Coppermill Stream to become Naturalised/improved. Pond/marshy habitat creation linked with new meadow

↗ Water Vole & Amphibiam Habitat Enhancements : Improved marginal habitat along water courses through new emergent and aquatic planting and existing cutting regime of the bank relaxed to allow natural growth

↗ Bank Enhancements : Terracing / regrading of banks to improve and enhance bank vegetation

■ Sand Martin habitat: Sand bank/artifical nests

Activity Plan Enhancements

● Bat Nesting Boxes : Bat boxes installed along existing stream corridor in existing trees

xxxx Amphibian & Reptile Habitat :To include log/rubble piles, 'wild corners' ,compost heaps hibernacula etc

● Bird Feeding Station within the Meadow

Potential West Warwick Reservoir Decommissioning

🟨 Roosting platforms in reed bed for Marsh Harrier habitat

🟨 Reed bed habitat creation for Reed Warbler Sedge Warbler, Reed Bunting, Shoveler, Gadwall & Bittern,

Cormrant Islands : Management to existing islands once existing cormorant population have relocated

■ Exisiting islands managed to re-establish areas of shingle substrate and scrub vegetation for ground nesting species

Additional Habitat Enhancements

🟨 Floating Island to Lockwood Reservoir: Reed bed habitat creation for Reed Warbler Sedge Warbler, Reed Bunting, Shoveler, Gadwall & Bittern,

Figure 61: Walthamstow Wetlands' Management and Maintenance plan for the next 25 years to come. Source: Maintenance and Management Plan, KLA.

COSTS, BENEFITS, CRITICISM AND AWARDS

The opening of Walthamstow Wetlands, after being closed for over 150 years, represented a huge change for the population of the English capital, both in terms of quality of life, thanks to the increased accessibility to this Nature Reserve, and in terms of the understanding of its landscapes.

The ten reservoirs constitute a fully operational complex of 211 hectares which, in addition to hosting a wide range of wild animals, is the main source of water supply for 3.5 million people. In October 2017, Walthamstow Wetlands opened to the public, and the fact that the Nature Reserve was made completely accessible with free admission was a source of great surprise and enthusiasm, especially owing to the exemplary collaboration between owners and architects who were able to involve the various stakeholders and specialized consultants, providing a vision that has exceeded expectations (RIBA, 2018).

Walthamstow Wetlands is now managed entirely by the London Borough of Waltham Forest, London Wildlife Trust and Thames Water. The three partners follow two detailed programs of key actions for increasing biodiversity and the ecological strengthening of the area, developed together with the design team. The action plan, which covers the next 10 years of management, focuses on key works and management objectives that will strengthen and enrich visitors' habitats and experiences, while the objectives of the twenty-five year vision (Fig.61) focus on the main changes infrastructures, which will greatly improve and enrich the project and the site as a whole (Maintenance and Management Plan, 2014, Counterculture and KLA).

The cost of this generous renovation operation on opening was 10.6 million pounds, of which £ 4.47m was financed by the Heritage Lottery Fund, £ 1.8m from Thames Water, £ 1.8m from London Borough of Waltham Forest, and 750,000 pounds from the Greater London Authority to support the creation of the 2 km cycle path that crosses the site and connects it with the Olympic Park to the south (walthamstowetlands.com).

Nevertheless, many of the advanced project proposals have not been enacted due to lack of funds, although not significantly influencing the final result in terms of interpretation and communication of the identity of the place[234].

The 211 ha of territory opened up to the public (Fig. 62) are a huge benefit for Londoners, who can finally take advantage of this place. Much of the citizenry and many of the residents of neighbourhoods bordering the basins did not know about its existence because of the significant visual and physical barriers that the transport lines at the edge of the Nature Reserve constituted.

[234] Interview with Lynn Kinnear, 2018.

This transformation, which took place relatively quickly, constituted a radical change in the cultural understanding of the area in which they live[235]: the main problem encountered, identified by the project Lead Consultants (Kinnear Landscape Architects) and by the local authorities concerns precisely “the inclination of people in learning how to use the place”[236].

Many of the nature reserves of London are smaller and disconnected from strategic public transport areas. In addition, they are not accessible for free, so most visitors have difficulties in understanding that Walthamstow Wetlands is not a public park, but a real Nature Reserve.

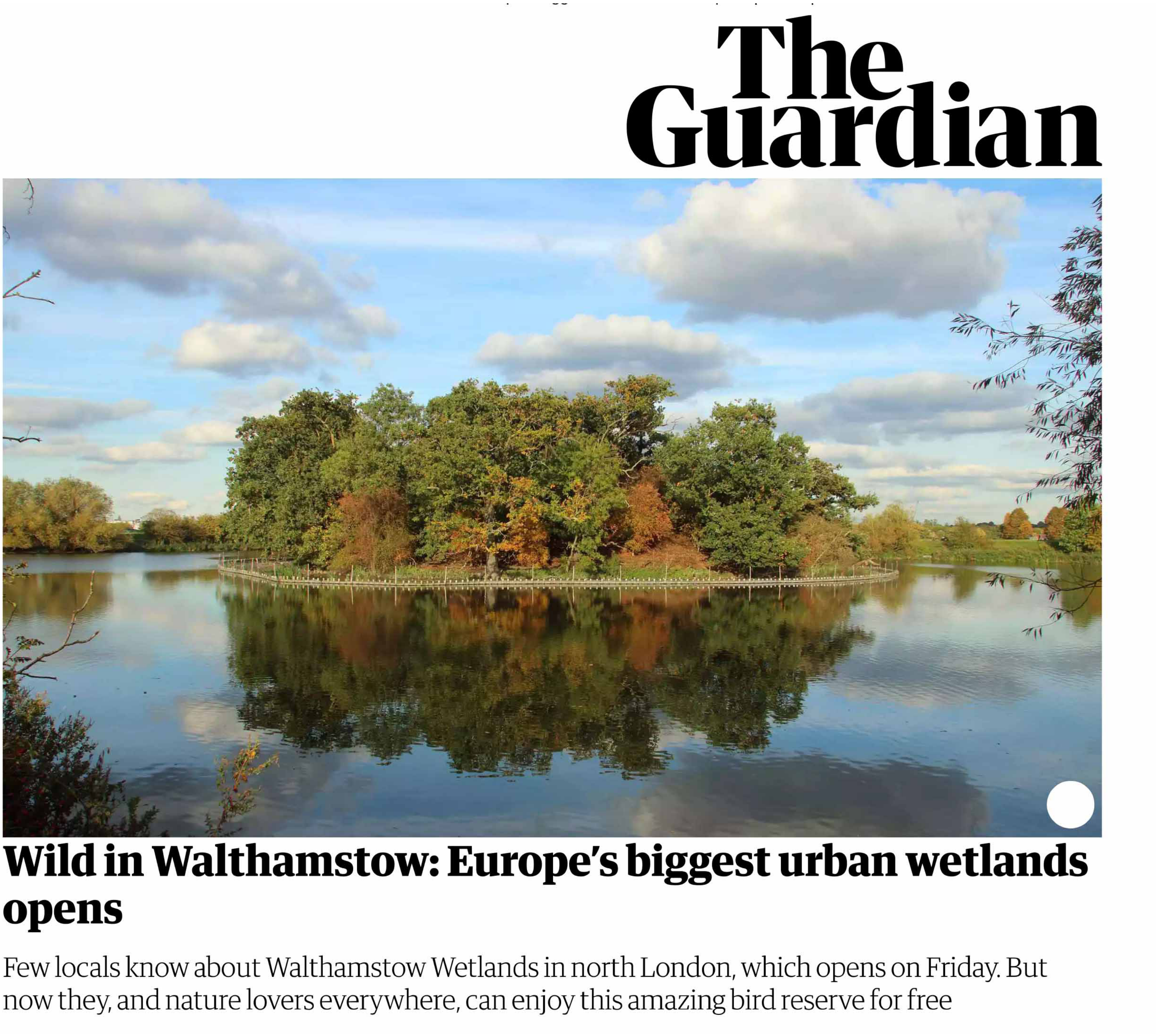
The Walthamstow Wetlands project was one of the candidate projects for the 2018 Landezine International Landscape Award and was awarded the RIBA London Award 2018 for the following reasons: «*The site has already attracted many more visitors than the original forecasts, hopefully giving rise to the possibility of additional enhancements in the future. The scheme, which encompassed four separate contracts, highlights an intelligent integration of architecture and landscape to create a new public space*» (RIBA, 2018).

The Kinnear Landscape Architects firm also developed a large-scale strategy for the Tottenham Hale neighbourhood, based on the recognition of the original alluvial character of the Lee River valley and seeking to recreate that identity, expanding the Walthamstow Wetlands characteristics into the context of the enormous urban redevelopment under way.

The “Tottenham Hale Green and Open Spaces Strategy” was awarded the title of “Best Conceptual Project” by the Council of London on October 12th 2018, at the Haringey Design Awards.

[235] Ibid.

[236] Ibid.



The Guardian

Wild in Walthamstow: Europe's biggest urban wetlands opens

Few locals know about Walthamstow Wetlands in north London, which opens on Friday. But now they, and nature lovers everywhere, can enjoy this amazing bird reserve for free

Figure 62: Article regarding the opening of Walthamstow Wetlands published on October 19th 2017. Source: The Guardian.

INTERVIEW WITH LYNN KINNEAR

The roots of your practice are founded in close collaboration with the arts, adopting a flexible and collaborative process as the project unfolds, which has led you to fulfilling an urban curatorial role. As written on your website your work tackles other common themes:

- **Building capacity for change in communities through innovative public engagement and inclusion in the design process**
- **The shift from the car to bike and the role of the bicycle in the city as a stimulator for social and physical change**
- **An approach to play that explores urban playfulness in its widest sense - for all ages and in all urban locations**
- **A preoccupation with history, memory and past identity of places;**
- **Forest or "Witness" trees in the City which root individuals in community, place, and mark the passing of time**
- **the role and need for water in urban landscapes**

Do you believe these are the fundamental issues to be addressed in a landscape project? What were the projects during your career that convinced you of this need?

That list was probably written about 10 years ago... it's interesting to be reminded that it is on our website! Those principles written on our website are kind of a "teardown" in terms of our approach to landscape because, beyond the opportunities that we look for in every project, there is a much more overriding idea about the importance of the Green Infrastructure in the city.

We actually pre-helped the development of the All London Green Grid, looking at the basic green infrastructure of the city and what was needed to keep the city healthy, being the important structure that holds the city together. So, the way we are practicing shifted somewhat, because in London, we're now looking at the green infrastructure leading the way in the city.

How did your design approach change?

Personally, I spent a lot of time nurturing my ability to work at that strategic level, my interest has shifted a lot from working with communities from the micro-level to more of a macro-scale. I started off as a landscape architect being interested in the impact that green space can make on social issues in the city. The first project I did was about enabling local residents to become involved in the green infrastructure and enabling and activating those social possibilities... actually making green spaces which are more integrated into people's lives... but I was doing it at a micro-scale, working very much with the park scale landscape which was local, not regional.

I think the difference with the practice is that we've shifted from that local scale to a much more regional or sub-regional scale, and that happened when we started getting involved in the All London Green Grid, when we started to look at the city's green infrastructure, it kind of enabled us to work at a bigger scale, leading urban projects! I mean, I think it's an interesting thing, isn't it?

How are you able to achieve these bigger visions now? And how would you describe your current design method in a few principles?

I suppose when I started out as a landscape architect I might look at a space in isolation and think about making a new character for that space that was about it as a place, whereas now, if someone asks me to design a small urban space I'll be thinking about the vision for the wider area a lot before I actually go into the detail of what that area might be, because I think there's a danger, as a designer, if you jump into the detail too early then you aren't placing the small place that you're designing into a wider context, so it becomes more like a garden than a piece of landscape. When you get into micro-scale, looking too carefully at the corners, at the edges, and you think too much about this space as an entity on its own then you're not really appreciating that wider landscape context. So, the first thing is landscape, not garden!

The second thing to say is that there's a side of me that's interested in challenging preconceptions about what a place might be like… I like to be surprising. That's important because, otherwise, what are the different planning elements that you're bringing? Of course, it makes it difficult… it takes ages to design something, because you spend so much time thinking about what the surprising thing is!

Then community engagement is important, but it's community in a wider sense, not just local people but understanding the tensions and difficulties and using that design to bring together polarized groups. Normand Park project is a good example of this principle, where we identified what the issues were in the park and then made design decisions and ran workshops and facilitated groups of people coming together.

Lastly, we don't see our discipline as a boundary, rather we allow it to be influenced and to expand. We used to collaborate a lot with artists and we still do wherever possible, but there's very little opportunity.

There's a huge crossover in our designs, if I want to get some inspiration and get some ideas together, I go to see an exhibition and that triggers ideas in my mind about how I might deal with that particular project; from that point on, you can say that the projects become very personal because they have lots to do with what I'm experiencing on a day to day basis.

I think we often try not to use our discipline as a barrier, because landscape is made of different elements.

How did you come to win the commission for Walthamstow Wetlands?

By Tender, on the GLA and TFL framework. They have different lots, within the tender, on the specialisms that they need in the city and then practices are chosen to work on different specialisms…for example we are currently choosing to work on lots 1 and 3: 1 is a master planning lot while the other one is landscape architecture. It works similarly to a competition, you put fees forward, you show your previous work and you offer the client a team to deliver the project. It takes a long time to get selected for a project, the first tender took a year and then the detailed tendered process to actually win the wetlands project probably took about three months.

Opportunity number 3 of the Lea Valley framework concerned the opening of Walthamstow Wetlands to wider public access as a regionally significant urban nature reserve and wetland centre. How did the All London Green Grid influence your project proposal?

The All London Green Grid is just guidance, you don't have to deliver what it suggests... It's the same as any master plan and any guidance... It's there to be challenged! For sure it's quite unusual in this country to have a landscape architect in lead roles on urban projects… but with the Green Infrastructure, in a lot of projects we are in the lead position and where we're trying to use this knowledge of landscape and Green Infrastructure as a starting point, rather than something that's added on to the project.

The precedence of this project is the All London Green Grid but also the Upper Lee Valley Study, which looked at infrastructure and identity.

The All London Green Grid puts together the blue and the green infrastructure, but actually in this part of London the River Lee is quite wide and reasonably generous: up in the Olympic Park, a quite a wide park that connects to the Walthamstow marsh... And then at the point where Walthamstow Wetlands was it became very narrow. Historically the river valley used to be wide... At Tottenham Hale, where the wetlands are located, there were just two paths on the canal!

So, what the project of the wetlands has effectively done is open up a huge area of the River Lee: when the 211 ha were opened up, 211 ha of land were newly discovered!

How would you describe the nature of the design team?

We chose to work with William Mann, from Witherford Watson Maan, an architecture firm which is our neighbour here in London, because we had this very nice idea of a walkway through the wetlands being continuous, through the landscape, up to the buildings, up to the towers, a sort of ribbon: We were interested in common materials, a common language between architecture and landscape.

We had about 15 consultants; We and Witherford Watson Mann architects chose the M&E engineers, because we obviously had to work with them directly, but the other consultants were mostly brought forward by us (KLA), because we were the lead consultants.

What are the reasons that, according to you, made it possible to win the tender?

I think we had a good track record of delivering this sort of projects; we'd already delivered the largest section of the agreement, the Olympic section 106, and we delivered three parks on the edge of the Olympic development. The London Borough of Waltham Forest were familiar with our work and tenacity, William Mann had also delivered the Upper Lee Valley study and won the RIBA Stirling Prize in 2013, with the project for Astley Castle, a very sensitive refurbishment at a very similar scale of the Marine Engine House... So, we were well placed from an experience point of view, and most of the teams had already worked together before, and that helps…our financial tender was probably quite good as well! 70 percent of the tender is about the quality of your work, 30% is price.

What specific strengths did the different firms bring to the project?

Obviously, Witherford Watson Mann were focusing on the architecture.The concept that was binding it to the landscape is this idea of the use of materials and the route going through.

Of course, we brought different ideas and skills even when it came down to the detail, we chose together what was more appropriate and we would often produce our own details independently of each other and then we would come together and discuss which way we should try integrating it... Also, because you can't use the same materials externally as you can internally, we had lot of discussion about that. For example, the steel plate that we used on the walkway input is a really useful material because it is so un-concrete that you can use it inside and outside, although you have to use different finishes.

Did the roles of the team members remain unchanged during the project?

The process of the project was very much dictated by the Heritage Lottery Fund which was one of the big founders, we followed the route through Heritage Lottery Fund projects which is quite prescribed... I think everybody's role was fixed.

Did you used any specific methodology? Like the RIBA plan of work?

Yes, we did. The Heritage Lottery Fund use their RIBA work stages first, but there are other requirements in the Heritage Lottery Fund: you have to produce a maintenance management plan and also the conservation management plan, so there are some more documents that need to be used at certain stages in the project, dictated by the Heritage Lottery fund.

Also they release money in certain stages of the project which relate to the RIBA work stages…So there is a lot of material to produce…too much, I have to say.

The natural blue infrastructure of the reservoirs, which has provided drinking water to Londoners for hundreds of years, rendered inaccessible and invisible by the largely industrial eastern edge, has now become one of the most popular places in London. The description of the intervention published by Witherford Watson Mann, reads: "A new brick tower housing swift boxes and bat roosts will be built on the existing chimney plinth, signing the transformation of the site from infrastructure to ecology". Do you think that this project contains a change of paradigm in the meaning of infrastructure, and/ or in the relationship between nature and city?

Yes, we were trying to use the project to make the shift from a place of industry to a place of ecology.

It was already implicit because the bird populations were rare, but sometimes not so visible.

Doing works that captured the public imagination and showed the ecology and sustainability of the site seemed really important. This is the reason why the habitat chimney was buit… we didn't have that project funded at the beginning of the program, but it captured the imagination of the partners and I think it captures the imagination of the public as well…We're waiting to see if swifts are going to nest in our chimney, it's quite an exciting moment. We were very aware of the need to make a shift and we didn't think that it was important for the Marine Engine House to be a historic refurbishment even though it is a listed building, we felt it was more important to make something new which was about the future of the site and a vision for the future of Walthamstow Wetlands.

In terms of infrastructure, Walthamstow Wetlands is a primary site for water supply. What kind of studies and analysis were conducted to be able to draft a proposal that could reinforce the identity of the area?

We looked back at the history of the site, understanding the historic role that the River Lee had, and its marshlands has had.

First it was a drinking water resource, in the seventeen hundreds where the River Lee hadn't been diverted, there was a natural landscape of wetlands, at that stage it was common grazing land, local villagers could bring their cattle and sheep to graze on the area. The first reservoirs were built in 1865, in the Victorian era, those are the ones built in the ground.

The reservoirs gradually increased as did the whole site boundaries, and what's interesting is that these reservoirs were built by hand, dug into the ground, whereas the later reservoirs show the evolution of engineering design… They were mechanically built, and lots of them were built above ground and much deeper and holding a much larger volume of water.

Because of that the landscape quality of these different reservoirs is very different. Today you can notice that some reservoirs are very vegetated and the ones around the edges very stark... that has to do with the subject, they are immersed in the very fabric of the place and have functions...So actually understanding that was fundamental!

The reservoirs were also very important for fishing… understanding the different fishing techniques was important! So, history gave birth to the vision... and we tried taking that history forward into the future.

Furthermore, we knew that there was a previous proposal by the local authority of the Borough of Waltham Forest who were very keen that people should be able to access Walthamstow Wetlands without paying to go into it, even though in other wetland projects, like Rainham Marsh, run by the RSPB, further east in London, people have to pay to go inside. So, it was quite important, to the client, that the reserve should have open access.

When infrastructure becomes public space it is a major generosity, because the land is privately owned.

Thames Water, I suppose, could have insisted on a charge to go in, but it wouldn't have been the same generous gesture! It would have been very difficult to have a strategic cycle-way through the middle of the nature reserve if you had had to pay... it would have overturned the whole nature of the project!

What about the ecological aspects of the project?

One of the things that we did at an early stage with the ecology of the site is that we looked at the much wider context within which Walthamstow is set and, actually, we could have gone much wider... through Europe and the whole world... due to the migratory bird populations that the reservoirs support! So really understanding the role that it has with those migratory birds is quite important.

We looked at the species present in other major wetlands and marshes and then we tried to understand whether those species were already present in Walthamstow Wetlands or whether there was an opportunity to create habitat for them: one of the species that brought with it quite a lot of richness and variety was a bird called the bittern (*Botaurus lentiginosus*), that needs about 20 hectares of reed beds for it to nest. At the beginning of the project we wanted to persuade Thames Water to allow us to plant 20 hectares of reedbeds. But it was a very wide vision... In fact, we planted 2,5 hectares of reed beds, which are just balancing the reservoirs. We also started a conversation for the main reservoir, to close it off completely for water use and allow for a really large reed bed but that didn't get implemented as our project.

Looking at our own site we identified the sensitive areas in relation to the sensitive species immediately around it. The understanding, for example, that the tufted duck moult at a certain time of the year and that the reservoirs become very sensitive at that time, was fundamental.

Also, there is a highly managed fishery, so we started a conversation with Thames Water about naturalizing it, because the fish are mostly exotic.

What were the main difficulties in managing the ecological aspect of the project and that of opening up the area to the public?

Natural England was involved in this process. They were not convinced that opening up the site was a good idea, Walthamstow Wetlands is a Site of Special Scientific Interest (SSSI) and part of a Special Protection Area (SPA) for wildlife, and conservation comes first here. It is also an internationally designated wetland site under the Ramsar convention, so we had to prove to them that we could create a new landscape which would not compromise the existing birds.

The study we made goes into quite a lot of detail, looking at the vulnerable species at different times of the year and looking at opportunities for habitat creation. We wanted to create a north-south route that would be open at all times of the year but avoided the sensitive ecological areas of the site and we also created a green heart next to the Marine Engine House to absorb the largest number of visitors to the site.

Actually, one of the main opportunities came from a restriction placed on us by Natural England: what they wanted was to mitigate the presence of people on site, so if you were walking along the *green core* the birds couldn't see you walking all the way along and therefore weren't startled. What they wanted to do was to create more of a visual envelope for people to walk through, so we planted up the banks of the reservoirs, to make then narrow little windows cutting the planting where you see through to the reservoirs all the way round and then the new reed beds, which are also part of our projects. In that way we developed a strategy that Natural England could sign up to and say was a good one!

What kind of strategy did you use to work successfully with so many public authorities?

We participated in many meetings, reset our initial targets on the basis of our client's requests, and worked towards it.

When I started working I thought that I could work just from the bottom up, but it is impossible, it's a combination between top down and bottom up approach!

From a top down perspective, we needed a really ambitious target which would actually really change the way the reservoirs looked, we thought about putting reed beds in that would be a really dramatic change in that landscape and it would start to bring it further back towards its vision of wetland context...but for Thames Water it was too big a step initially...So gradually, as a part of our long term plan, we suggested it for the future.

I think that most of the stumbling blocks to open up pieces of the land for public access had to do with entrenched views, about what issues it brings. So, it's a problem-based issue rather than a solution-based approach; at a strategic level is too easy for partners to be dismissive about each other's fears, but as a team we didn't do that, we took them seriously and set up doing group meetings that had all the departments present and we went through all their issues and picked them up and discussed it. Negotiation with local people and engagement with strategic holders are both very important in projects like that.

What were the most difficult aspects of this negotiation?

At the beginning of the project we needed to look very carefully at where the entrances should be.

The reason it's very political is because the site crossed the boroughs of Hackney, Waltham Forest and Haringey, three boroughs coming together with different interests!

Although Waltham Forest were the clients, we tried to be objective about where the entrances should go; what we wanted was to link to all the strategic routes throughout the site. Waltham Forest wanted an entrance near Blackhorse Wood Station, but we proposed the entrance at Forest Road because it would have brought the entrance into an area of sensitivity for birds… that was quite a difficult negotiation!

The local authority wanted the entrance next to Blackhorse Station because it connects people to the nature reserve much more directly, but we did a PTAL STUDY, a transport study, which looked at the time it takes for people to walk from where they live to a green space or to nature reserves and that also graded the different entrance possibilities and picked out which were the best, which entrance would capture the largest number of people and be closest to major transport.

Tottenham Hale station is on a Cross Rail, it's on the route to Stansted airport, it's also a tube station... Actually, the proximity of this station was more important than the proximity to the Blackhorse one on a London wide basis, rather than the local level. So, we were looking at both the local issues to do with access to nature and were also looking at London wider issues to do with accessibility.

Another consideration was this connection: the Olympic footpath that goes than onto the Olympic Park. Connecting to that strategic route became quite an important objective and all this came out from the PTAL study we did. We set several criteria for proximity to stations, proximity to allow access to ecology, we also wanted to reinforce the green part of wetlands and so we wanted the entrances to be near that green core and also near to the north site route. There were lots of criteria used to make decisions about where the entrances should be.... It was quite a tortuous process.

What about the design of the routes? How are they differentiated?

There is only one concrete route, the north-south one, made to allow disabled people, vehicles, bikes, pedestrian, buggies...Everybody can use that route! The rest of the routes are mostly gravel paths and quite informal.

We thought about how to orientate people and bring people onto the site, how to make green windows into the sites so that there's more visual accessibility, how to use the network of trees to reinforce the green core…and one of the other important ideas was that at every entrance people should either be close to or cross water, so that water is the actual threshold of the site. After the access points, we looked at the width of the roads in relation to vehicles passing and people walking, we also studied the seasonal walking relations and how to regulate the accesses throughout the year.

We also did a study for new bridges... because this area of London is divided up by railway lines, roads, and water. We looked at new bridges in Tottenham Hale through to Hale Village which is in a new development on the River Lee and then onto the paddock which is a piece of land next to the wetlands which would connect up to a new entrance to the wetlands and so, to be honest, the problem with that cross section through the landscape is that you had to go up and down to get over various obstructions. So we tried to persuade our clients to consider a new bridge crossing over all these limits, but anyway it wasn't accepted.

How did you manage to reconcile the ecological objectives with the operational needs of the reservoirs of the water infrastructure?

A major factor was Thames Water operations on site: up until the day until the wetlands opened, Thames Water operators could use the site in whatever way they wanted, so if they needed to do some work, they would just shut the whole site down and then do what they needed to do.

There's a huge change of culture needed with that client, to make them understand what it would be like to have the public on site and to modify the way that they did their operational stuff on site. For example, for the most recent reservoirs, the way they inspect them, by driving a vehicle around the edge of every reservoir, meant that both the vegetation and access were restricted.

What were the fundamental aspects of the negotiation between architecture and the reuse of existing buildings and the biodiversity agenda?

We did lots of studies looking at the buildings complex, and it was quite easy to see that not all the buildings were there anymore. The chimney of the Marine Engine House had been demolished...there were lots of adaptations that had been made. Similarly, at the Copper Mill building, none of the original structures exist anymore, but a row of poplar trees does...So an in-depth understanding of the evolution and transformation of the water feature were important.

We were quite interested in how to bring the site to life...So it was an interpretation of how to tell people about what was there before… The interventions were very small, only around the Copper Mill building did we change the access and put in new doorways.

Most of the work was about the deep understanding of what was there before so that we could interpret it for people in the future because that was one of our roles as a designing team.

What kind of participation strategies were implemented?

The London Wildlife Trust were responsible for what was called the Activity Plan, which sets a baseline to do community engagement and consultation at the beginning of the project, to see what issues exist and to understand what might come to bear on that design and then they follow of course when the wetlands opened, a lot of the management maintenance work is done through volunteers. So during the construction they brought people on site and gave them tours around the wetlands, to familiarize them with it. They were targeting mostly the local population and many people living locally didn't even know that the reservoirs were there! So, introducing school children and their parents to the reservoirs was quite an important task, as well as the programming of activities, but that was all done by the London Wildlife Trust, a delivery partner for the project.

In your view, what kind of change of paradigm does this type of project incorporate?

The need for people to learn how to use it... I think there can be a misconception that this place is a park.

One of the things you may notice is that when you arrive at the main entrance at Forest Road, there's an awful lot of signs for Walthamstow Wetlands…that's because the panel was really concerned that people should be aware of the change of culture people have to adopt when walking into the wetlands…

It is not a public park, it is not part of the footpath on the highway, it is a new thing. That change of culture, I think, people find it hard to grasp!

For example, last week a school group of Hasidic Jewish children went to the reservoirs and the teachers told the kids they could all go in the reservoirs... despite all the signage! This will evolve in time of course, but now the problem is making people understand how to be sensitive to the landscape and how to keep it ecologically rich. So changing people's behaviour when they walk over the thresholds is something that's an ongoing issue… probably because most of the nature reserves in that part of London are much smaller spaces that are not placed on a strategic route. Something we discussed a lot when we were designing the project is this confusion between the route that connects and the fact it's a nature reserve and how do you make that clear, but at the same time we needed to be reasonably subtle otherwise it is signage everywhere.

In the same way as we talked about a shift in behaviour needs at the entrances and footpaths, there's also a shift in the cultural understanding of this landscape that we were trying to reinforce with the design proposals we made…

For example, next to the Marine Engine House, instead of the dipping pond which London Wildlife Trust were making in their usual way , we were going to excavate the foundations of the building that used to exist there and use them as the pond…so that the history became more explicit from the use of that new piece of ecology!

That's why I said that not having the funding to do that extra work is actually quite a big missed opportunity… This piece of land has the route of the old aqueduct that used to go across that land and we were picking up that route with a deck that extended out into the River Lee! All that knowledge is forgotten now that the Wetlands are open, we now have a pond stuck there because it was the cheapest place to put it…. It should have been much more linked to the history and about reading the traces.

Is there something else that you would like to change or do in a different way now?

One of the things I really wished was to have more funding to do more detailed interventions along the River Lee… There were actually a lot more proposals made for the edge of the River Lee, because Walthamstow Wetlands is a water infrastructure and so access to the water is quite difficult. Whereas with the River Lee we could bring people right up to the water's edge and do more interventions and vary the habitats... it would have been great to have had the possibility to activate the west bank edges, I think we would have achieved something much more interesting, but we didn't have enough funding to do all this work. We always knew that the full master plan couldn't be achieved, also we had a very small budget for interpretation externally... I think we really needed more money to do the job. But with the basic landscape and architecture, we are very happy with the project. We would have liked to have done more.

Do you think the Walthamstow Wetlands project meet the following criteria?

- **Respect the fundamental principles of human existence and the power of archetypes.**
- **Avoid taking a strongly sectoral and formal planning and design orientation.**
- **Accept the existing and the isochronous. That is: attribute the same value to historical and contemporary structures.**
- **Promote and reinforce the mutability, feasibility and versatility of the structural networks.**
- **Create multipurpose spaces in such a way as to allow the adoption**

of free structures.

- **Emphasize communication and structuring factors**

The short answer is yes!

Has the realization of this project led to the development of further urban transformation strategies?

Another piece of work that we've done subsequently, getting involved in wetlands, is a green an open space strategy for Tottenham Hale, which looks at taking the influence of the wetlands and spreading it much wider.

It's a project that acknowledges the original floodable Lee Valley, and tries to recreate that identity, particularly with vegetation. We've made proposals for a tree network that extends back into the urban area to effectively widen the influence of the Lee Valley in those areas, in the context of the huge redevelopment of Tottenham Hale.

We have a vision for the Wetlands, to have a much bigger wetlands character, that has not just to do with the planting… but it has to do with animals and birds, with the identity of the green spaces and what they look like, so instead of a park looking like a municipal one, it can look like a fragment of wetlands landscape! It's quite a bold move, but the idea is to transform the character of the urban area back to its marshland roots, which could have a huge positive impact on people's lives.

What would you say are the causes of this renewed attention to the importance of infrastructural urban spaces, until now ignored by disciplinary and academic criticism?

I've always worked on infrastructure-based projects, but I think the reasons for this renewed attention in London have been brought about by a sum of factors: the climate change agenda, looking at the impact on the river Thames, the costs of improving the flood defences of the city...The air pollution issues and improving the quality of life of people living in urban areas joined up, also, with the desire to increase the cycle infrastructure in the city.

Now the city of London is trying to build more affordable housing in the identified intensification areas, where there is good transport infrastructure and there's a town centre that can support increased populations… Looking at development opportunities in those areas is an operation that needs to be done carefully by considering green spaces and infrastructures and the blue network that supports the new developments, because the risk is to create a worse situation for the River Thames by not really understanding these fundamental infrastructure issues.

In your opinion, can this project be defined as a source of knowledge for the transformation processes of urban spaces in terms of the process of designing, reading and preserving historical and geographical traces, sustainability, flexibility and multi-functionality of places?

I think the lessons learned from this project are applicable to every project really! Thinking wider, understanding geology and geography, the social context, the wider transportation issues, thinking about visions on a big scale and not allowing yourself to be too narrow... I think all those lessons are applicable at whatever scale of project you're working on. We always want to make flexible spaces that can be interpreted freely, because if you live in an urban area you already have a controlled lifestyle and there are already so many rules about what you can do and can't do!

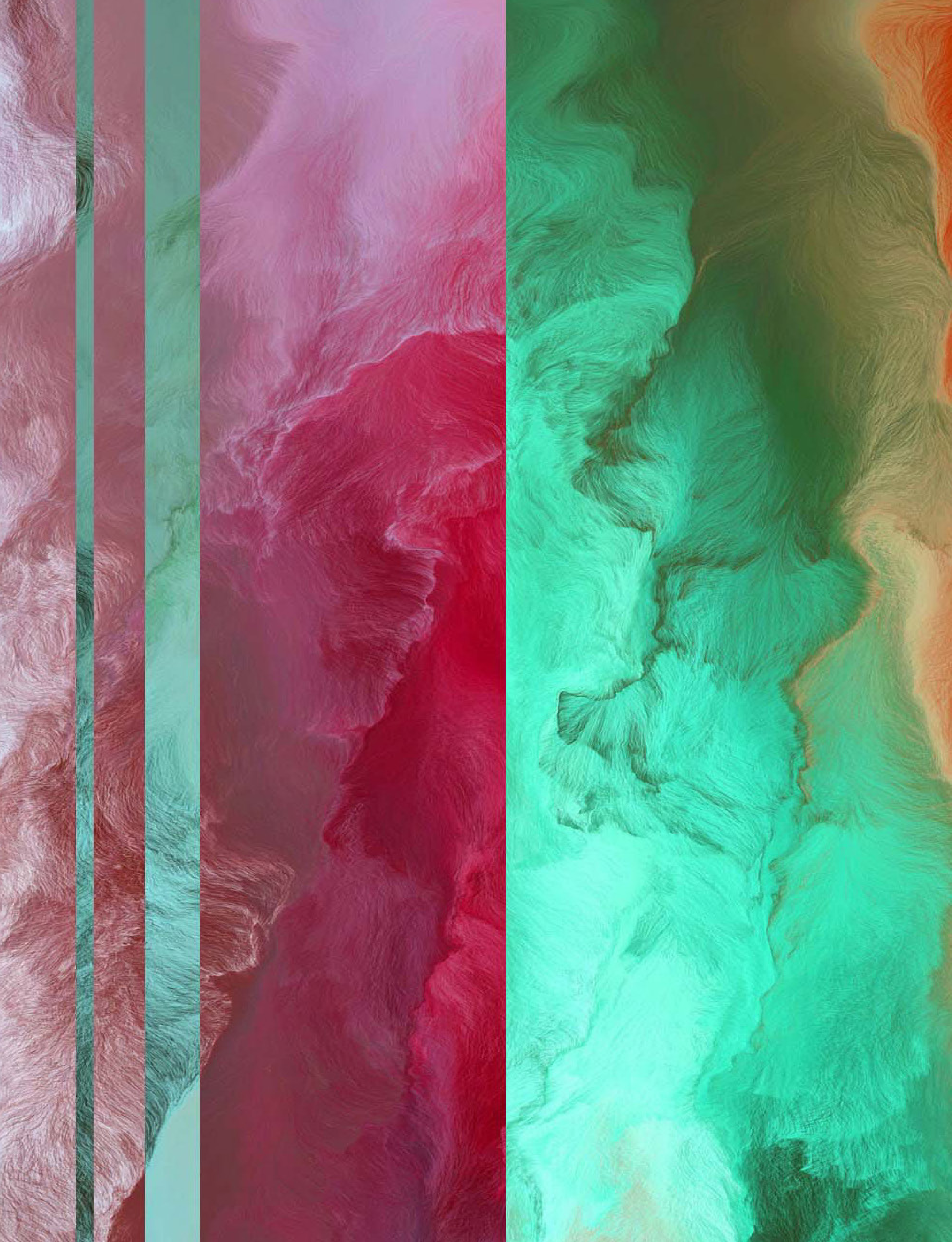
The Drapers Field project, for example, is very much about encouraging children and sport but subliminally… making play more active and building up the capacity of children to strengthen their muscles and get stronger and setting all that in the context of more adult sports facilities that they can migrate onto. The thoughts behind our projects are quite strategic and they are looking at ways to deliver those strategic objectives.

Which opportunities do you think could arise for the landscape architect profession from this kind of approach to urban space, especially in Europe?

The main opportunity is to demonstrate, with this kind of projects led by green infrastructure concerns, how they can enrich a project. I think that objects like the chimney at the Marine Engine House, in Walthamstow Wetlands, express a positive point of view, because that idea came out of a landscape and ecological vision and very much transforms the way that part of the building was being considered.

If you speak to most architects, they have a very blinkered approach to site planning and they are very focused on this object that they are going to make and the immediate environment around it... I know there are some of them who have more of an urban sensibility and work more broadly because they're working in a historical context... but it's not the norm to have a wider view... Learning to have a wider view in urban planning and landscape planning is very much needed and it's the main opportunity we have! Now I am a designer advisor for the Mayor, so all this knowledge that I have and the things that I have learned throughout my career will be disseminated through that role. Having a position where I can actually work on a London-wide basis and influence what's being done, I've started thinking that the transformation is possible!

London, May 3rd 2018.



CHAPTER 4:
FINDINGS AND CONCLUSIONS

FINDINGS AND CONCLUSIONS

This research first focussed on the semantic dimension of the terms "landscape"[237] and "infrastructure"[238] and identified, through a critical review of the literature, different ways of reading each of the terms which were capable of establishing significant patterns of association between these two concepts that constitute the theoretical foundations underpinning Landscape Infrastructure design. Moving away from the "modernist" vision and shedding the inherently territorializing concept of landscape, which for many years had laboured under a distorted meaning, the landscape historian John Brinckerhoff Jackson re-defined its significance: «*A landscape is not a natural feature of the environment but a synthetic space, a composition of man-made or modified spaces to serve as infrastructure or background for our collective existence*» (Jackson, 1984, p.8).

This definition, despite dating back to 1984, is still considered by many distinguished scholars[239] as the most suitable for reading contemporary landscapes because, the city, as such, «*can be considered a particular type of landscape during this "age of mankind*» (Weilacher, Hopstock, 2018, pp. 93); Nevertheless it offers a very useful tool for analysing all types of contemporary landscapes simultaneously, taking into account the value of time, memory, experience, sequence and structure.
Indeed, it constitutes a "spatial and cultural turn" (Cosgrove, 2004) that moves from a functionalistic, predetermined and fragmented approach to one that is holistic and interdisciplinary, in which landscape is conceived of as a "fluid continuum of interweaving systems"[240]; in other words as the complex sum of the products of those who design it, thereby opening out the field of infrastructure design to landscape architects and architects.

Since the contemporary urban landscape in the global city has developed acute disarticulation and fragmentation of its fabric due to the "free market in space" (Falqui, 2018), the open-systemic conception of the urban landscape, described in paragraph 2.2 and 2.3 of this research, has led to the condition of contemporary cities becoming an opportunity for the reconnection of voids and neglected spaces, for which infrastructures come to constitute a lever of transformation. Indeed, the holistic reading of landscape has helped in developing the discourse relating ecology to the city, definitively overcoming the traditional contradiction between man-made urbanization and nature evolving in a completely separate process.

Through this vision cities can be interpreted as "synthetic" landscapes formed by an intertwined set of structures resulting from diverse and competing forces, cultural and natural, whose patterns vary in response to the specific context.

[237] See paragraph 2.2.

[238] See paragraph 2.3.

[239] The definition of landscape by historian John Brinckerhoff Jackson is mentioned, among others, in the papers published more recently by Charles Waldheim (2016, 2017) and Pierre Bélanger (2016, 2017), and constitutes the guiding principle of the interdisciplinary organisation of the International Doctoral College "Spatial Research Lab" (2013- 2016), curriculum in "Urban Landscape Transformation", which involves six universities, namely: Hamburg, Karlsruhe, Munich, Stuttgart, Vienna and Zurich-Limmatal, plus Belgrade and Milan where specific research into case studies was conducted (Koch. Neppl, Schonwandt, Scholl, Voigt, Weilacher, 2016); See also: Weilacher, Hopstock, 2018.

[240] See Angélil and Klingmann (1999).

Henceforth, the dissolving of boundaries between traditionally separated disciplines would finally become the core subject of the critique on the production of urban space; This is especially the case in the interpretations of many scholars[241] , who have preferred the use of linguistics to formulate new theoretical fields to improve their understanding of the structure[242] of urban landscapes, simultaneously acknowledging the potential for appropriating *Infrastructure as Landscape* and vice-versa.
This acknowledgmet implies the consideration of any kind of landscapes as *«all living networks of space with permeable, porous boundaries that allow the different sub-areas to mingle and mix»* (Weilacher, Hopstock, 2018, pp. 93). This involves a broader systemic thinking concerned with ecologies of dynamic change, adaptability, resilience and flexibility, through a method based on the antithetical conception of the baseline principles of urban planning and civil engineering that forms the functional architecture and regulatory framework that underlie the legislative governance and physical construction of cities today[243].

In the field of landscape design methodologies, the symbiotic relationship between landscape and infrastructure is manifested in the operative design of *Landscape Infrastructure*, which is characterized by *«the consideration of the relationships between interconnected and interdependent systems that make up the new paradigm of landscape»* (Hung, 2013, p.14), where the focus of attention is put on the characteristics of the site instead of on the plan (Bélanger 2008, 2009, 2017, Hurkxkens 2015, Weilacher 2017c, et al).

The *koinè Landscape Infrastructure* has its theoretical roots in the redefinition of landscape by John Brinckerhoff Jackson, while the term infrastructure is used to reposition the field of landscape as a complex, instrumental system of essential processes, resources and ecologies that underpin the contemporary urban realm, aiming to transform the traditional models of habitation on the planet "for the establishment of a new negotiated ground for alternative models and synergistic precedents for an era of unprecedented transformation"(ASLA, 2010, Bélanger, 2012).

Therefore, this operational design category strongly differentiates itself from urban planning guidance strategies, going by different names around the world[244] but generally definable as *Green Urban Infrastructure*, where the term infrastructure is used to indicate an economic return in terms of the provision of optimized ecosystem services achievable through the improvement of the networks of "green" open spaces and the provision and management of water resources, storm water and flood prevention, or as a means to locate alternative infrastructures for commuting.

[241] Such as Christopher Alexander (1965), Peter Latz (1987), Rosalind Williams (1993), Gary Strang (1996), Weilacher (2017). See paragraph 2.3.

[242] See paragraph 2.3.

[243] Such as Standardization, Mono-functionality and Permanence. See paragraph 3.1

[244] See paragraph 2.4.

Rather, what is essentially proposed through the design of *Landscape Infrastructure* is the compendium and the collaborative formulation of landscapes which attempt to integrate the environmental and social sciences in the practice of urban landscape design, simultaneously expanding the professional practice of Landscape Architects into the design of infrastructures, but with a fundamental difference: mediating them through a position of cultural relativity, suggesting a more flexible and interactive structural approach[245] between Landscape Design and Urban Planning in the various scales of interaction that the *Landscape Infrastructure* project involves in its urban and territorial context. Therefore, it constitutes an interdisciplinary and trans-disciplinary design methodology, in which the different disciplines re-establish the constructive elements of a project in the form of a common language.

Within this open and systemic vision, several authors[246] have highlighted how the tautological understanding of infrastructure and landscape opens up the field of reflection to two different facets of meaning identified by the chiasmus of the two terms, in a two-way relationship:

On one hand, seeing **Infrastructure as Landscape** implies «*considering the non-biologic, non-dynamic and non-adaptive material of infrastructure as a constructed landscape and lived experience*» (Bélanger, 2016, p.193), therefore conceiving *Infrastructure as Landscape* enriches infrastructure by engaging the social and imaginative dimensions, while the ecological dimensions mean it takes on the role of bearer of new functions and biodiversity, implying the idea of a place designed as a result of mixed knowledge and perceptions and «*highlighting the significant propensity to the pedestrianization of public spaces*» (Cortesi, 2018, p.10).

On the other hand, seeing **Landscape as Infrastructure** implies the consideration of «*non-mechanical, non-linear and non-stable media of living systems as infrastructure*» (Bélanger, 2016a, p.193), as an effective means of shaping the urban environment and regenerating deteriorated landscapes through processes of restoration of ecological processes and integration of the contemporary infrastructure into biophysical systems, reclaiming «*natural processes in public space*» (Cortesi, 2018, p. 10).

Following this view, landscape becomes a productive mechanism capable of enhancing and generating urban ecological systems, spaces and morphologies.

«*The land no longer exists as a landscape feature, but as an architectural design driver for topographical urban infrastructure*» (Castro, Ramirez, Rico, 2013, p.85).

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[245] For a detailed description of the main processes and practices on which the Landscape Infrastructure projects must be contingent see pages 103-107 of the paragraph 3.1 of this research.

[246] See paragraph 3.2.

In both lines of thought, the infrastructural performances of the landscape become the distinctive cultural characteristics on which to base (or rediscover) the *genius loci* of the new landscapes to be created through the *Landscape Infrastructure* projects. Thus, designers have a key role in reading the stratifications of a place and interpreting the different symbolic dimensions of landscapes in ways which can be readily understood, as well as formulating new aesthetic forms with the use of ecological design.

Taking these observations as its starting point, the research investigated by which methodologies, techniques and tools the two varieties of *Landscape Infrastructure* project can be adapted to highly stratified and consolidated urban environments such as those in Europe. In order to provide answers to this question the method of "multiple, instrumental case studies" was chosen[247], meaning that the selected projects are deliberately different from one another to enable exploration of the differences both within and between the cases[248].

The findings originate from the evaluation of the site characteristics (Site Analysis), the analysis of the design, development and decision-making process, the analysis of the costs, benefits, criticism and awards for each selected project and from the analysis of grammar, poetics and perception of the sites, conducted with direct firsthand observation, enriched by interviews with the designers who directed the chosen interventions[249].

What is particularly evident is how the two interpretations of Landscape Infrastructure give life to differently configured landscapes:

On the one hand, the category of *Infrastructure as Landscape* projects gives rise to new, predominantly linear, public spaces originating from the re-configuration of transport infrastructures, whose interstitial spaces activate the transformation through the increase of new uses and functions, thus becoming "connecting membranes"[250] hosting landscapes that are the result of the sum of the new relationships created with the urban fabric.

These landscapes are not predominantly "green", but utterly urban and anthropic, where nature is just one of the materials used to obtain visual continuity, thus connecting the space with the surroundings not just physically but also perceptively, providing so additional value to built on areas of the city, rather than just urban green areas[251]. Indeed, the analysis of the case studies selected for this category, highlighted a significant change in the role that public infrastructures in cities can play in the moment they are considered, no longer as monofunctional spaces of linear dimension, but treated as corridors of public spaces, where multiplicity and diversification of functions coexist.

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247. For a detailed description of the selection criteria of the case studies see paragraph 3.3.

248. The case studies' dossier and interviews constitute paragraphs 3.4 and 3.5 of this research.

249. See paragraphs 3.4 and 3.5 of this research.

250. See interview with Fernando de Porras-Isla Fernandez, 2018.

251. See Weilacher, Hopstock, 2018.

On the other hand, the category of *Landscape as Infrastructure* spawns landscapes with a more variable form, mainly because it acts on urban voids, pockets of land enclosed within infrastructural systems, whose openness to the public is made possible by the restoration of the ecological processes[252], which in turn become the instrument for re-configuring the space through new uses and strengthening the identity of the place.

In this context, the analysis of the selected case studies has made clear how these types of interventions imply a design process strictly based on negotiation with the public administration bodies and on scheduled maintenance programs of the areas undergoing transformation, associated with intense activity programs for the awareness of local and non-local communities, regarding the new landscapes created.

Despite this difference, from the comparison between the analysed case studies findings emerged which have been divided into Interpretative Tools and Design Practices and Strategies, common to both varieties of *Landscape Infrastructure* design.

INTERPRETATIVE TOOLS

Analysis of the Historical and Geographical Traces and Signs

The first step in the design stage of all the projects analysed is an in-depth investigation of the history of the places undergoing transformation, through the identification of traces and signs both of geographical origin and of anthropic origin.

This investigation is never limited to the scale of the intervention, but focuses in particular on the events and processes that originated the space on which the designers are called upon to intervene with the aim of configuring the connection between it and its surrounding landscapes all the better, thus conceiving the object of study and the scope of the proposal as a unit which has to be related to a bigger and continuous landscape structure[253]. The investigation can be conducted through different methodologies, for example, in addition to the investigation of historical documents, *Mrio Arquitectos* covered the entire course of the River Manzanares on foot, in order to observe with precision every type of event or structure that interfaces with its course, which came to constitute the fundamental base of knowledge necessary for the drafting of the project.

[252] See interview with Juliette Bailly Maitre, 2018, paragraph 3.5.

[253] «*It is essential to consider the whole unit as the object of study and scope of the proposal. Any other delimitation seems to lack vision, proving to be almost blind in front of a promising reality*» (Mrio arquitectos, 2005, Competition table n.1).

Development of a Readable Language to Deal with the Juncture between Nature and Culture

All four case studies develop a design language which is performed through the use of certain grammatical design rules, which aim to attribute the role of interfaces to infrastructures[254].In order to do that, all the information gathered in the investigation of the historical and geographical traces and signs of the origins of the place comes to constitute a sort of aesthetic vocabulary, used not only as a grammatical rule to configure the *Landscape Infrastructure* project, but also taking on an educational role in making changes more comprehensible and visible to people, in order to make the "true nature" of the place clear in a new way and fundamentally change the way it is experienced.

In reality, these "design vocabularies" and the different materials that make them up are not used for the sole purpose of creating physical and aesthetic continuity, but also as educational tools to reactivate the memory of the interdependent relationship between the community and its land.

For example, the Madrid Rio project is articulated through a vocabulary of references[255] made up of materials such as granite, vegetation and sediment from the river, which are used as a unifying language that, by adopting specific characteristics in the various landscapes created, gives coherence to the reclaimed spaces, endowing them with distinctive character arising from the overlapping of its structural, constructive and formal resources, as emerged from the study of the natural and anthropic traces along the course of the River Manzanares (Garrido, Porras-Isla, 2018).

A clear example of this approach is noticeable in the treatment of the new pedestrian paths along the banks of the Manzanares in the northwest area of the Madrid Rio project (Fig. 1): all the working structures belonging to the ancient system of canalization of the river course have been kept as a trace of the historic engineering intervention on the Manzanares.

Similarly, in the Chemin de l'Ile park the different elements that have the role of phyto-purification of the water taken from the river Seine become the narrative guide that articulates the configuration of this new landscape.

The François Mitterand project also uses a set of materials to configure the new public space: the vegetation (historical rows of trees), Corten steel and the paving materials, but in addition to these, the designers adopted a further tool in order to strengthen the local and regional identity of the new public space, consisting of the elaboration of a graphic symbolic language[254] inspired by the colours of the Brittany flag, which simultaneously gives rhythm to the space while suggesting new uses.

[254] The concept of interface was developed jointly by Diana Balmori and the architect Joel Sanders in a Yale School of Architecture Advanced Study conducted between 2008 and 2010. The concept extends to the juncture between nature and culture, fostering a dramatic change in their relationship through the creation of new conceptual and physical connections that make this new relationship visible (Balmori, 2010). «*Interface is the area between landscape and architecture and by extension between nature and culture the concept was created to make connections between them […] Working on the interface means that in the end, such lines or boundaries, become thick bands […] It is as if by drawing a thin line you pulled up a new territory hidden under. The resulting Thick Edge is an area where a new relationship between humans and nature, between architecture and landscape, or between landscape and city can be worked on and made visible*» (Balmori, 2010, pp. 144- 146).

[255] See paragraph 3.4, pp. 160,161.

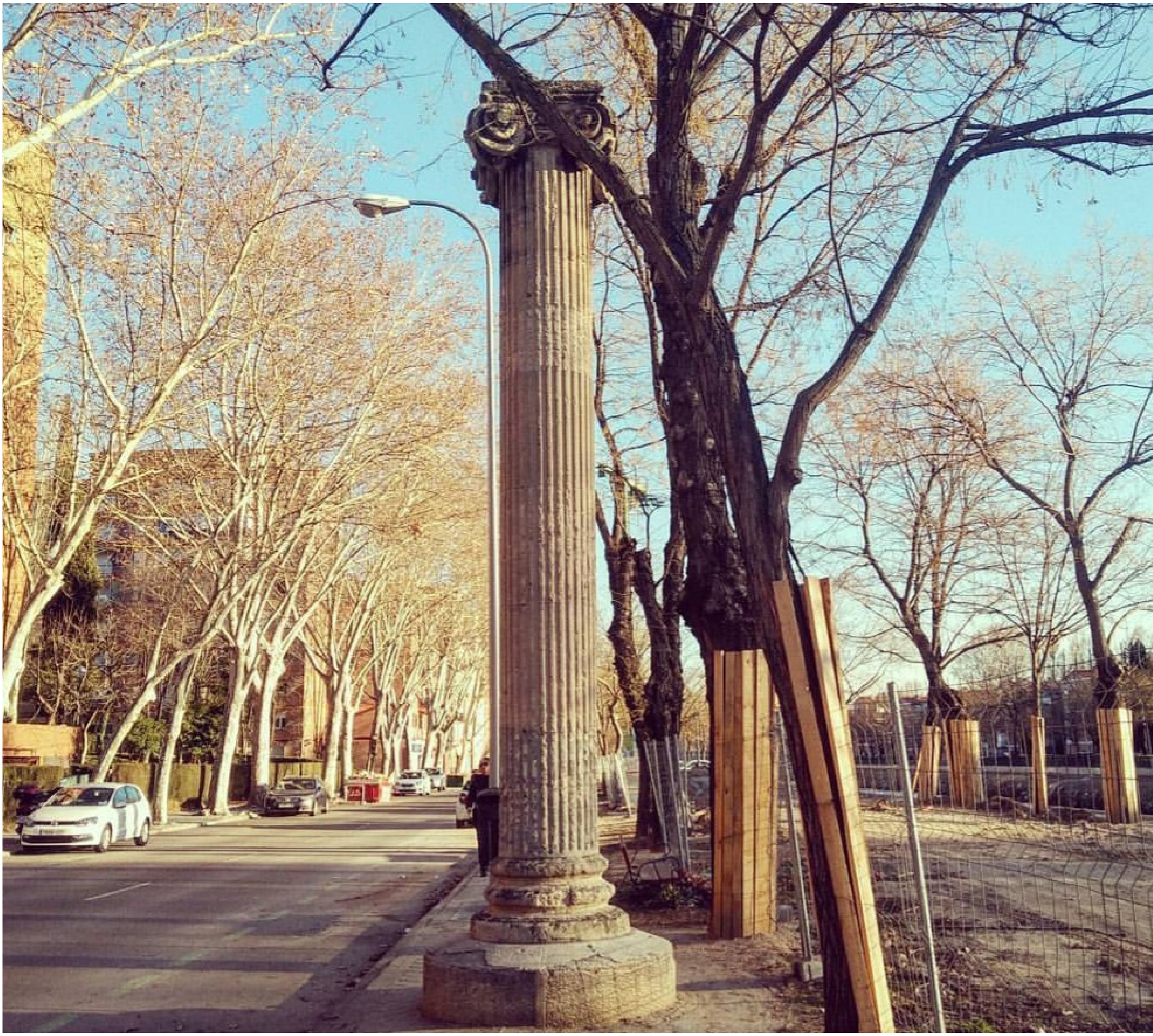

Figure 1: Picture of the restoration works on the banks of the Manzanares River in the area of Calle Aniceto Marinas, the column is actually the covering of a vent tower linked to the canalization system of the river course built in the 1950s; Source: Author, January 2018.

The entrances to the Walthamstow Wetlands Nature Reserve make it necessary to cross water thresholds, signalling to visitors the necessary change of attitude they have to adopt when entering these protected areas.

In addition, the historical buildings have been restored and have taken on the new function of information points and learning centres about the history of the place, using powerful aesthetic metaphors to signal the transformation of the place, such as the reconstruction of the ancient chimney that performs the function of reproductive space for bats (Fig. 2), clearly signalling a new engagement with nature[256].

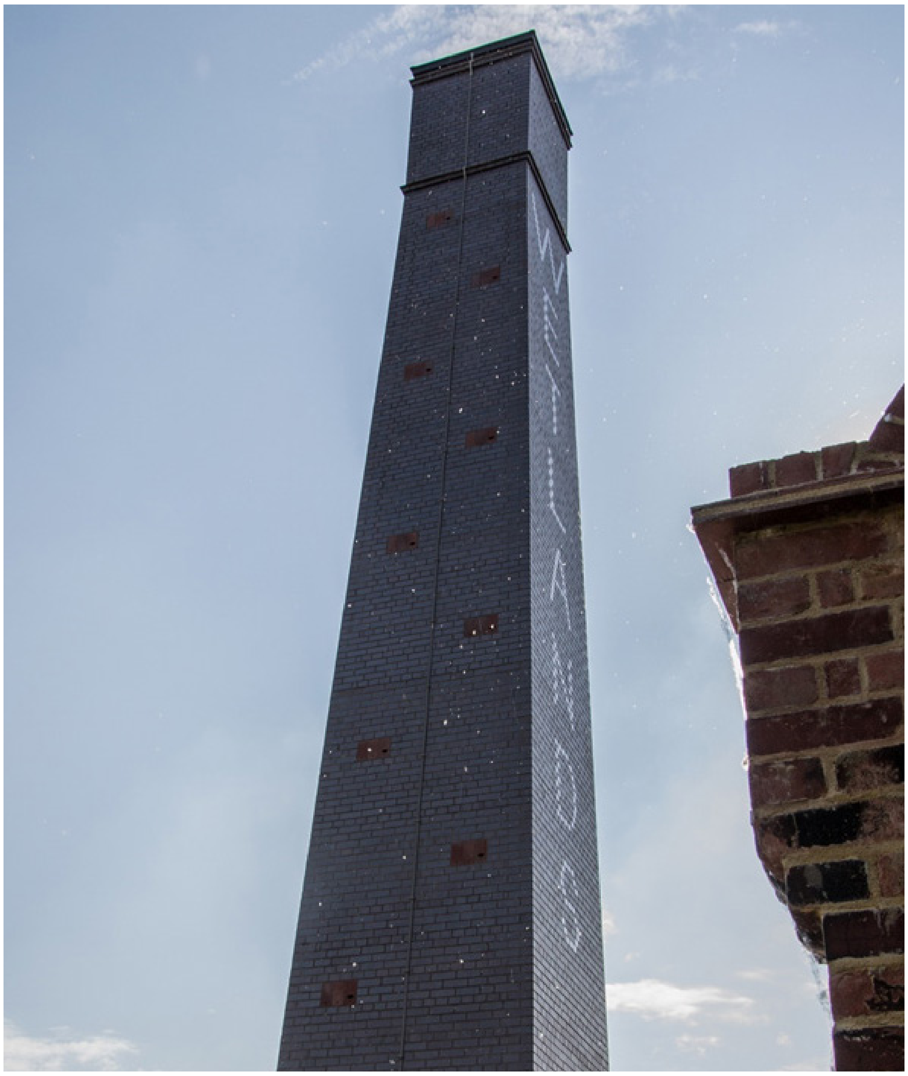

Figure 2: The new 24-meter high chimney was built on the existing basement and today hosts 54 boxes for the reproduction of bats, signalling the transformation of the site from place of industry to place of nature. Source: Author, 2018.

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[256] See interview with Lynn Kinnear, 2018.

Combining of Diverse Structures into a Super-Structural Entity

Evaluating the different structures in the areas of intervention as equally important makes the configuration of a continuous narration of the landscape being transformed possible. The recognition of different structural elements is used in all the analysed projects as a tool to transform all the disconnected existing elements and relationships of a place into a living connective tissue between fragments, thus bringing to the infrastructure the character of collective space.

The consideration of the urban fabric as a product of the sum of high complex landscapes, "living superorganism in a constant state of flux"[257], implies and finally allows landscape architects to be the main professional figure responsible for providing all kinds of living spaces for humans and nature to flourish, nurturing the complexity of the identity of cities[258].

The inspiration behind these projects is in truth never a personal repertoire of interests but a work of interpretation and mediation of the urban landscape, aiming to embed any kind of intervention into the cultural and infrastructural context of the place[259].

These structures can be of diverse nature: in Madrid Rio, after the burial of the M30 highway, the remaining structures were mainly bridges and buildings, infrastructural components which were incorporated with different uses into the new linear public park, which by also incorporating other types of structures such as the pine wood of the Salon de Pinos constitutes in its entirety a super-structure of connection and continuity between territories[260].

In Walthamstow Wetlands the remnants of the historical row of poplar trees along the Coppermill Stream and the bridge of the Garden of the Round House were the only original structures that testified the earliest anthropic use of the area.
The same structuring value was attributed to these two structures pertaining to very diverse natures, which together with the water reservoirs and the habitats they contain make up a super-structural entity, in this specific case a nature reserve. In fact, the recreation of systems of relationship between elements that have never been related to each other before is precisely the instrument that enabled the transformation of a purely infrastructural and productive landscape (the area of Walthamstow Wetlands before the intervention) into a nature reserve, not interfering with either the ecological balance of the area or the performance standards of the water infrastructures.

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257. See Weilacher, Hopstock, 2018.

258. See Sennet, 2013, 2015.

259. See interview with Christian Dobrick, 2018.

260. See interview with Gines Garrido, 2018, p. 196

DESIGN PRACTICES AND STRATEGIES

Topographical Interventions

One of the main design practices that unite all the four *Landscape Infrastructure* projects is the manipulation of the topography of the place.

Both in the Madrid Rio project and in that of the Chemin de l'Ile park, this technique was fundamental in order to connect the infrastructures with structures of a different nature: in the first case only by creating an artificial topography was it possible to superimpose the soft shapes of the public space super-structure created on the surface on the rigid geometry of the underground infrastructural tunnels[261]. In addition, the accumulation of soil and debris in the area of the Huerta de la Partida, deriving from the construction of the new Avenida de Portugal, was reused to create a new topography of the site, which now gently rises away from the river, culminating in a lookout which marks the exact place where, in 1572, the painter Antoon Van Den Wijngaerde depicted the first view of the city of Madrid.

In the second case it is precisely the design of a new topography[262] that configures the different areas of the park and their uses, as it makes it possible to significantly reduce the noise pollution of the transport infrastructures that cross it while simultaneously creating topographic structures capable of stimulating the imagination of children, secondly this technique allowed the designers to isolate the soils polluted by pre-existing factories into underground pockets, purifying them through the creation of the Jardin Filtrants[263].

Increase in Biodiversity and Improvement of the Habitat

All the examined case studies, for both project categories, have as one of the common founding objectives the increase of biodiversity and the reconstitution and/or improvement of local habitats.
The various approaches differ, obviously, according to the peculiarities of the place, as described in the dossiers related to each of the case studies.

However, it is important to remember that this design practice is always related to the reading and design interpretation of the *genius loci*, *«so that the history became more explicit from the use of that new piece of ecology»* (Interview with Lynn Kinnear, 2018, p. 365).

[261] See interview with Fernando de Poras-Isla Fernandez, 2018 and paragraph 3.4, pp. 206-209.

[262] See paragraph 3.5, p. 280, 281.

[263] See paragraph 3.5, pp. 276-278

Transdisciplinary Technical Solutions

As stated in paragraph 3.1 and 3.3 of this thesis, interdisciplinarity and cross-collaborations constitute one of the five points upon which the *Landscape Infrastructure* projects, in order to be defined as such, must be contingent.

The four case studies show this contingency, not only because they were designed by working groups made up of different people belonging to different disciplinary fields, but also because of the use of technical solutions deriving from the mixture of that knowledge.

In the case of Madrid Rio, the *Mrio* design team hired a team of engineers in order to accurately calculate the resistance of the underground motorway-tunnels. From the close cooperation and exchange of information among the group of specialists, including botanists, landscape architects, structural and civil engineers, the new gardens of the Toledo Bridge were created[264]. Nevertheless, the linear park, in almost its entirety, was built thanks to the invention of a special artificial topography able to give stability to the surfaces. In order to be able to plant the vegetation on top of this *Forexpan* topography[265], it was necessary to develop a special technique that would guarantee the survival and the safe growth of the trees on the surface, which, also in this case, required a transdisciplinary approach[266].

Indeed, in the case of the Chemin de l'Ile park, the design concept arises from the water purification treatment system, which originates from the disciplinary mix between hydraulic and ecological engineering, botany and landscape architecture. In addition, both the case studies realised by the *Mutabilis Paysage et Urbanisme* practice consider art as part of the concept in the design process.

The same use of art can be noticed in the restoration plans of the buildings of Walthamstow Wetlands and Madrid Rio case studies, which become clusters of artistic installations and activities.

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[264] See paragraph 3.4, and Interview with Fernando de Porras-Isla-Fernandez, 2018.

[265] See paragraph 3.4, Figure 15b, p. 156.

[266] See Interview with Fernando de Porras-Isla Fernandez 2018.

Reorganization of the Traffic Flows and the Connections Network

The projects selected for the category of *Infrastructure as Landscape*, focusing on the transformation of transport infrastructures, must by their very nature include the reorganization of traffic flows.
Their reconfiguration, in both cases, was drawn up through a series of analyses concerning the organization of the private and public transport network in the urban fabric surrounding the intervention area, which was modified on the basis of the newly created or restored connections on the surface, promoting the use of car-free mobility.

However, here too in the *Landscape as Infrastructure* design category particular attention is paid to the configuration of internal routes and access points to the areas, which have been precisely positioned only after conducting a careful analysis of the large-scale transport network: in the case of the Chemin de l'Ile park the project proposal developed during the competition phase by the architect Guillame Geoffroy-Dechaume was judged successful precisely because it proposed a substantial change in the functions of the project area, in order to establish a broader connection strategy for the river banks of the Seine[267].

In the case of Walthamstow Wetlands the first stages of the project development did in fact concern the study of the positioning of new access points, for which a PTAL study[268] was conducted in order to classify the different entrance possibilities using logical criteria, identifying which were the best options to increase the accessibility of the population residing close to the new nature reserve and at the same time attract a greater number of visitors thanks to its proximity to the public transport network and the cycle paths.

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[267] Currently being completed under the name of "Trane verte , Trame bleu". See paragraph 3.5, pp. 300,301 and interview with Juliette Bailly-Maitre, 2018.

[268] See paragraph 3.5, pp. 342, 343 and Interview with Lynn Kinnear, 2018.

Creation of Inter-Scalar Continuity Relationships

Landscape Infrastructure projects can be part of the development of a large-scale planning strategy or lead to the generation of such strategies.
Each of the projects analysed shows that in order to consolidate the transformation of the urban fabric, the local strategy must be contingent on the regional or metropolitan scale.

The Madrid Rio project was judged to be the winner of the international public competition also thanks to the fact that the project proposal included two design dimensions, namely the micro-scale relating to each of the 6 landscapes developed along the stretch of river which was the subject of the competition, and the large scale for which the design team elaborated the Territorial Plan [269] consisting of the recovery of the landscapes crossed by the course of the River Manzanares in its entirety.

The final purpose was the creation of a *Green Urban Infrastructure* (Fig. 3) for which the Manzanares constituted the fundamental element of continuity that could connect the natural parks north of Madrid with those to the south of the city[270], an operation that has been recently accepted by the new administration of the city, which is now proceeding with work on part of the interventions proposed in the aforementioned Territorial Plan[271].

On the other hand, the project for the transformation of the Francois Mitterrand strip was already part of a large-scale Municipal Strategy for the redevelopment of public spaces and neglected areas of the city of Rennes[272]. The completion of the project in this case accelerated the process of transformation of the surrounding urban fabric[273].
In the case of the Chemin de l'Ile park, it is part of a bigger planning strategy of transformation, covering the area between the Grande Arche de la Défense and the banks of the River Seine, with the final ambition being to create an area of consistent continuity[274]. In this case, however, almost twenty years after the competition was announced, the park is still the only strategic objective achieved.
As against this, the Walthamstow Wetlands project is part of a real Green Urban Infrastructure which goes by the name of All London Green Grid[275]. For this reason the key objectives of Walthamstow Wetlands are closely linked to those of the planning strategy of which the project is part, such as the achievement of the regional objectives to improve access to nature defined in the Mayor's London Plan and in the All London Green Grid, which form one of the cornerstones of the project, aiming to provide a coherent and integrated landscape experience extending from Walthamstow Wetlands to the larger Lea Valley open space network[274].

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[269] See paragraph 3.4

[270] See paragraph 3.4, pp. 149-151 and interviews with the designers.

[271] See interview with Fernando de Porras-Isla Fernandez, 2018.

[272] See paragraph 3.4, pp. 226-227.

[273] See paragraph 3.4, pp. 270,271

[274] See paragraph 3.5, pp. 324-333.

[275] See paragraph 3.5, pp. 333-337.

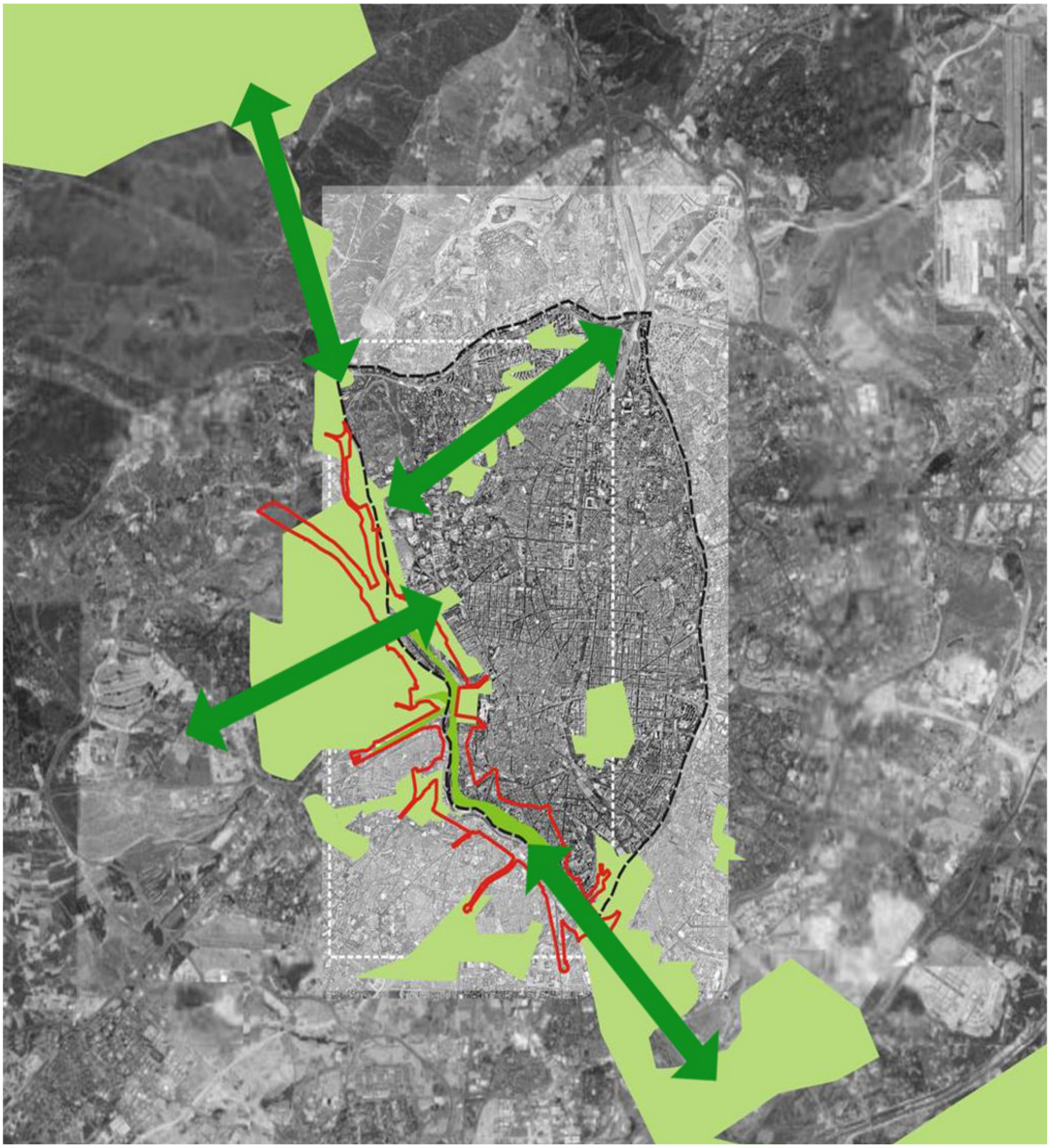

Figure 3: Scheme representing the Territorial Plan strategy proposed by Mrio design team, which is now being built by the Municipality; Currently Porras La Casta Arquitectos practice is completing the transformation of Plaza de Espana, which, once completed, will connect Madrid Rio to the north-east of Madrid through a corridor of public spaces. Source: Courtesy of the authors.

Participation Processes

Public participation is one of the aspects that the *Landscape Infrastructure* projects have in common.
Nevertheless, there are some significant differences between the two types. In the category of *Infrastructure as Landscape* projects, the type of public participation and consultation varies according to the planning strategies to which the local interventions are related, depending on the agreements made with the municipal administrative bodies.

In the case of the Madrid Rio project, in Spain the public participation information is mandatory in law, but the designers themselves, given the scale of intervention and the neighbourhoods involved, requested an extension of this information phase for a total duration of two months. In addition, the group of designers organized, together with the neighbourhood associations, a significant number of consultative meetings of an informal nature, which led to a series of changes to the project proposal. The same procedure was adopted for the preparation of the large-scale Territorial Plan. However, the Municipality of Madrid, during the international design competition, organized an inclusive participatory process dedicated to elementary school students, who, in turn, were able to participate in a small competition of ideas for the construction of the new public space above the tunnels of the M30 motorway. This had as its concrete outcome the creation of an "urban beach" inside the Madrid Rio park[276].

The creation of the redevelopment project of the François Mitterand Strip, on the other hand, was mediated by a wide range of public consultation initiatives under the auspices of the large-scale municipal transformation program from which the project originates: when the design program was finalized, a wide consultation process conducted by the "Redevelopment of the Mail" consultation group began, bringing together local associations and the neighbourhood council. Simultaneously, meetings with the pedestrian and bicycle associations were held , and all the stakeholders involved.
In addition, similarly to what happened in Madrid Rio, a competition for ideas was organized for the pupils of the "Ille" school, followed by an exhibition titled "City Fun: A Green Place, a Mail for All", which was displayed on the project site for three months, in turn followed by a conclusive conference dedicated to the explanation in detail of the redevelopment work. During all the participation processes, the participants had the possibility to join organized visits of the project site, organized with the Rennes Metropole Tourist Office, in order to acquire an in-depth understanding of all the phases of redevelopment[277].

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[276] See paragraph 3.4, pp. 181-183.

[277] See paragraph 3.4, p. 227

In the category of *Landscape as Infrastructure*, in both projects processes of public participation for the design of the areas were not conducted , but rather information processes, which took place in two respectively diverse temporal phases.

For the Walthamstow Wetlands project, The London Wildlife Trust, delivery partner for the project, was the administrative body responsible for drafting of the Activity Plan, which set out the guidelines for the community engagement and information process to be conducted at the beginning of the construction work, in order to determine what issues existed and what might come to bear on the design plan.

In reality, this type of involvement was aimed at improving the knowledge of the area among the local population, because the project area, having always been closed to the public, was totally unknown to the inhabitants of not only of the neighbouring areas, but of the whole metropolitan city of London. For this reason the London Wildlife Trust involved the local population in order to instruct them as to the future use of the area, with the aim of involving them after completion of the work as volunteers responsible for the daily management of the activities organized in the nature reserve[278].
Even in this case, however, particular care was given to raising awareness among the children of the neighbourhood schools and consequently to their parents to actively involve them in the educational activities organized by the London Wildlife Trust volunteers.

The project for the creation of the Chemin de l'Ile park is the only case study that does not include any public participation process, neither of an advisory type nor of an informative nature, during the implementation phases. One possible reason is inherent in the fact that the area was inaccessible for a very long time, first because the land was part of the factories and then because of the transformation undergone after the creation of the infrastructural transport viaducts[279]. Nevertheless, today the park owners (Hauts-de-Seine) organize various educational and informative activities involving pupils and the local population[280].

[278] See interview with Lynn Kinnear, 2018.

[279] See paragraph 3.5.

[280] See interview with Ronan Gallais 2018.

Mediation Processes with Public and Private Stakeholders

By its nature, the design of *Landscape Infrastructure* implies responsibilities shared across public and private jurisdictions. All four case studies experimented with new kinds of strategic project partnerships and new financial funding mechanisms that joined owners, users, stakeholders and regulators in different phases over time.

Of fundamental importance is the fact that the outcome of these transformative processes is always of a democratic nature, that is to say the products are new spaces and landscapes designed purely for public uses.
As emerges from each of the case study dossiers and from the interviews, the mediation process with public and private authorities is of fundamental importance, not only for the realization of the project, but also for its economic management and therefore for its maintenance in the future.

It is no coincidence that the Madrid Rio project required a special maintenance contract for the linear park, approved by the Mayor and the administrative bodies of the city, for which the same amount of funds and staff that normally operates in the maintenance of the historic gardens of Madrid[281] is used for the maintenance of Madrid Rio.

In the case of Walthamstow Wetlands, the maintenance and management plan includes a series of detailed operations of habitat enhancement for the next 30 years. The negotiation phases, in this case, substantially changed the design concept: the routes within the area were organized in order to demonstrate to the public bodies involved, such as Natural England, that it was possible to open the special protected area of scientific interest that the wetlands constitute to the public . In addition, a combination of top down and bottom up approaches was adopted: the top down perspective is represented in the direct decision of the designers to put reedbeds in some of the reservoirs, which Thames Water, owner of the site, didn't initially approve of.
Therefore, as a part of the long term management plan, the designers suggested a solution-based approach that could satisfy both the designers' desire to insert the reedbeds in the oldest reservoirs and the need for Thames Water to keep the maintenance costs of the area as cheap as possible, consisting of the re-cycling of the silt that must be dredged from reservoir n.3 after the periods of overflow to be reused as a stuffing material for the gabions, which make up the reedbeds of the new plant[282].

Part of the process of mediation between public and private entities involved, is constituted, in all four case studies, by the discovery of techniques to reduce not only the maintenance costs, but also the development costs.

[281] Significantly greater than the resources used to maintain the rest of the city's public spaces.

[282] See paragraph 3.5, and interview with Lynn Kinnear, 2018.

The common solution to that is the re-use, where possible, of the resources in situ. This can be clearly seen at the Chemin de l'Ile park with the re-cycling of the soils, and in the Madrid Rio project, where a number of motorway connection structures where maintained and converted into pedestrian boardwalks.

CONSIDERATIONS FOR FURTHER FIELDS OF RESEARCH

This thesis has shown, both in practice and in theory, that *Landscape Infrastructure* design marks a major change in the role that the discipline of Landscape Architecture has played in relation to the production of urban spaces and public spaces over the last century. One of the most promising factors is the ability of these projects to actively engage the political agency, with new kinds of private/public partnerships, capable of creating new landscape super-organisms representing a genuine cultural shift[283].

There are many issues addressed in this research that may constitute new avenues of scientific investigation, some of which can be identified right from the design practices listed above: The definition of a larger sample of case studies belonging to the *Infrastructure as Landscape* design category could lead to a thorough analysis of the different types of land topography transformation used, in different contents, in relation to the transformation of spaces where the passage of transport infrastructures is an element of strong disturbance, both on an anthropic and ecological level. Indeed, a similar line of investigation is constituted by the research on topology by Professor Christophe Girot (2013, 2017).

The use of ecology as a means of interpreting the memory of a given landscape constitutes in itself another almost unexplored field of research, which could stimulate interesting research also in the field of sociological studies related to the most effective educational techniques utilized in the *Landscape Infrastructure* designs. Further, almost unexplored, the research field consists in the study of alternative methodologies of composition and transformation of urban space through the use of practices related to complementary disciplines, such as, for example, Urban Agroforestry and Urban Forestry[283] or Bhiopyllic design[284] strategies.

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[283] See interview with Lynn Kinnear, 2018.

[284] See Ostoić, Krajter, Salbitano, Borelli, Verlič, 2018.,

[285] See Beatley 2016, Lister 2018, et al.

In the case of both *Landscape as Infrastructure* and *Infrastructure as Landscape* projects, this thesis has shown that interventions at the local scale produce catalytic effects on part of the settlement system with which it creates or maintains different types of relationships.

This shows that the design of *Landscape Infrastructure* implies the adoption of a more flexible and interactive approach between the landscape project and urban planning, at every possible level of interaction, to the point that it precedes the territorial planning, as in the case of Madrid Rio.

In this regard, an interesting avenue of research consists of the investigation of the new alliances and work modalities that can be created in order to favour transdisciplinary planning and design in all urban transformation processes, at any scale.

In addition, from the point of view of participatory processes it would be interesting to understand in depth how inclusive participation processes can affect the landscape infrastructure design process and vice-versa, a field of research that in Italy, for example, has never been explored.

Through a close interdisciplinary cooperation with all the design disciplines related to the field of Landscape Sciences, the field of *Landscape Infrastructure* design constitutes a strong guiding impulse for new strategies and practices of transformation, recovery and creation of urban spaces through which *«giving shape and consolidate the vital communication bonds between all the material and immaterial elements of complex spatial networks»* (Weilacher, Hopstock, 2018, pp.92); In this way it will be possible to give future generations a more resilient, more accessible and more connected territory through new ecological, social and cultural relations systems that improve the quality of communities life.

CHAPTER 5:
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5.3 Images Credits

COVER
Maps of parks in Toronto, Canada for Live Green Toronto. © Eiko Ojala Illustration

COVER IMAGE CHAPTER 1
"Human Footprint" by Earthworks Lab, satellite image of Nageri Hana (36*45.3' N / 82*42.0' E, Satellites: GeoEye-1, 06/10/2009). Image reworked by the author of this research.

COVER IMAGE CHAPTER 2
"Underpassage in Rotterdam City", picture taken in March 2018. Picture and image reworked by the author of this research.

COVER IMAGE CHAPTER 3
Collage by the author of this research.

COVER IMAGE CHAPTER 4
"Triangulation" by Andreas Nicolas Fischer. Image reworked by the author of this research.

COVER IMAGE CHAPTER 5
"Hybrid Webs". © Tomas Saraceno

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