CPUL in Urban Business District

A Research Design for the Renewal Project of
Amstel-III, Amsterdam

Master Thesis of Landscape Achitecture

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WAGENINGEN **UR**

For quality of life

Preface

Have been through one round of four seasons, from the March of 2011 till now, finally, this master thesis is finished, followed is my entire Master program of Landscape Architecture at Wageningen University.

From China to the Netherlands, from a bachelor of Architecture to a master of Landscape Architecture, it is just like a dream. Perhaps in people's mind, the shift is not a big deal, while the truth only stands by knowing.

My interest for the master thesis is a new landscape and planning strategy - Continuous Productive Urban Landscape (CPUL), with a focus on urban farming and collaborate with a variety of issues like urban ecology, sustainable landscape, etc.. It is common to find designs or projects working on this topic in residential areas and public open space, while, what I find even more bravely and challenging is to incorporate the productive landscape to urban business sites. And, I am so fortunate that granted an opportunity to elaborate on a real on-going project in the Amsterdam Southeast, which is the office park Amstel-III.

I have to say, it is this project changed my view point from an architect to a 'landscaped' architect. The project guides me constantly zoom in and out between different scales, travel back and forth in the time river, and finally help me find out a solution for the site well adapting to both local and regional environmental context.

Allow me to give my special thanks to my thesis supervisor Ir. Dr. Ingrid Duchhart. Her constructive critique and ability make me think more carefully. Also, many thanks to my commissioner Charlotte Buys from DRO Amsterdam. All those heated discussions with them either in Wageningen or Amsterdam, are the most precious learning experience for me. Also, I would like to thank Roy and Geert from the Municipality of Amsterdam as well, who attended my presentation in Amsterdam and provided me important feedbacks of the design.

Last but not the least, thanks to my parents, their warm words, concerns, and encouragements are the strongest support to me forever; Thanks to my boy friend, Hao Liu, my fellow students Shuangyu Han, Yi Zhou, as well as others who kindly criticized, suggested, and motivated me during the thesis-writing period.

Abstract

In the course of the Dutch industrial development, 'business site' is gradually replacing 'industrial site' in norms of city planning and other fields as a general term, which suggests a two-folded meaning: firstly, due to the globalized goods producing and development of logistics, the traditional industry is moving from the city core to edges and gradually disappearing from Dutch people's sight. Secondly, new urban spatial development strategies are prone to establish multifunctional business-centralized site rather than traditionally mono-functional industrial site. (Louw et. al, 2004) This subtle phrase change leaves numerous projects in urban transformation process, in which the Amstel-III project is definitely one of them.

As this 70s-built business site could not well satisfy the contemporary urban need spatially, socially and economically, it will be strategically transformed into a multifunctional urban district, according to the Amsterdam municipality's plan (2010). However, it is hard to engine this idea without a convincing plan that could sustainably save the site from the current negative situation, generally improve the local environmental quality, and positively affect its surroundings.

Departure from these existed problems of the Amstel III, the author conducted her research from the general subject of 'landscape urbanism' to the specific 'development of Dutch urban business area' to theoretically get to know the site. Followed, the 'Continues Productive Urban Landscape' concept is systematically studied, after more general studies on fundamental landscape theories assisting in improving the total environmental quality, the theoretical possibility of incorporating CPUL into business site is approved, principles and models are summarized to guide future design.

With a consideration of processing landscape, the final design will be presented in three scales - regional strategic plan for Amsterdam Zuid-Oost, master-plan for Amstel-III and surroundings, and lastly four detail designs.

Keyword: landscape urbanism, landscape design, urban business site, continuous productive urban landscape

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1 Introduction

1.1 Studying Background

There are moral and national obligations for cities in the 21st century: balancing the needs of today's population with the needs of tomorrow's through sustainable processes and design, addressing climate change, urban ecology and other environmental issues that have failed to take hold on a broad level, and advancing energy policies, both within the energy market and transportation fields. Balanced with the need to provide sustainable and functioning cities is the need to create livable cities, with equal consideration given to quality of life. This includes consideration of business areas which are essential to the maintenance of workers' life quality and vitality in urban transformation process.

This thesis aims to link the concerns for providing the working environmental quality to the staffs and local inhabitants by utilizing land-use dynamic (temporarily or durably wasteful spaces) in business site as a mean for creating productive landscapes which increase social contacts between urban districts, enhance regional ecological network of cities and provide relief from density. Particularly given the government focus towards productive landscape as a mechanism for ecological conservation, designers are entering an influential era to reconsider the current ecological and social needs of a modern city.

Much of current urban policy theories rely upon economic systems for their structure and definition, and it is these urban policies define the development patterns of city area. By providing productive values that holistically consider the role of wasteful business spaces, the project will challenge the current theories that place landscapes as the antithesis of development. It is expected that the Continuous Productive Urban Landscape (CPUL) approach emerged as an integrated design strategy connecting economic, social and ecological issues, and derived from and based on the landscape urbanism theories could help to solve some conflicts during redeveloping process and infuse new functions.

With the initial interest in the subject of CPUL, I started to look for projects and studying sites for further research and quickly I zoomed my view into Amsterdam, where 'urban farming' is a heated topic on board and a lot of urban transformation projects are right on hand. Amstel III, a business site established since 70s, last century and located in south-east branch of the big Amsterdam metropolitan, suddenly jumped into my sight at the moment as a 'promising problem business site' (private party in Het Parool 20 January 2011). After times of visits to the site and meetings with Amsterdam city planning department, the image of embedding CPUL into this business site became more and more explicit in my brain.

Fig. 1-1: Structuurplan Amsterdam 1965

1.2 Amstel III

The Amstel III business park was developed since the 1970s, and since that time, it has developed into a strong and dynamic working area to the southeast of Amsterdam, the Netherlands (Fig. 1-1). The site is strategically approx. 250ha, and it accommodates hundreds of companies and organizations, with a population of 750,000, almost one third of the Amsterdam Zuid-Oost region. The site was initially planned based on the functionalism. Even now, the urban planning marks belong to that time is still clear to distinguish. Below, the background of the studying area will be generally introduced.

1.2.1 Location

Fig 1-2. Loccation of Amstel III

Amstel III is right situated in one of urban branches of the Amsterdam city, which is well linked to the other cities through railway, metro line, and A2 motorway. Further more, the whole business area is surrounded by plenty of greens and various urban landscape forms. The Gaasperplas and Gaasperpark is to the east of the site, the Ouderkerkerplas and large agriculture land to the west, a Golf field to the near south, and several sports fields and city parks to the north.

Fig 1-3. National transporting connection of Amstel-III
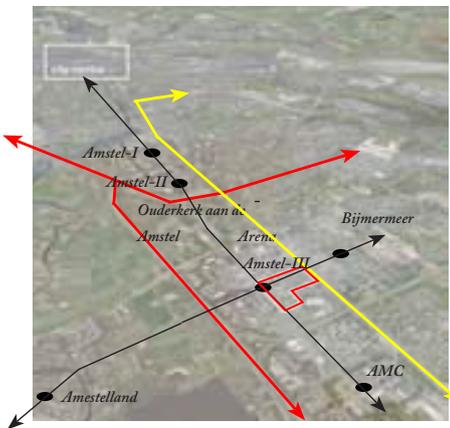
Fig 1-4. Regional transporting connection of Amstel-III

From the perspective of land-use, the Amstel-III area is an extension of the business functional land following the Amstel-I&II, vertically, but it is separated from the other two by a large residential area "Ouderkerk aan de Amstel" and the Arena Port (and its relatives). And to the south of the site is the AMC (Amsterdam Medical Centre) with the adjacent Medical Business Park. While horizontally, the Amstel-III is situated between the A2 motorway and the railway line, at the same time, these traffic lines split the site apart from the postwar housing blocks and to the east, and

Pic. 1–1 Aerial picture from the North

Pic. 1–2 Aerial picture from the East

Pic. 1–3 Aerial picture from the South

Pic. 1–4 Aerial picture from the West

the Amstelland of cultural-historical interest to the west.

In general, as a business site, the good transport connection to the outside, surrounding green structures and landscape patterns, and diverse functional lands nearby are great strengths that may attract more investments and business opportunities. But how does the decay come from? What form will be suitable for the site's redevelopment? And how to continuously improve the general environmental quality during the redeveloping process? These vital questions will be studied further in later chapters.

1.2.2 Current Situation

Amstel III is a "promising problem area" (private party in Het Parool 20 January 2011) in someone's eyes. Approximately 30 % of the office area is structurally vacant (10 of the 120 properties are wholly vacant), ownership is fragmented, investment climate has deteriorated. There is a lack of liveliness and public and private external space is designed to focus primarily on the car. The picture 1-1 to 4 present its current condition from four directions (Pic. 1-1 to 4).

The city is looking for innovative ways to transform a mono-functional business park into a lively urban district. This requires a strong development strategy, one that is appropriate at every scale level. Objectives are:

"Introduction of new functions, including housing, and improving the quality of the external space. The municipality's preference is for an integral, area-focused approach including financial instruments in collaboration with the leaseholders." (DRO Amsterdam, 2009)

The intervention area covers two subareas of Amstel III and comprises 36 plots, with an office block or commercial premises of three to eight floors, allocated on a long lease basis and owned by 28 owners. On the western side of the study area there is one – as yet to be allocated – undeveloped plot, comprising three sub-plots divided by infrastructure (Fig. 1-5). Some detailed condition could be refered to picture series of Pic. 1-5, which are took from a human view point.

1.2.3 City Strategy

The transformation of office space is the fourth major assignment in Amsterdam. And the transformation of large mono-functional business districts is even becoming the new assignment for the rest of the Netherlands. A study has revealed that part of the existing office stock will no longer be used for business purposes. This is

21

22

1 Holterbergweg to the north

2 Empty plots at Holterbergweg

3 Hondsrugweg to the north

4 Railwayzone Station Bijlmer Arena

23

24

5 Hogehilweg area pedestrian bridge Metro Bullewijk

6 Metrostation Bullewijk

7 Hogehilweg area from railwayzone

8 Hondsrugweg - Hessenbergweg

25

26

9 Hettenheuvelweg area (2)

27

28

10 Hettenheuvelweg area (1)

29

30

Fig. 1-5 Map of Interventional Site

11 Hettenheuvelweg area at Hondsrugweg (2)

12 Hogehilweg

31

32

13 Railwayzone

14 Hogehilweg area at Karspeldreef

15 Hondsrugweg to the south

16 Hettenheuvelweg area at Hondsrugweg (1)

33

34

17 Hondsrugweg to the south (3)

18 Hogehilweg area at Hondsrugweg

19 Hondsrugweg to the south (2)

20 Hogehilweg side street

Pic. 1-5 Series of Street Views in Amstel-III

Fig. 1-6 From left to right: Year of establishment, Stories of buildings, Floor space index, Ground space index (Source: DRO Amsterdam, 2010)

Figure 1-7 Urban structure 2040 (source: DRO, Amsterdam, 2010)

due to the introduction of "new approaches to working" with fewer square meters per employee and a surplus of office space. This new approach requires lively urban areas with amenities. Amsterdam is actively seeking alternative functions for the vacant office premises. For the coming 10 to 15 years the municipality anticipates demand for apartments for expats (working in Amstel III), student/starter housing, extremely large shell housing (new residential-business concepts for the creatively minded) and apartments for students and staff at the AMC. In addition, there appears to be a market for a number of hotels, restaurants, health clubs, etc.

1.3 Research-Design For Amstel III

1.3.1 Problem & Objective

As illustrated before, the Amstel III is a problematic area with approximately 30 % of the office area is structurally vacant, ownership is fragmented, investment climate has deteriorated." And now, the Amstel municipality is seeking for innovative ways to transform this mono-functional business land into a lively urban district.

This requires a strong development strategy, one that is appropriate at every scale level. It must be well matched the overall city strategy, meets the demands for new mobility, lifestyle, and sustainability. Therefore, probably an socio-ecological strategy is preferred as it is strongly related to a sustainable and environmental-friendly design purport, and equipped with various designing tools that help to build a resilient urban district and landscape accommodating future changes .

Design Objective

Consideration of social connections, multiple landscape functions and evaluation of urban landscape on a productivity level, the design is expected to provide predictable values to business sites so that nebulous terms, such as `sustainable landscapes' might become more substantive within the discourse of landscape architecture. These productive values might include but are not limited to: food production, biodiversity, air quality improvement, waste management, storm water treatment and transport.

The main objective of this thesis is to explore the theoretical possibilities and practical applicability to generally improve the business site's environmental quality (in terms of inner transport, leisure landscape and social connection with its context as focuses, air quality, waste management, biodiversity, storm water treatment as side aspects) by incorporating the 'Continuous Productive Urban Landscape' (CPUL) concept with the dynamic land use as a strategy and utilizing various landscape design tools (e.g. Permaculture).

1.3.2 Research Question

How to design the landscape in business site by incorporating Continuous Productive Urban Landscape (CPUL) as a strategy, in order to generally improve the environmental quality?

It is expected to summarize general design principles and design models for the incorporation of the CPUL within a old business site.

Sub Questions

♦ What is CPUL and its features?

♦ How to define business site in Dutch context? And its current condition.

♦ In there any knowledge gap or constrain when mixing the studies of CUPL and business site? What is it?

♦ When generally analyzing the site, what are the most positive landscape elements, which could be conserved and put forward?

♦ And what are the most negative landscape elements of the sites to be reduced or prevented in future development?

♦ Does a business site have the potency to contribute to the social and ecological networks in local and regional scale? Does ir have the potency to improve human working-living quality for the locals?

♦ How's the human behaviour in business site, from the author's observation? And what landscape elements do people expect to have in surroundings?

♦ How about the stakeholders' opinions towards the future developing direction of their working/living environment? And their preference.

♦ Is there any productive element of the site? Can the design principles of CPUL could be applied in this case?

1.3.4 Research Method

With a Theoretical lense of Landscape Architecture

The research framework created by Kerktra and Vrijlandt (1988) translates the philosophy of high/low-dynamic landscape issues into landscape concept framework (Fig. 1-8). They divided the physical landscape into three basic layers for analysis, planning and design, in which the abiotic and biotic layer represent low-dynamic landscape, and the occupation layer describing land-use, infrastructure, creations, etc., is comparatively high-dynamic landscape. "The framework created long-term opportunities for low-dynamic land uses, as well as for relatively fast-changing high-dynamic land uses... As such, the framework provides space for long-term public objectives for which the government holds responsibility as well as for short(er)-term private initiatives." (Duchhart, 2007)

The Sociophysical-organisation Model is "based on the reciprocal relationships

Fig. 1-8 The triplex landscape as usually represented by Kerktra and Vrijlandt (1988)
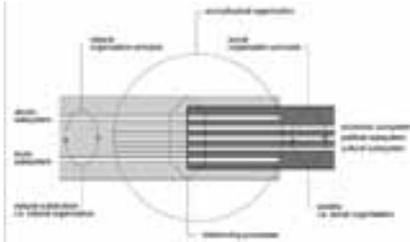
Fig. 1-9 Sociophysical-organisation model (Kleef-mann, 2002)
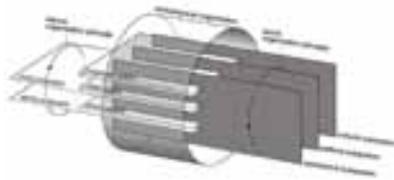
Fig. 1-10 Interwining the triplex model and the socio-physical model (Duchhart, 2007)

between man and nature and should be seen as an abstract notion of the functioning and co-ordinating of human activities required for living a meaningful life". (Fig. 1-9: Kleefmann, 1984; 1985 in Duchhart, 2007) With an additional focus of social system, the socio-physical model is more comprehensive and convincing than the former ones, as it clearly illustrates the reciprocal relations from a human-ecological point of view, instead from an ecological and spatial perspective. (Duchhart,2007)

What's also noticeable is the sociocultural element was especially included into the model aside from the other two dominant social subsystems. This emphasizes the importance of social participation in process.

'By interweaving the theoretical notions of both models, it was possible to gain an understanding of the Kenyan landscape as a hierarchically organised set of landscape systems...were bound together by integrated landscape-ecological and social-cultural networks.' (Fig. 1-10: Duchhart, 2007) The characteristic of Duchhart's model is, it explicitly demonstrates the sequence (or matrix) of the interwining process: after each combination of each triplex-model layer and each social subsystem, there will be a new integrated layer generated implying possible problems (constrains) and oppotunities of the studying landscape, which helps to develop corresponding strategies and design criteria.

Sociophysical-Organization Model / Triplex Model	Economical Subsystem	Political Subsystem	Cultural Subsystem
Abiotic Pattern	Abio- Economical Layer (Soil productivity/ contamination)	Abio-Political Layer (Soil modification)	Abio-Cultural Layer (Nature Conservation/ Farming)
Biotic Pattern	Bio-Economical Layer (Frorestation/ De-forestation)	Bio-Political Layer (Urban green network)	Bio-Cultural Layer (Nature Conservation, Ecological aesthetics)
Occupation Pattern	Spatial-Economical Layer (Land market)	Spatial-Political Layer (Infrastructure)	Spatial-Cultural Layer (Leisure landscape, Landscape aesthetics)

* The content in brackets are related issues exemplified in brief, which need further discussion and supplementary.
Tab. 1-1 Matrix derived from Duchhart's interweaving model

Based on the pragmatic worldview, a freedom of mixed research methods is available. At different studying steps of the research framework (Appendix), new information supplementing of theoretical knowledge and practical examples is required to approve the assumptions and access the final schemes. To obtain these information, quantitative, qualitative, and a mixture of both methods are essential. 'It is more than simply collecting and analysing both kinds of data; it also involves the use of both approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research.' (Creswell & Plano Clark, 2007)

Steps	Method	Result
1. Theoretical studying (including Urban Landscape Ecology and related, Landscape and Ecological Aesthetics, Business Site development, and finally the CPUL concept).	• Qualitative: literature studying (books, articles, internet...)and synthesizing the design principles of the CPUL concepts and "Permaculture"	• Attention-worthy general design principles • Research gaps between CPUL and business sites.
2. Site analysis of Amstel-III, from the physical and social layers of urban landscape; Specifying both the most positive and negative landscape elements of the site.	• Quantitative: geo information studying (maps, GIS sata) • Qualitative: literature studying, analysis of the GIS data, summarize the current situation and specify both the most positive and negative landscape elements of the site.	• Summarizing the best and worst landscape elements into list
3. Exploring the stakeholders' opinions towards the current environmental situation of Amstel-III and its future developing direction	• Qualitative: informal talks with local businessmen and residence; interviewing planners and professionals from DRO; studying people's opinion of the site through e.g. literatures, internet, official/in-offcial reports. ; Observing human behaviors in the site through videos or pictures	• Translating their opinions into preference list
4. Based on SWOT anaylysis, finding a poosible and concrete approach to incorporate CPUL into Amstel-III	• Quantitative: SWOT anaysis	• Theoretically figuring out the best corporation models and design principles for integrating CPUL into Amstel-III.

Tab. 1-2 Research steps, methods, and expected results

1.3.6 Research-Design Framework

THEORY RESEARCH

Urban Ecological Landscape
- Landscape/Ecological Urbanism
- Ecological Design principles
- Reference study

Business Site Development
- History
- Current Phenomenon
- Future Development

CPUL
- Definition
- Principle
- Reference Study

Knowledge gaps & potentials

First Ideas & Sketch

Theoretical Base

SITE RESEARCH

Landscape Features of the Site
- Site History + Context (Externality)
- Natural Ecological Features
- Urban Spatial Features
- Social & Cultural Features

Evaluation
- Pros
- Cons

Stakeholders' Perceptions &Opinions

Synthesis

FINAL

Best design alternative

EVALUATION PHASE

Design Criteria List

Incorporated design alternative

FEEDBACK

Feedback from commissioner (Amsterdam)

DESIGN PHASE

Research-based Design Criteria
- Model 1
- Model 2
- Model X

Alternative 1

Alternative 2

Alternative X

Design Initiatives

Fig. 1–11 Research–Design Framework

2 Theoretical Research

2.1 Un-traditional Urbanism

2.1.1 Transition From Urbanism

The degree to which the contemporary world may be said to be "urban" is not fully or accurately measured by the proportion of the total population living in cities. The influences which cities exert upon the social life of man are greater than the ratio of the urban population would indicate, for the city is not only in ever larger degrees the dwelling-place and the workshop of modern man, but it is the initiating and controlling center of economic, political, and cultural life that has drawn the most remote parts of the world into its orbit and woven diverse areas, peoples, and activities into a cosmos.(L. Wirth, 1938)

"The development of the industrial city begins with the invention of mass-production line through the application of Frederich Winslow Taylor's principles of scientific management to industrial production." (G. Shane, 2006) Le Corbusier published his icon publication 'Towards a New Architecture' (1927) as an exemplar of this industrial form. While, have been through a long-time process of destruction, finally "the effect of Fordism and the 'city machine' model of organization dissolved the industrial city itself into the landscape." (G. Shane, 2006) Schumacher and Rogner marked out the 3 phases of urbanizition with Ford's dispersal of production patterns (Fig. 2-1). This dispersal created a more open, decentralized, self-organizing, and postmodern matrix pattern, still operating today.
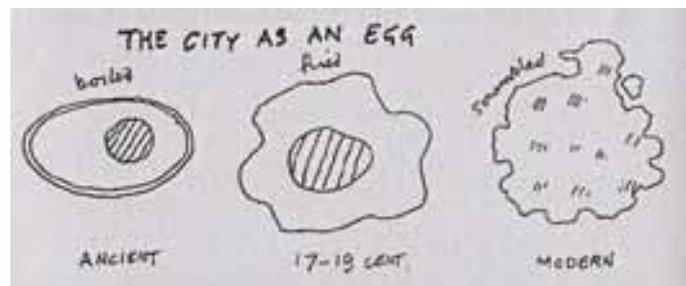
Fig. 2-1 Cedric Price "Three Eggs Diagram"

2.1.2 Landscape Urbanism

The word "landscape" is often mistakenly thought of as "nature", not something to be found anywhere near the city. It exists outside of the built encironment, somewhere out there in "the wilderness". It is precisely the friction between the words landscape and city, and ecology and urban, that generates the power and radicalism of "landscape urbanism". (Martha Schwarts, 2009 in Mostafavi, 2010)

Landscape Urbanism can be originated to postmodern critiques of modernism archicture and planning. (Charles Waldheim, 2006) "The idea of Landscape as a model for urbanism has been articulated by landscape architect James Corner, who argues that only through a synthetic and imaginative reordering of categories in the built environment might we escape our present predicament in the cul-de-sac of post indestrial moderity, and the bureaucratic and uninspired failings of the planning profession." (p. 30, Charles Waldheim, 2006)

The framework of landscape (infrastructure) should be the most permanent layer of the city and thereby preserve the viability of natural and cultural systems. According Corner, the potentials of landscape urbanism are the ability to shift scales, to locate urban fabrics in their regional and biotic contexts, and to design relationships between dynamic environmental process and urban form. (Corner, 2006)

Critiques

Landscape Urbanism is a hybrid. "Having its origins in the formal conceits of garden design, it is now updated with the 'green' touchstones of native plant species, naturalistic hydrological systems, and corridor topology. The design innovation is now offering its services as a setting for buildings - and not just as their ornamental appendage - thereby reaching for the mantle of urbanism." But that is more than it can bear; with tools limited to the imitation of nature, landscape urbanism cannot avoid the ruralization of even high-density schemes. With rabid bias against spatial definition, there is no such thing in its repertoire as a "corridor street" or a "square". The public realm is primarily therapeutic: rustic walking, rooting about with edible planting, and communing with nature are surrogates for the social activity fostered by Old Urban place. Even landscape urbanism's vaunted engagement with "infrastructure" amounts to buffering arterials, improving the design of storm-water apparatus, and decorating parking lots with porous paving." (Duany, 2009 in Mostafavi, 2010) But an urban paradigm cannot be base on the implantation of natural vignettes in the residual places between buildings. Besides, "landscape urbanism is too adept at being compromised by providing a green camouflage for the so-called unprecedented ty-

Pic. 2-1 "Ecological Urabnism"
(Mostafavi M. & Doherty, 2010)

pologies of big-box retailers and junkspace office parks" .(Duany, 2009 in Mostafavi, 2010)

2.1.3 Ecological Urbanism

The prevailing conventions of design practice have demonstrated a limited capacity both to respond to the scale of the of the ecological crisis and to adapt their established ways of thinking. In this context, ecological urbanism can be seen as a means of providing a set of sensibilities and practices that can help enhance our appoaches to urban development. This is not to imply that ecological urbanism is a totally new and singular mode of design practice. Rather, it utilizes a multiplicity of od and new methods, tools, and techniques in a cross-disciplinary and collaborative appoach toward urbanism developed throught the lens of ecology. These practices must address the retrofitting of existing urban conditions as well as our plans for the cities of the future. (Mostafavi, 2010)

According to Mohsen, ecological urbanism is a transdisciplinary appoach that gives designers a potentially more fertile means of addressing the challenges facing the urban environment. Yet another characteristic of ecological urbanism is its recognition of the scale and scope of the impact of ecology, which extends beyond the urban territory. Espacially, when incorporating human ecology, alternative multi-scalar design stratigies based on ecological urbanism, must be supplemented with and find the interface of a wide range of fields, from economics to history, from public health to cultural studies and the sciences (Mostafavi, 2010).

What Ecological Urbanism proposed, just as Landscape Urbanism proposed over a decade ago, is to multiply the availabile lines of thought on the contemporary city to include environmental and ecological concepts, while expanding traditional disciplinary and professional frameworks for describing those urban conditions. And, as a critique of Landscape Urbanism, it promises to render that dated discourse more specific to ecological, economic, and social conditions of the contemporary city.

However, all these remind Charles Waldheim (2009) of the Roland Barthes's formulation on the various roles of language and fashion in the production of interdisciplinary knowledge:" Interdisciplinarity is not the calm of an easy security; it begins effectively when the solidarity of old disciplines breaks down - perhaps even violently, though the jolts of fashion - in the interests of a new object and a new language."(Barthes, 1977) Besides,"Homi Bhabha locates the Ecological Urbanism project in a complex interwined dialectic between the ecologiesof the informal and the relentless reach of modernization. Bhabha maintains that one is in effect always

working with the problems of the past, however appearing with a new mask in contemporary conditions. Thus, the project of ecological urbanism, Bhabha insists, is a work of 'projective imagination'." (Waldheim, 2009 in Mostafavi, 2010)

2.1.4 Other New Forms

Performalism

Among those heated 'urbanism'-related debates, "Performalism" scape was emerged as a branch developed from landscape urbanism (Frampton, 1994), which emphasized pragmatism. Susannah Hagan admitted that the "ecological urbanism" is a literal term born from those trained environmental designers. (Hagan, 2009 in Mostafavi, 2010)

However, with so many cities suffering from environmental pathologies, it is understandable and necessary to presentsuch a urban metaphor. "At the urban scale, the environmental goal now is to create 'artificial ecosystems' - cities that achieve the same interdependent efficiencies as natural ecosystem." (Hagan, 2009 in Mostafavi, 2010) It is a far more complex to turn a city into an artificial ecosystem, as it is processing, rather than covering, all available urban surfaces in generic greenery. The environmental concept of a "performative" or "productive" scape, for biomass, urban agriculture, watermanagement, etc., posits a very different way of conceiving of city and non-city, and as such carries cultural implications.

User-generated urbanism

In contrast to technocratic urbanism, there exists a set of people process, and places that we would characterize as user-generated urbanism, this is the urbanism of the tactician, those devising temporal and interim uses, and seeking voids, niches, and loopholes in the socio-spatial fabric. These processes are made evident in circular, hybridized, and overlapping patterns of resource consumption and tend to foster a diverse, resilient social ecology. (Rebar, 2009 in Mostafavi, 2010)

Rebar claimed that two future scenarios could be seen for the ecological city. In one scenario, a global greening movement consolidates power in the hands of corporate multinationals, further eroding the public commons and civil liberties under the rubric of resource efficiency, resulting in SCAR(E)CITY. Another parallel greening movement, defined by dynamic, pluralistic, decentralized, and cooperative social ecology, results in a future of 'Sustatainable Abundance'.

2.2 URBAN ECOLOGY

A way to delimit the field fo ecology is to consider the concept of levels of organism. we may conveniently visualize a sort of "biological spectrum" something as follows: protoplasm, cells, tissues, organs, organ systems, organisms, populations, communities, ecosystems, and biosphere. Ecology is concerned largely with the latter four levels, that is the levels beyond that of individual organism (Odum 1973).

Like any ecological study, the understanding of urban ecological systems is concerned with the upper level of the the urban environment, which is structure, function, dynamics and their relationships. Urban structure includes the buildings and infrastructure; urban function includes delivery of resources and removal of wastes; and dynamics includes turnover in building stock and development of new transportation corridors, for example (Pickett & Cadenasso 2007). However, beyond these obvious human features, plant ecological processes also play a role in the structure, function and dynamics of urban ecosystems. Vegetation, along with buildings and surfaces, is a principal element of urban structure (Ridd 1995). Landscape architects now consider new urban vegetation and landscape system as a tool to enhance the environmental goods and services it provides and supports throughout the metropolis, and not just in designated reserves.

2.2.1 Ecological Sustainability

The core values that lie at the basis for reshaping globalization, are mainly informed by ecological sustainability. Although, according to NGO's, research institutes and learning centres, sustainability is the path for the future, it is hardly to tell how a sustainable community should be designed. (Werner & Capra, 2009) Inspiration and example can be taken from nature's ecosystems; we don't have to build our own sustainable communities from scratch. Nature has sustainable communities of plants, animals and microorganisms that offer good examples.

A sustainable human community is one designed in such a manner that its ways of life, business, economy, physical structures and technologies do not interfere with this vital ability. Sustainable communities always evolve around other living communities overtime, and interact with them, both living and nonliving. Sustainability does not mean that things do not changed: it is a dynamic process of co-evolution rather than a static state. (Werner & Capra, 2009)

2.2.2 Intetrating Plant Ecology Into Urban Lanscape

Three main ecologically orientated goals may be achieved in urban areas. First, "plant ecology can contribute to increased understanding of the structure and function of urban ecosystems", which might include researches about how plants infuence the C sequestration, nutrient retention, maintenance of biodiversity, as well as human actions and life style. The second goal is to increase the ecological function of urban areas. For instance, the stormwater treatment, micro climate improvement, and air pollutions. Last but not the least, a third goal is to increase the benefits to humans of the vegetation component of urban areas. "These may include such social benefits as reduction in conflict, provision of a focus for neighbourhood revitalization, or promotion of human health." (Pickett & Cadenasso, 2007) These points suggest that explicit incorporation of plant ecology into the work of urban design may yield benefits both to local urban residents and to people and systems 'downstream', in terms of water, air and pollution flows.

Pickett and Cadencasso's cycle of ecological design (Fig.2-2) illustrates the linkage of plant ecological research with the ongoing transformation of urban systems by urban designers and civil society. Quality of life, human health, public appreciation of ecological processes in cities, and scientific understanding can all be enhanced by participating in a cycle of ecological urban design.
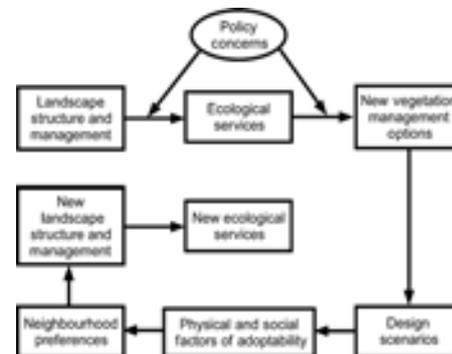
Fig. 2-2 The open cycle of ecological urban design

(Pickett & Cadenasso, 2007)

2.3 Nature-Human Relationship

2.3.1 Landscape Preference

Psychological Approaches

Accoroding to Stephen and Rachel Kaplan's information processing theory'(1989), people have two basic needs related to the direct/indirect visible environment, which are understanding and exploring the nature environment. The "preference matrix" developed by Kaplan is composed of four landscape features-coherence, complexity, mystery, and legibility, which are supposed to positively affect landscape perception (Table 2.1). In the matrix, 'coherence refers to the ease of structuring and understanding a scene, legibility to way-finding and orientation, complexity to the availability and variety of information in the landscape, and mystery to the promise of finding new information if one were to move further into the scene.'

	Understand	Explore
Direct information	Coherence	Complexity
Indirect information	Legibility	Mystery

Tab. 2-1 The preference matrix (Kaplan and Kaplan, 1989)
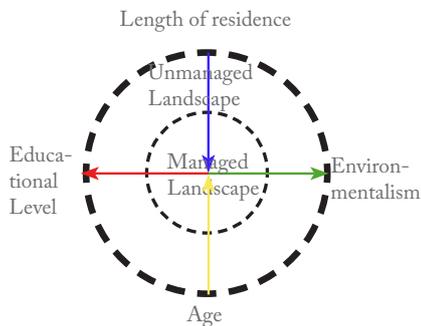
Fig. 2-3 Affectors to individual's landscape preference (based on Buijs, 2009)

Landscape preference studies have suggested a wide range of landscape features that are positively related to preferences for landscapes. It has been shown that people consistently prefer natural environments to built environments (Ulrich, 1981). Furthermore, preference for natural landscapes increases with the presence of vegetation, the visibility of water, scenic variety (variation and contrast between landscape elements), the absence of man-made objects, the scale or extent of the view, and the historicity and coherence o f the scene (Buijs, 2009).

However, "perceptual landscape preference studies have traditionally focused more on consensus in landscape preferences than on personal and cultural differences." (Buijs, 2009) Empirically speaking, people as individuals differs a lot in valuating visual landscapes, since they have different individual values, educational levels, social condition, personal involvement, engaging motivation, and experiencing period. And individual's landscape preference is subjected to either low or high degrees of human management (Buijs, 2009). Some like landscapes in sense of order and care, which

reflects active and careful management of the area, while others may favor wild natural landscapes that reflect the raw nature.

Historical views

Views on nature have had a strong influence, both directly and through their impact on nature conservation practices, on how people in Western cultures look upon nature. Nevertheless, it has to be remembered that the Romantic movement of the 19th century was very much an elite movement and the influence of Romanticism was mainly expressed by poets and painters. Consequently, the Arcadian and the wilderness view were mainly related to the upper class (Voorsluis, 2002). Only in the 20th century, these views were gradually dispersed through all groups in Western societies. The arts as a way of diffusing Romantic views on nature were gradually replaced by new forms of communication, especially related to the rise of the mass media. Especially television has widened the distribution of these views to all segments of society (Cosgrove, 2008). For example, several Dutch non-governmental nature agencies nowadays use very picturesque photographs and documentaries to propagate the importance and success of their conservation efforts. Even with changes modes of communication, the content of these views has remained rather constant and Romantic pictorial images of natural landscapes still play an important role in shaping Western views on nature. (Buijs, 2009)(Fig.2-5)

The influence of Arcadian and wilderness views from the Romantic era can also be recognized in contemporary nature conservation practices in the Netherlands (Van Koppen, 2002). For example, the scenic and aesthetic values of nature are very important criteria for the ecological valuation and protection of nature. The same holds for the normative values of nature and its focus on protecting remarkable and appealing species. As such, nature conservation strategies are to a large extent based on, and have been shifting between, the Arcadian and the wilderness view on nature as developed during the Romantic era (Van Koppen, 2002).

Policy Concepts of Nature

Only a limited number of the possible combinations of values and beliefs appear to be used in Dutch nature policy, and these combinations are interpreted as the dominant concepts of nature held by Dutch ecological experts (Fig. 2-5). These concepts are seen as implicit views on nature that are used in policy making to valuate different types of nature. (Buijs, 2009)

Fig. 2-4 Historical Views on Nature

Fig. 2-5 Typology of Concepts of Nature

2.3.2 Arranging Nature in Urban Structure

Is it better for people and nature to coexist in a coarse-grained or a fine-grained region(or landscape)? A coarse-grain area has mainly large patches, whereas a fine-grain landscape is an inter-mixture of different small land uses (Forman, 1995). The former supports specialization, such as a city with opera and art museum or a protected area with bear and wild cat, but requires extensive travel time and cost to access diverse resources. A fine grain eliminates most specialization, but supports generalists that thrive multiple nearby land uses. To provide the benefits of both landscape types, a coarse-grain region with some fine-grain areas within it is considered to be the optimum design for nature and people(ibid). Such a design provides a wide range of land-use resources, limits transportation time and cost, limits the amount of polluted area, and provides for generalists, diversity, and specialization alike.

The emerald network concept of large natural and semi-natural patches connected by green corridors is especially useful in most urban regions. (Forman, 1995). The corridors include stream and river (blue-green ribbons), green ribbon, and string (patch), all of which are enhanced by having attached small green patches (pearls) (Forman, 1995). These connections are for the movement of people(local and hikers), wildlife (indeed most animal and plant species), and water in stream, canal, and river). Three emerald –network components seem most likely to persist in the face of ongoing urbanization(and climate change)(Forman, 1995):

♦ Large natural areas(because their size and integrity)

♦ River corridors(most rivers are too powerful to cover or permanently divert, and major infrastructure usually parallels a river)

♦ A string of pearls (by being a well-used path attached to neighbourhood parks, both providing political support)

2.4 Aesthetics

2.4.1 Traditional Aesthetics

The connection between scientific objectivity and the appreciation of nature dates back from the early 18th century. The theoretical expression that emerged on this subject was initiated by British aestheticians (van Ruijven, 2010). A tradition evolved that looked upon the natural world with an eye like the scientific one; subjective and distancing. This point of view leads to the idea of the sublime, in which even the most threatening natural elements could be appreciated from a distance. (van Ruijven, 2010)

About the picturesque, the first 18th century aestheticians, such as Addison, said that nature could better be appreciated when it resembled works of art. (Sabine van Ruijven, 2010)

"In eighteenth-century theory, the boundaries between aesthetic categories are relatively clear and stable...beautiful forms tend to be small, smooth but subtly varied, delicate, 'fair' in colour;....sublime forms, by contrast, are powerful, vast, intense, terrifying, and 'definitionless,'.... The picturesque is typically in the middle ground between the sublime and the beautiful...complex and eccentric, varied and irregular, rich and forceful, vibrant with energy."

(John Conron, 2000)

The "positive aesthetics" was initiated by Henry David Theoreau, and in the 19th century reinforced by George Perkins Marsh. Its essential belief is that all wild nature is beautiful and ugliness can only be found where man has intruded. This positive aesthetics still influences wilderness preservation and contemporary environmentalism in America today.(Calson, 2008)

From the positive aesthetics point of view, there seems to be a close correlation between the development of natural science and the appreciation of nature as described. The growth of scientific knowledge of our natural environment is accompanied by the comprehensibility and appropriate aesthetic appreciation of nature. At the same time, a connection can be made between the growth of the positive aesthetics and the growth of ecology. Ecology is not just about the scientific value of nature, though, but also emphasizes qualities such as unity, harmony and balance- ones that we find particularly aesthetically good (Calson, 1999). "Aesthetic experiences may thus lead people to change the landscape in ways that may or may not be consistent

with its ecological function. "(Gobster, 2007)

One of the main reasons that we have set aside certain natural areas as natural, state, and country parks is because they are considered beautiful. In the conservation and resource management arena, historically, natural aesthetic has, indeed, been much more important than environmental ethics. Many more of our conservation and management decisions have been motivated by aesthetic rather than ethical values, by beauty instead of duty. (Callicott,1992)

2.4.2 Ecological Aesthetics

"Ecology is not just about the scientific value of nature, though, but also emphasizes qualities such as unity, harmony and balance- ones that we find particularly aesthetically good."

- p.46, Allen Calson, 2008

To get a deep understanding of the interaction between human and natural environment in an aesthetical perspective, a research was did by Gobster (2007), which made an explicit explanation of the human-environment relationship.

Interactions

There are important reasons why considering aesthetics helps to anticipate landscape change and its environmental impacts. First, landscape aesthetics provides a critical linkage between humans and ecological processes. As humans, our sensory system is tied closely to our emotions, and of our emotions, pleasure has a fundamental influence on how we respond to the stimuli of our world. For homo sapiens, the aesthetic pleasure derived from landscape experience is both a reflection of evolutionary history and a key driver of contemporary environmental behaviour, including land use, development policies, and real estate markets. Second, aesthetic experience can drive landscape change. This approach to aesthetics characterized landscape management policy in many countries around the world for decades, but has more recently been criticized for emphasizing the visual enjoyment of natural-appearing scenery, encouraging what some have called the 'scenic aesthetic'. Third, attention to ecological quality can be influenced by the perceived aesthetic value of landscapes. Understanding how people perceive and experience the beauty of all landscapes is central to achieving public support of, and compliance with, ecologically motivated landscape change. (Gobster, 2007)

Fig. 2-6 Model of human-environment interactions in the landscape (Gobster et.al., 2007)

Disjuncture – Aesthetics-Ecology debate

While ecological knowledge can help foster an intellectual understanding of new management policies, such knowledge may not translate into aesthetic appreciation of ecologically beneficial landscapes.

What is aesthetically pleasing may or may not reflect ecosystem health. Conversely, ecologically healthy landscapes may not be aesthetically pleasing. Similarly, landscape management practices that effectively conserve water quality, protect soils or provide other important ecosystem services may not be seen as aesthetically pleasing. Yet, importantly, for all landscape types, people tend to interpret their aesthetic experience of landscape as providing information of ecological quality.

This 'ecological aesthetic' is motivated conform to the visual qualities associated with a pleasurable landscape appearance, and that this disjuncture can encourage ecologically damaging anthropogenic landscape change. An ecological aesthetics is, by definition, normative in that it asserts that it is desirable for humans to take aesthetic pleasure from landscapes that embody beneficial ecological functions. In this way, aesthetic experiences can promote and sustain healthier ecosystems, and thus indirectly promote human health and welfare. (Gobster, 2007)

2.4.3 Meanings, feelings and Aesthetic Evaluations of Landscape Design

According to Dmitri Karmanov's research (2009), the aesthetic experience is an outcome of a complex interaction between the characteristics of both the object of aesthetic evaluation and the evaluating individual. As in the aesthetic experience of art, the aesthetic experience of landscape design involves the perceptual exploration of physical properties of a designed environment: colours, shapes, texture, and formal organization. However, the aesthetic experience of landscape design is more involved and comprehensive than the experience of other art-forms. It includes the experience of sounds, odours, the play of light and shadow, wind and temperature.

The aesthetic experience of landscape design is enhanced by knowledge, as, for instance, the recognition of plants, the perceived meanings and narratives through which the physical properties of the environment are interpreted and evaluated, evoked associations and memories and emotional reactions.

An aesthetic experience manifests itself as a rewarding feeling that is accompanied by an attribution of value to the object that triggered it. Such a feeling is the out-

come of a multitude of experiences that were triggered in the process of perception and evaluation of landscape design. The reward that the experience brings about is the complex sum of rewarding qualities, for instance, the recognition of a favourite flower or the perception of symmetry or repetition. The aesthetic experience of parks and gardens, therefore, begins as a pre-semantic phenomenon that originates from our appreciation of the play of lines, shapes, colours and textures, odours, sounds etc. It is modified by knowledge, associations and individual preferences as well as perceived emotional reactions, for instance: spatial organization can contribute to feelings of uncertainty, comfort or curiosity. It is therefore practically impossible to provide a comprehensive account of all the potential triggers of an aesthetic experience.

One of the outcomes of this study is that the conceptualizing of beauty and aesthetic experience can only be meaningful when its interdependency with the related concepts of meanings, emotions, and experience is taken into consideration. It is only this kind of approach that can do justice to the dynamic character of aesthetic experience. As in Berleant's (1998) call for a new aesthetics that would 'resist the tendency of essentialist thinking, identifying single forces and factors for the illumination of the aesthetic process, such as emotion, expression, or meaning, and looks instead for complexities, for characteristic groupings of influences, interrelationships, contexts etc'.

Finally, the *"concept of beauty as a description of the rewarding experience brought about by the aesthetic evaluation of landscape design has no adequate synonyms. It can not be replaced by frequently used concepts as 'quality' or 'atmosphere' without loss of meaning. Quality can be achieved in the absence of beauty and the recognition of an atmosphere does not necessarily transform into an aesthetic experience. The concept of beauty describes the pleasure an aesthetic object gives to the mind and senses."*

– Dmitri Karmanov, 2009, 'feeling the landscape', p66

2.4.4 Summary & Reflection

By learning all these different viewpoints concerning aesthetics, I get more clear about the arousal of aesthetical feelings, but for me, some aesthetic theories go adrift from practical designs. What is assured is that some aesthetical senses are retrospectively derived from human appreciation of nature and these feelings are tightly linked to the natural experience including both sightseeing, smell, sound, tactility, etc. Here, I have two concerns about the contemporary aesthetics which also confused me for a long time: one is how do we define the term 'nature' in aesthetical

Pic. 2-4 Abandoned buildings full filled with natiral plants make residence feel insecure.

Pic. 2-5 Story of 'Mr. Ye loving dragon'

Mr Ye likes drawing dragons very much, which moves the real dragon in the sky who decided to visit his fan as a surprise. However when the dragon came real in-front of Mr. Ye, Mr. Ye was scared to death.

system; and the other one is to what extent can people accept 'nature' in their living environment.

Nowadays, there might be hardly a piece of soil that human never reformed, or tried to reform. The "wild nature" we see and define as in contemporary world, for example, national parks, forests, etc., is designed, installed, repaired or at least planned and maintained by human power. It seems that the only thing makes people consider it as nature is because it looks like and it composed of some natural elements and natural materials. In another word, or say frankly, the 'real nature' is died off since human occupied the earth, while the 'manipulate nature' is existed with the aid of science and human power. Aside from it, people may recognize a nature with considerations of history, size and species, which could be easily understood as we usually believe the national park established hundreds of years ago is more natural than a new backyard garden (Pic. 2-2 & 3).

Pic. 2-2 National Park of the Netherlands

Pic. 2-3 Typical Backyard Garden

Secondly, though it is appealing that bring nature back to the city, when nature comes in human living environment, fears and complaints arouse sometimes. Nature has sustainable communities of plants, animals and microorganisms that could self-sufficiently complete its inner circle without any extra human force. (Sabine van Ruijven 2010) However, some places full filled with wild-growing plants and insects, yet lacking of maintenance and monitoring are repellent to people and leave them an impression of insecure, wasted and wasteful. Hereby, one thing is clear that, to some extent, 'residence requiring nature' is just like 'Mr. Ye loving dragon' (Chinese idiom, Pic 2.4.3-5). It means what general residence love and need is the 'manipulated nature' instead of highly wild nature, to be strict, a group of people calling for nature's returning can only accept the wild nature in certain distance for occasionally enjoyment, but not in their daily life. From this point of view, to incorporate 'nature' into urban life, is a collaboration task for designers, planners and ecologists, to properly embed natural landscapes into people's living environment with a consideration of regional ecology, aesthetics, and social and cultural acceptance. Although fake, this could include creating a natural-looking covered environment with certain ecological functions beneath, in purpose of providing people aesthetic values as well ecological benefits.

2.5 THE BUSINESS SITE DEVELOPMENT

2.5.1 History of Dutch Business Site

Compared to other land-uses, business areas, over the last decades have relatively and absolutely grown the fastest in the Netherlands (figure 2.2). Between 1996 and 2002 in total about 379 km2 of rural land has been transformed into urban land. (Louw & Bontekoning, 2007)

According to the Nota Ruimte there is a demand for 23.000 ha. new business areas until 2020. The largest amount of existing and future planned business areas are Mixed-use (almost 90 percent) (Ibis, 2007). Mixed-use business areas can consist of a mix of different business types with the exclusion of heavy industry. (Louw, 2004; van der Gaag, 2004)

2.5.2 Current Business Site Phenomenon

The 'business site' can be similarly defined as the Snep's definition (2009), which is 'a planning term for an area by local, regional, and some case national authorities to accommodate multiple companies that produce, transfer or store goods'. Reviewing the Dutch industrial and urban planning development, since the first industrial revolution till now, industrial establishments move gradually from city core more towards city edge. At the meanwhile, because of the goods distribution and trades get more dominant, the term 'business site' replace the 'industrial site' more and more in general uses. As Louw et al.(2004) said, this choice for strictly mono-functional business site planning is nowadays a typical Dutch phenomenon.

They are often located at the border of the city touching rural areas; Business areas are often located adjacent to nature areas; Business areas consist of mono-functional land-use; Business areas have almost no relation with the context of the landscape and the related ecosystems

While, outside of the Netherlands as well, the planning of economic areas is often mono-functionally interpreted. Aging of sites has also emerged as a problem in business districts meant for small- and medium-sized enterprises (SMEs) in the United States. Although revitalization of these districts has a long history (Samli and Prell 1966; Strickland and Judd 1982), these days, just as in the Netherlands, 'sub-optimal quality' (of architecture, appearance, life span) is still in evidence in many business districts in the United States and elsewhere (Feehan and Feit, 2006)

Social Discussion

Business areas are seen as large consumers of landscape, destroying rural landscape and replacing it with a build area lacking spatial quality and connection to the surrounding landscape. (van der Gaag, 2004) In 2003 about 35 percent of the total workforce in the Netherlands was working at a business area. (Louw, Bontekoning, 2006). Although a substantial part of the Dutch population spends a lot of time at business areas, these areas lack the quality to provide people with a pleasant working environment. (van der Gaag, 2003, RIGO and van Beek, 1998)

2.5.3 Strategy

Business site usually leaves people an unsustainable or un-ecological impression, for it occurs in urban area with large vacant wasteful land and little greens. However, it is still on the discussion board that whether it should and could contribute to local and regional ecological network, as more and more projects, either implemented or not, try to prove its possibilities and availabilities. Sorts of strategies are dealing with this issue at different levels, for instance, 'sustainable land use planning' at regional level, 'careful industrial land use' at site level, etc. These strategies are mainly focus on preventing and mitigating the negative environmental impacts of business sites, however, the sustainable strategy is also about creating added values (Snep, 2009).

A sustainable strategy may include land management to improve provision of ecosystem services to humans (Constanza and Daly 1992). Indeed, urban ecosystems contribute to the quality of life of citizens by providing 'services' such as air filtering, micro-climate regulation, noise reduction and enhanced biodiversity (Bolund and Hunhammar 1999; Takano et al. 2002; Anderson 2006 in Effting, 2009). The fact that these economic areas are not yet considered to accommodate ecosystems and thus provide ecosystem services (Fig. 2-7-A). But more researchers like Robbert Snep, explored options and opportunities in planning, design and management of business sites to accommodate ecosystems as a source of ecosystem services to their surroundings (Fig. 2-7-B).
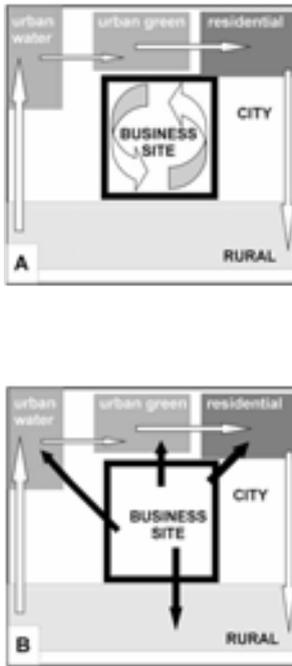
Figure 2-7: Snep's research conception (Snep, 2009)

2.5.4 Green Business Site

"The quality of the surroundings, (architectural) quality of built-up space and possibilities for ecological development of open space at the site are issues which are considered for this type of 'sustainable business site'."(Pellenbarg, 2002; Louw et al. 2004 in Effting, 2009) Different from the other sustainable business site - the eco-

logical industrial area which intends to reorganise production processes to prevent or minimize environmental damage, it more resembles the 'green business site' caring about surrounding landscapes and encironmental qualities, and regional ecological networks.
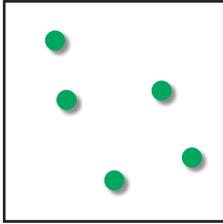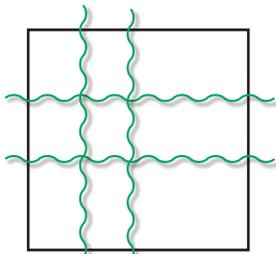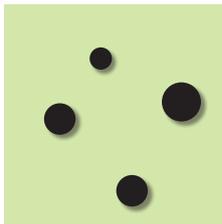
"The term 'green business site' refers to the characteristics of the surroundings, public space and overall spatial quality of the site."(Effting, 2009) According to the importantce of green structures in business sites, many different types of 'green business sites' could be distinguished. 'Natural sites' are business sites where nature conservation is a leading principle for the development of public space. Next, business sites where surrounding landscapes play a leading role in the whole design process are regarded as 'business site with landscape value'. Lastly, a business site at which vegetations and other green elements are used for decorating or improving the site design is called a 'dressed up business site'. (Kockman & de Kanter, 2001).

Ecological Potential of 'Green Business Sites'

When sustainability is interpreted in terms of site arrangements and organisation of the terrain itself, it is interesting to regard the potential ecological value of business sites. Considering interactions between human and natural systems, ecologists have concentrated on finding ways to reduce negative effects of human systems (Yang & Lay, 2004). With the disappearing of the traditional opposition between urban systems and natural systems, people have began to realize the ecological possibilities offered by urban green space (Breuste, 2004). Through researches, some foundamental theories in urban ecology offer valuable principles when designing a ecological business site. For instance, larger areas support more species; more remote or isolated areas are less accessible to immigrating species, resulting in a lower level of species richness.(Breuste et al., 2008).

Aside from these, some concrete efforts to integrate ecologic concepts into development of urban systems are paid, though more empiric research is required to be done to better approve the value of integrating ecological conceptes into urban system development, as several authors indicated. (Breuste, Niemelä, & Snep, 2008; Snep & Ottburg, 2008; Yang & Lay, 2004)

"It is of importance that natural areas are connected to a larger intercnnected system of ecological corridors, stepping stones and large habitat areas. Natural areas at business sites must be large enough to support a meta population of target species and these areas must be interconnected to increase opportunities for interaction" (Effting, 2009). While, if the size of the business site is not that large, will it lose ecological values? The answer is depended. Firstly, if a business site is isolated, we can consider

Fig. 2-8 Dressed up business site

Fig. 2-9 Business site with landscape value

Fig. 2-10 Natural Sites

it as a step stone for the regional ecological network by utilzing the empty land and recreating more green space with avaliable constructional elements for fauna and flora's tranfer. Secondly, when small business sites are fragmented but still linked each other somehow, we should consider them as a unity when designing the inner green structure and probably provide various passages and habitats.

Relatively, Snep et al. (2009) present the following possibilities for increasing biodiversity at business sites (Fig. 2-11-15):
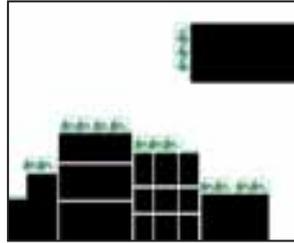
Fig. 2-11 Green Roof:
Roofs of company buildings offer great potential for habitat development.
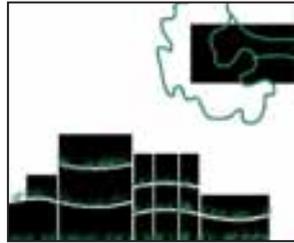
Fig. 2-12 Ground level green:
All ground level green space is developed for "biodiversity purposes" (only use native plants, create flower rich grasslands, etc.).
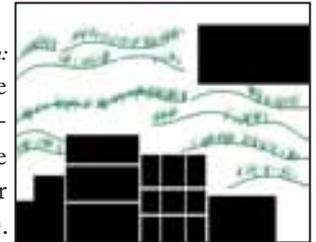
Fig. 2-13 Vacancy as habitats: Vacant lots of buildings are used to create habitat until these lots are needed for construction.
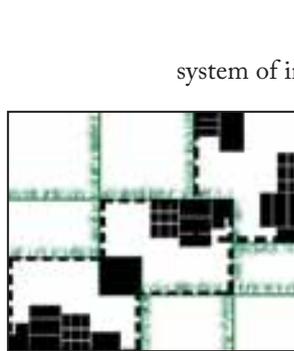
Fig. 2-14 As stepping stone:
A large open green area is created, which is open to the public. This large green area is used as a stepping stone within a context of a larger system of interconnected habitat patches.
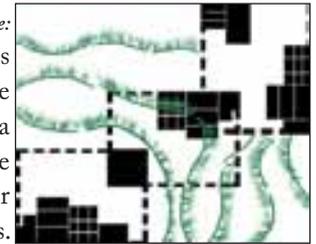
Fig. 2-15 Linear green:
Linear elements at the business site are used to create ecological corridors, again as part of a larger ecological system of interconnected habitat patches.

The Added Value of Green Business Site

Through the research of Effting (2009), he proved that green business sites can offer added value to firms through a sustainable image. It depends on firm characteristics whether firms benefit from a sustainable image as a location factor and whether firms are willing to invest more in a location on a green business site. If firms benefit from a sustainable image in their value adding process they may be willing to invest in a location on a green business site. Large (inter) national firms which are active close to consumer markets ('specialized firm activity') can be willing to invest more in a location on a green business site. This means that in general few firms are willing to make higher investments in a location on a green business site. Development of a green business site can be a way of creating a business site which distinguishes itself from other business sites. So, a business site with a sustainable image has a competitive advantage over other business site, which can aid in attracting firms to be located on that site. Hence, development of a green business site does not result in higher revenues for a real estate developer compared to conventional business sites, but it results in a higher competitive advantage. (Effting, 2009)

2.6 Urban Agriculture & CPUL

2.6.1 Civic Agriculture in City

Urban Impact on Local Food

In order to intergrate agriculture into an urban environment, it is necessary to understand the relationship between the two. According to a related research done by Wouter Holtslag (2010), there are several conclusions well illustrating the urban-farming reactions in a Dutch context. Importantly, the presence of urban activities plays a role in influencing the development of local food production, in ways of both negative and positive. (Fig. 2-16) On one hand, local food systems are dependant on looking for a market for sale, from which point, an urban area with high consuming population is preferred. On the other hand, the presence of urban activities stress agricultural production. For instance, the rising land price makes it difficult for farmers to expand their activities in city. Beside, some other aspects also affect the development of local food systems in the Netherlands, like, the current trend in planning compact cities, new neighbourhoods facing towards the city centre, urban development strictly separated from the rural landscape, etc.. This has led to a strict division between urban and rural activities. But, in order to come to a more successful local food system, urban and rural activities should be mixed.

Specially in the Netherlands, 4.7ha productive land is required per person to support annual needs (WWF, 2005). Food supplies to cities are an important components of the ecological footprint. "The impact of our transport-dependent food system can be expressed in food miles (food travels from where it is grown to where it is purchased or consumed by the end user)." (Wouter Holtslag, 2010)
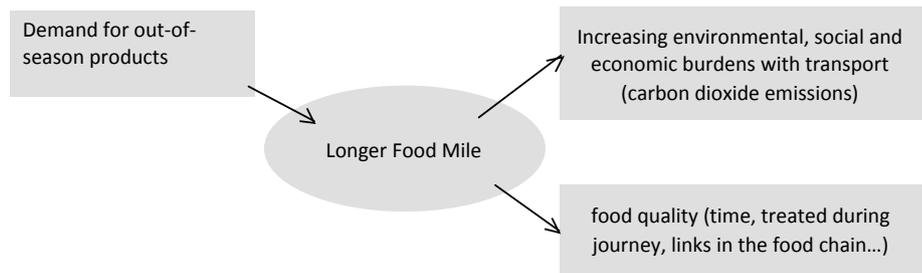
Fig. 2-16 The city's impact is far beyond its physical boundaries (Deeltra & Girardet, 2000)

Where we live is where we grow

'Prior to the industrial revolution, the absence of sophisticated, high capacity transport systems and of preservation techniques such as refrigeration, inevitably meant that people had to grow food close to where they lived. Consequently, for thousands of years, built and cultivated environments co-existed: Homes, markets, public buildings and sacred places were interspersed with kitchen gardens, farms and common gazing land delivering food for the settlement's population.'

– Lloyd Wright, 1970

Pic. 2-6 Appealing for transforming urban wasted space into vegetable garden

Within Lloyd Wright's proposition, we ding a vision that resonates with current architectural thinking about the essence of and generative power of the concept of landscape: "Architecture and acreage(agricultural land) will be seen together as landscape, as was the best in antique architecture, and will become more essential to each other.'(Lloyd Wright, 1970) As an idea, it frees us from distinctions between urban and suburban, and also helps to articulate a vision of a city driven by Ecological Intensification, where productive landscapes can stand equal to traditional development in the built environment. (Howe, Bohn & Viljoen, 2005)

The significance of urban agriculture within contemporary open urban space is highly variable according to the city examined(Bohn and Viljoen, 2005). In developing countries, urban agriculture is largely driven by economic need, while in developed countries, it is more likely to have arisen in response to social or recreational needs and desires. In Europe, interest in allotment holding, urban farming or community gardening has constantly increased in recent years, with a resulting resurgence of urban food growing. (Howe, Bohn & Viljoen, 2005)

In most European cities, movements towards the revitalization of city centres have pushed the importance of open urban space to the front of public awareness. The resulting open urban open spaces satisfy an immense variety of desires and programmes. Their themes are as different as their clients, occupants or locations, culminating in a multitude of approaches and solutions. 'Cities and towns are now full of fantastic new and old urban squares, urban parks, urban riverfronts, urban stages, urban forest and urban beaches. There are not (many) urban fields yet.' (Bohn and Viljoen, 2005)(Pic. 2-6 Poster appealing for "transforming wasted urban space into vegetable garden" movement,)

2.6.2 Introduction of CPUL

The CPUL concept grew out of design research exploring the role of urban agriculture within urban design and was first designed for and then defined by Bohn&Viljoen Architects respectively in 1998 and in 2005. (Bohn & Viljoen, 2005)

The concept of CPUL City provides a strategic and associative framework for the theoretical and practical exploration of productive landscapes within contemporary urban design. It describes the vision for a sustainable urban future based on the planned physical and societal introduction of continuous productive urban landscape (CPUL) into existing or emerging cities. CPUL advocates the coherent introduction of interlinked productive landscapes into cities as an essential element of sustainable urban infrastructure. (Bohn & Viljoen, 2005)

Central to the CPUL concept is the creation of multi-functional open urban space networks that complement and support the built environment. Key features of CPUL space include urban agriculture, outdoor spaces for people (leisure and commercial), natural habitats, ecological corridors and circulation routes for non-vehicular traffic. Its network connects existing open urban spaces, maintaining and, in some cases, modifying their current uses to reducce negative environmental impact. The concept recognises that each site and city will present a unique set of conditions and competing pressures informing the final shape and extent of the CPUL. CPUL City visualizes how this productive landscape could enhance a city's social, environmental and economic performance by questioning issues as diverse as urban lifestyles, air quality and agricultural yield. (Bohn & Viljoen, 2005)

The CPUL concept grew out of three discussions of international issues (Bohn & Viljoen, 2011). One was the design debate focusing on infrastructure, exemplified by the notion of infrastructural urbanism; the second was an interest in reducing the environmental impact of architecture, influenced by ecological footprint research; and the third was the revived discussion about public open space which confirmed urban landscape as major contextual and lifestyle component for the design of a sustainable contemporary city. This resulted in the CPUL City concept being underpinned by a number of robust and interrelated social, environmental, economic and design arguments, for what would amount to a radical change in the configuration and programming of open urban space within an overarching desire to find more self-sustaining ways of living.

2.6.3 Spatial Types of CPUL

The size of an urban productive land is closely related to its location in city and farming purposes. Varied by size, the urban productive lands could be generally characterized into several spatial types: private garden, single farming plot, community gardens, gathered allotments, high yield urban gardens. According to a research of CPUL in Havana, Cuba, Caridad and Sanchez (2003) summarized the characteristics of those CPUL types, in which the land types are illustrated from the per-

	Size	Location	Before-use	Ownership	Farmers	Use of Crops	Yield
State farms for producers consumption	about 1 hectare	Peri-urban			Voluntary cultivation by workers	feed workers, support care-centers/eldly homes/other social facilities, surplus sold to workers	0.34 kg/m^2·yr (1996) 0.6 kg/m^2·yr (2000)
Community gardens (plots)	<1,000m^2	urban or peri-urban	unexploited area within eucational or health facilities	State owned, or private owned	one person or family	to supply cultivator or family	1-2 kg/m^2·yr (1996) 8-12kg/m^2·yr (2000)
Community gardens (intensive cultivation)	>1,000m^2, <3,000m^2	urban or peri-urban		state owned or private land	one person or family, several families or co-operative	feed producers and for trade	1-2 kg/m^2·yr (1996) 8-12kg/m^2·yr (2000)
Urban Community garden	>2,000m^2, <5,000m^2	vacant urban sites	not suitble for direct agriculture use, require imported soil and containers	state owned	groups of individuals formed into a collective. institutional technical support and advice	produce for trade and small-scale consumption by producers	3 kg/m^2·yr (1996) 20 kg/m^2·yr (2000)
High yield urban gardens	> 10,000m^2	vacant urban sites	not suitable foe direct agriculture use, soil and containers for growing brought in	government	commercially viable work centres or cooperatives	produce for sale to the population and tourist sector	12 kg/m^2·yr (1994) 25 kg/m^2·yr (2000)

Tab. 2-2 Spatial types of CPUL (Caridad and Sanchez,2003)

spective of size, location, 'farmers', use of crops, and yield. (Tab. 2-2) Although the research was conducted in Cuba, and the examples are influenced by local conditions, some general issues still could be established and internationally relevant conclusions can be made as well.

2.6.4 Qualities of CPUL

"The most important qualities of a CPUL are, *spaciousness*-as its inheritance, *occupation*-as its present, and *ecology*-as its gift to future." (Bohn & Viljoen, 2005)

'*Spaciousness* describes the space itself, its extent, its width and breath.' (Bohn & Viljoen, 2005) It means more than size, but size is its basic element, its starting point. Size is a quality but not a judging criteria, it is considered as influencing the space's designation and its ability to accommodate certain programmes and occupants. Sense of openness, though connected to size, reflects the manipulation by providing a more sensual, qualitative measure for the spatial success of open urban space. It relates to the occupation and function of space as well as to its position in the urban grid and its connectivity. Visual stimulation refers back to spaciousness, as a visually stimulating space is more likely to be judged as appropriately sized.

'*Occupation* is one of the prime concerns when planning contemporary open urban space.' (Bohn & Viljoen, 2005) A more holistic view of current occupation of open space could include qualitative and longer-lasting criteria, such as education, health, potential for communication/integration or personal enrichment. Open urban spaces focusing that way will develop strong local interactions enabling the space to attract and retain local people. What should be noticed is that, this priciple is quite responsive to the user's specific design (Referring Chapter 2.1.4).

Occupants appear less interested in space's size or location and more in its potential to let them integrate and participate. It is useful to look at the variety of occupation on offer, not only to measure the success of open urban space to continuously attract people, but also to establish how the logistics of large user numbers are managed and whether any income can be generated from that.

'In our context, '*ecology*' gives weight to open urban space by connecting present design and programme to a widely desired and sustainable future.' (Katrin Bohn and Andre Viljoen, 2005) It also proposes a strategy to manage that process.

According to Katrin Bohn and Adre Viljoen, 'CPUL could be regarded similar to urban gardens as both will follow particular planting sequences and patterns. CPULs will most be larger than urban gardens and not as contained by user-specific or or-

namental design.' This emphasizes that, CPULs is closely related to user-specific or ornamental landscape designs, so are urban gardens, but not limited to it, since it is also interweaved with agriculture, human ecology, socio-economics, energy, etc..

In my opinion, in order to promote this new urban-landscape pattern, it is indeed important to apply criteria from user-specific and ornamental respects in designing process as primary principles. The aesthetical experience is a fundamental factor deciding landscape's viability, and it is always ranked top in assessing the landscape quality. Although, it is difficult to compare the aesthetics and function which comes first in attracting more visitors. But one thing is for sure that only when design put users' preferences and aesthetical aspects in consideration, it will be welcomed and popularized among the various urban public spaces.

As the CPULs could act as an urban green system in flexible scales, with its large-proportion plant/crop plots in dominance, its valuable social functions which attracting people from different backgrounds to come to this land and work/play together, and its considerable productivity which helps to meet the local demands of eco-foods and mitigate wasteful energy consumption, this landscape forms should be widespread as a new urban texture.

2.6.5 Design Criteria for CPUL

Specifically, derived from these three qualities, there is a set of design criteria concluded by Katrin Bohn and Andre Viljoen (2005) for the Continuous Productive Urban Landscapes.

Size: Through design, the sensed size of open urban space can become very different from its physical size: topography and proportion can visually enlarge open space, high and/or dense boundaries reduce it.

Local interactions: Space allowing encounters will both attract occupants and keep them coming back. As soon as open urban space allows a certain determination, it will be used by varieties of people, engaging in varieties of interactions. New quality will be reached when interactions between working, trading and shopping people will happen alongside the leisure and service activities.

Senses of openness: means both physical openness to the wandering/moving through space and sensed openness to people's wandering eyes and ears. The physical openness is determined by its physical boundaries. Sensed openness depends on people's personal experiences as well as on the design of the space.

Diversity of Occupation: Density of activities is a measure for the success of open urban spacer in that it create and maintain local interest, identity and satisfaction. Occupation through a typical use/user group can happen once or repeatedly.

Inner-city movement: Spaces that are easily accessible, easy to cross and/or inviting to sit, rest, wander are bursting with visitors, shoppers, traders and local residents. Quality inner-city movement is strongly linked to pedestrians/cyclist's access to individual pieces of land.

Economic return from ground-use: People's ability to generate income to live off is necessary and deeply satisfying. Open urban space that has designed areas for agricultural production has gained extra occupational and spatial quality. Reflectively, significant economic return exists alongside the sustainable development and better protection of open urban space

Urban nature: 'nature' briefly means 'un-urbanity'. Urban nature attempts to measure the presence of such 'natural' features in urban environment: abundance of vegetation, water, ecological planting, habitats for small wildlife.

Persistent visual stimulation: is crucial to maintain peoples interest, to challenge visitors. To guarantee visual stimulation, movement, change are needed. In case of urban open space, lighting, weather, the flow of urban life, vegetation's changing over seasons, etc. will continuously influence people's optics. A combination of everyday activity and event might be the most successful, catering for a large variety of users and avoid mono-stimulation.

Environmental delight: The qualities that leads most people to open space of similar reasons are called environmental delight. Apart from the existence of vegetation water, weather and/or animals, people, in an environmental senses, seems to search calm, clean-aired, biodiverse and rich open space.

Variety of occupants: inviting a variety of occupants is a quality of open space seeked by city councils users themselves for its potential to overcome societal boundaries. The subtle, open, transgressing design of a space's non-financial boundary and its functional arrangement will determine its lasting attraction to a diverse usership.

2.6.4 Permaculture and Productive Urban Landscape

Permaculture derives from Bill Mollison's vision of permanent agriculture (Mollison, 1992). As a technical tool, permaculture can practically support the CPUL and make it sounder in energy and ecological perspectives.

Permaculture places more emphasis on cycling energy and resources locally; it places greater emphasis on the maximisation of inter-connectedness; it is creative rather than regulatory; it emphasize the use of perennials; self-regulatory systems are encouraged; and community trading structures take a clear priority over global trading. (Sherriff, 2005)

Bill Mollison also devised a list of key principles by which this is effected, which are based on the example of nature. These are espoused in his 1988 'designer's manual' (Pepper, 1996 in Sherriff, 2005):

1. Work with nature

2. All nature plays a part in working land. e.g. worms aerate the soil

3. Use minimum effort for maximum effort

4. Increase yields, i.e. that it should be possible to increase the yield of a permaculture system through improving cultivation methods

5. Output become inputs

6. Each function should be supported by many elements

7. Each element performs several functions

8. Relative location, i.e. each element within the system should be located in the place most beneficial for the whole system.

Robert Hart's forest garden in Shropshire is an often used exemplar, taking as it does the inter-connectedness of the forest and redesigning it to create an 'edible system'. Whitefield describes the elements, chosen carefully to maximise their interconnectedness: a canopy of trees, a lower layer of dwarf fruit trees and nut bushes, a shrub layer of soft fruit, a layer of perennial herbs and vegetables at ground level, plus root vegetables and climbers. (Whitefield, 1997)

As Whitefield observed, each layer comes into leaf at different times of the year – the herb layer in early spring, followed by the shrubs, and lastly the trees – so that, through careful selection and placement of elements, the greatest possible use is made of the available natural resources. The dame can be said of the soil resource, since the plants roots feed at different depths and each has a slightly different nutrient requirement. The cyclic nature of the ecosystem (principle 6) is also reflected, with some plants needing specific nutrients for growth, and some returning those same nutrients to the soil (principle 5). The system is also relatively self-maintaining, as it uses perennial plants (principle 3).

Permaculture will often look like organic agriculture, and the end result of a permaculture may qualify for organic certification, but there are a number of important differences. Organics is a production method: permaculture is an approach to design and production. (Sherriff, 2005)

2.7 Summary - Qualifying Urban Landscapes with CPUL

After a general introduction of the fore components, it is necessary to find a link of them and to explain the reason why I picked them up. As shown in the chart (Fig. 2-17), the main developing direction of traditional business site is to accomplish the transformation from out-date mono-functional space into flexible multi-functional space. Which means, the new impression of business site should be compatible for various human activities and sustainable for future changes. Landscape as a container embracing both constructions, human beings and natural lifes, is right at the innovative point accompanying with the urban planning and design to be more resilient. The CPUL concept emerged as a physically and socially sustainable strategy to cope with all these assumptions. More specifically, permaculture could be a main tool to implement CPUL in real cases.
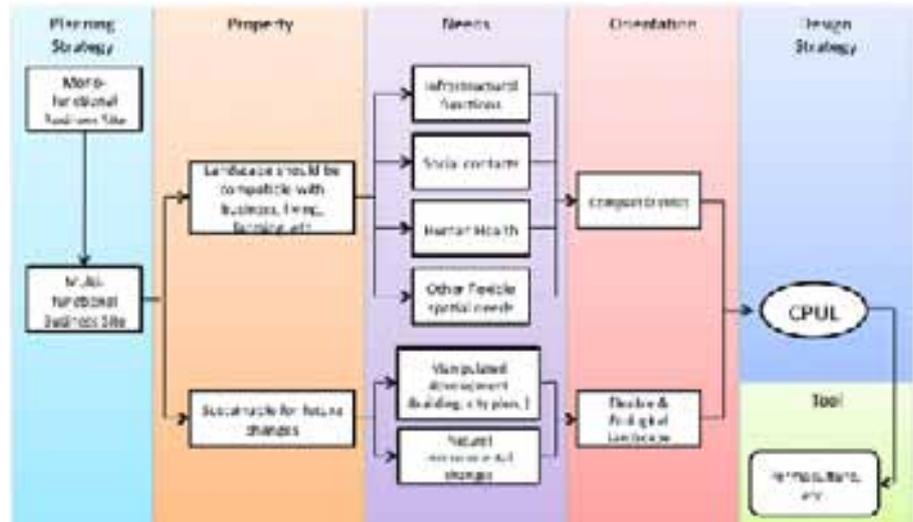
Fig. 2-17 Redevelopment Requirement of Amstel-III and its relation with CPUL

To achieve the overall scheme - a general improvement of urban environmental qualities, five objectives for urban landscape design should be reached, as a cretieria for evaluating the design. (Thomas Juel, Morten Daugaard, Tom Nielsen, 2010)

Appropriation (Sieverts)

An important quality in relation to urban landscapes is that people can interact with their environment and its material qualities. Such interaction is essential if urban landscapes are to function as learning environments and to be perceived aesthetically (rather than anaesthetically).

Without this aesthetic relationship, fragmented urban landscapes cannot become an object of concern and responsibility. (Sieverts, 2008) In order to enable people to feel 'moral ownership' of the land, to identify with it, urban landscapes should be open towards a certain degree of self-organisation.

Cohabitation (all, and especially Sieverts and Secchi and Vigano)

Another important quality in relation to urban landscapes is the ability to 'house' the great variety of lifestyles, cultures, activities and interests that characterise today's democratic societies. Differences often cause conflict and lead to the formation of enclaves. In order to support cohabitation, urban landscapes should blend different urban environments at the appropriate scale and contain 'zones of negotiation'.

Connectivity (Sieverts, Ascher, and Secchi and Vigano)

Interconnection between the different elements in urban landscapes is essential if they are to function as coherent domains reflecting common interests. This becomes increasingly important as urban landscapes accommodate both global elements that follow global rules and local elements that serve the living and working worlds of the local area. (Sieverts, 2008) Connections that function across scales or levels of influence and double coded zones that work as 'glue' between different elements have the capacity to support the connectivity of urban landscapes.

Diversity (all, and especially Ascher and Secchi and Vigano)

In urban landscapes, diversity can be considered an important quality as it reflects the ability to accommodate both a rich variety of living species (biodiversity) and people with different cultural and socio-economical backgrounds (social diversity). Urban landscapes could support biodiversity if urban processes and natural processes were better integrated and more attuned to each other. To support social diversity, urban landscapes should contain a mixture of different types of accommodation at the appropriate scale and a high level of accessibility for all income groups.

Porosity (Secchi and Vigano)

Secchi and Vigano use the term 'porosity' to explore and question how different

spatial structures can absorb movement and change: "Porosity varies in different materials, and is a function of their make-up, structure, form and design." (Secchi & Vigano, 2009) Porosity contains and combines two sets of objectives: reducing barriers in urban landscapes, and improving their permeability in order to ensure unhindered flow for pedestriansand cyclists as well as flora and fauna. The overall purpose is to maintain an openness and "availability towards changing collective and individual rhythms." (Vigano 2007)

8 Concrete Design Concepts

However, these five objectives are quite abstractive, and to make it explicit, eight concrete concepts were generated to qualify urban landscape designs (Thomas Juel, Morten Daugaard, Tom Nielsen, 2010).
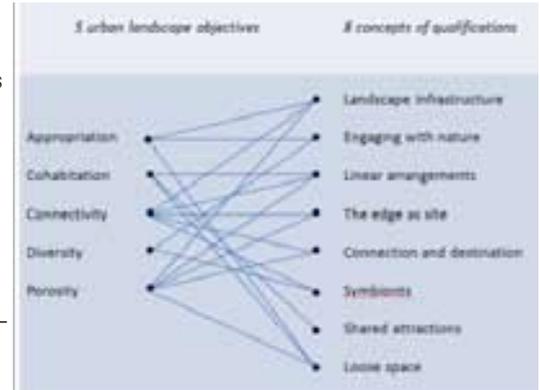
Fig. 2-18 From five urban objectives to eight design concepts (Made on basis of researches by Thomas Juel, Morten Daugaard, Tom Nielsen, 2010)

♦ Landscape infrastructure: This is based on the idea of landscape as a medium with the capacity of connecting and supporting a great variety of places, people and activities in urban landscapes across multiple scales or levels of influence.

Working with landscape infrastructure as a concept could be about linking existing landscape elements, from private gardens to green corridors, into larger structures or networks on a regional scale, or using afforestation in site preparation process to maximise the 'coastline' between built-up and un-built areas, avoiding isolated landscape elements and mono-functional landscapes.

♦ Engaging with nature: The concept of engaging with nature is about revealing and embracing natural elements and their process in urban environments and exploring their aesthetic potential. Instead of focusing on formal and visual qualities alone, it becomes important how urban landscape works and how its natural processes are embedded.

♦ Linear Arrangements: The basic idea is that linear arrangements maximize the contact area or interface3 between the different entities and increase their opportunities to interact without compromising their functional integrity.

By stretching and aligning different domains or systems of spaces, their boundaries become

weak and more porous, making it easier to move with less friction from one activity or domain to another. Apart from improving porosity, the weak boundaries associated with linear arrangements also promote some beneficial interactions, for instance, sharing facilities or functions, buffer for another in times of pressure, mutation between different programs that diversify urban lifes.

♦ The edge as site: Edges can belong to several domains at once they also can benefit from different sets of qualities.

Working with the edge is a balancing act; it is about creating edge conditions with the capacity to hold uneven or conflicting parts together and articulating their contrasts in ways that benefit each of the parts involved. It is also about considering edges as a potential network of connections between increasingly insulated and isolated zones or enclaves.

♦ Connection & destination: It means spaces with the capacity to function both as connection and destination.

Working with this concept can be considered an attempt to add qualities to the 'space of flow' (castells, 1966) through an intelligent organisation of different programmes and spaces with public access and appeal.

♦ Symbionts: This is about the combination of different architectural programmes, building typologies and structural logics in ways that create symbiotic relationship.

Working with the concept of symbionts is a way of improving the overall diversity and connectivity in urban landscapes and opening up to the creation of hybrid forms, which combines qualities from well-known elements of urban planning and design.

♦ Shared attractions: Central to this concept is the idea of 'democratic' use – maximizing he number of people who could enjoy a certain space or place. Ideally, one kind of use should not hinder the others, meaning that intelligent ways of organising spaces are essential to the concept – creation niches and nested spaces could be one strategy.

♦ Loose space: It aims to make room for people and activities that have a tendency to diverge from the standard repertoire of the dominant middle class.

Working with loose space involves leaving spaces open to the imagination of their actual users, creating room for many different groups as possible, including emerging youth cultures and other 'urban tribes' (maffesoli , 1996).

3 Case Study & Reference Study

3.1 Shanghai Houtan Park

Designer Turen Landscape

Project Location: Shanghai, 2010 Shanghai Expo Park, China

Project Size: 14 hectares

Duration of Design: January ,2007, October ,2009

Date of Complete: 2010

Client: Shanghai World Expo Land Development Co., Ltd.

Project Statement

Built on a brownfield of a former industrial site, Houtan Park is a regenerative living landscape on Shanghai's Huangpu riverfront. The park's constructed wetland, ecological flood control, reclaimed industrial structures and materials, and urban agriculture are integral components of an overall restorative design strategy to treat polluted river water and recover the degraded waterfront in an aesthetically pleasing way. (Fig. 3-1)(ASLA, 2010)

Project Narratives

Objectives and Challenges

The site is a narrow linear 14-hectare (34.6 acre) band located along the Huangpu River waterfront in Shanghai, China. This brownfield, previously owned by a steel factory and a shipyard, had few industrial structures remaining and the site was largely used as a landfill and lay-down yard for industrial materials.

Objectives: The objective of the park design was to: create a green Expo, accommodate for a large influx of visitors during the exposition from May to October, demonstrate green technologies, transform a unique space to make the Expo an unforgettable event, and transition into a permanent public waterfront park after the Expo.

Challenges: The first challenge was restoring the degraded environment. The site is a brownfield littered with industrial and construction debris both on the surface and buried throughout the site. The water of Huangpu River is highly polluted with a national water quality ranking of Lower Grade V, the lowest grade on a scale of I-V and is considered unsafe for swimming and recreation and devoid of aquatic life. The eminent site design challenge was to transform this degraded landscape into a safe

Fig. 3-1 Site of Shanghai Houtan Park
source: www.turenlandscape.com

All the pictures and figures, are from www.tunrenlandscape.com

and pleasant public space.

The second challenge was to improve flood control. The existing concrete floodwall was designed to protect against a 1,000-year flood event with a top elevation of 6.7 meters (22 feet), but it is rigid and lifeless. The 2.1 meter (6-foot) daily tidal fluctuation creates a muddy and littered shoreline and is currently inaccessible to the public.

A conventional retaining wall would continue to limit accessibility and preclude habitat creation along the water's edge, so an alternative flood control design proposal was necessary. The third challenge was the site itself. The area is long and narrow locked between the Huangpu River and an urban express way with water frontage is over 1.7 kilometers (one mile) in length but averaging only 30-80 meters (100-265 feet) in width.

Design Strategy

Regenerative design strategies used to transform the site into a living system that offer comprehensive ecological services included: food production, flood, water treatment, and habitat creation combined in an educational and aesthetic form. (Fig. 3-2) The site is destined to be an innovative demonstration of the ecological culture for the 2010 Expo.
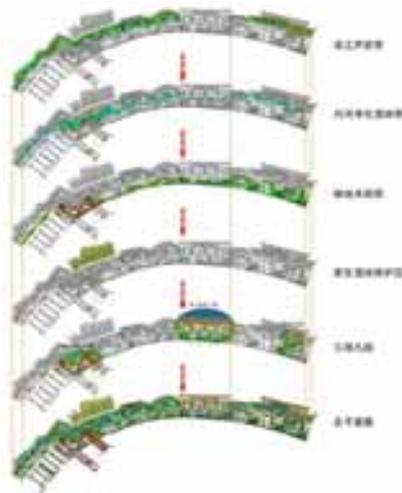
Constructed Wetland and Regenerative Design

Through the center of the park, a linear constructed wetland, 1.7 kilometers (one mile) long and 5- 30 meters (16.5 – 100 feet) wide was designed to create a reinvigorated waterfront as a living machine to treat contaminated water from the Huangpu River. Cascades and terraces are used to oxygenate the nutrient rich water, remove and retain nutrients and reduce suspended sediments while creating pleasant water features; Different species of wetland plants were selected and designed to absorb different pollutants from the water. Field testing indicates that 2,400 cubic meters (500,000 gallons) per day of water can be treated from Lower Grade V to Grade III. The treated water can be used safely throughout the Expo for non-potable uses, and save half a million US dollars in comparison with conventional water treatment.

The wetland also acts as a flood protection buffer between the 20- and 1000-year flood control levees. The meandering valley along the wetland creates a series of thresholds creating visual interest and refuge within the bustling world exposition with opportunities for recreation, education, and research. The terrace design of the wetland alleviates the elevation difference between the city and the river, safely reconnecting people to the water's edge. Additionally, the existing concrete floodwall was replaced by a more habitat friendly riprap that allows native species to grow

Fig. 3-2 Strategic layers

Pic. 3-1

Pic. 3-2

Pic. 3-2

Pic. 3-4

Pic. 3-5

Pic. 3-6

along the riverbank while protecting the shoreline from erosion.

Memory and Prophecy

Overlapped in the matrix of ecologically regenerated landscape are layers of agricultural and industrial past of the site and future of the post-industrial eco-civilization. Inspired by the fields of Chinese agricultural landscape, terraces were created to break down the 3-5 meter (15-18 foot) elevation change from the water's edge to the road, and to slow the runoff directed to the stream in the constructed wetland. These terraces are reminiscent of Shanghai's agricultural heritage prior to industrial development of the neighbourhood in the mid 20th century. Crops and wetland plants were selected to create an urban farm allowing people to witness seasonal changes: the golden blossoms in the spring, splendid sunflowers in the summer, fragrance of the ripened rice in the fall, and green clover in the winter. It provides a premier educational opportunity for people to learn about agriculture and farming within the city. (Pic. 3-1)

The terraces enrich the landscape along the wetland by creating spaces that encourage visitors to enter the living system through the field's corridors and experience the agricultural landscape and wetland firsthand. The paths, like capillaries of a sponge, absorb and pull people to circulate through the park. (Pic. 3-2)

The industrial spirit of the site is celebrated through the reclamation of industrial structures and materials. Shanghai is the birthplace of China's modern industry and the iconic structures that remained onsite have been transformed into hanging gardens and overlook platforms. The reclaimed steel panels hail the site's former industrial spirit. Situated throughout the wetland valley, the folded steel panels are used to frame views of Shanghai's skyline and highlight the industrial past. The materials are reconfigured to create artful forms, new paving material for the boardwalk, and shelters. (Pic. 3-3)

Path Network

An ecologically recovered landscape, urban agriculture and industrial spirit are the three major layers of the park, woven together through a network of paths where visitors are educated about green infrastructure within a lushly restored recreational area. The pedestrian network is composed of a main loop, a series of perpendicular roads bisecting the wetland and a multitude of footpaths leading through the terraces. This network ensures seamless connections between the park and its surroundings, encourages access within the site that not only effectively accommodates the massive pedestrian flows expected during the Expo, but ensures a pleasant and

accessible public park at the human scale afterwards.(Pic. 3-4-6)

Numerous platforms and enclosed 'containers' are designed as the nodes on the pedestrian network, including the 'hanging garden' transformed from a factory structure and the landscaped dock. These platforms and containers are integrated into the pedestrian network to create larger expanses where small groups can gather. Groves of bamboo and Chinese Redwood trees act as screens along the paths to break up the spaces and the enclosures surrounded by trees are used to exhibit modern art and

Fig. 3-3 Birdview of HoutanPark

industrial relics found onsite.

Summary

Houtan Park demonstrates a living system where ecological infrastructure can provide multiple services for society and nature and new ecological water treatment and flood control methods. The post-industrial design demonstrates a unique productive landscape evoking the memories of past and the future of the ecological civilization, paying homage to a new aesthetics based low maintenance and high performance landscapes.

3.2 Rooftop Haven for Urban Agriculture

Hoerr Schaudt Landscape Architects,

Projects Location: Chicago, USA

Duration of Design:

Date of Complete:

Client: Gary Comer Youth Center

Project Statement

The Gary Comer Youth Center Roof Garden is an after-school learning space for youth and seniors in a neighbourhood with little access to safe outdoor environments. Last year alone, it produced over 1,000 pounds of organic food used by students, local restaurants and the center's café. Sleek and graphic, it turns the typical working vegetable garden into a place of beauty and respite.

Project Narrative

"This project is so simple and straightforward and is clearly a good collaboration between landscape architect and architect. It is redeeming."

—2010 Professional Awards Jury of ASLA

Pic.3-7 Bird view of the site

Located in Chicago's Grand Crossing neighbourhood, the Gary Comer Youth Center offers a safe, welcoming after-school space for indoor activity. Its 8,160-square-foot green roof is a model for using traditionally underutilized space for urban agriculture and exceptional in its balance of an aesthetic vision with practical needs. The garden provides the crowning touch to an award-winning building recognized for its bold architecture.(Pic. 3-7)

The landscape architect worked closely with the architect and donor to develop a vision for a green roof to include a flower and working vegetable garden, and suggested that the center employ a full-time garden manager to enhance educational program development and manage maintenance. The result is a garden used in extremely creative ways for horticultural learning, environmental awareness, and food production. (Pic.)

All the pictures and figures, are from the website of ASLA

While reducing climate control costs and providing an outdoor classroom, the green roof is able to withstand enthusiastic children digging for potatoes and carrots with garden tools. Soils 18–24 inches deep allow for viable food production, including cabbage, sunflowers, carrots, lettuce and strawberries. Sharp differences between

Pic. 3-8 Over-view of the rooftop 1

Pic. 3-9 Over-view of the rooftop 2

Pic. 3-10-12 Children plant vegetables after school

ground temperatures and those on the roof mean that the rooftop is in a different

climate zone and can be utilized throughout the winter. The resulting garden, only three years old, is still evolving.

Located on the second floor over the center's gymnasium, the garden is surrounded by the circulation corridor and classrooms of the third floor. Floor-to-ceiling windows transform this working garden into a highly graphic viewing garden as students move from one classroom to another. Plastic lumber made from recycled milk containers forms pathways within the garden that align with the courtyard garden's window frames. Metal circles scattered throughout the garden serve as elements of artistic expression even as they function as skylights, bringing outdoor illumination to the building's gymnasium and café below.

Summary

The design of rooftop haven in Chicago provided a great example for CPUL. Specially, it is an integrated landscape architectonic solution, that the landscape architect and arhitect work together, innovatively put the productive surface on top of a mordern building. And the design works well for production, energy and social connection. Thinking combining with the theoretical research (Chapter 2.7) its success could be viewed a achievement of the five urban design objectves.
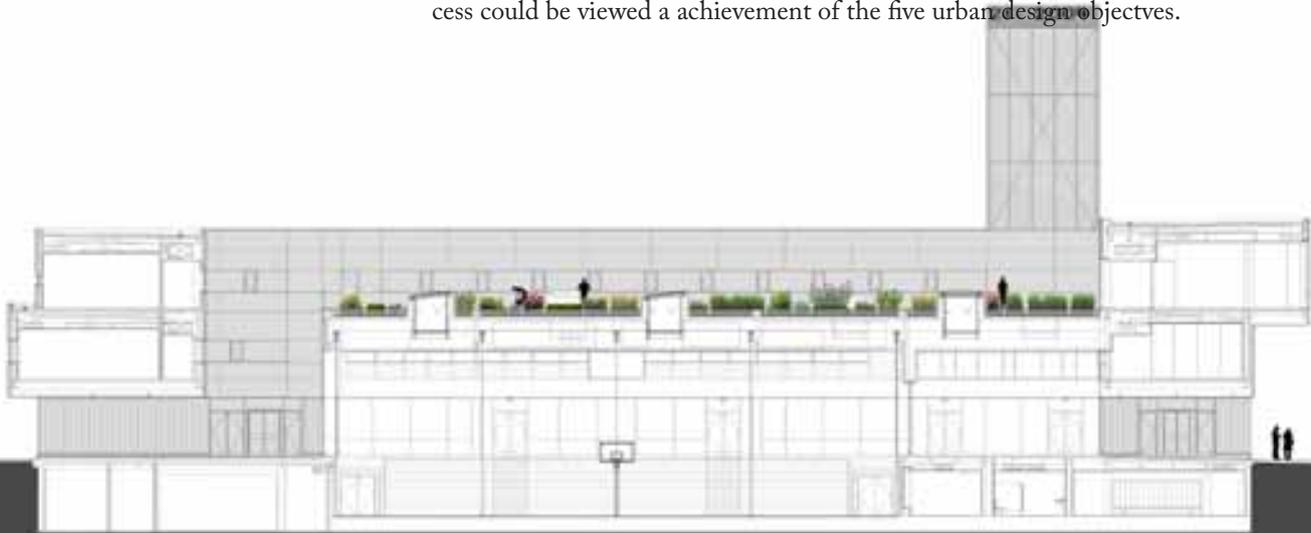
Fig. 3–4 Section of the Rooftop heaven

3.3 Referrence Study

3.4.1 Productive Landscape - Allotments, Community Garden, Agropark

Eden agro-park,
Cornwall, UK

Pic. 3-13 series of photos of Eden agro park. (www. eden-project.com)

Glass vegetable box,
Tokyo, Japan

Pic. 3-14 series of photos of Tokyo Glasshouse

Rooftop green house,
New York, USA

Community Garden

Pic. 3-15 series of photos of Allotment garden.

3.4.2 Business Park

Papendorp Business Park,
Urecht, NL

Pic. 3-16 series of photos of Business saite

3.4.3 Railyway Station

Amsterdam-Zuid Station,
Amsterdam, NL

Pic. 3-17 series of photos of Amsterdam Zuid- railstation

3–4 Break Through the Bottleneck

Bottleneck

After analysing the initially programmed site - Amstel III, I found it is difficult to find an independent solution to revitalize the site. That is partly due to the deteriorated investing climate of the mono-functional office site, which means the site is and probably, will be threaten by a vicious cycle: no constant investment and the existed vacancy still unfilled >> lacking well-maintenance >> loosing more companies users >> more vacancies >>deteriorated quality and unattractive image >> no new investor interested in it.
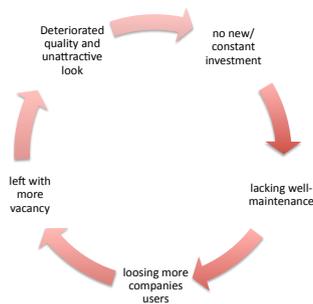
Although a pilot design may change the appearance of the site, it is hard to maintain with constantly expensive inputs. And the site will be thrown back to the vicious cycle again. So, a green-dressing design just acts as a camouflage.

Fig. 3-4-1 Amstel-III trapped into a negative cycle

Turning Point – Floriade 2022

Fortunately, at this tough point, the Floriade 2022 comes into my sight, and leads me zooming out from the original Amstel-III business area to the much larger Amsterdam Zuid-Oost region.

Floriade 2022 is a precious opportunity for the whole region, spectacularly for the deteriorated area. Firstly, it founds Amstel III and its context to be re-developed; Secondly, Floriade precipitate Amsterdam Zuid-Oost a renovating chance to alter its current urban structure; And, it promotes a social and physical connection of fragmented urban patches.

What is more, as a horticultural EXPO, Floriade can co-operate with CPUL concept, by using CPUL as a long-term developing strategy to launch the event, and contrastly, by using Floriade as a short-term booming point to attract more eyes from all over the world, thus comes in more commercial opportunities.
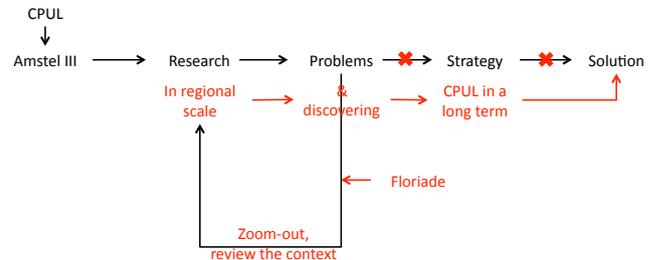
Fig. 3-4-2 Change of research design process.

Learning Experience – What is Wageningen Approach ?

It is a special learning experience for me to learn constantly changing my view between different scales of plan. This is about testing and fitting the specific designs to scales of contexts. This unique study experience at Wageningen totally changed my view point from an architectonic view to a landscape architect's broad view.

4

Research-Design For Floriade 2022

4.1 Get To Know 'Floriade'

"Floriade is a World Horticultural Exposition. World expositions are major international exhibitions that have been taking place across the world since 1851. They offer countries the opportunity to showcase their economic, social, cultural and technical developments. An expo often leaves behind it a legacy building, like the Eiffel Tower in Paris and the Atomium in Brussels. "

– Floriade Committe, 2012

The Floriade World Horticultural Exposition has been held in the Netherlands roughly every 10 years since 1960, with previous editions in Rotterdam, Amsterdam, Zoetermeer and Haarlemmermeer. And this year, the Floriade 2012 is going to take place in Venlo. The Floriade is a platform of Dutch horticulture. It is here that the worldleading greenhouse horticulture shows the innovation ability, the creativity and the vigor. (Floriade Committe, 2012)

From the first starting point of using greenhouse to cultivate plants in all seasons, to the latest theme of sustainablly cultivating without fossile energy, Floriade constantly elaborate on improving the ratio of productivity to energy-using as the unite permanent goal.
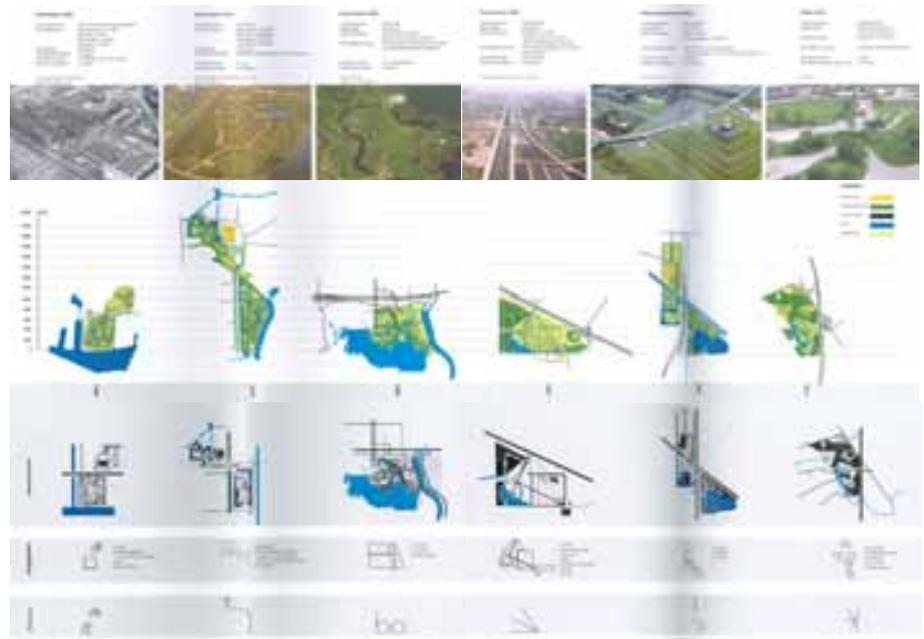
Fig 4–1. Comparison of former Floriades. Source(M. van Engelen , 2011)

4.1.2 Summary

Through reading the related research (M. van Engelen, 2011) and more expanding studies of those Floriade's site, I got a general recoganition of the Floriade. Comparing the former ones in aspects, including basic conditions, conceptual structure map, master plan and the layout (Fig. 4-1), the essencial principles behind the designs of Floraide are summerized in catagories (Tab. 4-1).

♦   Theme & Characteristic

Viewing the former Floriades, it is vital to show the contempery popular and even futuriistic greening topics with the aid of greenhouse and other new technologies. Beside, an artistic illustration of the topic and an aesthetical landscape experience of the event is the most directive way to help ordinary people understand and accept the spirit behind. This requires a strong but friendly theme to attract the professionals and un-professionals.

♦   Inner-outer transport

Importantly, the accessibility to the progamming sites, and the inner transporting measures affect the total touring experience of visitors. By learning from the former experieces, it would be better to use local existed infrastructure, or construct new lines based on the fixed strategic plan for future. Some detailed design principles

	1960 Rotterdam	1972 Amsterdam	1982 Amsterdam	1992 Zoetermeer	2002 Haarlemmermeer	2012 Venlo
Theme	greenhouse		natural art	sculpture	energy	sustainability
Before	delta-landscape/ clay on peat polder	peat polder	peat polder	polder	polder	sandy landscape
After	urban monumental park	urban park, exhibition center	recreation gaasperplas, part of regional park zone of Amstel	Rokkeveen-West residential estate, park and Randstad green structure	recreation component of 'green wealth' as used as a festival site	office park, part of Venlo 'green port'
Transport	cable car	train	tram	tram		
Highlight		showgrounds in different locations			the roof, the mountain and the lake	

Tab. 4-1 Compare of historial Floriades in aspects

also could be distilled: Clear and visible axises act as the backbone to help people recognize the scope of the site and find directions; Alternate routes provide flexible and diverse visiting experience; Complicated transfers in between should be avoided; Proper paths to outside surroundings can positively affect neighboring areas, vice versa.

♦   Structure of settings

Working with the principles of inner-outer tansporting, design principles for arranging the exhibitionl space are summarized: Landmarks are located on or well-connected to the main axises; The rythm of landscape nodes should be carefully designed to prevent visitors from a feeling of boring or besieged; The scale of the node decides the feasible activities, also influnce people's touring plan.

♦   Before- & After-Uses

Thoughtfully consideration of the after-use of Floriade sites also reflects the idea of sustainability. As shown in former cases, the majority held the event in an empty or park-like sites, and after the Floriade, a monumental park is the most typical remains. Except, the 1992's Floriade in Zoetermeer had made a redeveloping plan for the site in advance, and it finally became as a residential area, but appearantly, the memorible marks left by the 1992's Floraide can be hardly found among the inhabitats..

4.2 Inventory at Regional Scale

Different from studying the offcial papers about the site, a professional landscape inventory process would tell more about the site from a layered perspective. This can include physical landscape (abiotic and biotic layers), manual occupations on the site (infrastructure, spatial functions, etc) and social anaylsis (anthropology, aesthetics and opinion poll). Some layers could be studied by GIS data, maps and related literature researches, while some could only be obtianed by fieldworks and surveys.

Times of fieldworks to the studying area in different hours and seasons helped me to build a connection with the site. Picturing the instant image, chatting with the locals and office users, and observing their outdoor behaviour assist me a lot to discover the flaws of the site for current, even future uses.

Fig. 4-2 Green structure (source: CBS data, 2011)

During my visits, each time I narrowed down my observation scope into a more specific area, from the general Amsterdam Zuid-Oost to the exact problematic site - Amstel III. By making an assessment list (appendix 1), real local conditions were recorded and some problems popped out at the same time. All these information were listed in five catorgaries, under each there are several sub-terms which could illustrate my observations and impressions more precisely.

4.2.1 Topography

1. Green

♦ After years of urbanization, green fingers integrating with metropolitan branches is the basic landscape structure of the current Amsterdam city.

♦ Generally speaking, the Amsterdam Zuid-Oost as one metropolitan branch growing out from the old Amsterdam center, is well situated in green landscape soundings, including natural parks, recreational greens, and large marginal rural area.

♦ The green surroundings spread into urban areas mainly through horizontal ex-
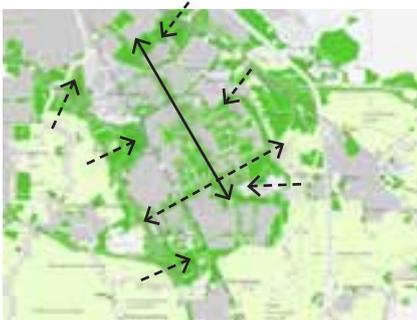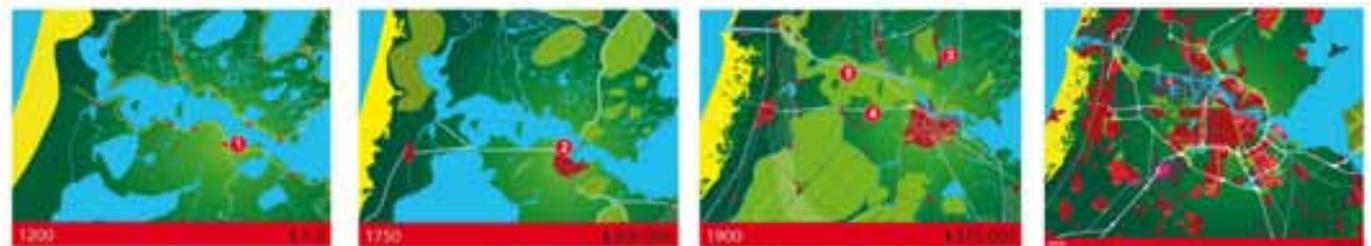
Fig. 4-3 Topography change of Amsterdam since 12th Century (source: DRO Amsterdam, 2011)

panding. And vertically, there is a dizzy green belt along the road almost crossing through the Amsterdam Zuid-Oost.

2. Water

Fig.4-4 Green structure (source: CBS data, 2011)

♦ Due to historical development, lots of water body had been filled into polders, for instance, Bijlmer meer did existed before 13th Century, so as the Diemer meer (Fig. 4-4 & 5). Even though, the biotic layer proves the possibility to bring the disappeared water back.

♦ Currently, the Amsterdam Zuid-Oost region contains three remarkable lakes, which are Ouderkerkerplas, Gaasperplas, and Abcoudermeer. Except for the Abcoudermeer, the other two lakes are human recreated.

Fig. 4-5 Historical Soil Map of Amsterdam (Amsterdam Museum, 2011)

♦ Rivers, namely Weesper, Gaasp, Gein,Holendrecht, and Amstel in clock-wise direction, ciriculate around the whole region. Aside from them, a little more distance away, the large Amsterdam-Rijnkanaal is located to the east of the region. Some of the rivers can further reach the inner urban districts of Amsterdam Zuid-Oost, in forms of channels and ditches.

Fig. 4-6 Ground level gauge (source: CBS data, 2011)

♦ Although the water network is an impressive characteristic, the streams can not be fully inter-conected because of the ground probing (map). The area consists of several polders with their own ground and water levels. West of the Gaasperdammerpolder is a level of NAP -1.4 meters, the Bijlmermeer polder with a level of NAP -2.9 meters and Bullewijk with a level of NAP -3.4 meters. This represents a significant difference of level. The ground water is approximately 1.30 meters below the ground level.

3. Soil

Fig. 4-7 Ground water level (source: CBS data, 2011)

♦ Originally, the soil types of the Amsterdam Zuid-Oost region could be viewed from the Fig. 4-8, peat and clay are the major types. After years of manipulation

Fig. 4-8 Historical Soil Map of Amsterdam Zuid-Oost. (Atlas bodem kaart, 1960-1963)
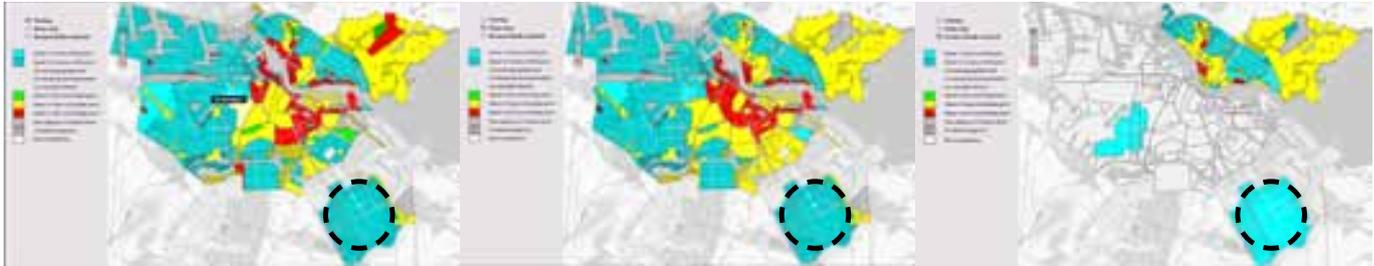
Fig.4–9 Current Soil Maps of Amsterdam (source: DRO Amsterdam, accessed 2011)

The soil quality focuses on the top layer, ie the upper layer of 0 to 0.5 meters below ground level (m below surface) called soil layer, the layer of sand (fill sand) that are locally more than 4 meters and the original clay and peat. The data concern the following substances in the soil:
• Heavy metals (8): arsenic, cadmium, chromium, copper, mercury, lead, nickel, zinc;
• Polycyclic aromatic hydrocarbons (PAH, sum of 10 (VROM));
• Mineral oil
• Extractable organohalogen (EOX)

• Class 1: Clean MVR-ground and ground
• MVR-land: land which has been approved under the Building and that no more than three target values are exceeded. This land is considered if the soil is clean.
• Class 1A: Clean floor with the exception of elevated mineral oil and EOX levels by components of natural origin

of the soil to better supply the demands of farming and constructing, the soil type had been modified.

♦ The three soil maps in series tell about the current soil conditions of the Zuid-Oost region. More information could be found in Appendix 2.

♦ From left to right, the top soil layer (0.0 to 0.5 meter below) is mainly clean MVR-land, apart from the land along the Weespe-Gein river course is moderately polluted; the qulity of the deep layer is same as the top layer.

♦ Research from the DWR (Dienst Waterbeheer en Riolering, Amsterdam)also shows that the IBA, between Kromwijk Dreef and Gaasp, the soil body consists of Gaasperdammerweg debris.

4.2.2 Infrastructure

♦ Amsterdam Southeast is very well accessible by car. A high way networrk composited of A1, A2, A9 and A10 go through the region from north to south. Among these are the backbones of the Bijlmer as Gooiseweg and Holten Bergerweg. (Fig 4-10)

♦ Perpendicular to this is the main east-west connection to the Daalwijkdreef /

Railway Station
Rail way
Metro
Highway
Motorway
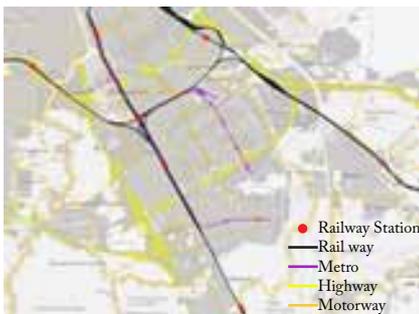
Fig. 4–10 Infrastructure Map of Amsterdam Zuid-Oost (CBS Data)
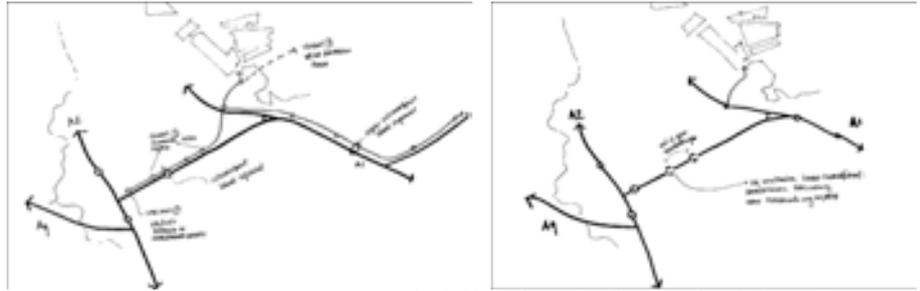
Fig. 4-11. Horizontal traffic connection of Gaasperdammerweg (DRO Amsterdam, 2005)

Mayor Stramanweg. Among these carriers is a network of alleys and streets.

♦ Also regarding public transportation in Zuid-Oost is relatively well digested by two metro lines, two railroads and a Zuidtangent, the Gein Line is intensively used, while the line Gaasperplas is seldomly utilized. Compaction or more activities around this line is desirable (DRO Amsterdam, 2005).

♦ The Gaasperdammerweg crosses both the railway and metro lines.(Fig. 4-11)

4.2.3 Urban Functional Structure

♦ The whole region could be generally referred to as 'urban living-working' and the green area.

♦ Alongside the rail- and metro-lines are the business areas. Particularly, the office parks are intensified around the railway linking Amsterdam and Utrecht, where the Amstel-I, II and III are located. As described in the chapter 1, those business lands are physically well connected to the outsideworld, but socially isolated, which is partly because of the hugh infrastructure on both sides.

Urban farming
Facility
Residential
Business
Recreate Green
Rural

Fig 4-12. Land use Map of Amsterdam Zuid-Oost (CBS Data, 2011)

♦ The residential areas could be roughly divided into several parts: Diemen, Bijlmer and Gein on the main metropolitan branch, Oudekerker Amstel, Abcoude, Weesp, and newly developed over-Diemen in the outskirt. Struturally, the inner modern residence are divided by polders in history, and urban infrastructures in modern time. What should be noticed is the debatable project of the Bijlmermeer, more details would be indicated later in next chapter.

♦ Bijlmerpark and Gaasperplas are part of the provicial ecological structure. The route between the Bijlmerpark to Gaasperplas is part of the recreational hoofd-fetsnet. Along Gaasp and over Gaasperdam runs along the the boundary of the Green Heart and the easten part of the Gaasperdammerweg (beyond Gaasp) is

in the green heart. (DRO Amsterdam, 2005)

4.2.4 Morphology

It is very recognizable of the districts in the Zuid-Oost from an aerial view point. They are varied in size, shape, inner passage, greenery, etc.. I catagorized them into several types. This study is helpful for gaining a better understanding of the spatial limitation and potency, as well as finding local identity.

Fig. 4-13 Honey-comb high-rise flats

Fig. 4-14 Slab high-rise flats
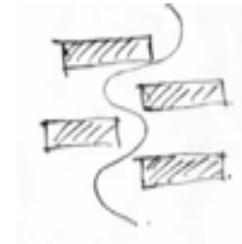
Fig, 4-15 Cauliflower Apartments

Fig. 4-16 Rowhouses:
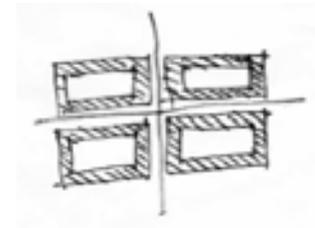
Fig. 4-17 Office park

Fig. 4-18 Singles

4.2.5 House Price

The house map is a snapshot of a given year. (Fig, 4-19) Based on the examination of the m2-prices in a number of years, the map is made to focus on the future trend (increase or decrease) of the houses' value. The assessment is given out by comparing the average of the Amsterdam housing price. This creates four possibilities:

1. Lagging areas: The current value is below average, the its developing trend is not positive as well, probably stay lower than average.

2. Hopeful areas: With a current value of below-average, the hopeful areas are expedicted to be better and above the average line.

3. Arrived areas: The current value is already above-average, and the trend is predited to be above-average as well.

4. Attention areas: The current value is higher than the average, but it may decrease soon to the lower-average group.

From this map, it could be found that most of the housing areas in Amsterdam Zuid-Oost are of the lower-average level, and they hardly have the potential to achieve the average. And this map map alarm the planner to reconsider the living environment quality of the whole region and make some adjustments to improve its current situation

Fig. 4-19 Housing Price in Amsterdam (DRO Amsterdam, 2009)

4.2.6 Culture

Landscape shaped by human intervention. Three human intervention can be identified:

• Mining

• peat

• Urbanization

Pioneers drained the peat digging ditches. These ditches carried the water to the peat streams. In the polder Rondehoep example, these patterns preserved castle.

A consequence of the drainage was the lowering of the soil by subsidence of the peat. As a result, more and more floods. The rivers were larger and some were like lakes and Bijlmermeer Watergraafsmeer.

After mining in the 16th century changed the landscape by peat. Residents of the

city of Amsterdam had great need of fuel. The peat was extensively excavated. The dried peat - peat - was an excellent fuel. The lakes that were created by the excavation were reclaimed. The last polder polder the Future, in 1940 reclaimed.

The peat along the rivers was of poorer quality. It also called for the dams intact. The peat was dug up was not. Along the rivers was therefore a strip of land that was higher, over land.

The area falls Elsen Hove immediately notice the difference in altitude between East and West. The two areas are separated by a broad water and a dike. The height is caused by the excavation of peat for peat extraction. In the never-income fervor over land is landscaped with voorbeeldveenderij legakkertjes and petgaten. Sometimes demonstrations given peat win.

Urbanization led to the next major change in the landscape. Especially since World War II, large parts of the rural area set up as district or business. The high-rise often from afar. The town lies in a web of railways, waterways and fast and power lines. From the deep subsurface of the Ouderkerkerplas lake and the sand is extracted Gaasperplas which residential areas and roads are built. Around the city are recreational. (www.amsterdamzuidoost.nl)

4.3 Analysis and Concepts

4.3.1 Landscape Elements

During the inventory phase, the local landscape qulities are described by layers. In this sector, more analysis to find design inspirtions and transforming possibilities for future phases will be conducted. The analysis is theoretically based on both the theory researches and site inventory process.

After zooming out from the original project location to a much larger scale of the entire Amsterdam Zuid-Oost metropolitan branch, I found one thing interesting that all the natural landscape elements and population booming site are more or less related to a two-ring (Halo) structure, of which the outter one is formulated by river and the inner by metro. Additionally, highways, motorroads, and paths also make a spider transporting structure at the ground level, which well links the outter ring with the inner ring. From a top view of the map, the two structures almost naturally make a complete and inter-linked traveling system.

Specifically, natural green, water and productive landscape are mainly around the outter river ring; Urban residential, and cultural facilities are gathering adjacent to metro/rail-lines; Urban recreational greens are penetrated with the spider-network and business areas are located near highways and railways.

4.3.2 Initial Ideas

Inspired by the beautiful 'water ring', a series of structrual concepts popped out from my brain.
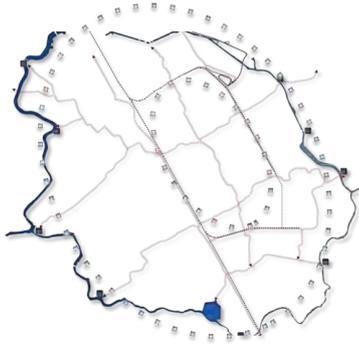
Fig 4-20 Outer water ring and inner metro ring structure

Fig. 4-21 Green Recreations Before

Fig. 4-22 Lakes Before
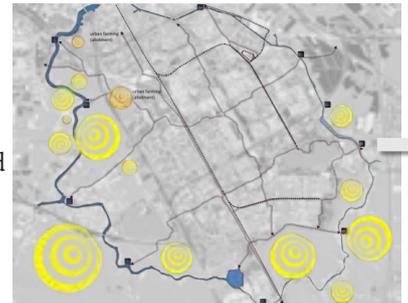
Fig. 4-23 Productive Landscape Before
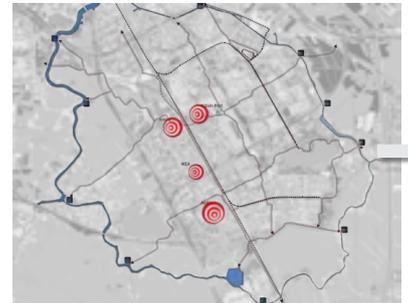
Fig. 4-24 Landmarks Before
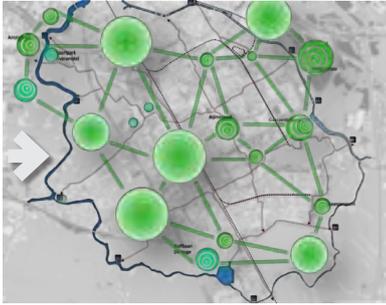
Fig. 4-25 Green Recreations After

Fig. 4-26 Lake After
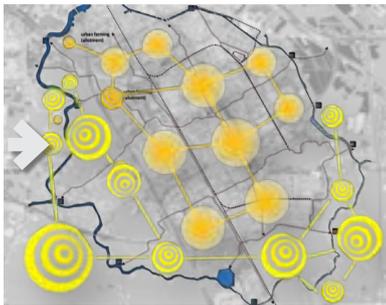
Fig. 4-27 Productive Landscape After
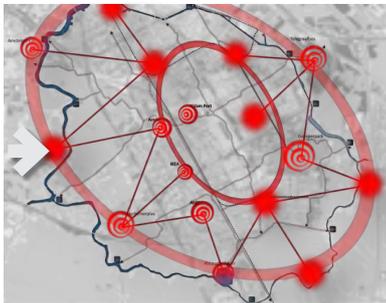
Fig. 4-28 Landmarks After

Greenery

As metioned before, the natural green spreads into the metropolitan area of the South-East Amsterdam mainly through horizontal ways. For this reason, vertical greenery could be introduced into the urban area as well to form a more stronger and resilient green network. Ecologically, this would provide more habitats and corridors for species, thus encourage their movement. While from a human point, the increased green space will provide more positive ecological services for local residents, and, make more public spaces for kinds of activities. (Fig. 4-25)

Water Body

To enhance the water identity of the region, and to remind people of the old memory about the disappeared lakes, more water space are required to be brougnt back to the site as a preferrable strategy to strengthen the *'Loci'* of Amsterdam Zuid-Oost. What is more, allocating water body in city can improve local micro-climate, and appropperiate landscape designs with water body would upgrade the aesthetical quality of sites and attract more outsiders to settle down here in the main while. (Fig. 4-26)

Productive Landscape

Since the existed productive lands are located close to the river system, and relatively far from urban sites, it would be better to shorten the distance between farmers and customers by integrating productive functions into urban fabric. And, the lower land price well supports the idea. Most importantly, the coming Floriade 2022 in profession of horticultre and cultivating technology, also gives a sound reason to develop the productive landscape here. With the consideration of the current urban functional structure, the productive lands might be penetrated gradually from small-scale community gardens to Agro-Parks, and after ten years of development, the region will be fully prepared for the World Horticulture Expo. (Fig. 4-27)

Landmark

The region is much easier to recognize from an arial map than from a view point of normal human standing on the ground. The buildings just look similar in one district, for example, when you standing in Amstel-III, all the buildings are of office-look, while in case of the Bijlmer, it becomes even worse.

To collaborate with the Floraide progam, the structure of the region should be highlighted by laying landmarks on proper locations. Aside of urban landmark constuctions, signal landscape elements in rural also should be added to guide people explore

the rural idyll. (Fig. 4-28)

4.3.3 Suitability Analysis

Where to find room to accomodate these new space in a greatly mordernized metropoitan area becomes a new issue for design. However, reusable city 'corners' always existed.

By making a criteria list (Tab. 4-2), the potential space for future integration of urban productive landscapes, more water bodies and greeneries, is screened out. The criteria is made of four catagories base on the main urban landscape types. And for each catorgory, the exstied vacancies (VA), the problematic lands (PR) that stand on the waiting list of tranformation, and the potential areas (PO) that their environmental quality could be improved to further comfort the users, are included in the research process.

The difference between VA(cancy) and PR(oblem sites) is the off or of uses, and the same when comparing to PO(tential sites).

The difference between PR and PO is depending on the quality. Problematic sites are more in severe conditions urgent to be solved, while, potential sites are physically acceptable but can be improved to attract more users and utilities.

There are some inevitable overlaps of the three groups. For instance, a living block with high empty rate could be viewed as a site with all these features, since in maxium situation, the building might be totally empty, so it is a VA; When the empty rate is high but stable, it could be viewed as a potential sites to be improved to attract

Housing	Business Site	Open landscape	Infrastructure
◆ Useless lawns near high-rise flats (PO)	◆ Unfrequently-used parking lots (VA)	◆ Urban undeveloped sites (VA)	◆ Infrequently-used roads, railways... (VA/PO)
◆ Blocks with high empty rate (VA/PO/PR)	◆ Physically decayed office building (PR/PO)	◆ Large lawn, open ground, without clear themes (PO)	◆ Overlaid roads (PR/PO)
◆ Physically decayed houses (PR)	◆ Buildings with high empty rate (VA/PO/PR)	◆ Water Surface (PO)	◆ Space underneath highways (VA)
◆ Typology: enclosure or semi-enclosure (PO)		◆ Embankment (ditch, canal, river...) (PO)	◆ Railway dike and tunnels (PO)

Tab. 4-2 Criteria for selecting future transforming spot.

new settlers; And a growing empty rate means the site is in trouble and needs a solution to stop the deterioration.

By overlapping these layers that drawn following the criteria, the most vulnerable places are marked out in darker colour (see figure. 4-29). The darkness of the place represent its feasibility to future redevelopment or transformation. The darker, the more feasible.

Decayed buildings

Closure

High empty rate

Vacant plots

Space underneath high- infrastructure

High density flats
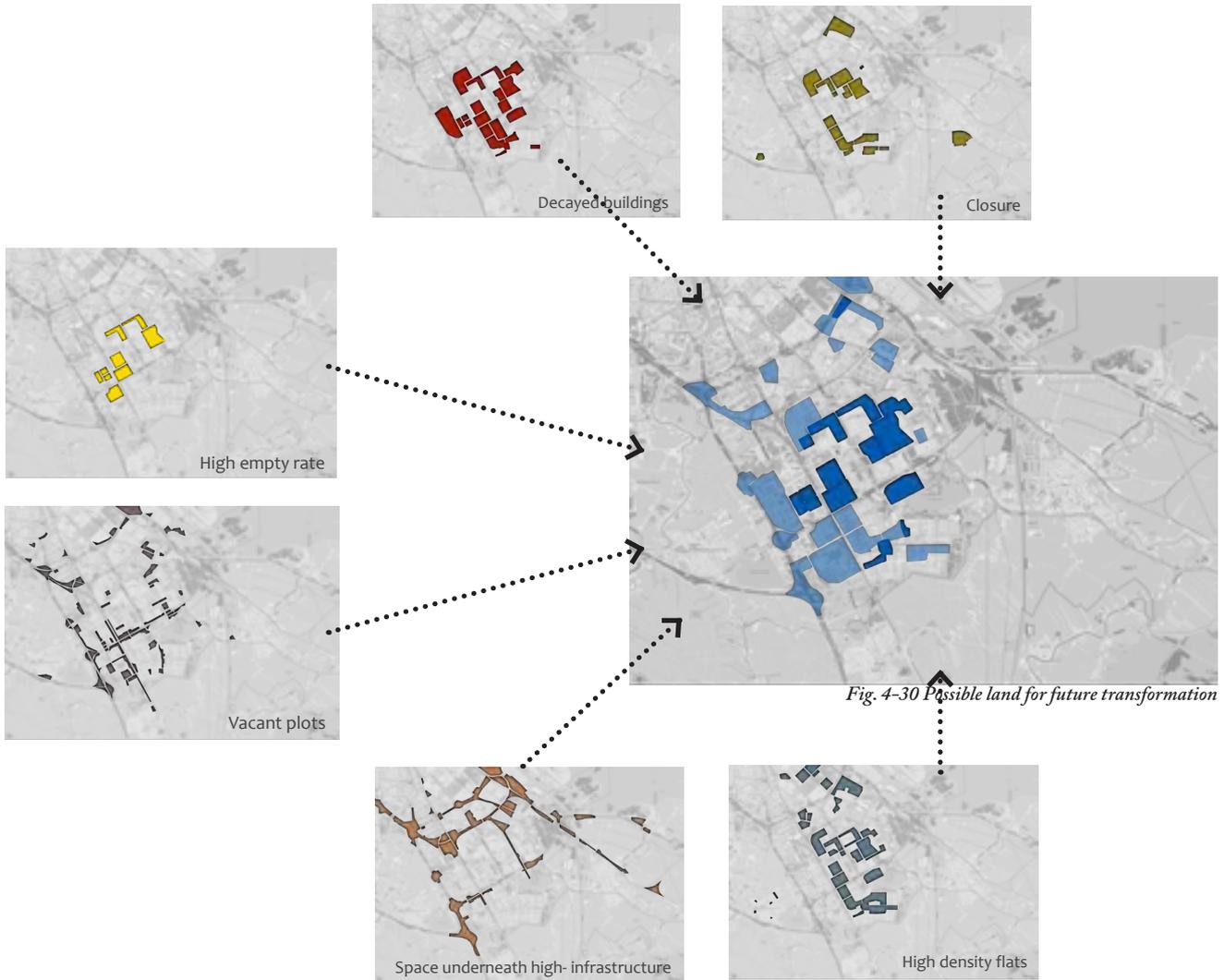
Fig. 4-30 Possible land for future transformation

Fig. 4-29 Possible land for future transformation based on different criteria

4.4 Strategy

4.4.1 Ambitions of Amsterdam city

The green ambitions of the Amsterdam city could be briefly summarized as below:

-Green space should be in walkable distance to city inhabitants who prefer to live near to sorts of greeneries to easily engage with nature and landscape.

- Build area should be more compact to protect natural green space, whild compact build can only be successful when hold considerable healthy greenery.

- Accessibility and diverse uses of the green space affects its popularity.

- Water retention, air quality, urban climate, food production and biodiversity are the issues green space should make more efforts on.

- The diversity of flora and fauna is as important as the diversity of recreative uses. (Amsterdam, 2009)

4.4.2 Integrating CPUL

Based on the ambitions of Amsterdam greening plan, and the local context of the Amsterdam Zuid-Oost, a time-scaled CPUL strategy is raised to incorperate with the Floriade 2022.

During the first 10-year phase from 2012 (this year) to 2022, the region can engine the CPUL strategy by recycling small-scale feasible lands (see Fig. 4- 30) and redevelop them into productive backyard gardens, or transform the lawn in front of flats into a community garden by civic group work. The products are self-sufficient and the main perpose is to improve social connection and help to maintain the wasteful land. Later, more large-scale feasible plots could be adopted and organized by municipalities or other stakeholders for a more professinal cultivating activity. The products is to supply local needs of food as much as possible.

It is expected in 2022, the majority of the feasible land are redeveloped for different productive activities and productions. By 2022 of Floriad, high-tech equipments are introduced and permanant constructions are compeleted for the exhibiton. The constructions should be designed capable for future uses of the locals. After the Floriade, the productive urban landscape is already a tag of the Amsterdam Zuid-Oost.

	Flats	*Business*	*Office*	*Infrastructure*
2012				
2022				
2032		No parking lots in 2032 !		

Fig. 4-31 Future development of four different urban spatial types.

The quantity of the productive lands will be generally stable after 2022. Except when encountering the assumed 'electrical mobility revolution' (Pic. 4-1), more grounds will be released from infrastrural system, and sustainable perma-productive lands might occupy parts of them.Extra energy generated in process can also be used to empower the electrical mobile cars, in a futuristic vision.

Catorgarized based on land-selecting criteria, the future development of the four sorts of urban lands could be predicted and illustrated as showed in Fig. 4-31.

4.5 Design

4.5.1 Design Proposal

Pic. 4- 1 "Plug-in Time", Catrina Stewart, 2011

Due to the different current functions, proposed additional landscape elements (chapter , initial ideas), and feasible sites selected in chapter 4.3.3 , some plots could be transformed into urban productive landscapes. There are several basic integration forms generated according to the sum of predonditons, as showed in the Fig. 4-32.

Fig. 4-32, Proposal for future changes in Amsterdam Zuid-Oost region

4.5.2 Design Proposal For Floriade 2022
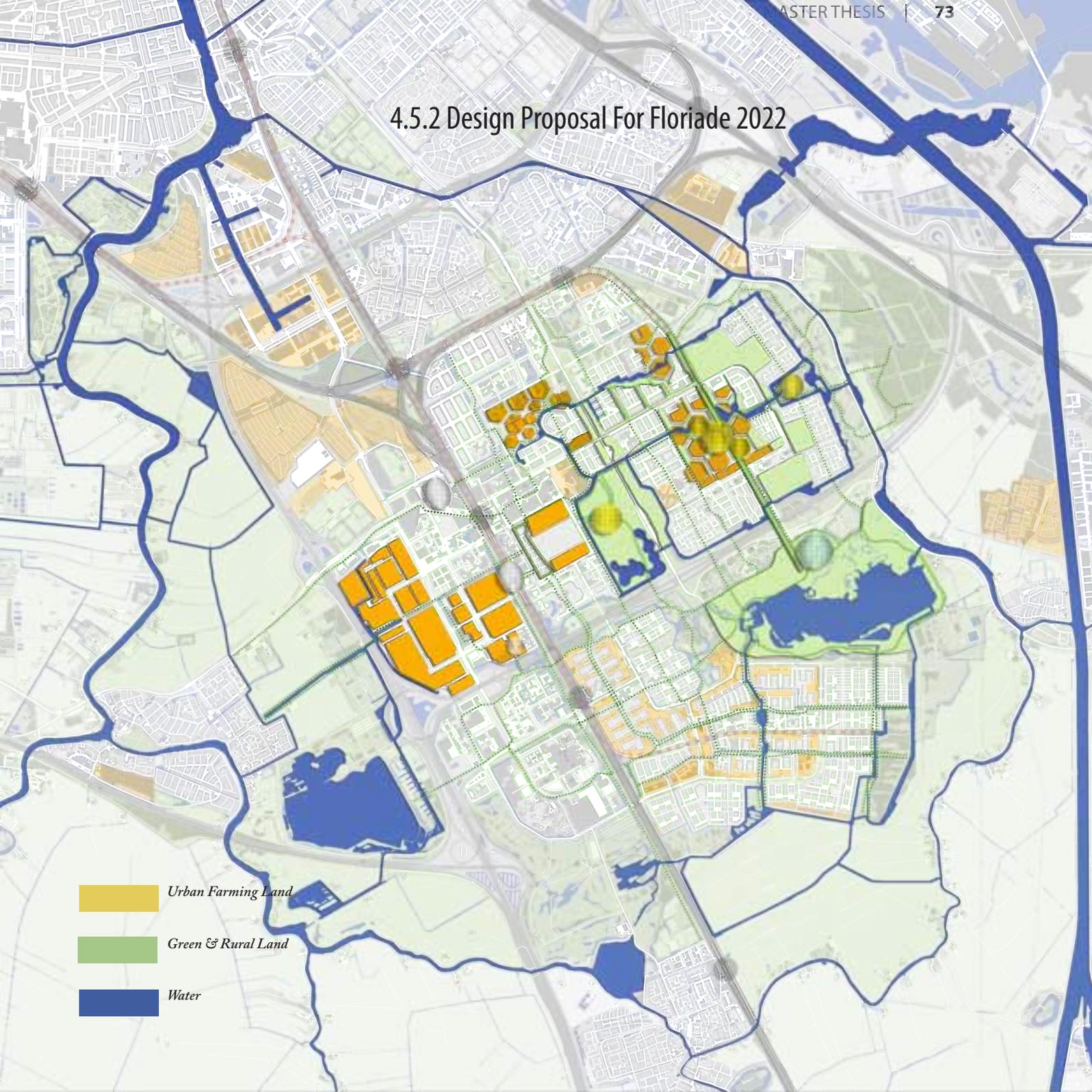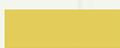
Urban Farming Land

Green & Rural Land

Water

Fig. 4-34, Recreation green in Floriade 2022
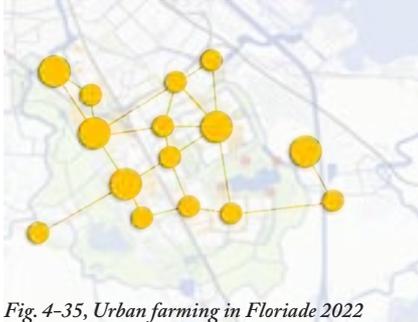
Fig. 4-35, Urban farming in Floriade 2022
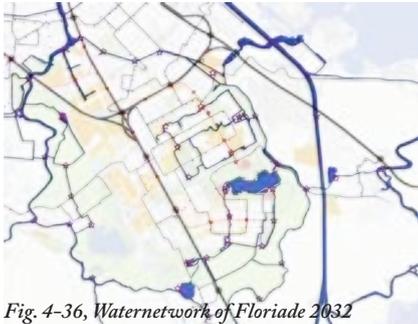
Fig. 4-36, Waternetwork of Floriade 2032
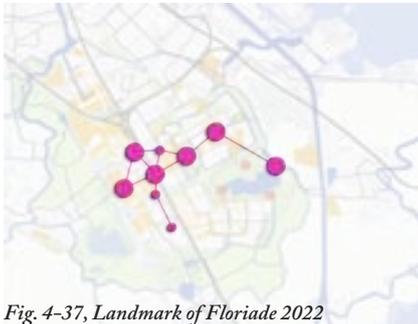
Fig. 4-37, Landmark of Floriade 2022

4.5.3 Review

What the plan proposes here is a less traditional Floriade, where the themes of urban horticulture and sustainability are central, while exhibited in the way with residents' involvement in the production of food and sustainable gardening in the city.

Schematic structure

The main structure is proposed to be divided into four parts: the Bijlmermeer Neighbourhood, Gaasperplas park, Metro zone of the Bijlmermeer, and the Amstel III business park, of which, the first two areas will be functioned as fenced exhibition zone, where tickets for access is necessary.

Fig. 4-33, Schematic Structure of Floriade 2032

While, the other two are open zones assisting the chief exhibition areas, where markets, cultural events and various complementary services are provided. These four sectors are well inter-connected by the inner rail/metro-ring, vehicle road and slow paths.

Spatially, the two fenced parts will adopt the existed metro line(NO.53) as its vertical axis, as well as the primary inner transporting method. Accompanying with the metro axis, several slow paths through 'crop tunnels' (designed by Claire Oude Aarninkhof and Minke Mulder, 2009) for walking and biking are high-lighted to direct visitors travelling between the two sites. Typologically, the characteristic of the two are opposite to some extent, for the Bijlmer is a product of urban architectural modernization and the other one is a practice of natural-figured park. This contrasting pair will guide people walking from 'urban' to 'nature', and take floral high-technologies into people's daily life.

Recreational green

Comparing to the conceptual proposal (see Fig 4-21), those large green patches such as forests, parks nearing lake, and an emphasized Bijlmermeer park are maintained. Some locations of the new added green spots are a little different to better fit and keep a loosing urban fabric. What is more, some irrelevant and unnecessary paths are removed, to strengthen the transporting role of waterway.

Urban Farming

The new urban productive lands are more keen on locating near urban infrastructural system, or closing to public open space like urban squares and parks. This benefit the urban farmers by reducing the distance for selling products, the locals by achieving fresh food, and general environment by reducing the polluting air emissions from logistic.

Water transport

The final proposal for Floriade 2022 does not change on the main transporting watercourse - outer ring, except refining their locations and size of boat stops, to better connect with the ground-level public transports and shorten transferring distance. Several stops are added in rural area to access people to discover the beauty of rural landscape and cultures.

Yet, several small-scale circulus channels are included to remind people of the 'Bijlmer meer' history and high-light the 'water' characteristic. What is more, more water related activities and cultural customs are advocated. Initially, all the small-scale boating ways are designed to link with the large 'water ring' and inter-linked with each other to achieve 'water city' like Venice in Italy. However, considering the water contour map, only four workable circles are remained in the final proposal, where the entrance connected with outer river ring are designed to small ports to park boats.

Urban landmark

Along the railway, except the existed landmarks of ArenA Stadium, Amsterdam Gate (shopping centre), IKEA and AMC, the Bijlmermeer metro station is designed to be emphasized in order to impress visitors to view the metro stop as a general entrance to either Amstel-III or Bijlmermeer.

And from west to east, more memorizable landmarks are to be constructed, from the group of offices with a rooftop greenhouse corridor, to the 'elevated earth', then the Bijlmer station, and the Bijlmer agro-park, lastly the 'polydome' community garden in the Bijlmermeer neighbourhood.

By this way, it high-lights the two clear crossing axis to direct visitors to explore their interesting spots, and to keep their curiosities.

In summary, the plan shows a Floriade in the middle of an urban area with existing buildings and facilities, where living, working and leisure time together. The businesses, residents, and social organizations closely involved. The proposal is the green link of natural and recreated parks, in the blue network of regional and local water bodies, in the red connection of the large Amsterdam Southeast with the middle metropolitan area.

4-5 Back to Amstel-III With New Lenses
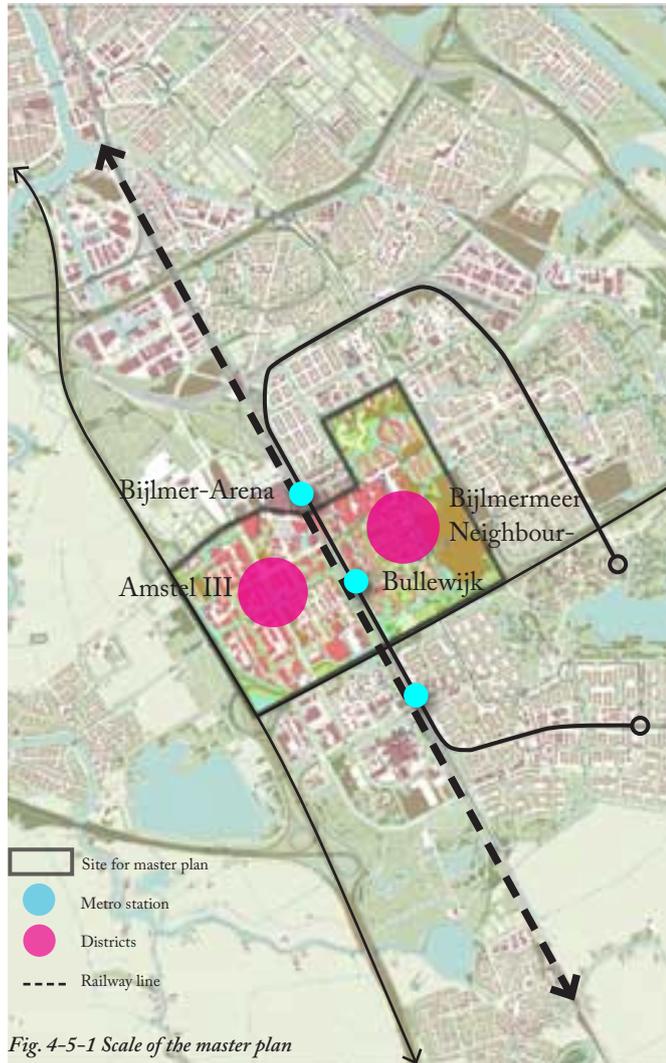
Fig. 4-5-1 Scale of the master plan

The master plan will be on the scale of a combined zone of Amstel III, linear zone along the Bullewijk metro station, and the Bijmermeer-centrum neighbourhood (yellow-highlight area in map). The chosen area is also part of the 'Floriade' plan schemed by DRO Amsterdam.

Reason of site choice

After analysing the initially programmed site - Amstel III, I found it is difficult to find an independent solution to revitalize the site. That is partly due to the deteriorated investing climate of the mono-functional office site, which means the site is and probably, will be threaten by a vicious cycle: no constant investment and the existed vacancy still unfilled >> lacking well-maintenance >> loosing more companies users >> more vacancies >>deteriorated quality and unattractive image >> no new investor interested in it. Thus, when there is no clear guarantee of future constant investment, we can escape from the vicious circle by filling those vacancies with other (temporary) functions instead of offices and housing and/or maintain the site by 'outcomers' from surrounding neiborhoods. And for this reason, I decide to enlarge the scope of master plan (include its neighboring residential districts and A'dam port) and regard these as a whole.

Aside from this change, the linear path embedded in green along the railway will be one of focuses of the master plan. This is because:

♦ first, it is the first sight when commuters go out of the station;

♦ second, the linear form provides a strongly oriented path

for slow traffic flows (walking and cycling);

♦ third, all the metro stations alongside would be the comparetively population-boost-point as people can change transportations here;

♦ fouth, the linear space with certain width owns numerous fansinating landscape elements (continuous watercourse, dike, etc) that would be attactive for to be transformed to bound the sperated urban parts more tight;

♦ fifth, it is the candidated main path for Floriade plan, as it shows the capacity to hold variable activities and the reigional (Amsterdam-Urecht)/ local (Arena, Amstel III, Bijmermeer, IKEA and AMC) connectivity.
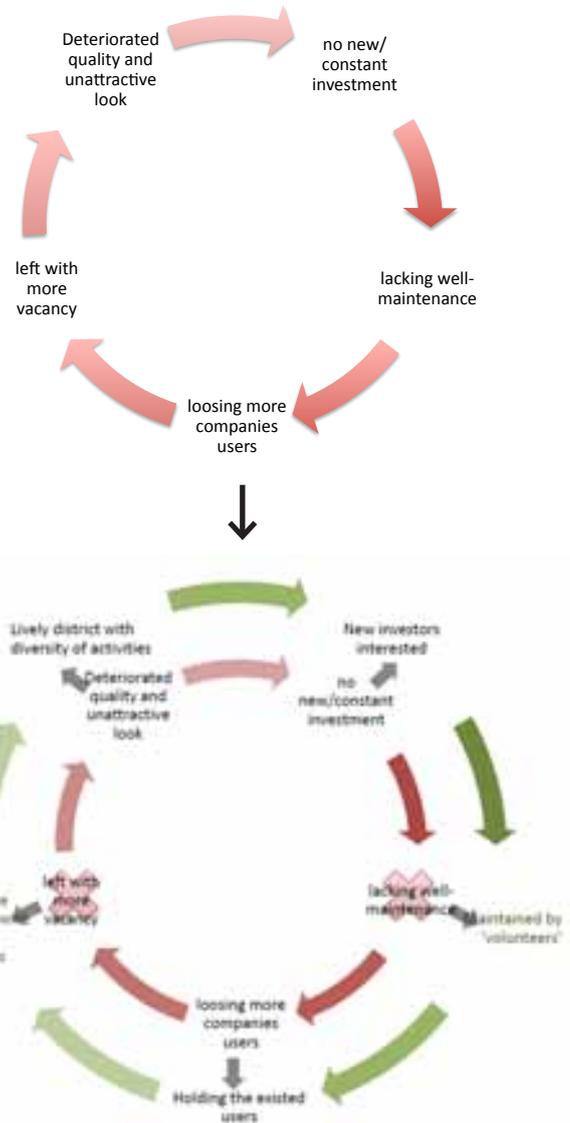
Fig.4-5-2 Break the negative Circle of the Amstel-III

5 Research-Design For The Selected Site

5.1 Inventory of the Master Plan Site

Refer to
1
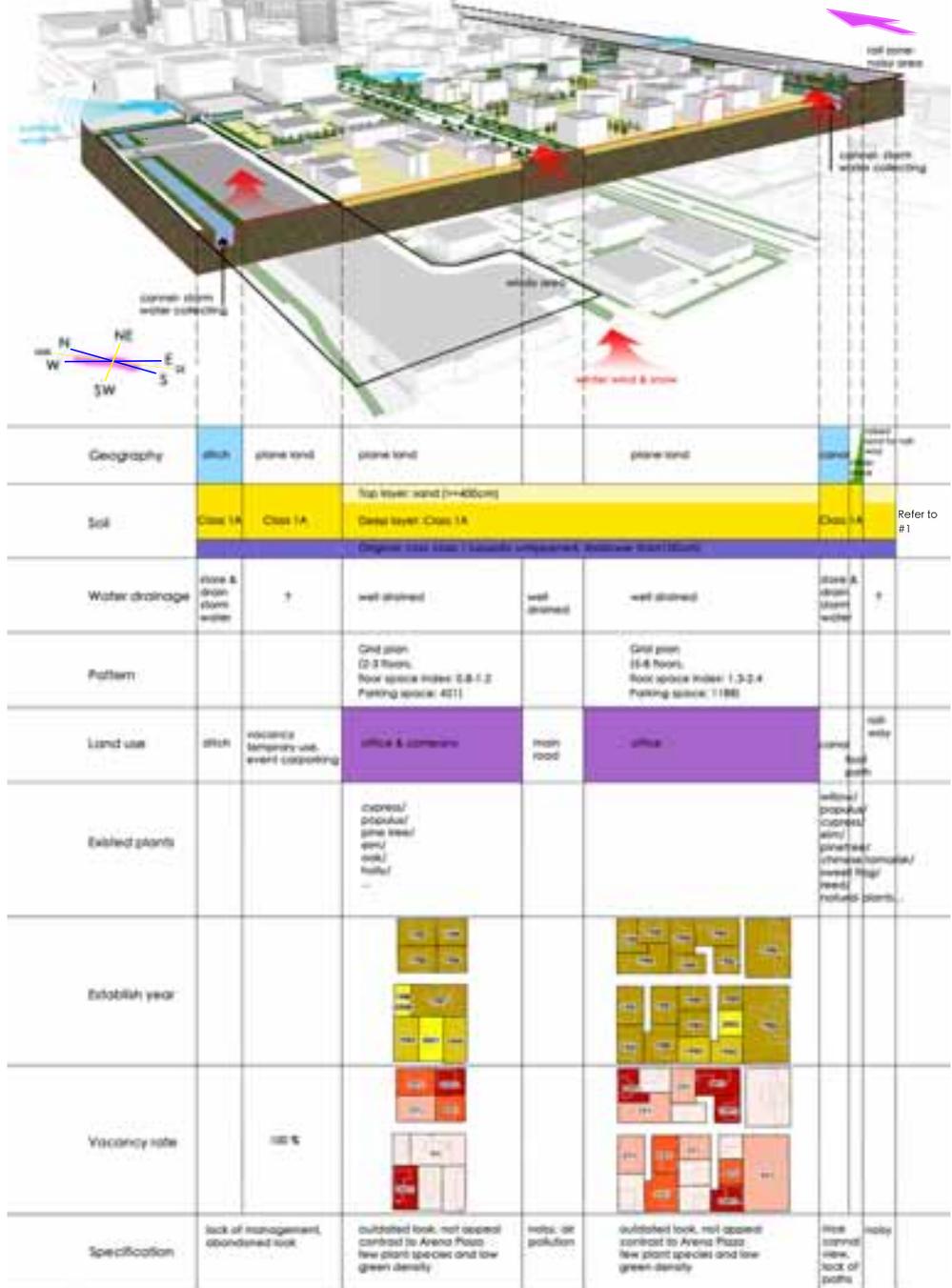
Fig 5-1 *Vertical Inventory of the site*

Fig.5-2 Green structure of master plan site
(Source: CBS data)
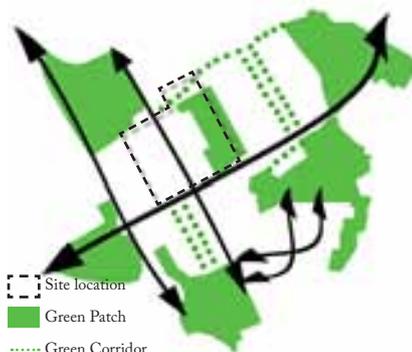
Fig.5-3 Green structure analysis of master plan site
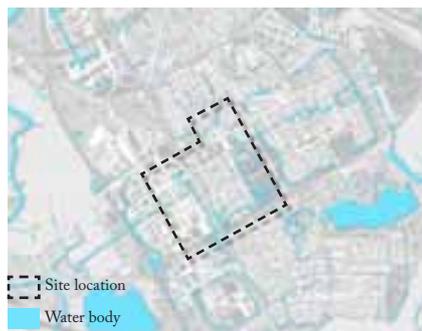
Fig.5-4 Water network of master plan site
(Source: CBS data)

5.1.1 General Inventory

1. Topography

Green

♦ Several big green patches are located at a comparatively further distance to the site (red dot) and inter-connected by small fragments.

♦ The site (as part of the Amstel III business area) breaks off the local green network, therefore negatively affects the species' movements in the region.

♦ There is litte green in this almostly fully paved site, which means there is few habitat for species.

♦ The railway line as well as the motorway acts as barriers hinders interaction between species and thus reduces the metapopulations.

♦ The site is quite a weak point in regional ecological network.

♦ When zooming in, the site is embraced by lawn/blank strips along cannels, which could be considered as wasteful landscapes to some extent.

♦ Trees are in low density and aesthetically monotone. Species includes cypress tree, poplar, willow, anana shrub, cherry tree among office buildings, while reed, Chinese tamarisk, willow and sweet flag around water bodies.

♦ Inside the site, vegetations, usually trimed shrubs, are planted for the use of cutting the parking lot and trees dressed the site without clear purpose.

Water

♦ River - Artery & Vein: River water flows in city system just as blood in human physical body, which bring necessary water supply for various uses and deliver waste for treatment.

♦ Stream/Creek/Canal/Ditch - Microscopic Vessel: Similar to microscopic vessels in a physical body, distributing oxygenated arterial blood to cells and after exchange process returning waste-carried veinous blood back to heart again, small volumes of water distribute the main water flow to different areas/blocks, and flow back to the main volume with/without toxins.

♦ Lake - Lung/Heart: Heart works as a storage and a pump for the two basic blood circulation process - systemic circulation and pulmonary circulation. Alike, a lake stores inpouring water for a while, and exporting water to flows with/without purification.

Soil

♦ Historically, the main soil type of the site is clay (unrippened, <120cm). Clay is a naturally occurring aluminium silicate composed primarily of fine-grained minerals and they also may contain variable amounts of water trapped in the mineral structure by polar attraction. Therefore, clay retains water and tends to be poorly drained. What's more, clay is dense that limit the ability of some plants to force their roots through it; aeration and useful bacteria are also restricted. (DRO, 2007)

♦ According to the new Amsterdam soil map (referring chapter 4.2.1) and related report(DRO, 2007, see Appendix 2), the general soil quality of the site, is now clean soil with the exception of elevated mineral oil and EOX levels by components of natural origin. This is formulated by covering layers of sand tops.

2. Infrastructure

Railway

The study area is bordered by Bullewijk metro station to the east, . (there is no train station, 3 tram lines have their stops

Pic.5-1 Bullewijk Railway station

here). It takes 5-10minutes from the offices to the tram station 'Bullewijk' on foot, which is an acceptable walking distance for people working here. However, an adequate pedestrian and bicycle network is lacking. How do you get from the stations to the offices and the desired housing, hotels, café, restaurants, etc.? This is precisely where the opportunities lie.By the side of the railway, there is a large empty green area embedded with a canal in it. This empty green area are assumed to screen out the noise from the rail way, however, except of the distance, there are few trees and leaves to filter the noise.

Vehicle

The western side the intervention area is bordered by the north-south orientated Holterbergweg with two times two traffic lanes. This is the central main road through Amstel III, connecting it with the A2 and A9 motorways, the city centre and the Bijlmermeerand Gaasperdam residential neighbourhoods.This road was constructed in the late nineties,prior to this Amstel III had a chequer-board road layout.

Site location
Railway
Metro
Bus

Fig.5-5 Public transport networ of master plan site (Source: CBS data)

Site location
Highway
Motor road

Fig.5-6 Vehicle road network of master plan site (Source: CBS data)

Fig 5-7 From left to right: cover zone of metro stop, Risk zone, Noise effect of the metro, Car-parking number in Amstel -III (source: DRO Amsterdam, 2009)

There are six vehicle entrances to the site. The car parking waste too much area of the site which made the originally small area even more crowded. Besides, stakeholders here have their own parking space instead of a unit one, which leads to the whole area divided by shrub lines, stopping poles and rods. Symbols settled, yet people from different companies communicate little.

Bicycle & Motorcycle

It Is noticed that bicycles and motorcycles are few here, which is quite related to the site location and the Dutch public transporting regulations (in Dutch regulations, it is pointed out that bicycles could not be brought on the rail or trams at the peak time). Obviously, it is not wise to travel from one's home (supposing in Wageningen) to the Amstel III business site by biking, and it is quite complicated to transfer among trains, trams and buses over and over again. However, people driving and working here may also be obsessed by the crowded parking lot and unaesthetic window view. Facing the coin-side conflict, how to manage the problem and solve the conflict with an acceptable plan or strategy is on the discussion board urgently.

Waste Collecting

The waste collecting points are almost allocated at the corner of each parking lot.

Pic. 5-2 Infrastructual issues in Amstel-III, from left to right: Bicycle shed, Car parking, Waste gathering point

Site location
Natural green
Recreational Green
Residential
Business
Shopping and Facility
Hospital
Others

Fig.5-8 Land USe of master plan site
(Source: CBS data)

Like division parking lots, different companies manage their own waste, and every plot is managed very individually and independedlly.

3. Land Use

Current situation

The Amstel-III business park is an extention of the business function following the Amstel-I&II, vertically, but it is seperated from the other two by a large residencial area "Ouderkerk aan de Amstel" and the Arena Port (and its relatives). And to the south of the site is the AMC (Amsterdam Medical Centre) with the adjacent Medical Business Park. While horizontally, the Amstel-III is situated between the A2 motorway and the railway line, at the same time, these traffic lines split the site apart from the postwar housing blocks and to the east, and the Amstelland of cultural-historical interest to the west.

Fig.5-9 From left t o right: Occupation the buildings in Amstel III, Empty rate of Amstel-III, Undeveloped Sites
(Source: DRO Amsterdam, 2009)

Future Structural Plan

♦ As planned, in 2040 the study site will be transformed into a 'work-live' area, which is similar to SOHO(small office home office) concept. That means, the business function here will be weakened to some extent (as it already depressed). At the mean while, other functions like residential, commercial and social-cultural functions will be encouraged, and incorparate with the original and primary business use to make up a space-intensively-used metropolitan branch of the Amsterdam City.

♦ In future, the site, accomodating multi-functions, will play as a buffer zone from residential (to the east) to business (to the west), and from urban (to the north) to nature (to the south).

♦ As located close to the public transport lines and the busy transport center of Arena, the site owns great potential to be developed and reboomed.

Existed Vacant Plot

♦ Lot 206b (16,000 m2; Half Hardened surface; Owned by leaseholder Central City, project Zuidoostlob): Comments temporarily as a parking lot rented for events; No clear planning, temporary use could be interesting (IOM Project).

♦ Cisco name field plot (14,000 m2 land size; Hardened surface; Owned by leaseholder Central City, project Zuidoostlob): Comments as a temporary car park lot for rent to surrounding offices; No clear planning, temporary use could be interesting (IOM Project).

Fig.5-10 Empty land in invention area
(Source: DRO Amsterdem, 2009)

Social Space

Social contacts between districts has always been an issue in contemperary society and living environtment. As a modern business site, Amstel III is supposed to present a sort of friendly and wellcoming gesture to increase social commercial contacts and develop potential clients. Also, it should provide positive inner landscapes to encourage workers have breaks and relax in green yards, which is helpful to maintain their physical and mental health.

However, from my observation, smoking is the most usual activity for people going out of offices. And because of the spatial division of the site, people stay inside their company-owned space when smoking, and would not go across the 'boundary'. Even during lunch time, people seldomly enjoy their food in open air. That is mainly because, there is hardly leisure landscape facilities or outdoor furniture attracting people to walk there to have a break, although it is just steps-distance to achieve the beautiful open views of canal banks.

Pic. 5-3 Human behaviour out of office in Amstel-III
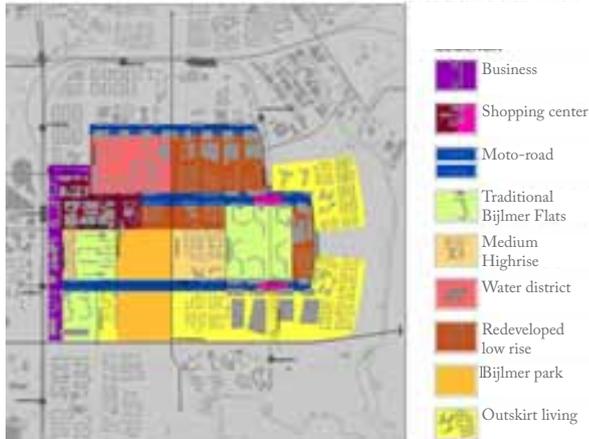
Fig 5-11: Living Environments in the Bijlmer
(Toelichting, 2007)

Fig.5-12 Economic and facility structuur in the
Bijlmer (Toelichting, 2007)

Fig. 5-13 The Bijlmer's connection with outside
(Toelichting, 2007)

5.1.2 Specific Research on Bijlmermeer

Bijmermeer means 'Bijlmer lake'. From the thirteenth century onward, the lake that once lay to the southeast of Amsterdam was gradually filled in. It became an area of farmhouses, grazing cows, and little ditches. As a disdrict of Amsterdam, the Bijlmermeer is quite new; It did not exist as such until 1968. Yet less than ten years later, 'the Bijlmer' had become notorious in the Netherlands, in much the same way as the Bronx in New York.

Development

The construction started in 1966. The design for the district, produced by a team of Amsterdam's Department of Urban Development, led by architect and urban planner Siegfried Nassuth was inspired by the 'functional city' ideas of CIAM and the Swiss architect Le Corbusier(Stadsdeel Zuid-Oost, 1994). It was a revolutionary concept at that time that a strict separation between living, working and recreation was advocated. The idea behind the separation of traffic flows was to prevent traffic accidents and clutterings, since modern man had, according to Le Corbusier, the right to a peaceful green environment with no traffic.

The initial plan for Bijlmermeer was of very tall buildings in a honeycomb pattern (Pic. 5-4)– to minimise the distance between the parking garages and maximise the amount of sunlight each apartment received – set within a parkland environment with peripheral parking and raised roadways (Leeming, 2006). (Fig. 5-14) And, it was designed to specifically attract the Dutch middle-classes, however, the tastes of the majority of the consumers for whom it was designed had changed (Leeming, 2006). Instread, mobile families and those who had the fewest options left, which made the Bijmer to a site of intense social and economic deprivation (Blair & Hulsbergen, 1993; Leeming &

Pic. 5-4 Honey-comb structure of the Bijlmer
(source: Bijlmer Museum)

Fig. 5-14 Planning idea of the Bijlmer-
meer (Wagenaar, 2008)

*Pic. 5-5 High-rise Flats in the Bijlmermeer
(Gerben Helleman & Frank Wassenberg, 2003)*

Shakur, 2005)

Although originally envisaged as a 'lobe' of Amsterdam, the transport links and retail facilities available were extremely limited for over a decade. It was not until 1980 that the Metro was extended into Central Station, the mid-1970s before any shopping centres were completed, and 1987 before the most important retail centre, Amsterdamse Poort, was completed (Luitjen, 1997; 2003). Later on, Amsterdam Bijlmer-ArenA was built between 2000 and 2007 extensively renovated and expanded.

Suplus of Houses

It had a total of 31 high-rise blocks of flats, with an average of 400 flats in each one. (Pic. 5-5) Some of the blocks were linked to make building with some 800 flats. The municipality authorities of Amsterdam had intially planned to build even more high-rise blocks of flats, but in the mid-1970s it became apparent that these flats were not popular and policy shifted to low-rise construction projects (Street sculpture, 2011). In the completed development, it is 18,000 housing units realized (Duke, 2002).

High rent and the lack of demand for flats in a large deck-access blocks led to vast numbers of flats standing empty in the 1980s. In some periods, a quarter of the flats were unoccupied.

The design also overlooked car-free areas of the park-like landscape which costs too much to maintain. Especially when the project was managed and owned by 14 different housing corporations, the parkland maintenance became more difficult and chaotic, and the large lawns were eventually wasted (Leeming and Shakur, 2005).

Multi-Ethnic District

From the 1970s, as a direct result of government policies,the gap between vacancies and housing revenues was closed by rentals to ill-housed, low-paid workers, needing social groups and immigrant ethnic minorities. Bijlmermeer accomodated the post-colonial influx of Afro-Caribbean and Hindustani people from the Dutch Caribbean, Surinam and the Antilles. Later came people fromThird World counrtries (Blair & Hulsbergen, 1993). This is what made the Bijlmer into the cultural melting-pot it is today, a district whose residents come from 0ver 130 different countries. (Appendix 3)

This extremely diverse population of different cultures, experiences, languages and needs also had high levels of illiteracy and innumeracy, and large numbers – especially of the more recent immigrants – could not speak Dutch, fuelling some of

the highest unemployment rates in the Netherlands (Catling, 1998; Leeming and Shakur, 2005; Markovic, 2000).

Bijlmerramp

On 4th of October, 1992, an Israeli Boeing 747 cargo plane crashed into one of the Bijlmer towers killing at least 47 people (BBC News, 1992), 'scrambing architecture and landscape into a zone of destruction' (Mitchell Rasor, unknown). The event made a deep impression in the Netherlands and had a long aftermath. At the disaster , a monument is erected in 1996 at the accident location, which was designed by Ge-oges Descombes.

Renewal of Bijlmermeer

After years of debate, maintenance experiments, adaptations and partial solutions, it became clear that the urban concept had to change structurally. Together with the heartbreaking Bijlmer disaster, a radical reconstruction and renewal work started gradually after 1992.

By conducting times of evaluation and civic survey, in 2002, the 'Final Plan of Approach' was approved for the urban renewal of the Bijlmermeer for the period until 2010 (Helleman & Wassenberg, 2003). Many of the tower blocks have been replaced by new buildings. (see Appenddix 4, Pic. 5-6) There are new residencial boulevards with shops and business. Since then, the Bijlmermeer has been transformed beyond recognition. (Fig. 5-16)

Pic. 5-6 Demolition of High rises from 90s (Gerben Helleman & Frank Wassenberg, 2003)
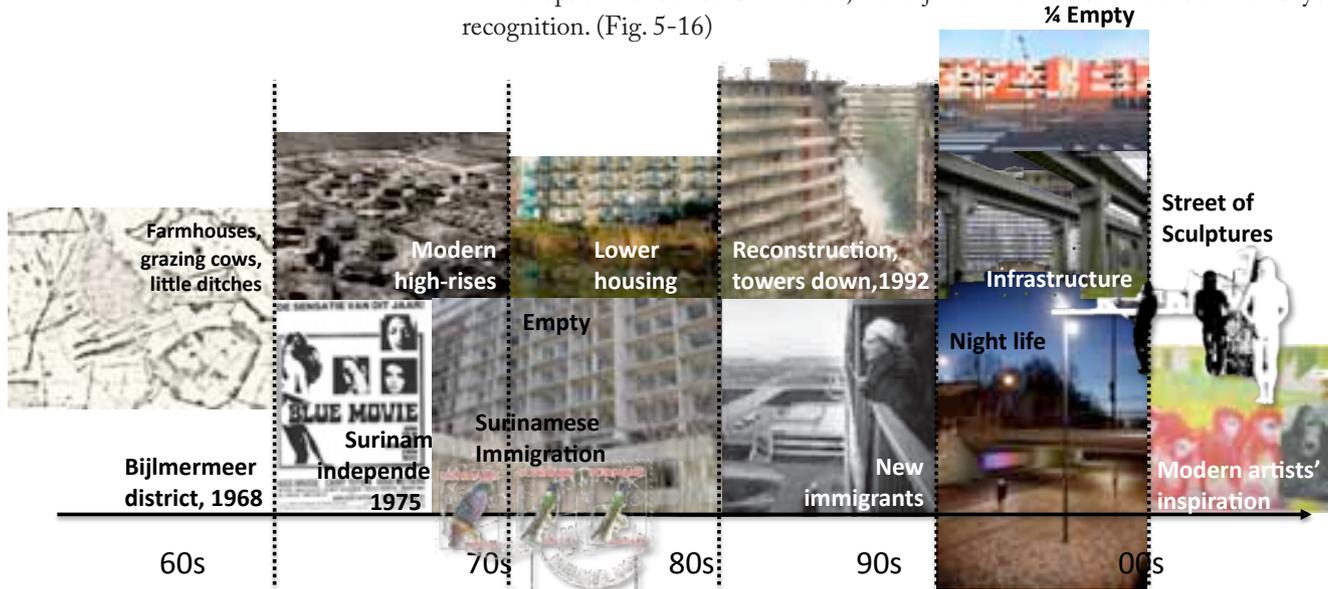
Fig. 5-15 Brief History of the Bijlmer as an urban district
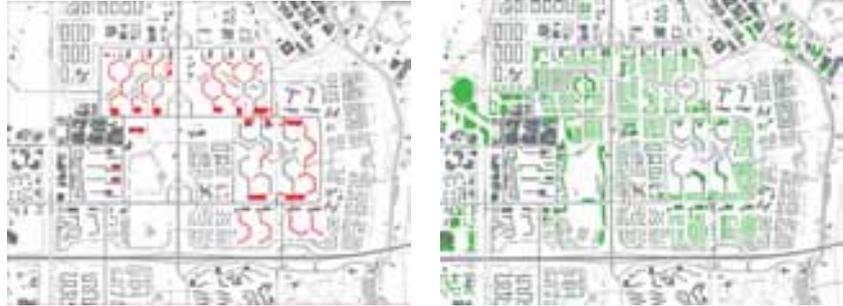
Fig. 5-16 Before & after the renovation of the Bijlmer (DRO Amsterdam, 2008)

Art & Cultural Life

With a population of 85,000, the southeast borough of Amsterdam, to which the Bijlmermeer belongs, is equivalent to a medium-sized Dutch city. Breaken through the tough past, international atmosphere and the optimisim of the pioneers, has remained. That atmosphere is the most important reason for staging various art projects. And the space, the Bijlmermeer's enormous expanse of public space.

As an inspirition spring, the Bijlmer has held kinds of art and cultural events, for instance, 'Street of sculptures', 'Flat-residency art event', etc.. (Fig. 5-17)

Fig.5-17 Art Activities in the Bijlmer

Summary

'The history of the Bijlmermeer is symptomatic of highrise estates as tomorrow's idealistic cities.'(Helleman & Wassenberg, 2003)

There were certain rather futuristic elements in the design. For instance, each block had its own underground car park, with a capacity designed to accomodate an unbridled growth in car ownership (three times as many as while building was going on).

However, the Bijlmer practiced contradictory to its intial, which was to build a 'model district, the district for the modern man'. Physically, the Bijlmermeer's layout was considered to be a fundamental mistake in urban design: too massive, with too much high-rise and especially having too little differentiation in the housing stock.

While socially, for about 10 years after construction, the Bijlmermeer was nationally known for its social problems. It concentrated large numbers of disadvantaged people in the district; Some places in the Bijlmermeer were plagued by crime, decay and drug nuisance; Also, there was considerable   unemployment. 'A combination of continuous liveability problems, a long history of partial improvements, changes in the surroundings of the Bijlmermeer, a firmly set negative image and pessimistic future prospects led to the understanding that a radical redesign was inevitable.'(Helleman & Wassenberg, 2003)

The renewed Bijlmer did looked much appeal to the Dutch whites, with low-rise with private gardens, paved squares and most importantly, service facilities in steps distance. But some things have not changed, or say not yet, one of which is the fabric of urban space, and the other thing is the negative impression of the outsiders. Since it is hard to define it good or not for 'the compact Bijlmer', this already became a characteristic of the site. More attention should be paid on the hidden dangerous corners. To improve people's negative impression of the site, it is vital to consider social contacts at the first place, which includes both inner communication and communicating with the outside world, probably, its neighbor-Amstel III at first.

3. Alienated Neighbour

In 1987, Zuid-Oost urban district was established and the bijlmer was given its own spatial development agency. In addition to densification and the creation of varied living environments., key objectives were to raise the level of facilities and to attract new sections of the population, including employees in the business park Amstel III. Another aim was for Zuid-Oost to become Amsterdam's second centre, with Amstel III and Amsterdamse Poort functioning together as the economic driving force in the bijlmermeer. However, the railway embankment formed a major barrier between

two areas. (Marlies Buurman, Maarten Kloos eds, 2005)

Aside of the obstacle of the huge infrastructure, different social class is the main mental border for the two districts. Actually, since living in the Bijlmer is already the last option for the white-collars of Amstel III, it is common for them to have little contacts. As two social isolated neighboring districts, to break through the icy-relationship between Amstel III and Bijlmermeer, one of the applicable way to link them by elementary commercial activities - sale. Only the first step overcomed, more interactions could be expected and introduced gradually.

5.1.3 Summary - SWOT Analysis

In the inventory phase of the site, it is obvious that the two site are of huge differences, both in perspectives of physical landscape and socio-culture. In this summary part, two seperated SWOT analysis were conducted for the Amstel-III and the Bijlmermeer. While, considered as a united site, the two sites should be linked by proper social and landscape approaches, for which, a common/ complementry ground is neccessary.

Amstel-III Business Park (Tab. 5-1)

Reviewing the previous inventory part, the Amstel-III was found still competive because of its advantages in location, transport connection and green surroundings. But at the same time, three strongest problematic issues also emerged, which are somehow corespondsive to its merits. The mono-functional 80s' office park is lack of facilities; The inadequate walking/biking path leads to a defect of the access structure; Boring extertior space is filled only with cars, and the totally paved ground

Strength	Weakness
1. Good transport connection to outside	1. No adequate path (to station & nearby attractions)
2. Diverse urban functional lands nearby	2. Building physically decayed
3. Various landscape patterns, especially water	3. Ownership fragmented, space fragmented
4. Green surroundings	4. Investment climate deteriorated
	5. Unpleasant external communication space
	6. Isolated from social context
	7. Hindering regional ecological network
	8. Lack of liveliness and No Identity
Opportunity	**Threat**
1. 30 % structurally vacant – space waiting to change	1. Totally paved office site (not for plants)
2. Steady busy hours : 8:00 am- 6:00 pm, other time almost fully 'empty'	2. Mono-functional
3. Floriade 2022	3. Locals (workers) unwilling to help maintain the site
	4. Huge infra hindering horizontal social connection
	5. No adequate path (to station & nearby attractions)

Tab.5-1 SWOT analysis of Amstel-III

with little vegetation; And the social disconnection with its context lead the site a lack of liveliness. All these problems prove that the site cannot meet the requires for different market initiatives, and the interaction of problems accounted for its current deterioration.

Yet, as Floriade is coming in 2022, some of its weakness might be viewed as opportunities from another point, for instance, vacant office buildings can be reused for vertical exibiton, commercial space, or resting spots induring the EXPO. The next ten years could be viewed as its destiny turning point of the Amstel-III.

Bijlmermeer Neighbourhood

Bijlmermeer is continuously situated in a more complex social context and its physical appearance has been tremendously changed over the last ten years. As listed in the table , although social problems were never stopped or solved, and inherited constructional problems still existed, the place is getting much progress and trying hard to change the outside judges. Together with its strength in melted culture, and

Strength	Weakness
1. Good transport connection to outside	1. High-rise flats physically decayed
2. Good interior footpath connection	2. High-rises block landscape views
3. Inherent diverse urban functions	3. Large un-managed green space extending walking distance to service facilities
4. Various landscape patterns, especially water and large amount of lawns	4. Hidden dangerous corners left by original urban design
5. Large green space assist regional ecological network	5. Notorious for social problems: crime, drug dealing, high unemployment, disadvantaged population
6. Multi- cultural social & constructional atmosphere	6. Isolated from social context
Opportunity	**Threat**
1. A considerable vacancy of flats	1. Decay of high-rise flats
2. Enormous open space	2. A number of unregistered residents
3. A number of available labours	3. Low-educational people
4. Finished renewal projects provide more living options	4. Potential conflicts between races and social classes
5. It is always a debatable focus	5. Huge infra hindering horizontal social connection
6. Floriade 2022	6. Negative impressions still in people's mind

Tab.5-2 SWOT analysis of the Bijlmermeer

large available open space, the Bijlmer is already regarded as a 'living museum' that welcome various cultural activities.

But, extra attention should be paid on some potential threats hidden behind the multi- ethnic atmosphere, and the management of Floriade could be a tough issue.
Common Ground & Complementery

Disparity between the two districts increase the difficulty of co-operation, wherever, it is the gap that make two contrasts become perfect parterners. For the case of Amstel III and the Bijlmermeer, their complementary features are listed in pairs in table 5-3.

Amstel III	Bijlmermeer Neighbourhood
◆ Mono-function	◆ Multi-functions
◆ High vacancy of offices	◆ High density of flats
◆ Inadequate walking /biking system,	◆ Only slow path in open landscape
◆ Almost totally paved	◆ Spacious greenery
◆ Some decayed offices	◆ Poor physical quality of flats
◆ Highly educated white collar	◆ Low educated, poor dwellers

Tab.5-3 Complementry conditions between Amstel-III and the Bijlmermeer

Mono- v Multi- fuction

Amstel-III is a typical Dutch business site, and there is almost nothing except offices and warehouses. On the other side, the bijlmer owns a variety of facilities like shops, resturants, etc, that could support working people's basic needs. To better co-operate with each other, those facilities could be moved more close to the edge between the two to increase interactions.

The monofunction of Amstel-III also decides its stable schedule of work-rest cycle, which is usually, from eight o'colock in the morning till seven o'clock in the after-noon, from monday to friday. The peak commuting times are up to 1 to 2 hours around the starting and ending time point. This means, apart from these busy hours, the site is possible to provide space for outsiders to use, and the Bijlmer-er could be the potential user.

High vacancy vs. High density

Since the Amstel-III is trapped into a negative circle, more and more buildings have became or will become empty. While in the Bijlmer, although the registered population on the official statistic paper is not high, actually, there is quite a large number of dwelling population, much more than recorded (Blair & Hulsbergen, 1993). Still, a group of people live in the high-rise flats looking forward their own backyard gardens to grow flowers or crops, to feed themselves as well as to sell for money.

For these two reasons, two options emgered for future development, the first is to transform the vacant office buildings into apartments or loft-house for starters, and the second is to recycle the empty space for urban productive utilities.

Vehicle vs. Foot, Pavement vs. Green

The large greenery in the Bijlmer Neighbourhood is designed only for walking and cycling, cars are parked in vertical parking lots near to flats. The problem is seldomly would people walk a very long distance to reach those facilities everyday, not even to say the weather in the Netherlands is not always pleasant, and the paths are unshedded. However, when encountering good weathers and public activities, some well greened places are quite in favor. Besides, from the point of regional ecological network, these natural green areas acting as habitats for species should be preserved.

Oppositely, the Amstel-III is originally designed to prioritize the motor system, for which the whole area is almost totally paved and lack of green space. The existed planting just dressed the site, and far from sufficiency to provide an aesthetical view or comfortable exterior environment.

Infusing extra greenery into a business site could be realized in varity of forms, in which, prodective plot is a economical choice for landoweners. Since these productive greens could profit the urban farmers, therefore they will more actively manage these vegetable gardens.

Highly-educated white collar vs. low-educated poor dewellers

According to former theory studies about people's landscape preferrence, the well-educated group prefer natural landscape elements to recreated landscape crafts. This again requires more natural elements to be added into their living-working environment. It does not only mean the visionary green and biodiverse environment, but also the enjoyment of clean fresh air, organic food, etc..

In the Bijlmer, there is a group of disadvantage people living rely on subsidy from the government. It is difficult for them to earn a better life because of their limitions in

educational level, language, or other else. However, under certain circumstances, their green surroundings, multi- cultural backgrounds, and a bounch of free labours, might create oppotuities for them, with Floriade and neighboring districts.

5.2 Strategy for Redevelopment
Sharing & Collaborating

In the previous analysis, the two controditionary distiricts were found to be complementary in several aspects, and some possible cooperation ways were implied. Together with those fundamental researches on the current landscape quality and the context of the master-plan site, a more concrete strartegy specific for the site emerged. It could be considered as an alternate approach to implement CPUL in the future development of the site.

The design strategy is Sharing land with neighboring districts and Collaborating on developing and maintaining it. The philosophy of sharing and collaborating is also a key point of the Continues Productive Urban Landscape, reflected in planing process and perma-cultivating process. What would be shared of , and, collaborated on refered here does not only mean properties and wealth, but also, perhaps even more importantly, means the joy and other benefits derived from the sharing and collaborating process.

"Access is better than ownership."

- Kevin Kelly, Editor of 'Wired Magazine'

Sharing is a human nature. One little child has sandwiches would love to share his/her food with the other one who doesn't (Video 'Share is human nature', 2011). This is one kind of share. Two childs have only one set of LEGO, they will play together and collaborate to build a house. This is another kind of share. Similarly, Mr. Jang has an large backyard half of which is wasted, he can share the backyard with Mrs. Smits who doesn't have a garden but really wants to grow her own vegetables and flowers. As a reward, Mrs. Smits shares her harvested products with Mr. Jang. In this story, both two benefit a lot from the sharing and collaborating process, and they easily examplify a win-win model in our daily life.

Pic. 5-7 Website for landshare (www. landshare.uk)

This model is named 'collaborative consumption' and it is a very popular exchanging form worldwidely. (Pic. 5-7) Contemporarily, millions of people exchange their useless stuffs with each other through internet to get what they need and 'recycle' what they dropped at the same time. This model well illustrates one thing is what people need actually is the experience one stuff full-filled, instead of the stuff itself.

While, tracing back to my project, Amstel III owns some vacant plots without proper maintenance, while at the same time, lots of inhabitants in Bijlmermeer live in flats without backyard gardens and some are jobless or with low income. Inspired by the concept of 'collaborative consumption', an idea of 'land-share' between Amstel

III and Bijlmermeer crashed me.

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                         Farming land --->
        Amstel-III <--------------------------> Bijlmermeer
                         <--- Eco-products
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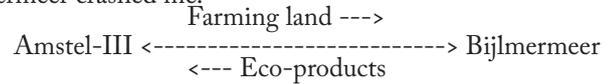
Beside the 'land share' strategy for feeding the vacancy, there are more aspects the two districts could collabotate on. The linear green belt along the railway line is the cutting line seperating districts on both sides. On the other hand, the green belt belongs to and serves for lands on both sides. This is could be characterized as a Janus-face landscape element, since it divides the area into two parts and grants them two totally different character, while it also bonds them tightly by sharing the public transportation in middle, and providing tunnels enable accessibility to each other.

While from a demographical perspective, landscape should carry the capacity of diverse activities for different classes of people coming for variety of purposes. The linear zone along the railline presents a great potential to be transformed and used as a urban public space to show this quality. It could act as a social bridge linking workers, residents, by-passingers and visitors (propably in future), if properly designed. There all kinds of 'free-style' public activities would never ever lay a limition to people from different backgrounds.

What is more, the railway/metro stations where population booms temporarily, are the stimulating points to increase inter-mobility and interacts between the two districts, and between the whole site and the outsideworlds. The three stops closely related to Amstel-III and the Bijlmer are 'Bijlmer-ArenA', 'Bullewijk' and 'Holendracht', and the former two are covered in the selected site for master plan.

Therefore, the railway line and the railway/metro stops also should be seriously take into account in design phase. (Pic. 5-8)

Pic. 5-8 Iniative of linear railway bank

5.3 Design Principles

Based on the strategies raised before, some corresponsive design principles are going to be brought about to direct future planning and design. These principles consist of five sub-groups concerning local landscape qualities, and they are urban spatial structure, social connection, urban function, aethetics, and ecology & energy.

5.3.1 A Loose Urban Fabric

1. Create a loose urban structure by preserving the existed empties and appropriately arranging those niches between previously crowded office buildings and parking lot.

The niches should be places promoting social connections and enhancing local ecological network. The basic idea behind this principle is to create compact blocks and leave those open scapes for imaginations from their actual users, and proposals considering as many social groups as possible. Right now in my case, the empty office buildings and their vacant parking plots, as well as existed undeveloped lands play the role of niches.

During the slack time waiting for proposals, these empty sites should make efforts on improving its environmental quality to inspire local users or attract new comers, e.g. providing ecological habitats for species, planting woods to improve micro-climate, etc.. The flexible loose space for multi-users and multi-activities have a tendency to differ from the stiff activity and planning traditions in business site.

2. Fill the spacious combined emptiness with flexible landscape designs, to avoid wasting land.

Although, 'loose space' concept points out the necessity of reducing density, however, a large totally empty urban patch is wasteful and unwelcomed, since it leaves people a negative image of lacking management. For this reason, it is suggested to fill these large patches with thoughtful strategic landscape designs, for instance ecology-focused landscape like urban forestry, productive landscape like urban agriculture, urban livingroom like urban squares or parks, and combined functional space by integrating some of these listed ones. All these spatial types contribute to build a positive/lively image of the site, and construct a resilient urban structure with certain void space to accomodate changes. (Fig. 5-18)

Fig.5-18 Concptual model of loose urban infra-structure

5.3.2 Social Connection & Interaction

1. Take advantages of 'edge effect' to improve local and regional social contacts and
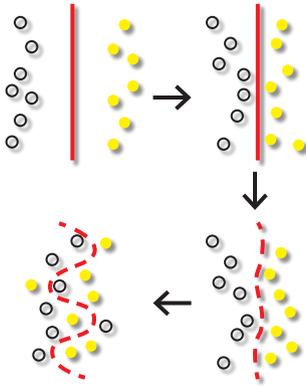
Fig.5-19 Concptual model of soften the edge effect
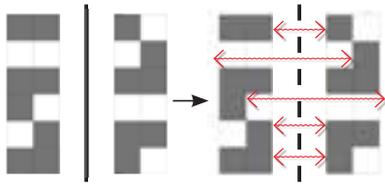
Fig.5-21 Concptual model of increase tunnels to increase soical contacts

ineractions.

Working with the edge is a balancing as well as a sharing act. (Thomas Juel, Morten Daugaard, Tom Nielsen, 2010)

Firstly, it is about creating edge conditions with the capacity to hold uneven or conflicting parts together (e.g. busy and quite in opposite time) and articulating their contrasts in ways that benefit each of the parts involved (e.g. people back from work can have a relax at the quite office side; workers can buy a fresh lunch made by local residents). (Fig. 5-19 & 20)

Reflected in my project, the linear green zone along the railway could be regarded as an edge of both Amstel III and Bijmermeer. This implies, the railway zone supports the identities of the two sides. Therefore, for each side, it should introduce more functions to expand user groups, and recreate participatatable landscape types to mix different social groups in collaborating process. And under this principle, CPUL may play the role of particitatable landscape

Fig. 5-20 Different users visit to and collaborate on the land with different purposes

to be introduced into the niches among office buildings. It is expected to attract multiple social groups come for different perposes.

Secondly, working with edge is also about considering it as a potential network of connections between isolated districts, as well as a public property to be shared and collaborated (Thomas Juel, Morten Daugaard, Tom Nielsen, 2010). (Fig. 5-21)

This principle fit my project even more pricisely, since the edge refered here, on its own, is a already part of the transporting network. If improved, it is assumed to make greater contribution in increasing the social connection between the two or more districts. It could be realized by consturcting more tunnels for people commuting and commnicating from different districts.

Plus, the linear railway zone as a site, should be spatially modified, by diversifying its spatial types and forms, with an aim of accomodating various public activities to draw more attentions from both sides.

5.3.3 Continues Urban functions

1. Making co-habitating space where multi-functions could work together without invincible conflict, and elaorate together for better living environmental qualities.
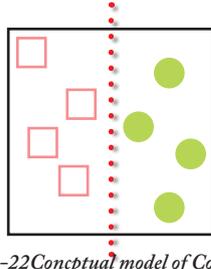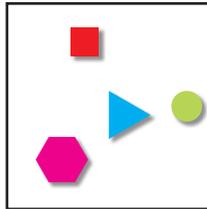
Because of the fixed busy time of business site (Monday-Friday, 07:00-19:00), it is possible to have dual-functions of business and urban agriculture in day time. To achieve the co-habitating mode of office workers and urban farmers, it requires certain 'boundries' to avoid disturbance, like mix-match peak hours and private transporting route. But this boundry is a vougue one, and it never should be a concrete fense. Meeting place for different groups is also very important for increasing social connection and exploring more commercial co-operation opptunities.

The co-habitating model is a mutual-benefit model that derived from the 'sharing and collaborating' strategy. (Fig. 5-22)

2. Providing diverse spatial types that supports continuous activities during different time.

With continuous functions, the landscape could work for a longer time for kinds of utilities and avoid to be wasteful. This could be viewed as increased porosity of landscape, which is an important quality to survive within an urban context. For instance, the parking lots of Amstel-III could be used as open markets, sports field, and other variable uses in work-off time (19:00-07:00 of weekdays, and whole weekend). While, the openscape in the Bijlmer are quite capable with holding large artistic events, and the channels normally used for storm water retention while during harvesting season for inner transporting. (Fig. 5-23)

5.3.4 Aesthetics & Experiencing Landscape

1. Designing landscape elements with basic considerations of Simplicity, Variety, Balance, Emphasis, Sequence and Scale.

♦ Simplicity means design should asist people to understand what is, and what is not important in a landscape design. Details that will not have a major impact on the landscape should be omitted to keep it uncluttered. This is could be reflected in designing and arranging the 5 landscape elements by which users percieve spatial information: paths, edges, districts, nodes, and landmarks. (Kevin A. Lynch, 1960)

♦ Variety is mixing up the form, texture, and colour combinations in a landscape to create extra interest without sacrificing the simplicity of the design

Fig.5-22Concptual model of Cohabitation

Fig.5-23Concptual model of Porosity

- ◆ Balance is the relationship between elements in the landscape. Balance can be formal or informal. Formal balance would usually mean that one side of the landscape is mirror to the other(seriously geometry), while informal balance is when plant sizes and numbers are only relatively similar on both sides.

- ◆ Emphasis means the hierarchy of landscape settings, like vegetation could be planted in several levels: specimen plants, accent plants, key plant, plant groups, massed plants.

- ◆ Sequence is a gradual transition from one area to another within a landscape.

- ◆ Scale is the relative size of one part of a landscape to another. Scale may be the proportion or ratio of size between components in the landscape.

2. Framing landscape with local identity, and the memorial landscape elements to strenghthen the 'Loci' of the site.

5.3.5 Ecology & Eco-Energy

1. Preserving local biotic species to the most extent

2. Providing ecological services like air filtering (gas regulation), micro climate regulation, noise regulation(disturbance regulation), rainwater drainage(water regulation), food production, erosion control, and recreational / cultural values, by green infastructure (Constanza et al., 1971).

One of the most effecive green structure in an urban context is linking natural patches by green corridors. The corridors include stream and river (blue-green ribbons), green ribbon, and string(patch), all of which are enhanced by having attached small green patches(pearls) (forman, mosaic territorial). These connections are for the movement of people(local and hikers), wildlife (indeed most animal and plant species), and water in stream, canal, and river). (m.mugica, J.v. de lucio and f.d.pineda, the Madrid ecological network", 1996; b. Babbitt, 'cities in the wildness',2005; forman, 'mosaic territorial', urban regions).

3. Designing urban farming plots with permaculture design principles.

- ◆ involving nature as a role in working land (worms aerate the soil, stored water pumps out for irrigation, etc.) to sustain the agro-land

- ◆ spatially arranging crop species (relative location) to save effort and energy, achieve maxium effect, and benefit the whole system most: poly-dome crop system

♦ transforming output to input to reduce the dependence on inputting sources

♦ building a collaborating and mutual system, in which each function should be supported by many elements, and each element performs several functions.

4. Linking the urban farming plots with water recycle system fomulated on local existed water network.

The water recycle system is quite like the blood flowing process in a healthy human body. (Fig. 5-24)

♦ River - Artery & Vein: River water flows in city system just as blood in human physical body, which bring necessary water supply for various uses and deliver waste for treatment.

♦ Stream/Creek/Canal/Ditch - Microscopic Vessel: Similar to microscopic vessels in a physical body, distributing oxygenated arterial blood to cells and after exchange process returning waste-carried veinous blood back to heart again, small volumes of water distribute the main water flow to different areas/blocks, and flow back to the main volume with/without toxins.

♦ Lake - Lung/Heart: Heart works as a storage and a pump for the two basic blood circulation process - systemic circulation and pulmonary circulation. Alike, a lake stores inpouring water for a while, and exporting water to flows with/without purification.

Fig.5-24 Immitation of Water recycly system with blood flow in huamn body

Fig. 5-25 A subdivision of the site for conceptual design

5.4 Design

Each design principle will generate one or more conceptual models. By evaluating and balacing these models, it is possible to choose one of them, or more taking general interest into account, to recreate a combined model with one focus and some other company elements to achieve the optimum effects.

5.4.1 Conceptual Models For Master Plan

Derived from the five catorgories of priciples, alternate conceptual models could be illustrated by following graphs. (figure) In these graphsm the site is subdivided into different parts for conceptual design.

Fig. 5-26 Conceptual design based on Principle 1
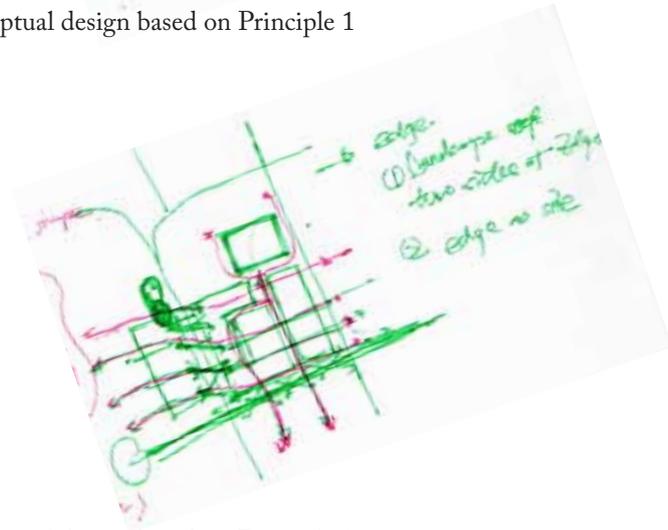
Fig. 5-27 Conceptual design based on Principle 2

Fig. 5-28 Conceptual design based on Principle 3
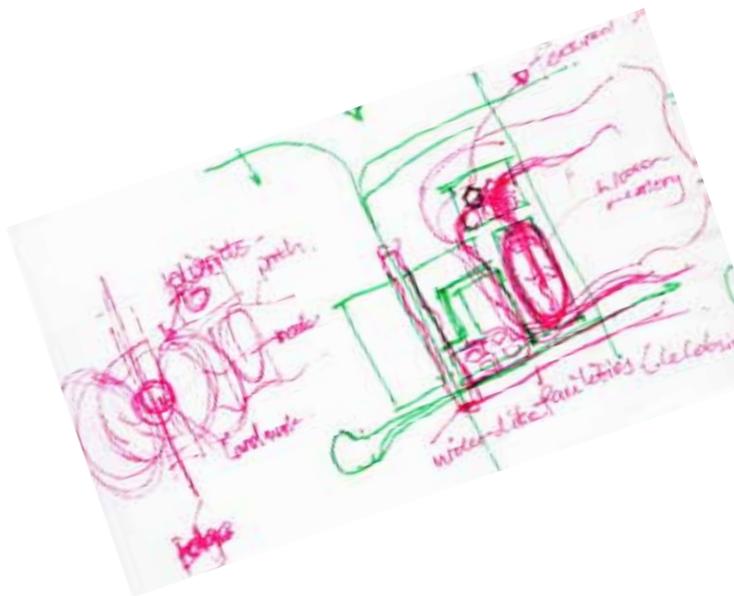
Fig. 5-29 Conceptual design based on Principle 4

N

100   500m
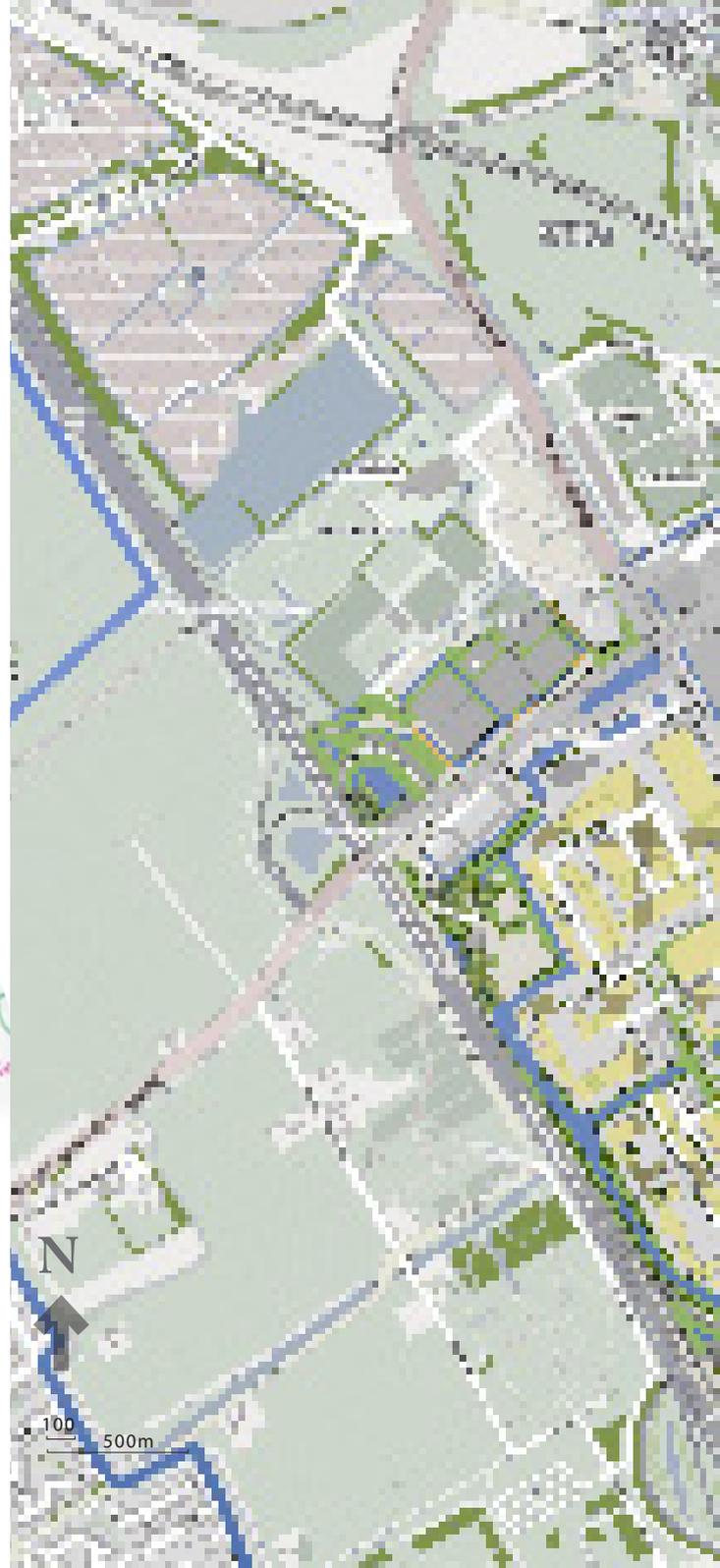
5.4.2 Master plan
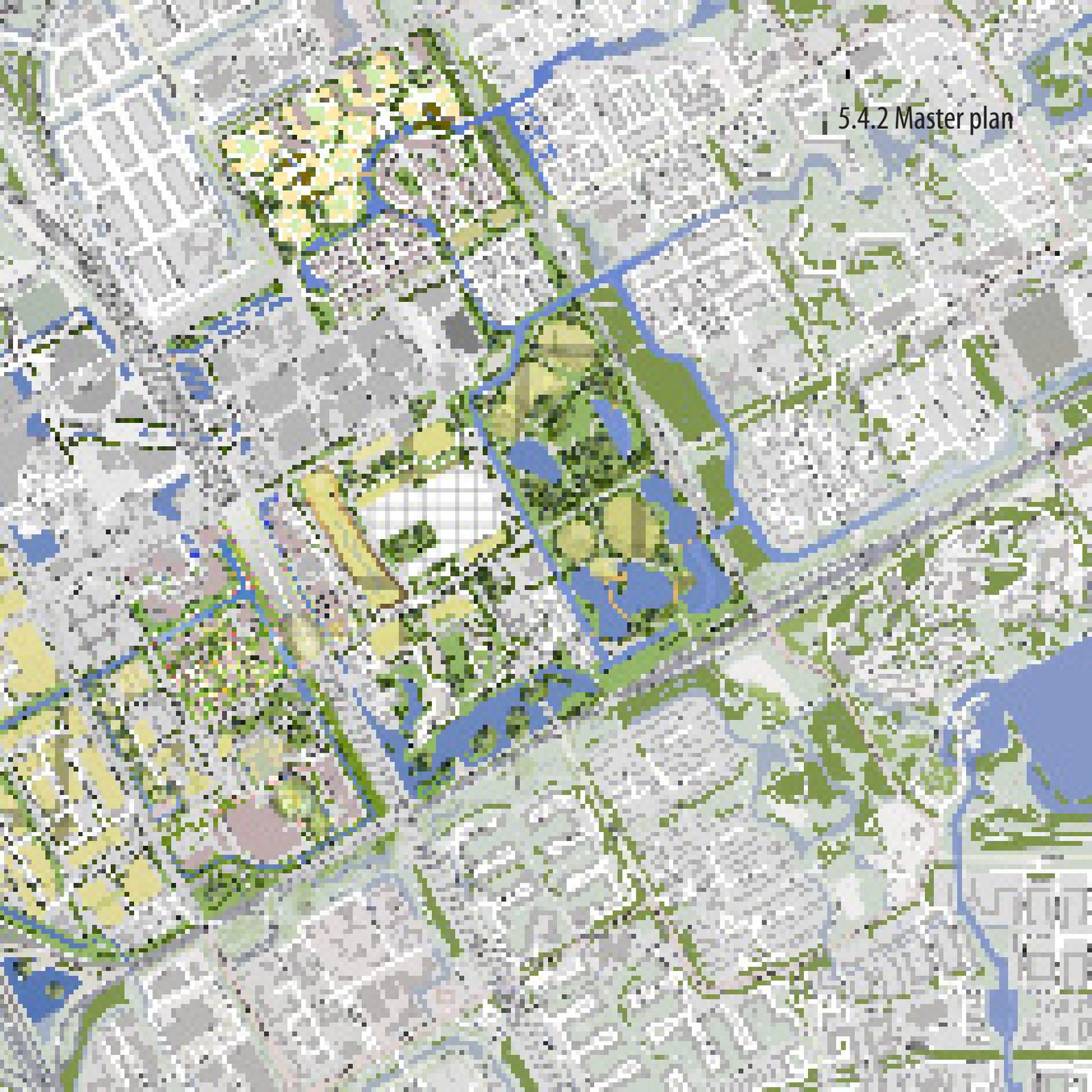
5.4.3 Review

Basic Structure – Loose

In the final plan, the marjority vacancies in office park are left without definite design waiting for new users, only except for the totally empty plot on the west edge of the site, which is proposed to be filled as an urban forest. The reason of this transformaion is mainly based on the design principle 1, 4 and 5. Similarly, the east side of the site which was an urban park in openscape style, will be transformed into an agro-park, with more water excaved, more trees planted, and polydome greenhouses introduced here.

Vacancies in the housing area are generally preserved as public openscape. Some seriously decayed flats will be demolished, and the left emptiness might be used as a central square surrounded by facilities and shops, or commutity gardens close to remained high-rise apartments. Although these vacancies still functions, they are actually without constructional redevelopment, and capable with a diverse utilities and future changes. This transfromation proposal is based on all the five principle catorgories.

Function–Diverse

The basic urban functional structure of the site is kept, in the main while, productive functions are interweaved to diverse the current variety. The productive lands are originated from the reclaimed urban vacancies, the rooftop of office buildings, and newly added elvated platform. The design with CPUL is based on the principle 1,2,3 and 5.

What worth extra attention is, more living or entertainment facilities are planned to concentrated around the rail-line, to better serve users from both sides, and potential users from other areas travelling here. The backbone principles are number 2, 3 and 4.

Social Contacts – Expanding

Instead of use other English terms, I prefer to desicribe the future of local social contact is 'expanding'. That is because, before the project, the two districts are lack of communication with others in the region. The proposal assumes to re-link the two alienated neighbors by productive landscape at first, in order to tear down the mental wall by collaborating on improving the living-working environmental quality. The rebooming lively image will attract new comers and investments, and expand their social nework with the outside world.
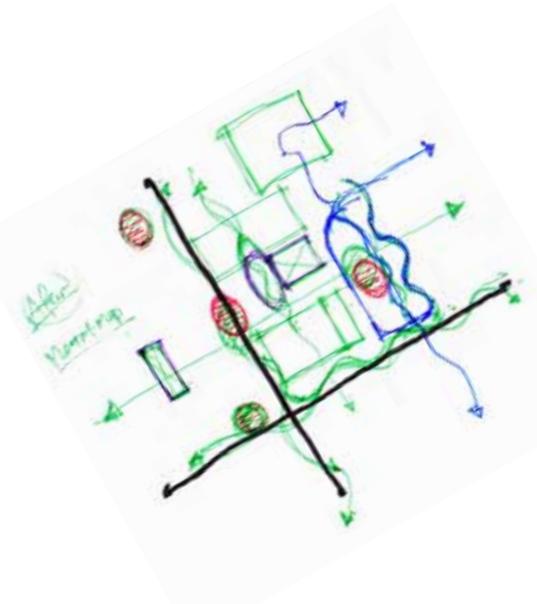
The two design apporaches adopted here are openning the concrete edge, and multi-exhanging approach. The proposal works for principle 2, 3 and 5.

Aesthetics & Landscape Experience – Foci & Loci

After re-arranging the current landscape structure, and emphasizing local cultural-landscape identity, the site is expected to reveal the cohenrence, complexity, legibility and mystery to visitors. The refined aesthetical qualities could be seen from the new mental map:

New interesting landmarks are added that can help visitors mark out their position, and with different characteristics, these landmarks may also draw people's curiousity;

More qualified and orientional paths are recreated to provide foot walkers a pleas-ant landscape experience. One path is designed to circulate the central agro-park, which follows the water channels and provide walkers a strong feeling of touching the nature.

The two edges are softened by the diversified spatial forms and functions on its own, and winded paths go through between two sides of the border reduplicatively. The image of the edge is percieved only by the elevated height.

The un-clear node system (before there is only ArenA plaza and Amsterdamse Poort that recognizble from the author's perspective) in this area is improved by transform-ing places along the main path axis.

The five districts are designed involving more local cultural landscape elements in shapes, forms, and materials. For instance, the community gardens are designed in shape of hexagon in the F neighbourhood of the Bijlmermeer, which is originated from the 60s' plan.

To remind the locals of the 'Bijlmer lake', which could only be inferred from the name today, an enlarged water surface in the Bijlmer agro-park is connected with channels in neighborhoods, which could roughly outline the former shape of the disappeared lake.

Fig. 5-30 Predicted mental map after design.

6 Detail Design

6.1 Site Selection

Within the master plan brought out in the last chapter, some parts of the site are preserved, some are re-developed on its current base, while some are newly invented on emptiness. As a designer, I choose several plots covered in the master plan for further research and detail design. These plots are representative cases with totally different properties, and their transformation process could be imitated by other similar sites.

The detail design sites are selected from three concerning points:

♦ from the point of the Floriade 2022, the land spot where visitors will boost could be included, for example, the proposed entrance or exhibition core of the Floriade plan, the public transportation stops, etc.; Path connecting transport stations to Floriade site, or inner path connecting the two sectors of Floriade as proposed in chapter 4, would also be interesting to be refined.

♦ from the viewpoint of the locals, it could be some plots highly occupied or frequently used, where improvement will directly positively affect the locals' daily behaviour, and upgrade their living quality. For instance, office plots, metro station; Undeveloped land with so many unfixed possibilities is also interesting for supplying social and spatial needs of the locals, e.g. a large open ground near flats, the fully vacant plot in the west Amstel-III, and the wasteful linear space along the railway line.

♦ From the point of increasing local and regional communications and interactions, it would be interesting to consider unique places of attractivity for outsiders, like shopping centres of IKEA, natural space of the Bijlmerpark; Or paths of connectivity to surrounding environment, like path going through different districts.

Followed are the final selections after assessment:

Plot A - Lot 206b is a totally empty site, comprising three parts to the west of Hettenheuvelweg area

Plot B - A combination of Hogehilweg 22, Bullewijk metro station, and Karspeldreef 15,17,19.

Plot C - Cisco possessed field, situated between Cisco office complex and IKEA market.

Plot D - Block D&F in the Bijlmermeer Neighbourhood
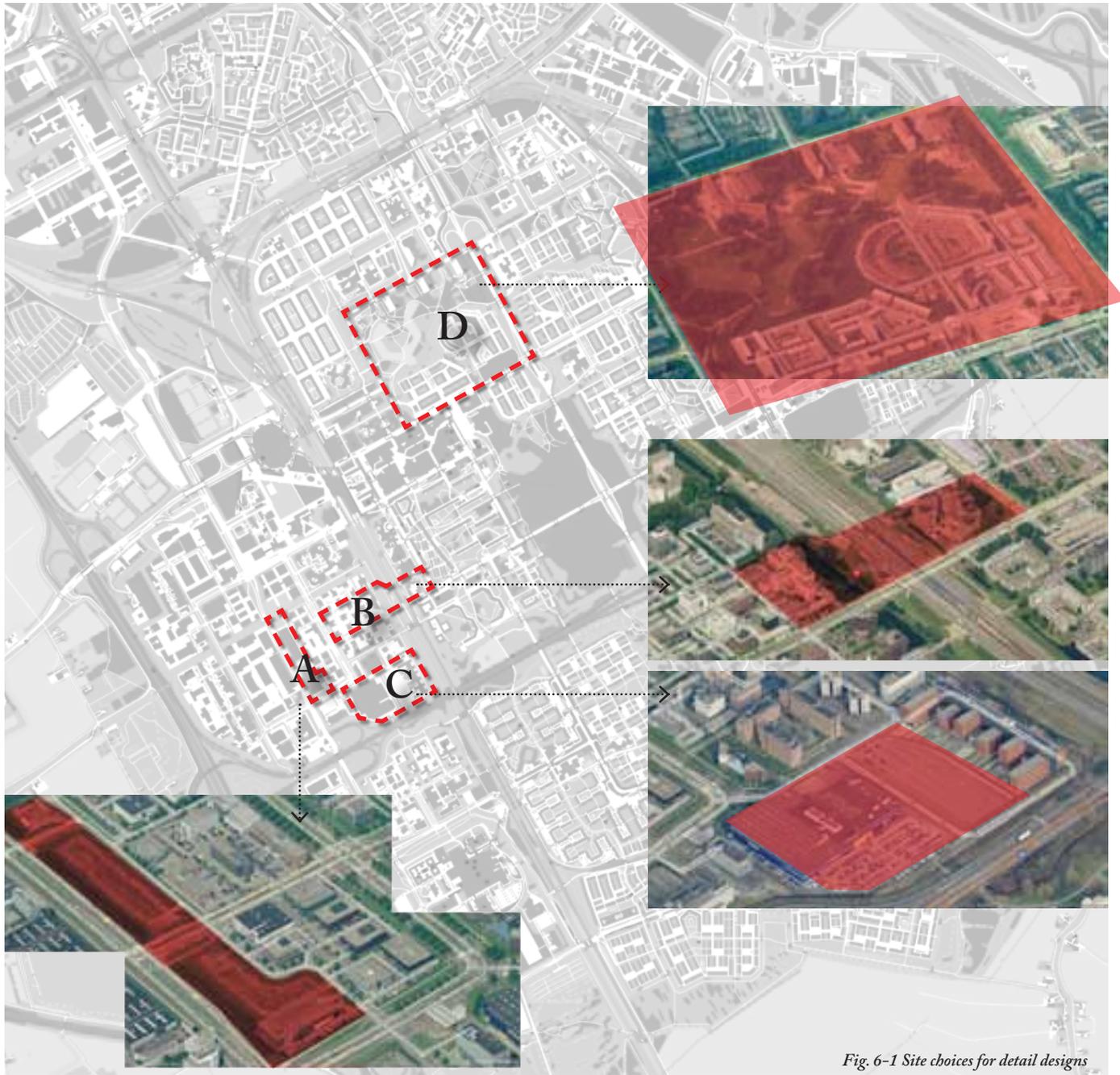
Fig. 6-1 Site choices for detail designs

6.2 Detail Design Principle

Companying with designs from the largest Floriade plan, through the middle-size master plan, to the last detailed level, in this research-design process, the design principle is also divided into three levels. For this level, principles are summarized into three parts, which could be directly translated into design details.

Traffic

♦ Emphasize the hierarchy of road system by plants arrangement plan. (refer appendix.)

♦ Link foot paths and form a circulate walking system, and avoid a sharp ending. This is helpful to provide a sequential walking experience.

♦ Provide different walking experience by considering shape, material, and road side planting. Especially when extending to surrounding natural landscapes, path could be designed in variable forms to increase the interestingness of landscape, and to be better memorized. (Fig. 6-2,Pic. 6-1)

♦ Pay attention of small nodes in traffic system, like parking lots, public transport stops, etc.. Design the nodes with other principles to improve the comfort level.

Pic. 6-1 Experience of Path
(source: www.Floriade.nl)
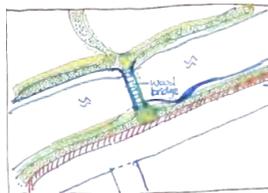
Material of Path   *Form of Path*   *Circultion of route*
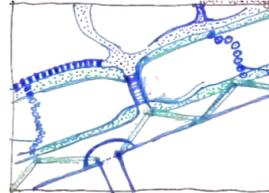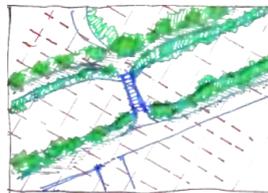
Micro-climate   *Landscape rythm of path*   *Seasonal Change*

Fig. 6-2 Affectorsto people's perception of path quality

Micro Climate & Energy Saving Landscape

Trees can help people create a nicer environment in which to live. In addition to helping make landscapes visually pleasing. They make our environment cleaner and more comfortable. Tress proved shade in summer and shelter from harsh winds in winter. Correctly placed shad trees, windbreaks, and foundation planting can reduce heating and cooling costs by an estimated 25-30%, with some estimates as high as 50%. Tree canopies keep air temperatures at ground level cooler, and when summer temperatures are cooler, fewer air pollutants form.

♦ Create windbreaks to block harsh winter wind, but allow cool summer breezes to flow through. (Fig. 6-3)

In most places, the harsh winter winds come from a different direction than the cool summer breezes. Placing an effective windbreak along the side of the house where winter winds are strong can provide shelter from cold winds, and therefore reduce heating energy needs.

winter wind   Summer wind

Fig. 6-3. Wind break and channel effect of trees

An area of relatively calm air is formed downwind from the windbreak, a distance of approximately 10 times the height of the windbreak. There can be some wind reduction as far as 25 times the height of the windbreak downwind (Fig. 6-4). To be effective, the windbreak should consist of trees and shrubs that are tall enough, dense enough, and in a long enough line to protect the house. The most efficient windbreaks will consist of at least one row of dense evergreen trees whose branches extend to ground level. Usually the windbreak is planted in rows perpendicular to the wind direction. In most cases, the windbreak will run to the north and west of the building. A windbreak that permits 50-60 percent of the wind to penetrate (such as evergreen trees) is better than a solid barrier (such as a solid fence) because it creates a larger area of protection on the downwind side.

Fig. 6–4 A reduction of 10 to 25 times of the height os the windbreak

Based on the research of the local climate index (Appendix 5) of Amsterdam, trees are preferably be lined in northwest-southeast orientation to achieve these effects .

♦ Increase the tree canopy to cool the surface area, including air conditioners, parking places and paved areas in summer:

This will allow the air conditioner to run more efficiently and will prevent heat build-up in cars and on pavement. For the greatest effect, mature trees should cover at least half the canopy space. This will provide some shelter from winter winds, and a significant amount of shading from hot summer sun.

♦ Shade east and west windows in the summer, where most solar energy enters the

house; and avoid shading south windows in winter, where most solar enters the house:

Shade trees should be planted due west and east of windows. Shade trees to the west and east will shade the late morning and afternoon sun, which adds the most solar heat to homes in summer. Trees should be planted within 20 feet of windows and should grow to a mature size of at least 10 feet higher than the window.

Fig. 6-5 Shade east and west windows from late morining and afternoon summer sun

Trees planted to the south of the home will have an adverse effect on energy savings. In summer the midday sun is high, almost directly overhead. The shadow of a tree will fall directly under the tree, and miss the house, providing no shading. However, in winter, when the sun is at a lower angle, the branches will provide some shading to the house, rather than letting the full solar heating benefits get through.

The ideal shade trees for energy conservation are those with dense summer foliage and fine twigs in winter. Trees that lose their foliage by the time the heating season begins are best. Mature deciduous trees in summer block 60 to 90% of the sun. In winter, a mature tree's branches and twigs will block approximately 30 to 50% of the sun.

Typically, the bigger the tree, the more benefits it will provide from an energy saving and air cleaning view. For those reasons, you can select trees that will grow as big as the space permits. Keep in mind, however, that trees need space for both roots and branches, and many city locations can be harsh environments for trees. Be sure trees are planted where adequate water is available. Choose trees that are adapted to the particular site, considering soil conditions, light conditions, and moisture conditions. Trees planted close to the house should be strong and resistant to damage from disease, insects, and storms.

♦ Effect of Shrubs and Other Plants

Foundation planting of shrubs and small trees can also significantly reduce energy costs. In addition to reducing the amount of wind that actually hits a home, shrubs planted next to the house can provide insulation because they create a dead airspace next to the foundation. Plant shrubs so that when mature there will be approximately 1 foot of space between the plants and the building wall.

Vines growing on a house wall, or on a trellis attached to a wall, will absorb the sun's heat and shade the wall's surface, allowing less conduction of heat from the sun to enter the house. In winter, the vine will reduce the amount of wind hitting
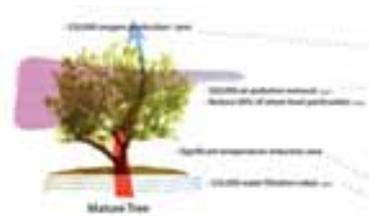
*Fig. 6-6 Trees for improving air quality
(Except, 2008)*

*Fig. 6-7 Water rentation and restoration
(Except, 2008)*

the house walls, and will provide a small insulating layer of air.

Air Quality

♦ Using effective plant species along main urban infrastructures to absorb toxic air emission, and stop fine dusts. (Fig. 6-6)

♦ Spatially arranging different types of plants to achieve optimum effects of air purification.

Ecological Environment

♦ Preserving existed natural landscape to the most extent

♦ Using native plant species for ornament, since they are well-adapted to local conditions, tolerant to severe climate conditions, resilient to environmental changes, and easy/cheap to manage

♦ Greening rooftop and building walls to provide habitats for species

♦ When design human landscape in nature environment, make sure that reserve enough buffering zone for species, and avoid blocking their moving path

♦ Design with existed water network for water retention and recycling, with appropriate aqua-plant species.

Aesthetics

♦ Design nature plants with human sensories, which suggests a mix-matching plant species with different shapes, colours, textures, fragrance, etc.

♦ Shaping the native natural plants plots in forms to create a mild natural-manipulated landscape

♦ Tagging some specific local vegetations to educate young people, and help the locals recognize the plants suitable to the site that could be cultivated around their homes.

♦ Compartments of dense tree planting around the functional agro-units in Amstel III business site as a dashed border to separate the working space of businessmen and urban farmers.

♦ Open tree lines along the main road both sides, and structured against winter wind direction.

♦ Semi-closed tree structures in leisure landscapes for people staying and pausing, while not hindering continuous sight view.

♦ Clusters of trees spread in landscape using typical Dutch species with shrub undergrowth (shaping, formulating)

Applicable Urban Farming and Permaculture Models

Within the confines of , or in deference to, climate, topography ecology, and culture, many landscape layouts are possible. What are utilized at the multi- plot level are the coarse patterns (Wojtkowski, 2008). The coarse layout place agro-ecosystems, small or large, in close proximity. The basic lay-outs are blocks, strips, groups, pivot, and circular. These diagrammed in Fig. 6-8, of which on the left can, and often do, incorporate rotational sequence. For those on the right, a well-formulated rotational sequence is integral to the success of these spatial arrangements.

Researched and tested by Except studio, a general poly-dome permaculture system is illustrated as below. (Except, 2008) Included, they use the theory crop rotation theory(Fig. 6-9), and the mutual supporting system of crop species (Fig. 6-10), and a optimum system under the poly-dome green house is built up, and a final crop selection is listed as well (Fig. 6-11). The schematic diagram of the green house (Fig. 6-12) at a mature age of six years was used to develop the space allocation between different modules.

Fig.6-8 On the left, from top to bottom: clump, strip, and block design; On the right, from top to bottom: scattered, circular and center pivot design (Wojtkowski, 2008)
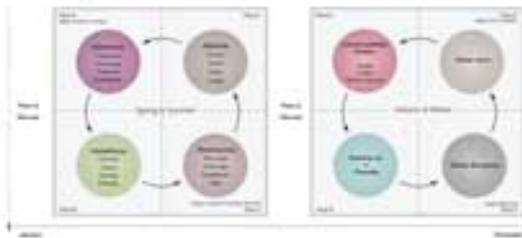
Fig.6-9 Four year crop rotation exemplar (Except, 2008)

Fig.6-11 Final selection of crops (Except, 2008)
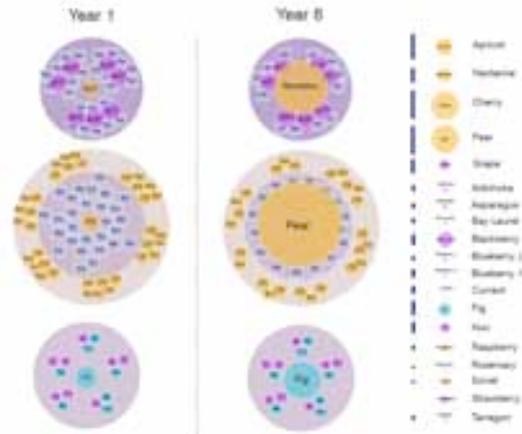
Fig.6-10 Functional crop clusters envolving through time (Except, 2008)

• apricot	• rosemary
• artichoke	• sorrel
• arugula	• spearmint
• asparagus	• spinach
• basil	• strawberry
• bay laurel	• tarragon
• green bean	• thyme
• blackberry	• tomato
• blueberry	• zucchini
• bok choy	
• carrot	**Additional products:**
• cherry	• chicken meat
• chive	• chicken eggs
• cilantro	• tilapia
• cucumber	• oyster mushrooms
• currant	• shiitake mushrooms
• dill	• honey
• fig	
• garlic	**Support crops:**
• grape	• borage
• lettuce	• comfrey
• marjoram	• french marigold
• nectarine	• hyssop
• onion	• nasturtium
• oregano	
• parsley	
• pear	
• peas, snap	
• peppers, bell	
• raspberry	

Figure 6-12 Examplar of Green house at Maturity (6 years) (Except, 2008)

6.2 Plot A

6.2.1 Current Situation

Fig. 6–13 Location & context of Plot A

The totally empty plot A, officially named Lot 206b, is situated to the west of Hettenheuvelweg area. It consists of three parts setting out in belt shape. Right now, it is temporarily used as a parking lot rented for events. There is still no clear plan for that, and no investment as well.

♦ There is an inter-linked ditch embedded in the three pieces of land fragments.

♦ Specially, on the west side of the plot is the primary vehicle road Holterberg-weg. This is a north-south oriented main road through Amstel III, as descibed in chapter 5, it connects the Amstel-III with the A2 and A9 motorways, the Amsterdam city centre, the Bijlmermeer and Gaasperdam residential neighbour-hoods.

♦ Some five years ago, in order to improve the flow of traffic in the area, an extra through-connection was constructed which is Hessenbergweg. Around this time an extra connection to Holterbergweg was constructed to create an extra entrance for the enormous basement car park of the Plaza Arena Complex. As a result, this originally unbroken plot on Holterbergweg was forced to be sub-divided into three pieces.

♦ However, beacuse the site is boardered by four motor roads, which implies it could be viewed as an un-claimed island in the Amstel-III business park, which further implies the site does not necessarily interact with surrounding office buildings.

Pic. 6–2 Ditch in Plot A

Pic. 6–4 Unmanaged land

Pic. 6–3 Boardering road of Plot A

Pic. 6–5 Surrounding Offices

6.2.2 Alternattive Design Conceptual Model

There are plenty of design choices for the completely vacant site. Based on the master plan, the site is preferably used as a node from the point of human spatial perception, that typologically and functionally distinguishs with its context while serving it as well. Three elementary design conceptual models are generated here, perspectively referring to improvement on ecological sevice and productive function, both with a consideration of social connection. (Fig. 6-14 & 15)

Model 1:
1. Ecological services suppliment for human being, including micro-climate improvement, water rentention and purification, air quality upgrading, energy saving, etc..
2. Urban green island as a 'step-stone' in regional ecological network, provision of habitats for species.

Figure 6-14

Model 2:
1. Productive functions, including Poly-dom greenhouse (permaculture), vertical farm, local food market, storm water recycling, etc.

Figure 6-15

6.2.3 Detail Design

Urban Oasis

Year 2017
Urban Forest
Green Office Roof

Year 2022 (Floriade)
Poly-Dome Greenhouse
Rooftop Farming

Year 2032
Multi-functional Domes
Ground Farming

Figure 6-16 Strategic Design for Plot A over 30 years

6.3 Plot B

6.3.1 Current Situation
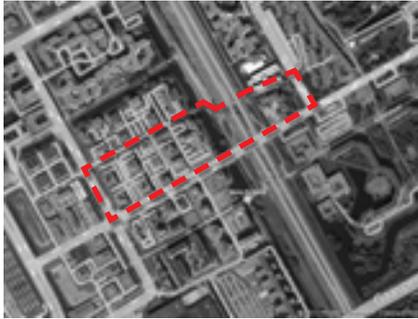
Fig. 6-17 Location & context of Plot B

The Plot B is a land use combination of Hogehilweg Office Plot, metro station Bullewijk and Veeraartlaan 12. It is bordered westernly by Hondsrugweg, easternly by Foppingardreef in the Bijlmer, northernly by Hogehilweg, and southernly Karspeldreef. (Fig. 6-17))

♦ Hondsrugweg a main road with a charming tree-lined avenue cutting straight through the intervention area from north to south. The road appears over-dimensioned, but the strong profile is important for the flow of traffic at football matches and events in Amsterdam Arena. Most of the businesses have their backs to this avenue.

♦ Hogehilweg is the only east-west orientated no-through-road to the office neighbourhood with the same name. The profile has a spacious layout with lawns with trees and separate pavements. The main road has a number of pragmatic side roads in order to access all the plots.

♦ The Hogehilweg area is bordered on the southern side by Karspeldreef, an important connecting road to the Bijlmermeer neighbourhood on the eastern side

Pic. 6-6 Water channel in Plot A

Pic. 6-9 Urban context

Pic. 6-7 Infrastuctrue around Plot A

Pic. 6-10 High occupation

Pic. 6-8 Empty railway bank of Bullewijk metro station

Pic. 6-11 Beautiful water line

of the railway line. What is remarkable is that the separate cycle and pedestrian routes from the post-war Bijlmermeer are also still visible in the profile of the Karspeldreef in Amstel III.

♦ Aside of these three roads on the office side, the site also contains a Bijlmer's road-Foppingadreef. The road is of 4 lanes for motorcars, equally seperated by a pavement in middle. The road links the Amsterdamse Poort to the north, and Karspeldredf to the south.

♦ Currently the Bullewijk station is still a high-occupated public transport hub accessing people to Amstel-III offices, IKEA, Cisco, and the Bijlmermeer neighborhoods.

♦ The Hogehilweg office neighbourhood is now surfing an average empty rate of 44% on a rough calculation (refer chapter 5), while several spots among the plot is totally out of use, for instance, the largest plot near the Bullewijk metro station- ABN AMRO's property.

♦ This plot-combination is a highly-constructional urban site that is severely lacking of landscape consideration, the integration of green landscapes within a densified architectural context is a hard chanllenge, but it dose posively add values to a business park.

6.3.2 Design Concept

1. *Enhancing the Bullewijk Foci with landscape architectonic approach*

Based on the previous plans, the Bullewijk metro station will be regarded as a landmark in visitor's mental perception and an informal gate of the Floriade. Additionally, the problem of no adequate path from the station to offices is urgent to be solved. The poor quality of the path with absolutely no shade is really annoying (refer to author's field-work reflection in Appendix 1).

All these reasons inspired me to combine the transport hub with horticultural elements, and the idea of 'green mega-shed' was generated to emphasize the Foci of the Bullewijk station.

2. *'Green transport hub' intersecting with 'Vertical urban farm'*

How to define the boundry of the 'green mega-shed' is the coming issue to be solved. Through previous research, the ABN-owned high-rise building on the west side of the railway bank is off use, while to the other side of the railway, the land subsidence provide possibility to recreate a unite surface ground. (Fig. 6-18)

Poly-Dome Greenhouse

From an Empty High-rise Office to
a Vertial Urban Farming Complex

Metro Station

Green Dike

Office
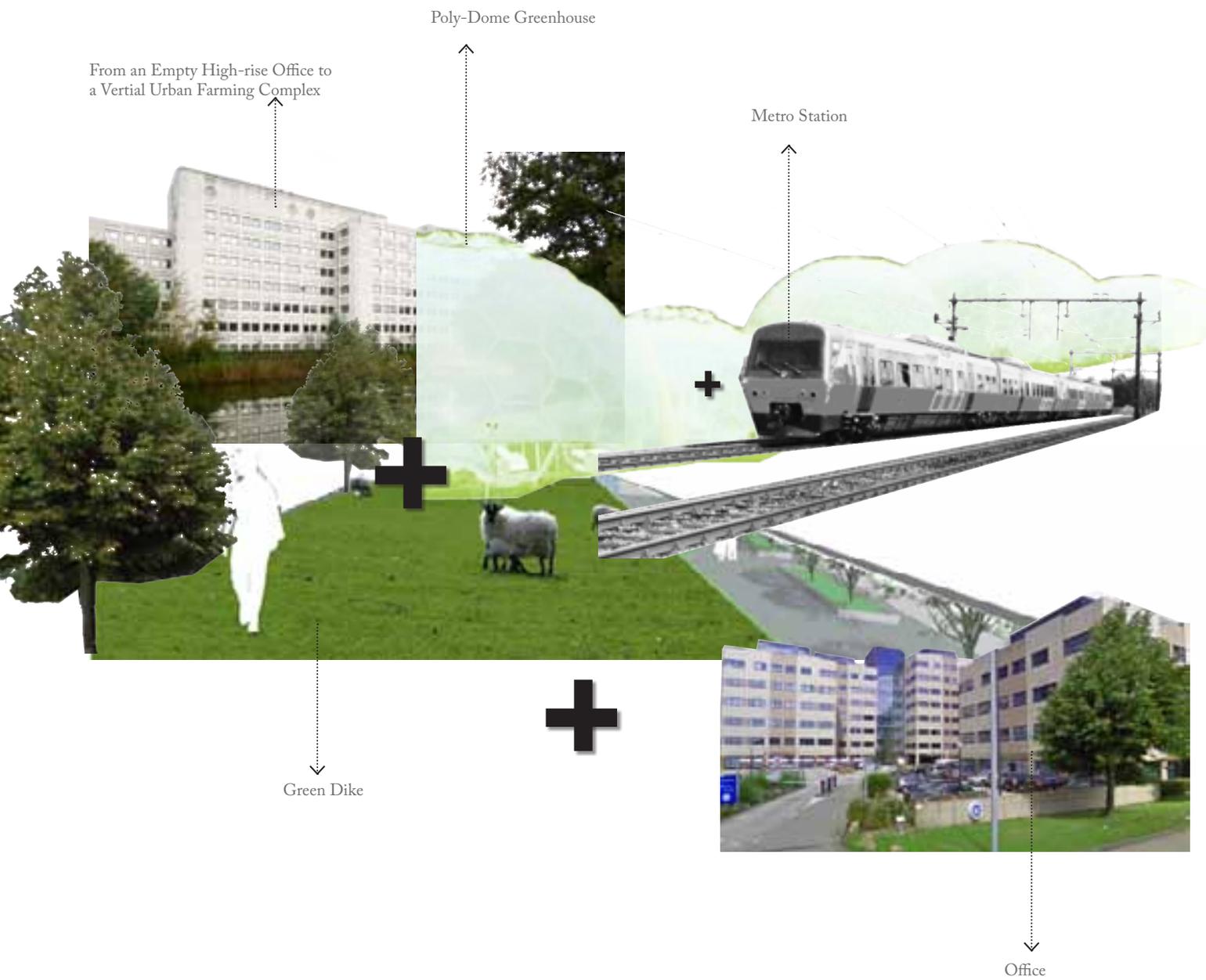
Fig. 6-18 Conceptual illustration of the design for Plot B

3. Greening the site on an elevated earth level

The curent ground floor is mainly occupied by traffic lanes and parking lots, and it is impossible to remove them in near future, since a considerable parking capacity is still an important competence in offices' marketing perspective. But this pre-condition requirements is possible to change after years, when the electic mobile time comes.

Fig. 6-21 Conceptual image of a tranformation unit

Therefore as an urgent tranforiming action, an idea of elevating the green landscape layer as an insertion is popped out. As the conceptual model shows (Fig. 6-19), the origional one infrastructual layer would be conserved as the basement to park cars and trees; The inserted landscape layer serves as a platform with continuous footpath, open-air meeting room, beds for crops, habitats for species, like some insects; Lastly, the rooftop layer will also be greened for vegetations and avifauna's temporary habitats.
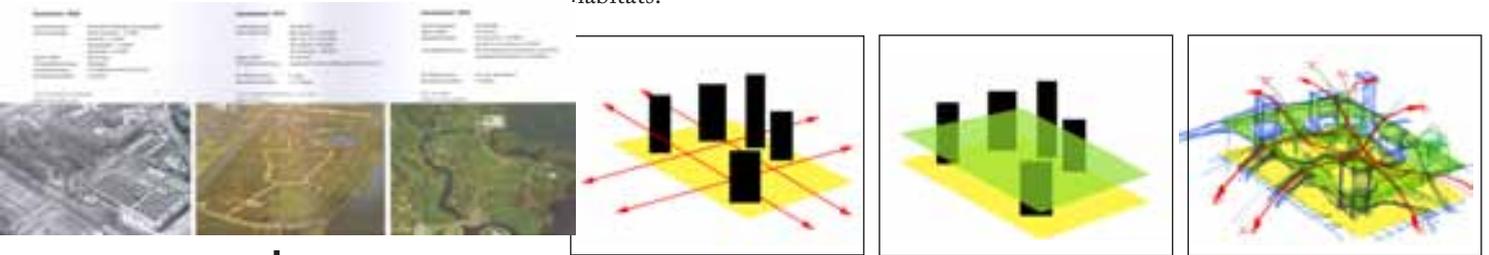
Fig. 6-19 First Conceptual Sketch

The constructional process of the work could be conceptuallized as figure 6-20. What is modified from the figure 6-19 is the comprising process of parking lots on the groud floor, this happens with the electric mobile revolution. When more motor cars are replacey by eletric cars, more ground-floor space will be released, and the middle layer is also disintegrated gradually to support ground-floor vegetating.

Fig. 6-20 Conceptual model of the transformation process

6.3.2 Detail Design for Plot B

Green Mega-Shed

Linear Park

Green-Dome Transport Hub

Bridge linking transporting
hub with Agro-complex

Farming on top of parking lot

Top view
Height - 12m

Section line

Elevated platform with foot paths,
farming land, natural platns gar-
den, and meeting space

Office Building

Vertical urban farming complx

Land sharings with
the Bijlmer's residents

50m

10m

N
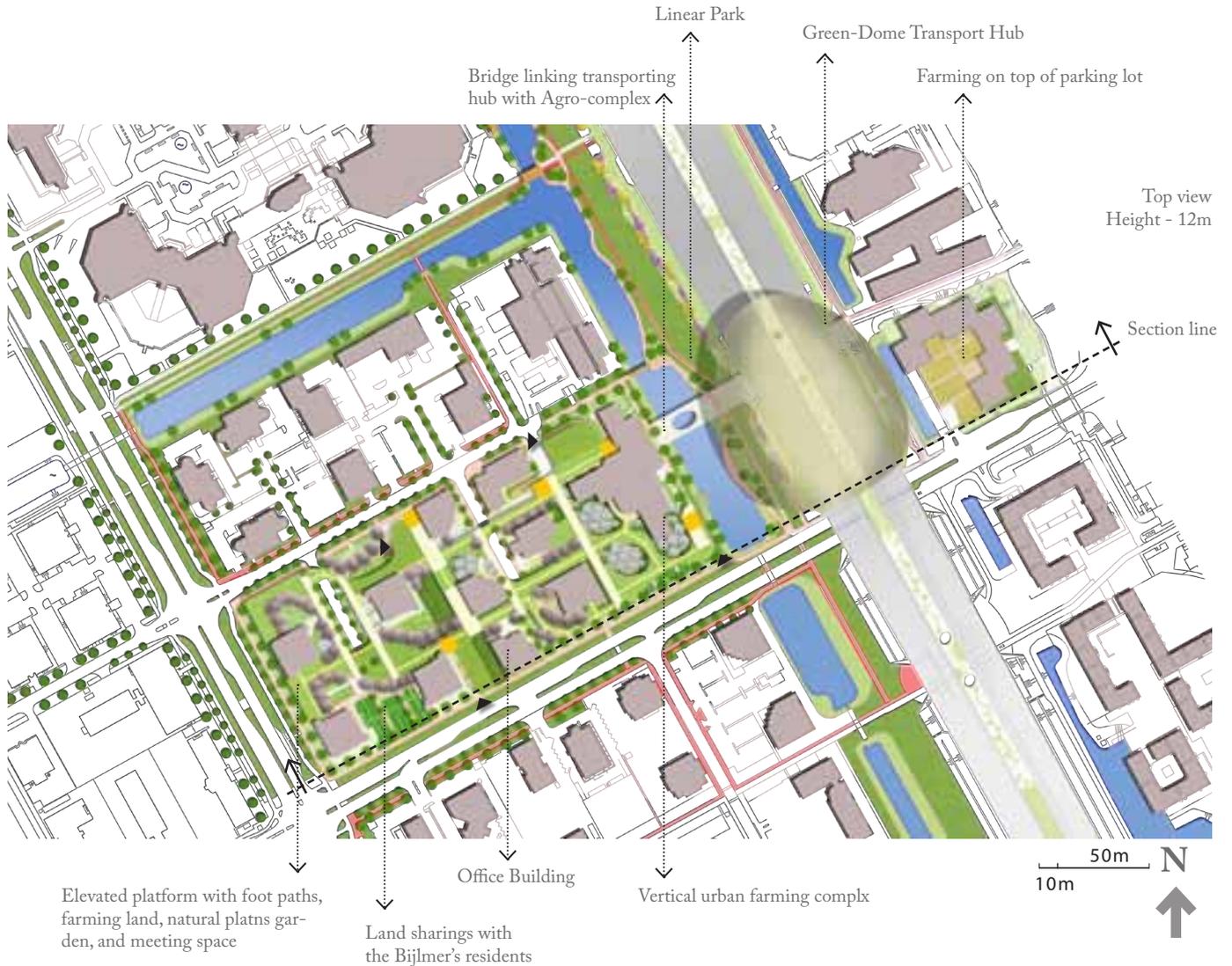
Fig. 6-22 Design Plan of Plot B

Fig. 6-23 Bird View of the Greenhouse Transporting Hub

Fig. 6-24 Plan of Plot B at 6 Meters

Fig. 6-27 Vision: on the platform 1

Fig. 6-28 Vision: on the platform 2

Fig. 6-29 Vision: from platform to parking basement
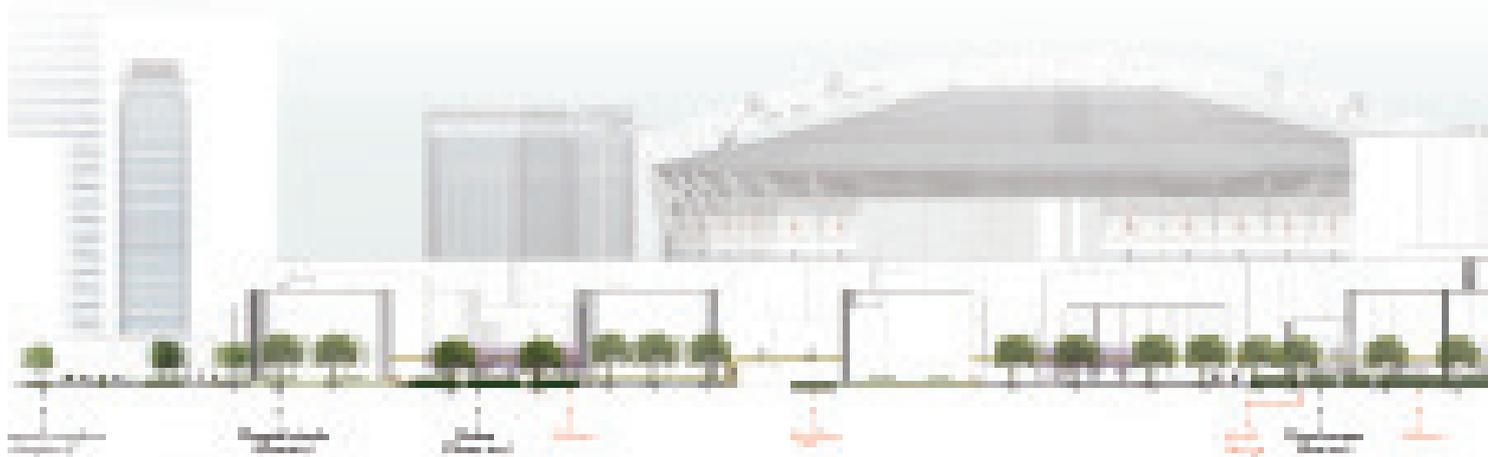
Fig. 6-25 Plan of Plot B at 4.5 Meters

Fig. 6-26 Plan of Plot B at 1.5 Meters

The design is expected to create a good link between Amstel-III and its neighbour-the Bijlmermeer in both the perspectives of physical and social landscape.

Physically, a bridge was cre-

Fig. 6-30 Vision: inside the Greenhouse hub

ated, extending through the green-house dome of Bullewijk metro station. Tunnel square can also help to remove the border in a concrete way. The emphasize of the metro station, bring outsiders a stong and lively image of the site.

Socially, the collaborating landscape idea is a sound approach to involve local (even un-local) people to actively involve into reclaiming the Amstel-III.
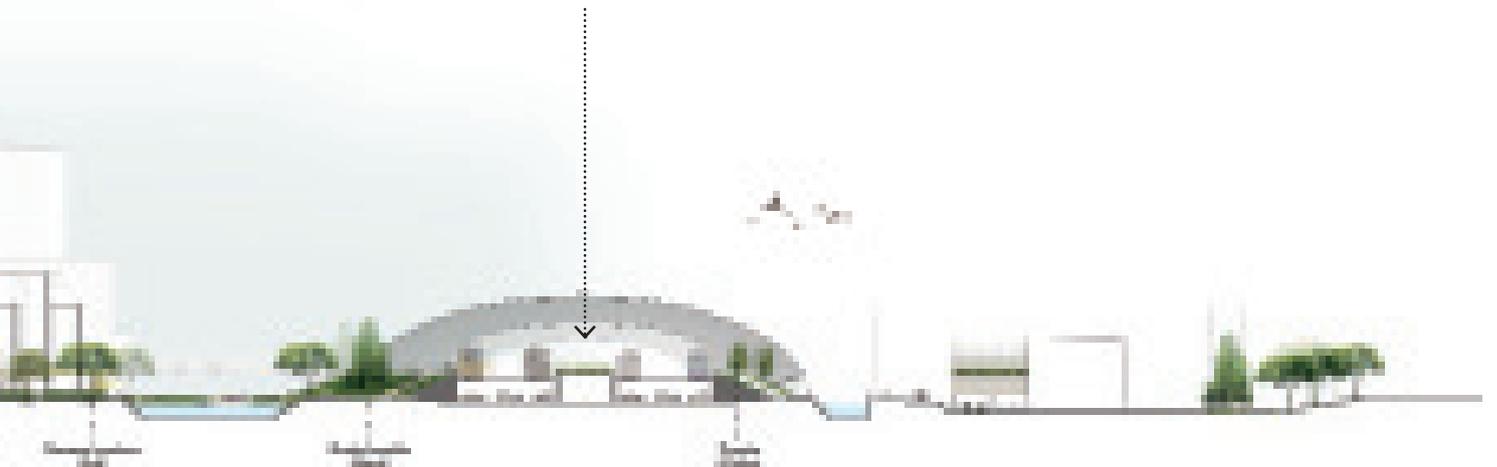
Fig. 6-31 Section of design for Plot B

Fig. 6–32 Vision: from Polydome to IKEA

6.4 Plot C

6.4.1 Current Situation

Plot C has similarities with Plot A: they are both used as a temporary car-parking site; Their bordering road are attached (Laarderhoogtweg and Hullenbergweg); Both of them have ditches, actually the two ditches are connected under ground). But they greatly differed in developing direction, because of the vital location of Plot C. (Fig. 6-20)

♦   The Amsterdam branch of IKEA (Pic. 6-13) and the offices of the American software producer, Cisco Systems (Pic. 6-12), are situated immediately adjacent to the intervention area.

♦   Vertically, the site is separated with those offices by A9 to its south, and Hullenbergweg to the north.

♦   The site is located in between of the Bullewijk and Holendract metro station (more close to the Bullewijk). However, the path from the metro station is far from high-quality.

Fig.6-33 Locaton and Context of Plot C

Pic.6-12 Cisco Complex

IKEA

Hullenbergweg

Pic.6-13 Ploc C is just by side of IKEA

6.4.2 Design Concept

Since the two neighbors of Plot C, IKEA and Cisco ,own a dominated position among the others in Amstel-III, the site had better to be designed Comprimising in physical space, Complementery in urban function, and Competetive in landscape quality.

Firstly, the site should cooperate with its 'strong' context, and supply them with qualified social space as a friendly media. This would be reflected on the path plan that an under-shed overline bridge is designed to connect IKEA rooftop parking lot (referring master plan proposal) to the platform of Cisco, and and more foot accesses are added to link each other; The plot can also provide nice exterior landscape views for irs parteners (it will be much more comforting to see a green landscape than a parking lot) ; What is more, the site gives priority to both the two sides in ground space, which corresponsively in the design, there is no routing change on its current road structure.

Secondly, the design complements the two comprises in function, by providing considerable social space in pleasant greenery landscape surroundings; It could provide more leisurement facilities to serve the working group; It is possible to integrate urban framing here as well, because it has IKEA attracted group as a stable consummer source for local products;What is more, the plot may provide ecological services, like water purification and recycling, shleter of air polltion from A9, etc..

Thirdly, the Plot C could be designed in interesting form and shape to draw attetion of the visitors. It may supply a variety of vegetations especially some rare species in Floraide period, therefore attracting extra population for IKEA as well. And if it is designed combined with the ecological energetic system, it would be more appealing for its efforts on alleviating burdens on environment.

The last two qualities will perfectly fit the master plan, in which the plot C is a landmark to guide visitors, as well as a green node to improve living-working environemental quality, and local/regional social contacts.

Rooftop Parking lot

IKEA
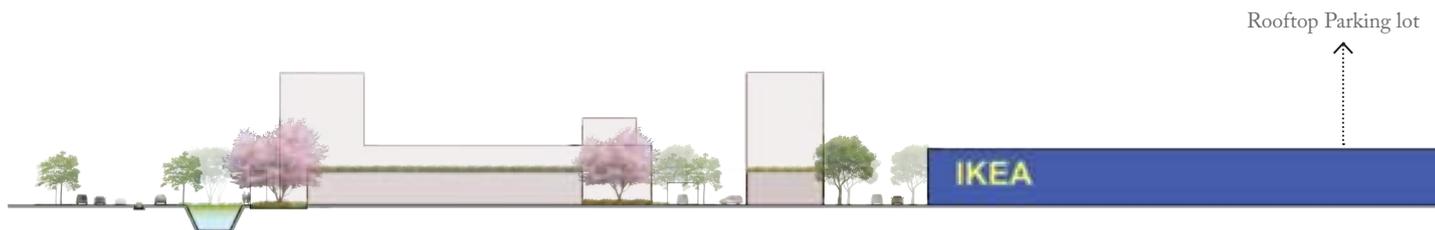
Fig.6-35 Section of design for Plot C

6.4.3 Detail Design for Plot C

Urban Botanic-Allotment Garden

Fig.6-34 Design Plan for Plot C

Section line

N

50m

10m

Rooftop garden

Botanic Exhibition

Overline Bridge

Ditch with water puri-
fication function

Drinks & Foods

Fish Pond

Allotment Garden

Linear Park
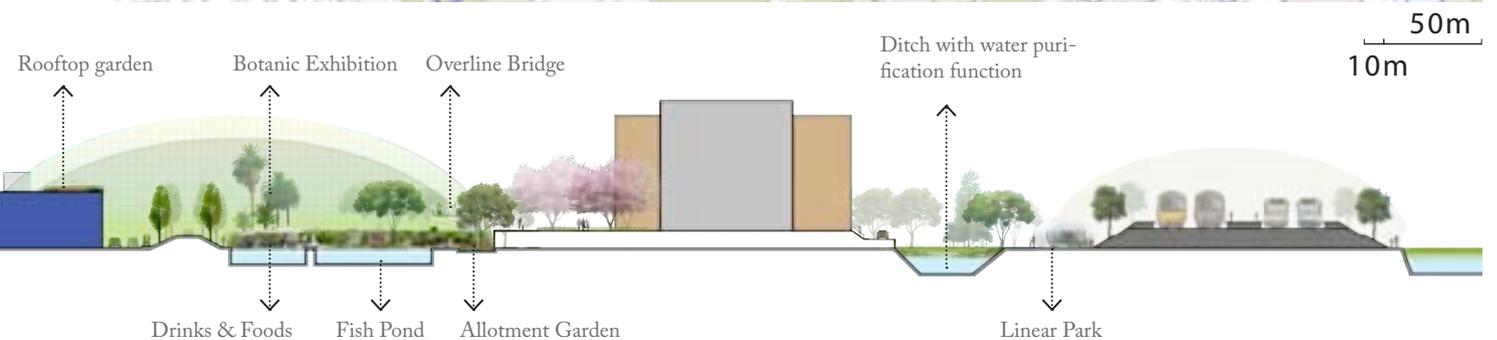
Fig. 6-36 Vision: Community garden in Plot D

6.5 Plot D

6.5.1 Current Situation

Plot D is the residential part of D+F neighbourhood of the Bijlmermeeer. The site is on the west side of Gooiseweg (S112), the north side of the Bijlmerdreef. Respectively, these are two main motor roads vertically and horizontally passing through the Bijlmer. The western boarder of the plot is Dolingadreef, the northern one is Daalwijkdreef. (Fig. 6-34)

Fig. 6-37 Location and Context of Plot D

♦ The site belongs to the Bijlmer polder which is -2.9 NAP, the surrounding roads are elevated, and people are accessed to the site by tunnels.

♦ There is a water channel in Plot D as well, which is generally east-west oriented and embanked with a variety of trees. However, the beautiful shape of the water course later becomes the dividing line between the old and the new.

♦ The southern part of the site has been newly redeveloped into houses with private front-/back-yard gardens, and there are some new architectural forms in between, While in the northern part, several high-rises are preserved, or semi-preserved, within large empty lawns lack of management.

♦ It is still possible to find some traces of the old plan in today's map, where the underlying geometric picture- 'honey-comb' is somehow remained. Although the strict shape of the Bijlmer had raised professional and social debates since a long time ago, it is undeniable that the hexagon form leaves an unique identity which is a rare quality in the contemporary uniformed world.

♦ As a traditional Bijlmermeer neighbourhood, the multi- ethnic social culture is definite. As the southern part is a renovated and attract a number of white

Pic. 6-14 Empty Lawn without management

people dwelling here, it is even more diverse in social composition. However, it could be predicted that the social segregation might exist as well, as mentioned before, it is already spatially divided by the channel.

6.5.2 Design Concept

Point to this plot, the basic plan is to reclaim the empty lawn as community productive garden, and shape it with local morphological patten-hexgon.

Actually, the idea of urban farming is not new to this site. In early '80s, the garages in the Bijlmer were mainly empty because of the over-predicted plan. Paul , who was once the head of the High-rise project during 1982 to 1986, came up with the idea of using horse dung to grow mushrooms in the garages. And it was launched and proved to be fun and workable. Many residents enthusiastically participated at that time.

This short story of urban farming in the Bijlmer fundamentally support the idea of community garden. And lots of researches have proved that community gardens can greatly improve social connection within the neighbour-hood, and especially, it is effective in a multi- cultural environment. (referring chapter 2.6.4&5)

Pic. 6-15 Infrastructure & Tunnel

Pic. 6-16 Wasted Lawns

Pic. 6-17 Channels

Pic.6-18 The Old vs. The New

6.5.3 Detail Design for Plot D

Community Garden

Old High-rise Flats

New Bridges

New Ponds for Water Retention, Irrigation

New Houses

Community Garden in Hexagon in Local Cultural Pattern

Green House + Market Square

Connected Water Channel for Transporting Crops in Harvesting Time, Boating Visitors When Floriade

Section line

N

50m

10m

Fig. 6-38 Design plan for Plot D
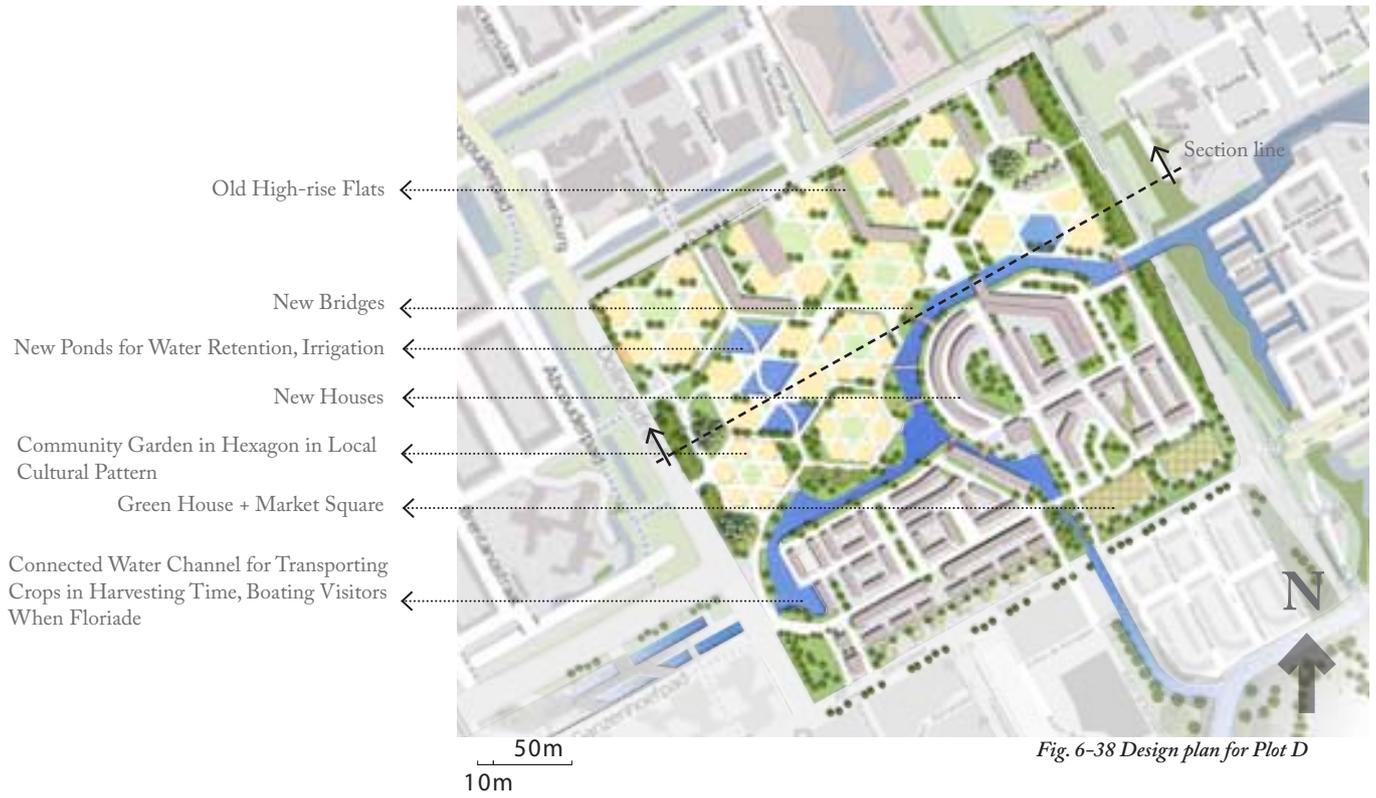
Fig. 6-39 Section of design for Plot D

Fig. 6–40 Vision: Boating in water chanel in Plot D

Pic. 6–39 Location of View Point

Pic. 6–19 View towards river connection

6.6 Summary & Evaluation

With the 'five urban landscape objectives' (refer chapter 2.*) - appropriation, co-habitation, connectivity, diversity, porosity, as criteria to evlaute the urban lanscape quality, the four detail designs are assessed as below.

	Plot A	Plot B	Plot C	Plot D
Title	Urban Oasis	Green Mega-shed	Urban Botanic Allotment Garden	Community Garden
Focus	Production, Human Ecology	Social Connection, Urban Spatial Function, Production	Social Connection, Production, Aesthetical Urban Landscape	Social Connection, Production, Aesthetical Urban Landscape
Action	Urban Forest, Energy Saving Landscape Architecture, Polydome	Polydome, Allotment garden, Permaculture Bridge, Green Surface	Urban botanic park, Allotment garden, Permaculture Energy saving landscape,	Hexagonal community garden, Permaculture, Local food market, Water connection, Bridge

Tab.6-1 Summary of the four detail design

	Plot A	Plot B	Plot C	Plot D
Appropriation	++	+++	++	++++
Cohabitation	+	++++	+++	++
Connectivity	+	++++	+++	++
Diversity	+	++++	+++	++
Porosity	++++	++	+	+++

Tab.6-2 Evaluation of the four detail design.
The assessment result is based on the comparation between the four design.
++++ Exellent   +++ Good   ++ OKay   + Not Good

After evalutating the four detail designs, it could be found that:

Among the four, the design for Plot B is much closer to the five objectives of urban landscape. This is due to the integration of multiple design tools, a variety of landscape architectonic elements, and a stratigic design consideration involved in process.

The result is a multi-functional urban lanscape associated with the 'collabarational' planning strategy. The design process could be charaterized as landscsape re-urbanization.

The design for Plot D is also highly advocated, since it is a design without too many debating issues, and fundamentally supported by cases studies all over the world. Hence, the design for Plot D is the most recommended proposal for practically realization.

One more worthy to pay extra attention to is the design for Plot A. Though in the evaluation list, its score is not as high as the others, the urban and human ecologcial thinkings, and the processing integration plan of CPUL in time scale, are the remarkable highlights.

7 Conclusion & Further Discussion

The main purpose of this master thesis is to find out a feasible co-operation model to integrate Continuous Productive Urban Landscape (CPUL) into business sites with a variety of design approaches and tools, in order to generally improve the local environmental quality, which could be translated into the five objectives of urban landscape.

From the proposal phase till now, the initial research-design framework guide the study process in general, while in-between, there are still some special situations that the made the process even more complicated, fortunately, a winding route was adopted and final bring my study back to the right track.

Those sub-research questions are answered as the indispensable knowledge basis, for finding out the final answer to the main question.

♦ *What is CPUL and its features?*

"Continuous Productive Urban Landscape (CPUL) is a design concept advocating the coherent introduction of interlinked productive landscapes into cities as an essential element of sustainable urban infrastructure. Central to the CPUL concept is the creation of multi- functional open urban space networks that complement and support the built environment." (p34, Viljoen & Bohn, 2005)

Key features of CPUL space include urban agriculture, outdoor spaces for people (leisure and commercial), natural habitats, ecological corridors and circulation routes for non-vehicular traffic. Its network connects existing open urban spaces, maintaining and, in some cases, modifying their current uses to reduce negative environmental impact.

♦ *How to define business site in Dutch context? And its current condition.*

Reviewing the Dutch industrial and urban planning development, since the first industrial revolution till now, industrial establishments move gradually from city core more towards city edge. At the meanwhile, because of the goods distribution and trades get more dominant, the term 'business site' replace the 'industrial site' more and more in general uses. As Louw et al.(2004) said, the choice of mono-functional business site planning is nowadays "a typical Dutch phenomenon".

♦ *In there any knowledge gap or constrain when mixing the studies of CPUL and business site? What is it?*

The gap is indeed existed. The central concept of CPUL is to (re-)create multi-fucntional open urban space network to support the built environmental in social, economic and environemtal ecolological aspects. While there are a lot of limitions

here of the Dutch business sites, which are mono-functional largely constructed urban space. Firstly, there is no sufficient open space in a densified office site; Secondly, the mono-user-group make a invisible boarder within its social context; Thirdly, the almost totally paved space is difficult to integrate ecological functions, except for a highly empty site or some 'comprimising' strategies. And all these limititions are tough constrains to the incorporation of CPUL, as well as some other landscaping design strategy.

♦ *When generally analysing the site, what are the most positive landscape elements, which could be conserved and put forward?*

The most positive elements of the site is somehow more from the urban landscape quality, such as good transport connection to outside, diverse urban functional lands nearby. And the strong points of natural landscape is its various landscape patterns, especially the interlinked water courses, and its green sub-urban surroundings.

♦ *And what are the most negative landscape elements of the sites to be reduced or prevented in future development?*

There are quite a lot negative environemtal elements in Amstel-III, like no adequate slow path, the uncheerful external space, and its pavement hindering regional ecological network. Also, from the point of urban landscape, the building physically decayed, the space fragmented, there is a lack of social connection with its context, and a lack of liveliness and identity.

♦ *Does a business site have the potency to contribute to the social and ecological networks in local and regional scale? Does a business site have the potency to improve human working-living quality for the locals?*

The answer is yes, especially when surfing developing crisis. This is because, when there is problem of the site, people will trun their eyes to other fields for support, propobaly landscape environemt, and try to develop their social network with its context for rebooming a lively image. Hence, the problem business site is 'promissing' by incorporating social and ecological functions to its vacancy. And companied is the improved environmental qualtiy for local dwellers

♦ *How's the human behaviour in business site, from the author's observation? And what landscape elements do people expect to have in surroundings?*

This could be refered to the observation list in Appendix.

♦ *How about the stakeholders' opinions towards the future developing direction of their working/living environment? And their preference.*

This could be answered by reviewing the reacting strategy of municipality of Amsterdam. It was wrote:

"Introduction of new functions, including housing, and improving the quality of the external space. The municipality's preference is for an integral, area-focused approach including financial instruments in collaboration with the leaseholders." (DRO Amsterdam, 2009)

♦ *Is there any productive element of the site?* No.

♦ *Can the design principles of CPUL could be applied in this case?*

Yes. As I explained before, the site is a office park encountering developing crisis, which urgently needs a renovation. And the high vacant rate could fit the central concept of CPUL, by involving urban farming and urban farmers into the reclaiming process, it is expected to provide food productions, outdoor spaces (leisure and commercial) for people, natural habitats, ecological corridors for regional ecology, and a complete circulation of slow path. The integration of CPUL could improve the current qualities of Amstel-III, and reduce its negative environmental impact.

Besides, the three design criteria of CPUL-spaciousness, occupation and ecology could be interweaved with the demands of the landscape-valued business sites, the result is a group of design priciples for the urban productive business site landscape design. Again, by mixing the these design prinples, several integrated models for designing productive urban business site are generated, see figure 7-1 in next page.

As shown in the chart, I finally chose the design model A+B2+C2. According to the former researches and analysis, this model was approved to fit the Amstel-III best.

Green Business Site

Criteria for Green Business Site

Dressed up business site
- Current Situation

Business site with
landscape value
-Goal

Natural Business Sites
- Dream

CPUL

Spaciousness

Occupation

Ecology

Agro-Ecology

Desgin Criteria for CPUL

Multi-functional Productive Landscape

Urban Green Open Space

B1. Cohabitation

C1. Center Pivot Plots

A+B1+C1

A+B2+C1

A. Loose Urban Structure

B2. Porosity

C2. Scattered Plots

A+B2+C2

A+B1+C2

Fig. 7–1 Combination of Desgin Principle & Models

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Appendix 1

Observation List

Category	Element	Function	Quality		Grade (10)
			Positive	Negative	
Infra-struc-ture	Rail Zone	3 tram lines; 5-10 minutes walking distance;	nice view of open green and canal	only a rough road oriented to the station	7
	Vehicle	6 regular entrance; 2 main roads crossing though; separated parking lot	enough spots	no unit car parking area; seperated by electric poles or munal barriers	5
	Bicycle	few bike parking spots	some are sheltered in interesting shed	some without shed or rackle ; few spots affiliated to car-parking lots	6
	Waste Collecting	usually located at the parking lot corner; managed individually by different companies		no santitary standard and management	6
Green	Outside	embraced by green strips without functions	wide green strips; filtering the traffic noise to some extent	lack aesthetic value; unsufficient to improve general environmental quality	6
	Inside	functions as cutting line/pole to divide the whole area	in certain density	mono-funtion; lacking aesthetic value	5
	Plant Variety	few species in ever green tone	good supplement around water course	missing ecological value; lacking aesthetic value	3

			nice surrounding environment with lawns, various trees, and bridge	not frequently used as leisure landscape	8
Water	Canal	embracing the site	not frequently used as		
Leisure Landscape & Human Behaviour	Spatial Characteristics	no leisure landscape setting in the site, stairs as outdoor funiture		without attention to leisure landscape in this business site design	4
	Human Behaviour	smoking, answering phone, chatting around the gate		negative motivated actions; lacking communication between 'neighbors'	4

Observed by Author, in May, 2011

Appendix 2

Soil Management of Amsterdam Zuid-Oost

Bijlage 3 Toepassingsmatrix Bodemkwaliteitskaart

In onderstaande tabel is de klasse-indeling weergegeven (zie ook pagina 16).

zone	teelaarde	zand toplaag	zand dieptelaag	zone	kleilaag	veenlaag
1 Bullewijk/Holendrecht	1A	1A	1A	12	1	1
2 Bijlmermeer/Gaasperdam	1A	1A	1A			
3 Gemeenschapspolder	x	x	x			
4 Driemond/strook langs Gaasp		3	3			

Klasse 1:	Schone grond en MVR-grond
Klasse 1A:	Schone grond met uitzondering van verhoogde minerale olie- en EOX gehalten door bestanddelen van natuurlijke herkomst
Klasse 2:	Geen klasse 1, alle 95 percentielwaarden onder de tussenwaarde
Klasse 3:	Tenminste één van de 95 percentielwaarden boven de tussenwaarde. Alle gemiddelden onder de S2-waarde.
Klasse 4:	Tenminste één van de gemiddelden boven de S2-waarden.
x =	geen gegevens bekend / verdacht gebied

Toepassingsmatrix Bodemkwaliteitskaart Zuidoost

Van zone	Naar zone											
	1TA	2TA	1T	2T	3T	4T	1D	2D	3D	4D	12K	12V
1TA	j	j	j	j	n	j	j	j	n	j	j*	j*
2TA	j	j	j	j	n	j	j	j	n	j	j*	j*
1T	j	j	j	j	n	j	j	j	n	j	j*	j*
2T	j	j	j	j	n	j	j	j	n	j	j*	j*
3T	n*	n*	n*	n*	n*	n*	n*	n*	n*	n*	n*	n*
4T	n	n	n	n	n	n(2*))	n	n	n	n(2*))	n	n
1D	j	j	j	j	n	j	j	j	n	j	j*	j*
2D	j	j	j	j	n	j	j	j	n	j	j*	j*
3D	n*	n*	n*	n*	n*	n*	n*	n*	n*	n*	n*	n*
4D	n	n	n	n	n	n(2*))	n	n	n	n(2*))	n	n
12K	j	j	j	j	n	j	j	j	n	j	j	j
12V	j	j	j	j	n	j	j	j	n	j	j	j

1	=	bodemkwaliteitszone 1
2	=	bodemkwaliteitszone 2
TA	=	teelaarde
T	=	toplaag zand
D	=	dieptelaag zand
K	=	klei

V	=	veen
j	=	toepassing mogelijk zonder uitvoering van analytisch chemisch onderzoek
ja*	=	toepassing mogelijk wanneer de verhoogde minerale olie- en EOX-gehalten veroorzaakt zijn door bestanddelen van natuurlijke herkomst en historisch onderzoek geen twijfel laat bestaan over mogelijk verdachte activiteiten.
n	=	toepassing **niet** mogelijk zonder uitvoering van analytisch chemisch onderzoek
n (2^e j)	=	indien uit (Bsb-)onderzoek blijkt dat het om klasse 3 materiaal gaat mag het in deze zones onder nadere voorwaarden (op zowel herkomst- als toepassingslocatie moet het om dezelfde verontreinigende stoffen gaan) worden toegepast; indien uit (Bsb-)onderzoek blijkt dat het om klasse 2 materiaal gaat, is het in deze zones toepasbaar
n *	=	indien uit onderzoek blijkt dat het om klasse 1 of 1A materiaal gaat, is het in deze zones toepasbaar

In onderstaande algemene tabel, bruikbaar voor alle bodemkwaliteitskaarten in Amsterdam, is weergegeven hoe materiaal van een bepaalde klasse in andere zones, zonder onderzoek naar de chemische samenstelling, mag worden toegepast.

Toepassingsmatrix voor de gehele stad

	Naar zone				
Van zone	Klasse 1	Klasse 1A	Klasse 2	Klasse 3	Klasse 4 #
Klasse 1	J	J	J	J	J
Klasse 1A	N	J	J	J	J
Klasse 2	N	N	J	J	J
Klasse 3 *	N	N	N	N (2^e J)	N (2^e J)
Klasse 4 *	N	N	N	N	N (!)

J	=	Toepassing mogelijk
N	=	Toepassing **niet** mogelijk zonder analytisch chemisch onderzoek naar de kwaliteit van de partij
*	=	Indien uit het (Bouwstoffenbesluit) onderzoek blijkt dat het materiaal beneden de S2-waarde verontreinigd is mag het materiaal overeenkomstig de uitkomsten (klasse bepaling) worden toegepast.
2^e J	=	Indien uit onderzoek blijkt dat het om klasse 3 materiaal gaat mag het in deze zones onder nadere voorwaarden worden toegepast (er is sprake van dezelfde verontreinigende stoffen).
#	=	Hier moet bij het toepassen een duidelijk onderscheid met de onderliggende bodem worden gemaakt (geen vermenging). Bij voorbeeld fysisch onderscheidend (zand op klei), door middel van een doek of folie of door een tussenliggend laagje anders gekleurd materiaal.
!	=	toepassen (herschikken) van sterk verontreinigd materiaal (alleen niet mobiele verontreinigingen) mag alleen binnen een goedgekeurd saneringsplan, binnen de I-waarde contour waarbij na toepassing geen risico voor verspreiding of voor mens of milieu ontstaat.

Klasse 1:	Schone grond en MVR-grond
Klasse 1A:	Schone grond met uitzondering van verhoogde minerale olie- en EOX-gehalten door bestanddelen van natuurlijke herkomst
Klasse 2:	Geen klasse 1, alle 95 percentielwaarden onder de tussenwaarde
Klasse 3:	Tenminste één van de 95 percentielwaarden boven de tussenwaarde. Alle gemiddelden onder de S2-waarde.
Klasse 4:	Tenminste één van de gemiddelden boven de S2-waarden.

In de onderstaande tabel is de klasse-indeling weergegeven.

zone	teelaarde	zand toplaag	zand dieptelaag	zone	kleilaag	veenlaag
1	1A	1A	1A	12	1	1
2	1A	1A	1A			
3	x	x	x			
4		3	3			

Klasse 1:   Schone grond en MVR-grond
Klasse 1A: Schone grond met uitzondering van verhoogde minerale olie- en EOX gehalten door
             bestanddelen van natuurlijke herkomst
Klasse 2:   Geen klasse 1, alle 95 percentielwaarden onder de tussenwaarde
Klasse 3:   Tenminste één van de 95 percentielwaarden boven de tussenwaarde. Alle gemiddelden
             onder de S2-waarde
Klasse 4:   Tenminste één van de gemiddelden boven de S2-waarden.
x   =   geen gegevens bekend / verdacht gebied

Source: Stadsdeel Zuidoost ((in samenwerking met de Dienst Milieu en Bouwtoezicht) (2007), Bodembeheer-plan, Accessed through http://www.dmb.amsterdam.nl , in August, 2011

Appendix 3

Multi-Ethnic Community of Bijlmermeer Neighbourhoods

Table 1. Population composition of Bijlmermeer, by ethnicity (1 January 1991).

	Bijlmermeer		South-East		Amsterdam	
Surinamese	16 581	31.4%	22 884	25.6%	58 010	8.3%
Antillians	4 429	8.3%	5 327	6.0%	9 673	1.4%
Turks	567	1.1%	664	0.7%	24 856	3.5%
Moroccans	616	1.2%	831	0.9%	36 355	5.2%
South-Europeans	661	1.3%	995	1.1%	11 528	1.6%
Other foreigners: industrialized countries	2 705	5.1%	3 535	4.0%	25 018	3.6%
non-industrialized countries	4 539	8.6%	5 256	6.0%	17 516	2.5%
Other Dutch	22 723	43.0%	49 953	55.8%	519 766	74.0%
Total	52 821		89 445		702 731	

Source: Het Amsterdamse Bureau voor Onderzoek en Statistiek, *Amsterdam in cijfers 1991*, Amsterdam.

Table 2. The Four Aims and related projects. The Bijlmermeer renewal approach proposed by the Stuurgroep Vernieuwing Bijlmermeer (July 1991).*

Aim	Methods	Projects
Physical renewal	Strengthen the position of the area in the urban housing market Greater variety of housing and employment More attention to multi-cultural urban quality Accessibility of dwellings to urban services and infrastructure	General preparatory plan(ning) including all existing plans Two action areas General Physical Development Plan for the area as a whole
Social renewal	Strengthen the social and socio-economic position of residents Promote employment participation Encourage residential stability	Employment advice bureau Ethnic entrepreneurship Multi-cultural centre Vocational education for adults in the region Reception centre for newcomers Help to residents displaced by change or demolition
Maintenance and management renewal	Enlarge appreciation of the daily environment, maintenance and cleaning of buildings and open areas, safety	Periodical inspection by residents and officials together, of living quality and conditions Activities to encourage residents to put forward ideas on housing and management improvement Crisis intervention to deal with problems in the renewal process
Open and result oriented	Encourage information exchange and communication between residents and authorities Measure and publish results of the renewal process	Participation of residents, especially ethnic minorities Open forums and conference Public assessment of facts and opinions

*Time span – 10 years.

Appendix 4

Renewal of the Bijlmermeer

The renewal of what was tomorrow's idealistic city. Amsterdam's Bijlmermeer high-rise: Gerben Helleman and Frank Wassenberg
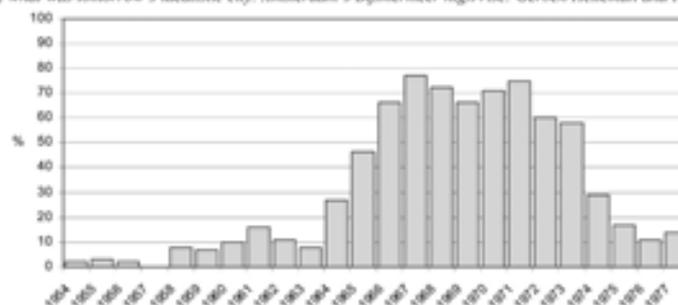

Figure 1 The high-rise wave in the Netherlands: dwellings in high-rise (over five storeys) as a percentage of all social sector flats.
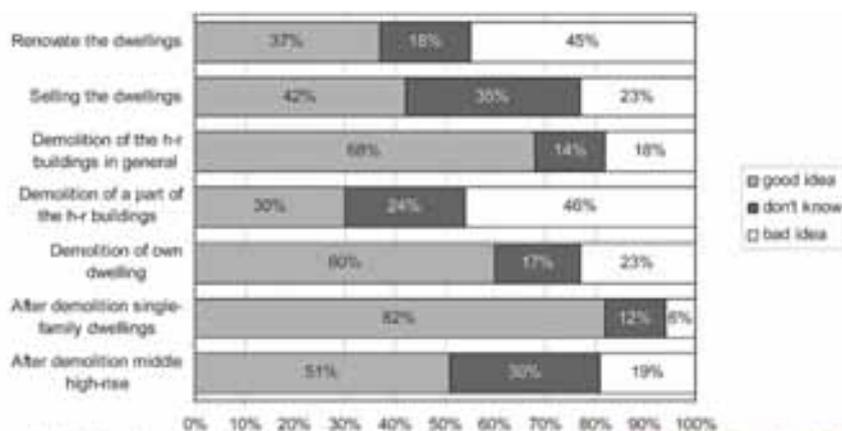

Figure 2 Opinion about the physical renewal per measure (in percent). Source: Helleman & Wassenberg, 2001

Table 1 Opinion about the physical renewal per measure in 1995, 1999 and 2001 (in percent*)

	Survey 1995 (1500 dwellings, response 55%)		Survey 1999 (300 dwellings, response 63%)		Survey 2001 (4900 dwellings, response 77%)	
	good idea	bad idea	good idea	bad idea	good idea	bad idea
Renovation of dwellings	62	21	73	21	37	45
Sale of dwellings	38	25	53	24	42	23
Demolition of high-rise blocks in general	65	20	63–74*	19	68	18
Demolition of a part of high-rise blocks	43	39	17	49	30	46
After demolition single-family dwellings	76	9	83	12	82	6
After demolition low-rise flats	65	12	63	22	51	19

Source: Helleman & Wassenberg, 2001.
*category 'no opinion/don't know' is left out of consideration.
*63% wanted to demolish both buildings, 11% one of the two buildings.

Table 1 Opinion about the physical renewal per measure in 1995, 1999 and 2001 (in percent)

	Survey 1995 (1500 dwellings, response 55%)		Survey 1999 (800 dwellings, response 67%)		Survey 2001 (4900 dwellings, response 77%)	
	good idea	bad idea	good idea	bad idea	good idea	bad idea
Renovation of dwellings	62	21	73	21	37	45
Sale of dwellings	38	25	53	24	42	23
Demolition of high-rise blocks in general	65	20	63–74	19	68	18
Demolition of a part of high-rise blocks	43	39	17	49	30	46
After demolition single-family dwellings	78	9	81	12	82	6
After demolition low-rise flats	65	12	63	22	51	19

Source: Helleman & Wassenberg, 2001.
category 'no opinion/don't know' is left out of consideration.
57% wanted to demolish both buildings, 11% one of the two buildings.

	Besluit 1992/1995	Totaal programma 'Vernieuwing Voltooien'	Vastgelegd in plannen (tot en met Finale Plan van Aanpak)
Sloop	2.600	4.900 à 7.100	6.586
Renovatie	8.950	4.150 à 7.350	5.200
Herpositionering	750	750	714
Nieuwbouw	4.000	5.390 à 7.810	7.470

Source: Toelichting (2007), Bestemmingsplan de nieuwe Bijlmer

Appendix 5

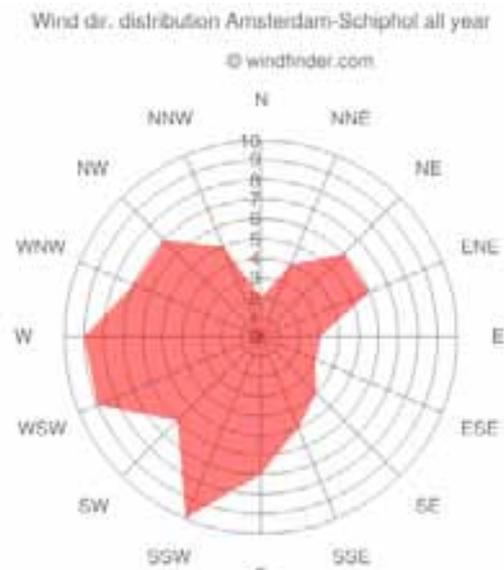## Climate Data & index of Amsterdam

Figure 1 Wind Rose measured in Amsterdam-Schiphol

Source: KNMI data base

Amsterdam-Schiphol (SCHIPOL)
Statistieken gebaseerd op waarnemingen van 7/2001 - 8/2011 dagelijks van 7u tot 7pm lokale tijd.

Maand van het jaar	Jan 01	Feb 02	Mrt 03	Apr 04	Mei 05	Jun 06	Jul 07	Aug 08	Sep 09	Oct 10	Nov 11	Dec 12	Som 1-12
Overheersende windrichting	⬈	⬈	→	⬈	→	→	→	→	⬈	⬈	⬈	⬈	⬈
Wind waarschijnlijkheid > = 4 Beaufort (%)	50	51	56	45	49	42	55	43	41	45	49	45	47
gemiddelde Windsnelheid (Knots)	12	13	13	11	11	10	12	11	11	11	12	11	11
gemiddelde luchttemperatuur (°C)	5	6	8	13	16	19	20	20	17	13	9	5	12

10-Year Record of the Wind direction, Wind Probability, Average Wind Speed, and General Tempreture

(Source: KNMI data base)