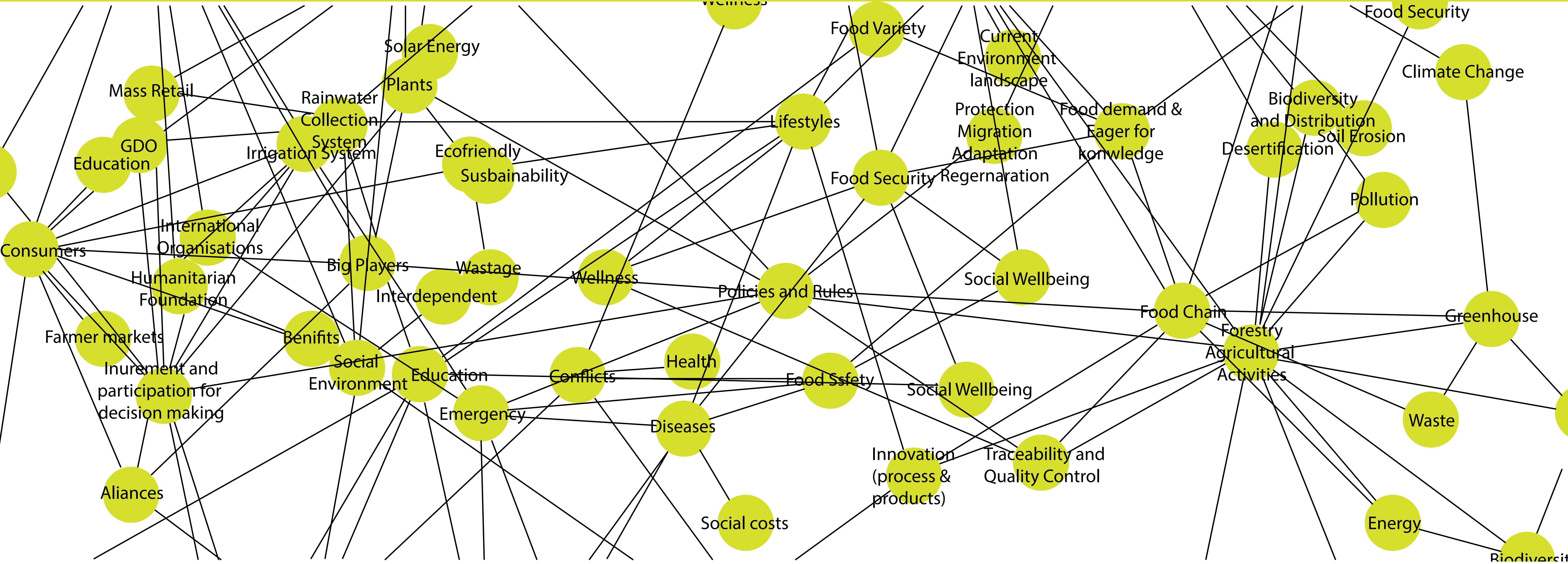
CONVERSATION BETWEEN INFRASTRUCTURAL DIVERSITY AND ECOLOGICAL INHABIT

----- at a scale closer to urbanism



POLITECNICO DI MILANO

Facoltà di Architettura e Società
Laurea Magistrale in Architettura

Living Place...

Water, Food, people

Supervisor: DAGLIO LAURA
Author: YUAN YUAN(780954)
Co-author: FAN YINGHUI(780613)
4/2014

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

CONTENT

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

"Ecological design begins with the intimate knowledge of a particular place. Therefore, it is small-scale and direct, responsive to both local conditions and local people. If we are sensitive to the nuances of place, we can inhabit without destroying"

–Van der Ryn and Cowan

ABSTRACT(English)

The competition is focused on creating innovative and buildable solutions to the dynamic intersection of water, food and people.
The word ecology comes from the Greek 'oikos' meaning home, and 'logos' meaning knowledge. From the root, we can then define "ecological design" as building knowledge of home or creating connection to place.

We all share equal responsibility to improve the quality of our environment for future generations and to implement sustainable practices. It appears that today we have the technology to accomplish the task. Thus, the greatest challenge is to enlist ourselves to change the current mode of thinking and habits.

The human infrastructure is the human community, its built environment (buildings, houses, ets.), hardscapes and regulatory systems (laws, regulations, ethics, etc.). This is the social and human dimension that is often missing in the work of many green designers. It is clear that our lifestyles, our economies and industries, mobility, diet and food production all need to become sustainable.
In that point of view, it is required to put the view in a much larger way of thinking. It is about the urban scale of natural systems, life cycle together with human activities. It's a deep conversation between nature, urban and community.

ABSTRACT(Italiano)

La sfida è focalizzata sulla creazione di soluzioni innovative ed edificabili situate nella intersezione dinamica di acqua, cibo e persone.

La parola Ecologia deriva dal greco 'oikos' che significa casa e 'logos' significa conoscenza. Dalla radice, quindi possiamo definire "design ecologico" come la conoscenza della costruzione della casa e la creazione di una connessione con il luogo.

Condividiamo tutti la medesima responsabilità nel migliorare la qualità del nostro ambiente per le future generazioni e nell'implementare pratiche sostenibili. Sembra che oggi abbiamo la tecnologia per realizzare questo compito. Quindi la più grande sfida è di predisporre noi stessi per cambiare il modo attuale di pensare e le nostre abitudini.

L'infrastruttura umana è la comunità umana, costruisce il suo ambiente (edifici, case, ecc.), hardscapes e sistemi normativi (leggi, regolamenti, etica, ecc.). Questa è la dimensione sociale e umana che spesso manca nel lavoro di molti designer ecologisti. È chiaro che i nostri stili di vita, le nostre economie e le industrie, la mobilità, la dieta e la produzione alimentare devono tutti diventare sostenibili..

Da questo punto di vista, è necessario focalizzarsi su un modo di pensare molto più ampio. Si tratta di una dimensione urbana dei sistemi naturali, ciclo di vita insieme ad attività umane. È una profonda conversazione tra natura, dimensione urbana e comunità.

LIST OF FIGURES

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

1 Competition background

1.1
Introduction to the competition
1.2
Requirements of the competition
---objectives
----evlautation critieria

*fig*1.1 competition logo

- 1.1 Introduction to the competition

ABOUT

Introducing University of Vermont's first student-designed competition: **Living Place.**
University of Vermont is pleased to invite architects, students, engineers, designers, and artists from around the globe to take part in the **'Living Place'** Competition. The **Living Place** is a Vermont-Grown international design competition that encourages the linkage of student-initiated projects and the sustainability needs of the Burlington community through place-based ecological design.

The competition was announced on Tuesday November 19 at the University Heights South 'Green House' Residential Learning Community. This Ecological Design Competition is sponsored by the new UVM Ecological Design Collaborator, a community crossroad for ecological design and supported by a grant from the Thoreau Foundation. The Living Place Competition serves as a springboard for the launch of the UVM Ecological Design Collaborator.

WHY: Community engagement, stronger partnerships, hands-on practice that lead to place-based design.
WHAT: Proposals (design competition submission) for the dynamic and buildable intersection of **WATER, FOOD, and PEOPLE.**

- History

The competition is focused on creating innovative and buildable solutions to the dynamic intersection of water, food and people.
The word ecology comes from the Greek 'oikos' meaning home, and 'logos' meaning knowledge. From the root, we can then define "ecological design" as building knowledge of home or creating connection to place.

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

The Living Place Competition is a product of The University of Vermont class: Catalyzing Ecological Design. With the generous support from the Thoreau Foundation and the Rubenstein School of Environment and Natural Resources, the students have developed an ecological design competition to address a growing need- space for experimentation, place-based solutions, and creative community energy.

- 1.2 Requirements of the competition

- Objectives

Design teams are tasked with creating a ecological design for a system that integrates storm water management, sustainable food production, and community engagement. The final design needs to address to one of the three designated sites he aforementioned sites with particular attention to their ecological and urban setting while allowing for it to be transferable to other locations.

Competitors should consider the following elements in their design:
* Storm water impacts (runoff, erosion, urban pollutants, etc.)
* Sustainable food production (urban food systems for people, wildlife, etc.)
* Community engagement (long-term viability, maintenance, ownership, etc.)
* Material choices (locally sourced, re-used/recycled, hand-crafted, etc.)
*Bio mimicry (natural and ecological design, systems-thinking, etc.)
*Mobile projects (how can this project be transferable to other locations—either physically or otherwise)
*Project response to designated sites and creation of enhanced sense of place

--Submission Evaluation Criteria

Community: The design should positively affect and benefit all scales of community within the city of Burlington. It should be direct and responsive to local conditions and local people and enable every voice, opinion, and perspective to be heard.

Mobility: The design can be easily packed and transported to different sites.

Ownership: Must address who the owner of the final product will be. The design should encourage ownership and responsibility through direct benefit to the owner to encourage use

Tafter initial installation.

Creates a Sense of Place: Design should be sensitive to the nuances of place and incorporate the intimate knowledge of a particular place. It should fit aesthetically and functionally within the surrounding area.

Accounts for all Impacts: All environmental impacts from materials, build, and function of the design must be included. Strive for the most ecologically sound design. Design should seek a balance between social and environmental ecology. (i.e. must involve the public in end use)

Includes Nature: Works with living processes and engages in processes that regenerate rather than deplete natural resources.

Informs Through Nature: Bring the designed environment to life by making natural processes and cycles visible in order to inform us of our place within nature.

Universal and Adaptable: The design have aspects of universality and applicable to many settings and sites. It should include both materials that can be widely used be easily adaptable in order to be installed in a range of places as well as Vermont-based local materials that engage the local economy and continued use of the installation.

Problem Solving: Addresses relevant and strongly supported set of problems. (Design must be multifaceted in use (ie. Design does not ONLY address storm water, but other things/ needs for users and plants/food)

Innovation: Design is an innovative and creative use of the selected site also can evolve after initial installation and act as an educational tool that students at 'The Greenhouse' can develop and experiment with'.

2 The urban scale of sustainability

2.1 Introduction

Until recently, proponents of urban densifications have generally spoken little of the potential contributions to sustainability of green space or wildlife habitats in urban areas, and some still discount them.

The value of green infrastructure services to man was estimated at close to twice the Global Gross National Product.[1] Over the same period, the concept of 'green infrastructure'---urban landscapes performing multiple functions for mankind---has rapidly attained a high profile.[2,3] Green infrastructure has now been heralded, for example by the UK Town and Country Planning Association, as having an 'essential role' in the development of sustainable urban settlements. [4]Green infrastructure is somehow placed in an equal categorization: 'green' (vegetation/ natural and designed soft estate), 'blue' (surface water systems), 'red' (social---e.g. built forms, pedestrian networks) and 'grey'(hard engineering utilities).[5]

The multiple benefits of urban green infrastructure have been progressively characterized.[6-10]Perhaps one of the greatest benefits and until recently least acknowledged, in terms of the sustainability of high-density urban populations, is the promotion of human health and psychological well-being with all associated economic benefits. [11-17]

1 Contanza.R.R d'Arge, P Sutton and M van den Belt(1997). "The value of the World'sEcosystem Services and Natural Capital". Nature,387:253-260.

2 Goode, D(2006). "RECEP Urban Envrionments Desk Study: Green Infrastructure". Royal Commission on Envrionmental Pollution,London.

3The Royal Commission on Environmental Pollution(2007). "26th Report. The Urban Environment: Chtr 4: The Natural Urban Environment". HMSO, Norwich.

4 Town and Country Planning Association (2008). "The Essential Role of Green Infrastructure: Ecotowns Green Infrastructure Worksheet. Advice to Promoters and Planners'. TCPA, LONDON.

5 Yeang,K(2009). Ecomasterplanning, Hohn Wiley and Sons, London.

6 Town and Country Planning Association. (2008)

7 CABE Space(2003). "Does Money Grow on Trees?" CABE, London.

8 Lancaster University and Center for Ecology and Hydrology(2004). "trees and Sustainable Air Quaility'. Lanchester University, UK.

9 Mentens, J H,D Raes and M Hermy(2006). " Green Roofs as a tool for solving the rainwater Runoff Problem in the Urbanized 21st century?' Landscape and Urban Planning,77:217-226

10 Rhode, C L E and A D Kendle(1994), Human Wellbeing, Natural Landscape and Wildlife in Urban areas----A review. English Nature, Peterborough.

11. Ulrich, R S(1999). '"Effects of Gardens on Health Outcomes: Theory and Research". In C C Marcus and M Barnes(Ed.)(1999). Healing Gardens. Wiley, New York pp.26-86

12. Ulrich, R S, RSimons, B d Losito, M Miles(1991). "Stress Recovery During Exposure to Natural and Urban Environments". J.Exp. Psychology: 11,201-230

13 Royal Commission on Environmental Pollution.(2004). "Desk Study: Urban Nature". RCEP, London; Nicholson-Lord, D(2003). Green Cities: and Why We need them. New Economics Foundation, Lodon.

14 Burls, A and W canan(2005). "Human Health and Nature Conversation'. BMJ,331:1221-1222.

15. Sullivan, W C(2005). "Forest, Savanna, City: Evolutionary Landscapes and Human Functioning". In P F Barlett(ed.) Urban Place. Reconnecting with the Natural World. MIT Press, London, pp237-252

16 Douglas.I(2005). "Urban Greenspace and Mental Health. Discussion Paper for the UK Man and the Biosphere Urban Forum". UKMAB, London.

17 Fuller. R A, K N Irivine, P Devine-Wright, P hwARREN AND k j Gaston(2007). "Psychological Benefits of Greenspace Increase with Biodiversity". Biological Letters, 5:352-355

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

2.2 Vision of sustainable transport infrastructure

Visions of sustainable transport systems have featured heavily in theoretical eco-cities. Regional strategies have emerged as planners have realized how transport can have a large effect on environmental, economic and social sustainable development. An example of this is the visionary strategy developed by will Alsop for the development of a network linking the north of England. Although this may appear to be rather abstract, there are many important features contained within the concept, in particular the adoption of "transport nodes, accessibility and connectivity", important elements when developing a sustainable transport strategy.[18]

Within the urban regeneration sector, the strategic implementation of mass transit systems that improve accessibility both to and within the city centre can provide infrastructure networks that promote sustainable development both of the urban area and linkages to other regions. The strategy also needs to promote integration with "multi-modal public transport systems".[19] Depending on the scale of the urban area, this may range from pedestrian to rail and air and include "restrictions in car use to reduce contgestion and traffic pollution".[20]

18 Dunnett, N and J Hitchmough(2004). The Dynamic landscape. Spon Press, London

19 Andrews, J(1993). "the Reality and Management of Wildlife Corridors". British Wildlife,5(1):1-8

20. Giradet, H(1999). Creating Sustainable Cities. Grenn Books, London

Case study 2.2 Sustainable masterplan-Nordhavn, Copenhagen

With its unique positioning and an area covering the size of 625 football fields, Nordhavn in Copenhagen is Scandinavia's largest and most ambitious city development project.
The city of Copenhagan has about 540,000 inhabitants. This numner is growing and is expected to increase by 100,000 by 2025. Nordhavnen is intended to accommodate a large proportion of these new inhabitants, give them a good place to live and provide them with workplaces, education and experiences.
Copenhagen has seen positive trends in the past decade. Once an industrial city, it has transformed into a city of knowledge. Nordhavnen is symbolic of this development, as it is a former harbour area that will become a center for the knowledge and service trades of the

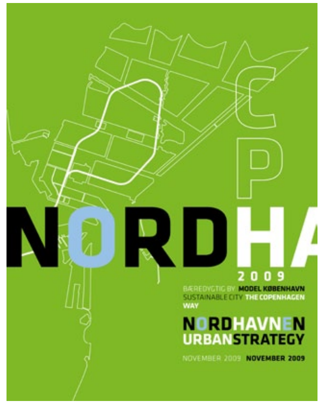


*fig*2.2.1 Nordhavcnen uban strategy

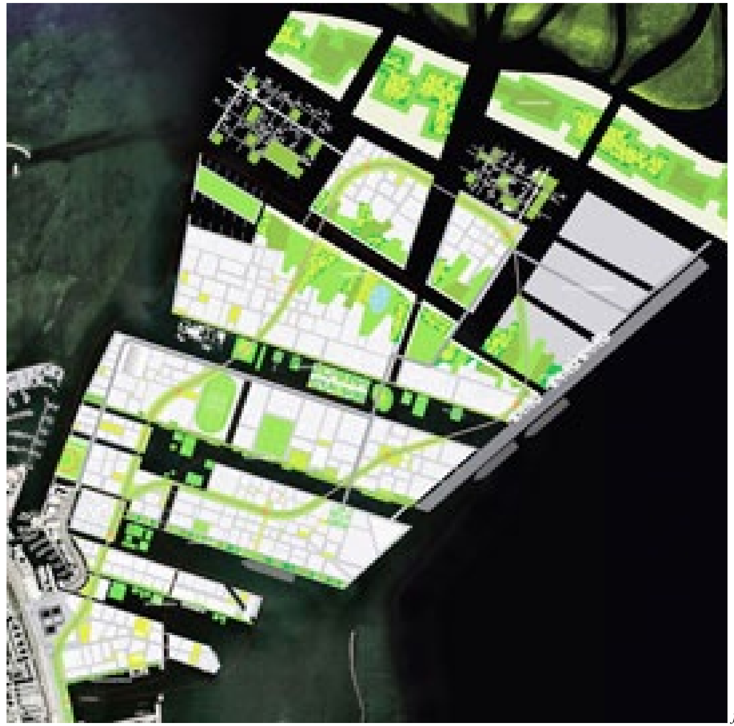


*fig*2.2.2 Nordhavnen masterplan

This new area creates an urban delta with 11 individual islets encircled by canals and water. The islets are planned as manageable units, small neighbourhoods each with its own identity incorporating the characteristics of its location and historic position as a harbor. It is easier to walk, cycle and take the metro than use a car. Since transportation to and from work accounts for an increasing share of society's expenditure in terms of time, money and pollution, it has been recongnised in the design that an effective transport infrastructure makes a major contribution to reducing CO2 emissions.

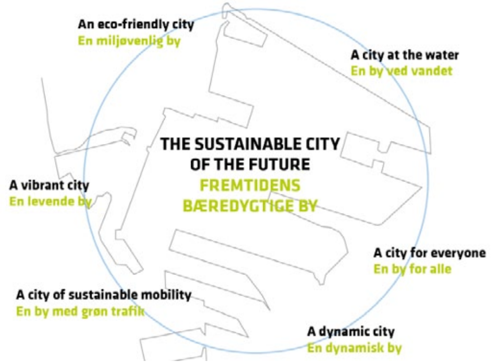
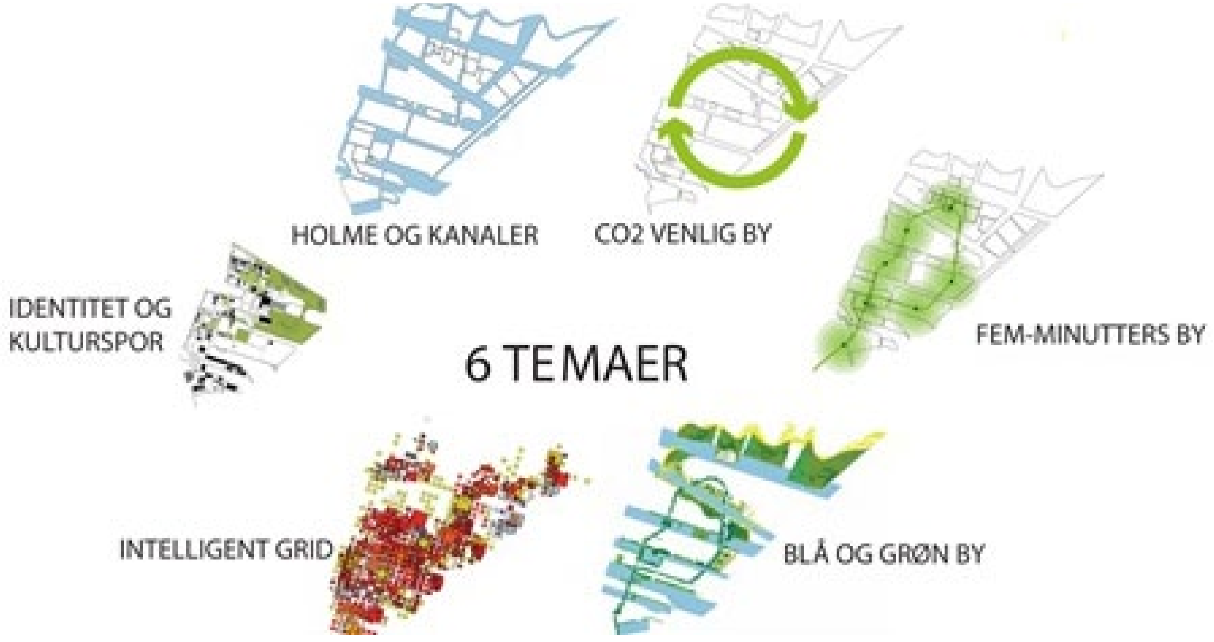


*fig*2.2.3 Nordhavnen masterplan design openrules

*fig*2.2.4 Nordhavnen masterplan design strategy illustration



Case study 2.2 Sustainable masterplan-Nordhavn, Copenhagen

The scheme has prioritized an efficient public transport system with bicycle and pedestrian connections to transport nodes that tie the neighbourhood together with the rest of the city. The scheme includes an elevated Metro track and a bicycle network that together create a green artery. The track creates a linear park area and functions as a cover for the cycleway, enabling the people of Nordhavn the opportunity to cycle all year round in the dry.

*fig*2.2.5 Nordhavnen masterplan greenpath

*fig*2.2.6 Nordhavnen masterplan bicyclepath

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

2.3 Green infrastructure concept and urban landscape view

The green eco-infrastructure parallels the grey urban infrastructure of roads, drainage and utilities. This is an interconnected network of natural areas and open spaces that conserves natural eco-system values and functions and sustains clean air and water. It also enables the area the area to flourish as a natural habitat for a wide range of wildlife, delivering benefits to humans and the natural world alike. [21]This eco-infrastructure is nature's infrastructure(parallel to our man-made infrastructures), and in addition to providing cleaner water and enhancing water supplies, it can also result in cleaner air, a reduction in heat-island effect in urban areas, a moderation in the impact of climate change, increased energy efficiency and the protection of source water.

Having an eco-infrastructure in the masterplan is vital. Without it, no matter how advanced the eco-engineering, the masterplan remains simply engineering, and can in no way be called an ecological masterplan nor, in the case of larger developments, an eco-city.[22]

Linear wildlife corridors connect existing green spaces with larger green areas, and can create new habitats in their own right. These may be in the form of newly linked woodland belts or wetlands, or existing landscape features such as overgrown railway lines, hedges and waterways. Any new green infrastructure must also enhance the natural functions of what is already there.

In the masterplanning process, the designer identifies existing green routes and areas, possible new routes and linkages for new connections in the landscape.[23] At this point additional green landscape elements or zones can be integrated, such as linking with existing waterways that provide ecological services such as drainage to attenuate flooding.

This eco-infrastructure takes precedence over other engineering infrastructures in the masterplan. By creating, improving and rehabilitating the ecological connectivity of the immediate environment, the eco-infrastructure turns human intervention in the landscape from a negative into a positive. [24]Its environmental benefits and values are a framework for natural systems that are fundamental to the viability of the area's plant and animal species and their habitat, such as healthy soil, water and air. It reverses the fragmentation of natural habitats and encourages biodiversity to restore eco-systems while providing the fabric for sustainable living, safeguarding and enhancing natural features.

21. Goodes,D(2000). "Cities as Key to Sustainablity". In D Poore(Ed.) Where next?Reflections on the Human Future. The Board of Trustees, Royal Botanic Gardens. Kew.

22. Register, R(2006) Ecocities: Rebuilding Cities in Balance with Nature. New Society Publishers, Canada.

23. Glaeser. E L92009) "Green Cities, Brown Surburbs". City Journal. 19(1):1-5

24. Hall,P(1999). "Sustainable Urbanism: Urban design with Nature. JohnWiley & Sons, London

Case study 2.3.1 Project Green by Mithuns Inc

" Project Green", located in Austin, Texas, Mithun won to transform five city blocks into a dynamic, transit-oriented neighbourhood that included 2.5 million square feet of office, hotle, residential and retail space. Crucial to this masterplan was wakability, based on the reintroduction of the city's historic grid as well as new pedestrian alleys, bike trailsl, civic plazas and courtyards. Along with a renewed focus on urban food production, Project Green linked pedestrian, transit and bike routes to a series of flexible outdoor spaces while creating new venues for Austin's thriving music culture.

*fig*2.3.1 Project Green Bird view

*fig*2.3.2 Project Green Bird view2

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

The plan's focal point lay at the intersection of Second Street and Shoal Creek in downtown Austin. Here, in the footprint of a decommissioned water treatment plant, the new masterplan set out a series of strategies to achieve both water and carbon neutrality by the time the build-out was complete. With several aspects of this project aspirational in nature, it was also important to clearly define what carbon neutral meant: energy, transportation, the materials within each building, new or old.

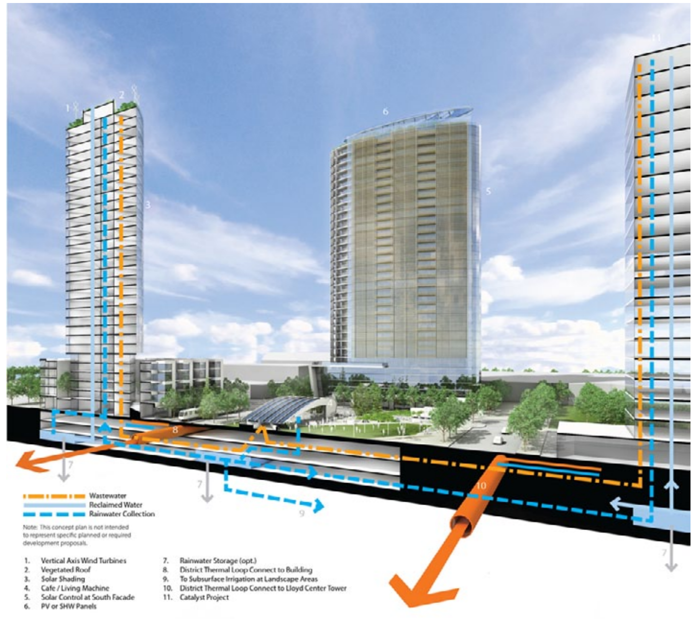


*fig*2.3.3 Project Green connection with the city infrasture

*fig*2.3.4 Project Green green proposal

Case study 2.3.2 Project Green by Mithuns Inc

Energy elements---both passive and active----for this hot climate included natural cooling, solar thermal collectors, double skin membranes, solar screens, hydronic heating and cooling and solar hot water. Energy efficiency and demand reduction were crucial components, yet Project Green also proposed a concentrating solar plant, to generate electricity and waste heat for hot water. To become a water neutral development, the plan recommended a grey water treatment plant to lower potable water demand irrigate landscaping and park space throughout the neighbourhood.

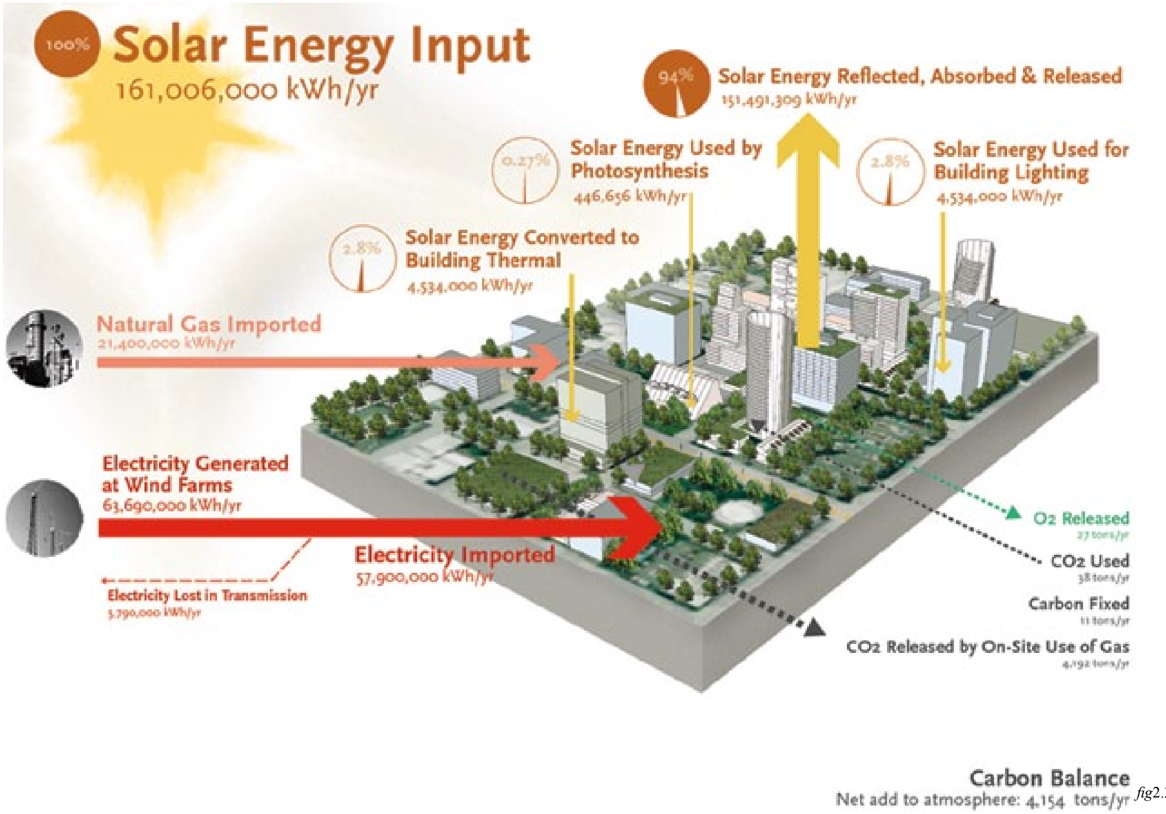


*fig*2.3.5 Project Green solar system

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

2.5 Inspiration from natural systems----Processing, recycle and waste cycle design

When considering the holistic design of energy and infrastructure solutions for any new or existing developments, a hierarchal approach should be taken with the first step being the reduction of energy consumption and waste.

A reduction in energy demand can be brought about by efficient passive design methods. Local recycling of consumables such as waste water can reduce demand on the infrastructure and many technologies are now readily available, including rainwater harvesting and grey water recovery.

The need for demand side reduction and production of water is most prevalent in arid climates and has resulted in a number of innovative solutions. Solar desalination is a technique using solar energy to desalinate water.

The treatment of waste is another process to have considerable impact on infrastructure. A particular objective is the reduction of waste going to landfill. Responses to this include anaerobic digestion plants and bio-gas production which produce a renewable gas source that can either be used exclusively or fed back into the main gas supply to reduce its carbon impact.25

Reed bed technology is also being incorporated into some new developments in the form of constructed wetlands. Constructed wetlands are artificial swamps(sometimes called "reed fields") using reed or other marshland plants to form small-scale sewage treatment systems.26 Water trickling through the reed bed is cleaned by microorganisms living on the root system which utilize the sewage for growth nutrients, resulting in a clean effluent. The process is very similar to conventional aerobic sewage treatment, except that the latter requires artificial aeration.

Constructed reed beds can be of two main types, horizontal and vertical. Vertical beds are much smaller in the area, and are most suited to a sloping site. Horizontal beds require considerable areas of land, but are simpler construct. 27Usually the top surface is planted with reed, but are simpler to construct. Usually the top surface is planted with reed, but, as one of the main treatment methods in a reed, but, as one of the main treatment methods in a reed bed is filtration, a variation is to use unplanted beds that are simply sand filters. The depth of most reed bed systems is about a meter, as the reed's roots an rhizomes are rarely beyond 0.6 meters. Most contaminants are removed by filtration within the first meter of soil.

25.Ruano, M(1999). Ecourbanism: Sustainable Human Settlements:60 Case studies. Gustavo Gilli, Barcelona

26 Gill, S E, J F Handldey, A R Ennos and F Pauleit(2007). "Adapting Citites for Climate Change: The Role of the Green Architecture". Built Envrionment, 33(1):115-133

27 American Society of Landscape Architects(2009). "The case for Sustainable landscapes'> ASLA, Washington DC.

Case study 2.4 The Cardboard to Caviar Project by Graham Architects

The Cardboard to Caviar Project(also Known as the ABLE project) is an inspired example of how wasteful Linear systems can be transformed into closed loop systems that produce no waste and yield much greater productivity. Intiated by Graham Wiles of Green Business Network, the scheme started as a way of involving handicapped people in recycling cardboard. The waste material was shredded so that it could be sold to equestrian centres as horse bedding.

THE ABLE PROJECT

*fig*2.4.1 Cardboard to Cacviar Project image

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

At every stage of the project Graham Wiles applied the biomimetic principle of seeing waste as a resource with which to feed another process. So, when the equestrian centre asked what they should do with the soiled cardboard, he offered to collect it and established a wormery composting system. A deal was also confirmed with a firm that supplied angling bait to buy surplus worms, but when this fell through, Wiles decided to establish a small-scale fish farm to raise Siberian sturgeon.

From Cardboard to Caviar' is a pretty unusual fish farming project but it's a textbook example of 'Cradle to Cradle'. The project gets cardboard packaging waste from stores and restaurants, shreds it and sells it to stables as horse bedding. Once the horse bedding needs replaced, it is collected and feed to worms in a composting pit. When the worms are all fattened up, they are fed to the sturgeons who will produce caviar. Then, the caviar is then sold back to the restaurants where the cardboard was collected fro

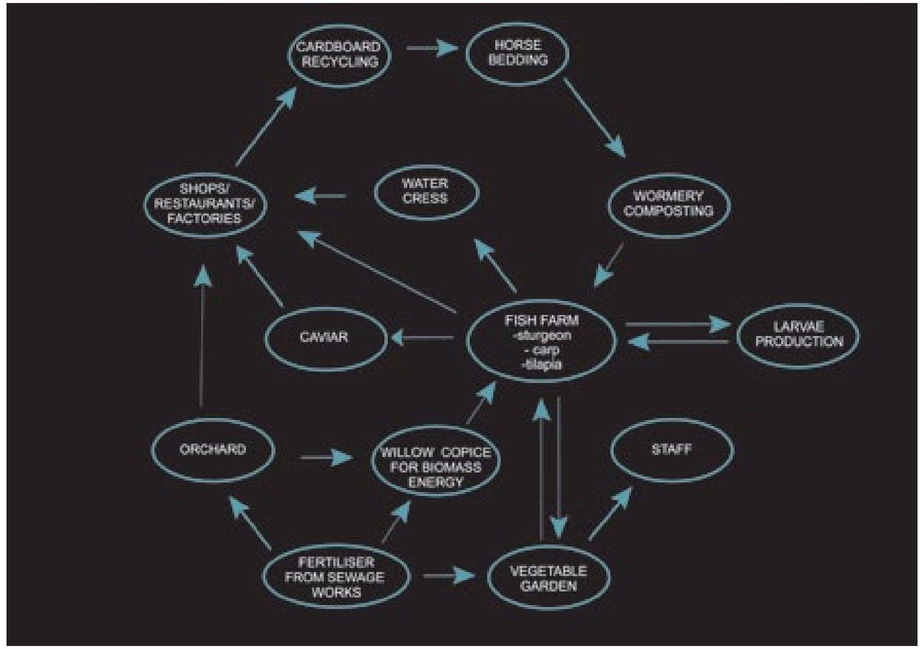


*fig*2.4.2 Cardboard to Cacviar Project digram

Case study 2.4 The Cardboard to Caviar Project by Graham Architects

This part of the project involved working with former heroin users and has achieved huge success in getting pursuits. Since then many other elements have been added to the systems:

1. The filtration system uses micro-organisms and watercress to clean the water while also producing a food crop.
2. It was noticed that the growth rates of the fish reduced dramatically in winter due to colder water temperatures so willow has been planted(using fertilizer from the adjacent sewage works) such that a biomass boiler can be used.
3. An area of land adjacent to the project is being cultivated, partly for the people that work on the project to learn about food, but also to produce food fro the fish to supplement the diet of worms.

The Cardboard to Caviar project managed to transform a low value material into a high value product and earn money at each stage in the process.

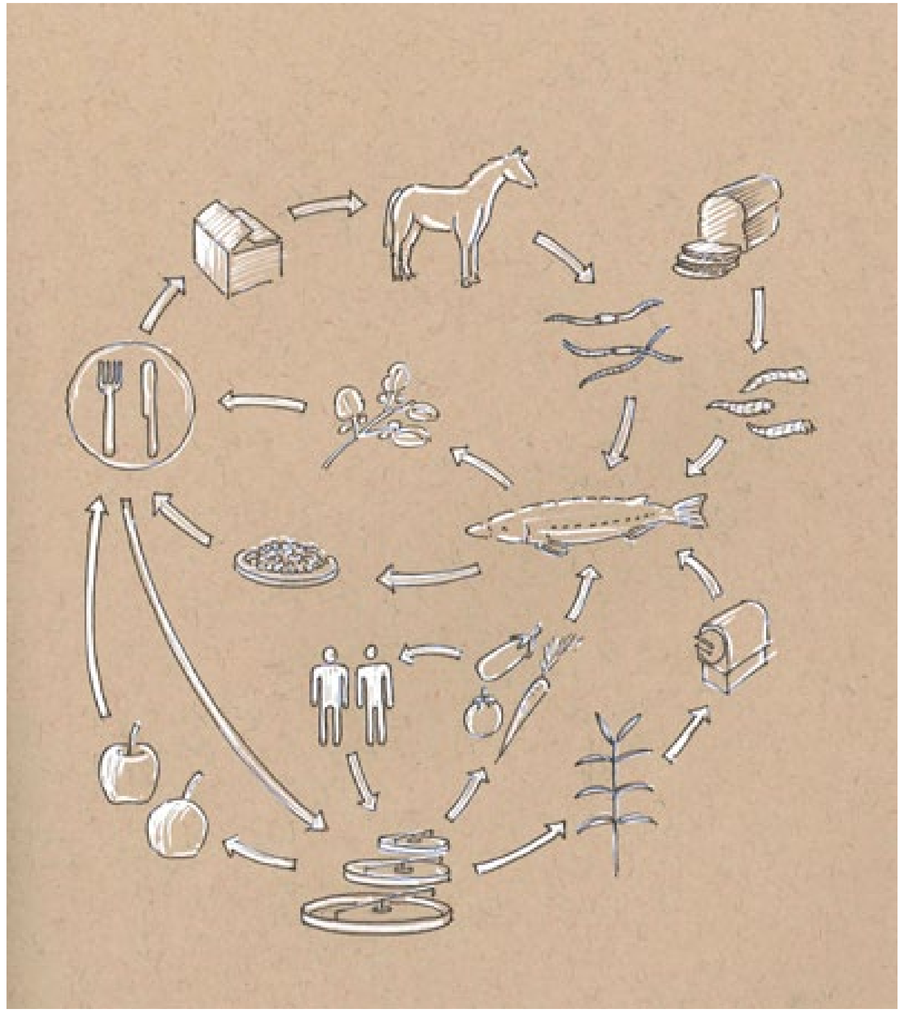


*fig*2.4.3 Cardboard to Cacviar Project food system

2.5 Diversity of architectural program

The human infrastructure is the human community, its built environment (buildings, houses, ets.), hardscapes and regulatory systems (laws, regulations, ethics, etc.). This is the social and human dimension that is often missing in the work of many green designers. It is clear that our lifestyles, our economies and industries, mobility, diet and food production all need to become sustainable.
Imagine if cities were like forests: plenty of shade, diverse, rich in variety while offering abundant fresh air and daylight, with access to clean water, surrounded by living things---an integrated natural system in balance.[28] Like a forest, urban sustainability begins with a healthy watershed, encouraging storm water use, re-use and delivery back into the eco-system. Creating more compact, mixed-used neighborhoods with buildings, streets and parks linked to mass transit. Providing healthy, liveable habitat for all living things.

28 Ipsen, D(1998), "Ecologh as Urban Culture". In J Breusted, H Fled mann and O Uhlmann(Eds.)

Case study 2.5 “En Pointe” runner-up entry by The Open Workshop + Lorena Del Rio Architects for E12 Austria, Kagran

The site of Kagran is unique in that it is characterized by complete infrastructural separation, forming an island of building types that operate at a scale closer to urbanism than of architecture. Simultaneously, however, the site is highly connected to regional infrastructures, allowing it to attract both a local and regional public.

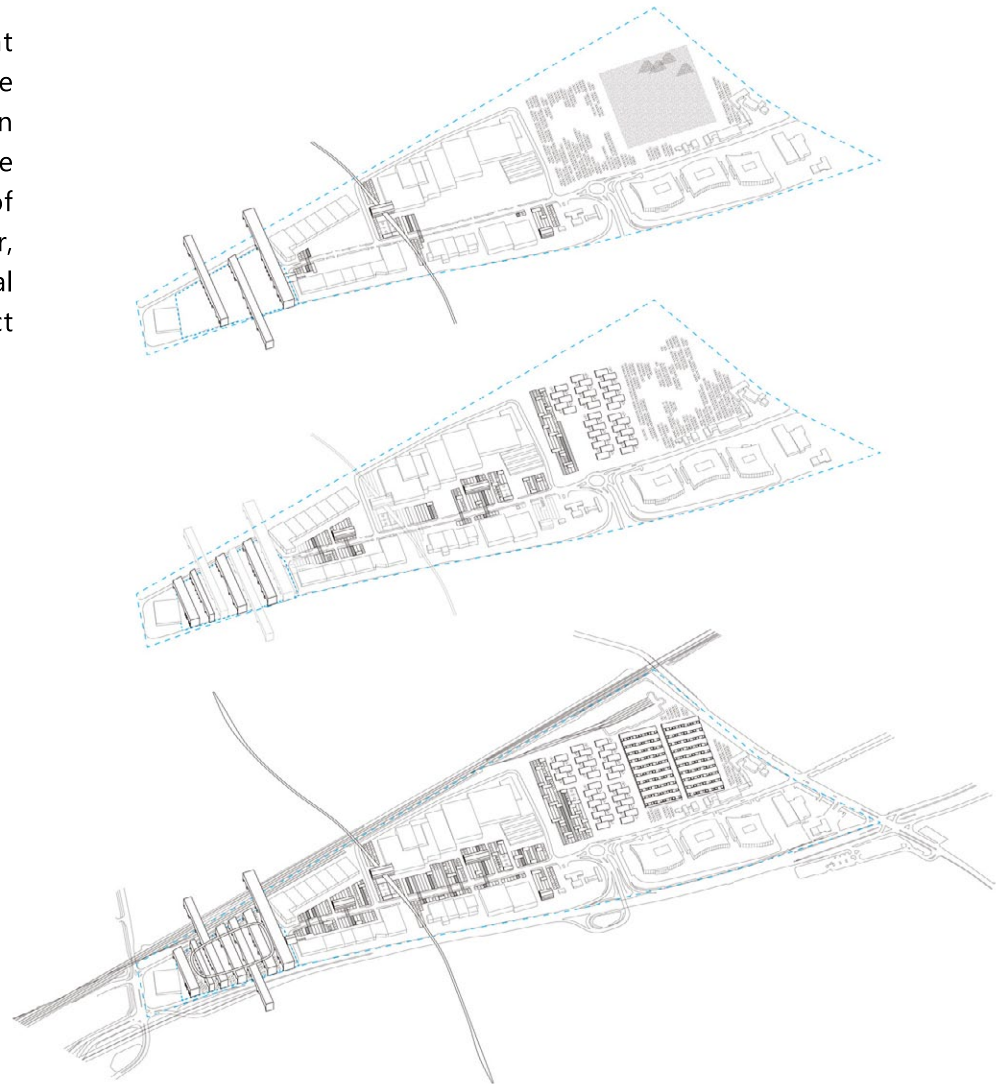


*fig*2.5.1 "EN pointe" project masterplan

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

The question of adaptability in the site is addressed through the notion of time and the spatial type of the surface. A large surface operates as a multi-programmed public realm that is timeshared through a schedule - to allow a more diverse and larger set of public programmes. The surface is coded through differing materials and paint to provide flexible, soft organizational strategies that are activated by the bars above. For instance, the same space can be used for greenhouse, parking, market, and basketball courts at different times of the day, week, and year.

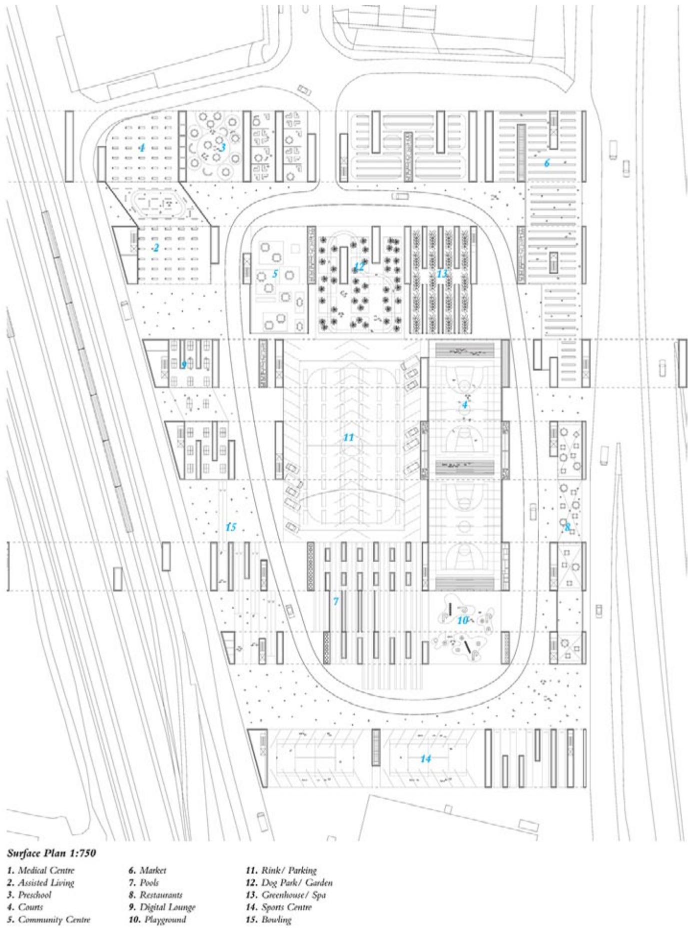


*fig*2.5.2 "EN pointe" project ground floor plan

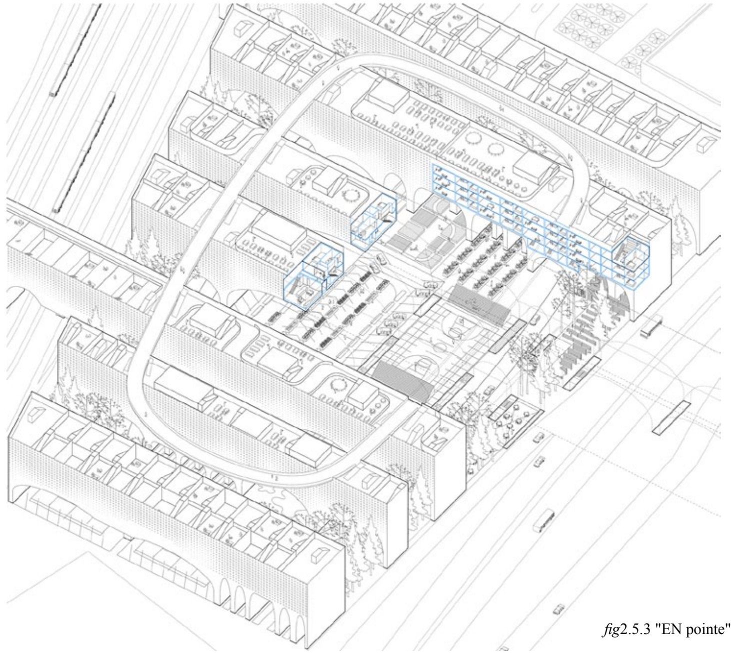


*fig*2.5.3 "EN pointe" project ground bird view illustration

Case study 2.5 “En Pointe” runner-up entry by The Open Workshop + Lorena Del Rio Architects for E12 Austria, Kagran

Five subtle surface variations provide diversity while still allowing for flexible programming. Pools of water and landscape enable sustainable water collection and promote microclimates to alleviate the large paved surfaces in the broader strategic site. The malleable surface and schedule is structures through the arches above, forming a symbiotic arrangement as well as a unique architectural scenario wherein form runs east-west through the site to connect across infrastructure while space runs north-south to connect with the larger strategic site. This weave between form and space is structured through the public realm and surface below.

The arcaded public realm works in conjunction with the surface that adheres to the monumentality of the infrastructure and surrounding architecture while breaking down into local supports to promote soft neighborhood units. By connecting this island to the surrounding developments and infrastructure, a multivalent public realm is achieved in a dynamic field condition.

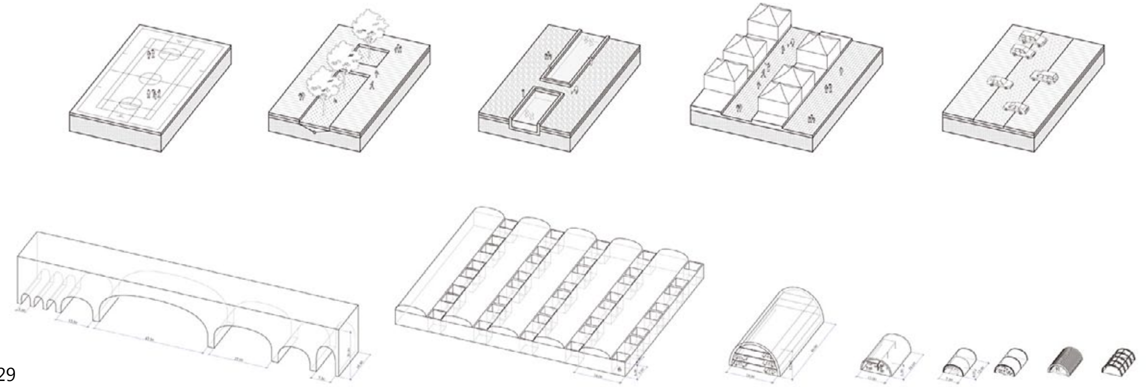


*fig*2.5.6 "EN pointe" project ground floor typology

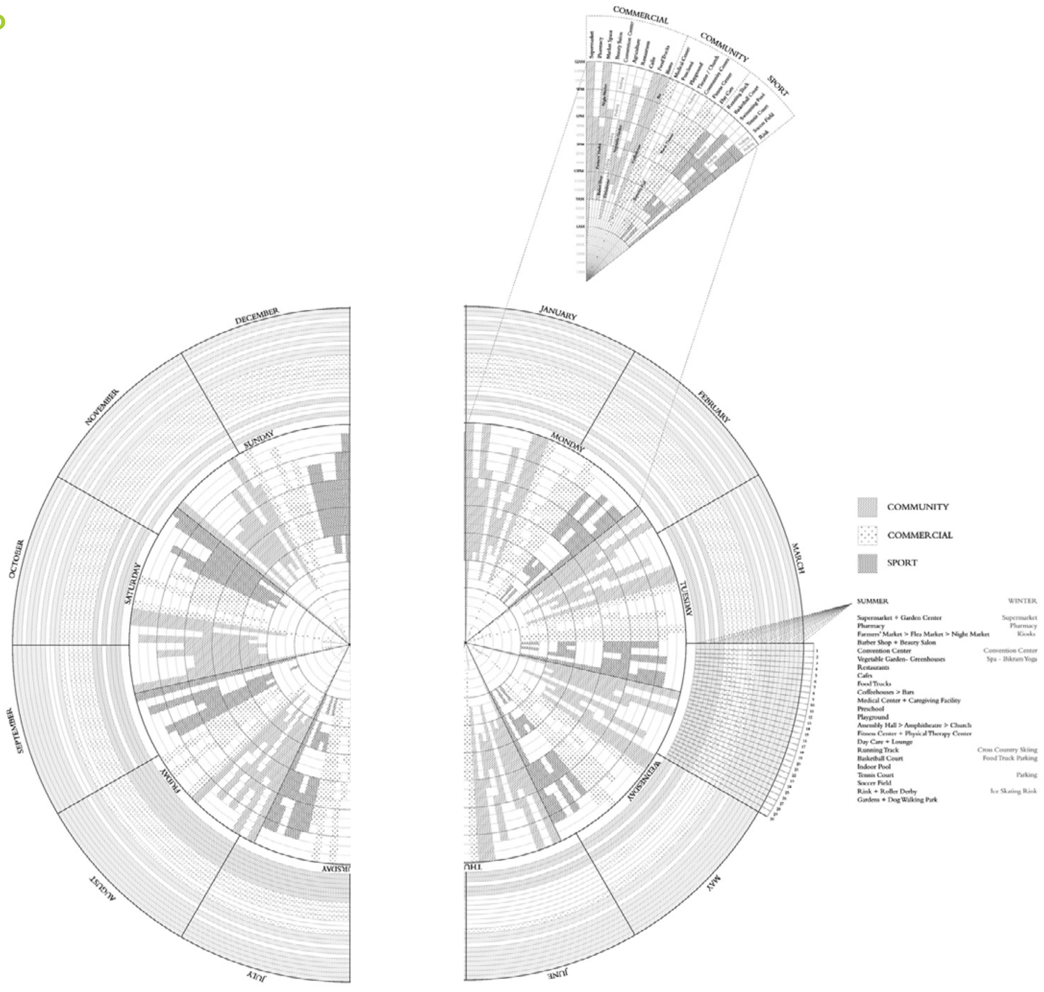


*fig*2.5.4 "EN pointe" project timetable

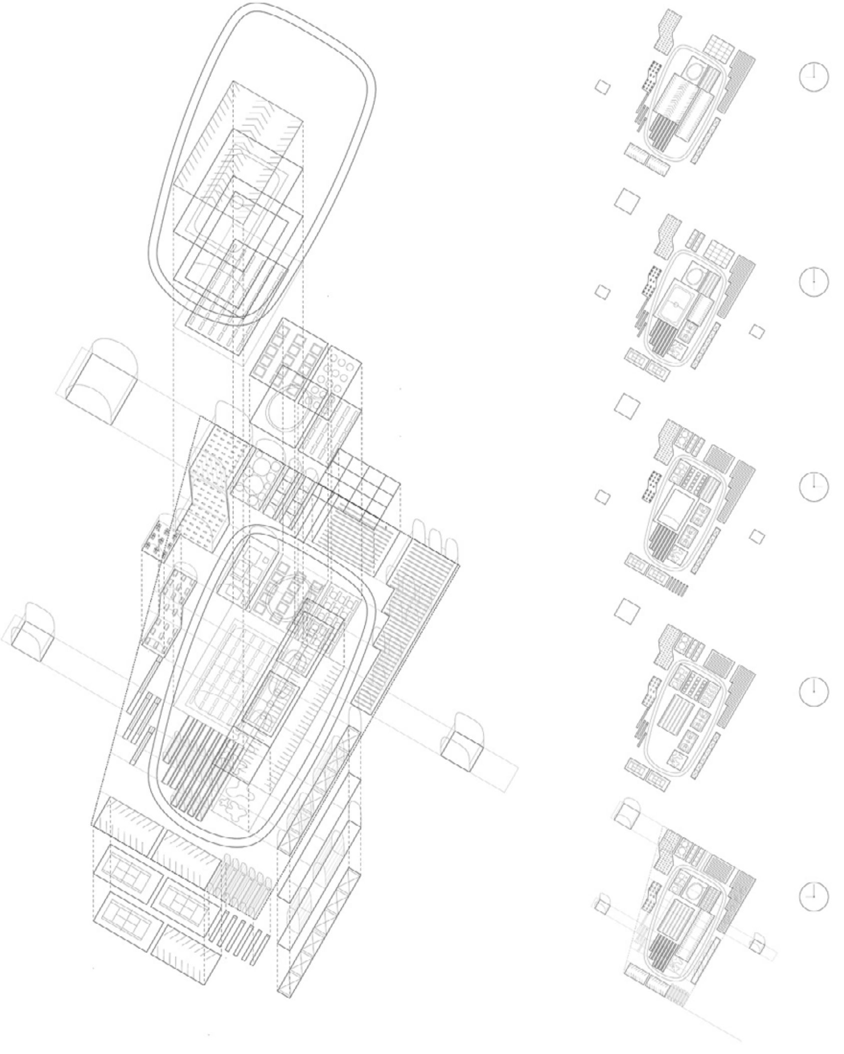


*fig*2.5.5 "EN pointe" project program illustration

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

2.6 Conclusion

We all share equal responsibility to improve the quality of our environment for future generations and to implement sustainable practices. It appears that today we have the technology to accomplish the task. Thus, the greatest challenge is to enlist ourselves to change the current mode of thinking and habits.

The human infrastructure is the human community, its built environment (buildings, houses, ets.), hardscapes and regulatory systems (laws, regulations, ethics, etc.). This is the social and human dimension that is often missing in the work of many green designers. It is clear that our lifestyles, our economies and industries, mobility, diet and food production all need to become sustainable.

In that point of view, it is required to put the view in a much larger way of thinking. It is about the urban scale of natural systems, life cycle together with human activities. It's a deep conversation between nature, urban and community.

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

3 The architectural scale of sustainability

3.1 Introduction

Though several definitions for sustainability are available, that suggested by then Prime Minister of Norway, Gro Bruntland, in 1987—meeting the needs of the present without compromising the ability of future generations to meet their needs[29]—is considered simple and effective.1 Sustainable development or, simply, sustainability is thus a realization that today's population is merely borrowing resources and environmental conditions from future generations.

Many architects and engineers think sustainability is a mere issue of mathematics. Their method is to apply technical means in order to produce sustainable architecture ar the other end of the building process. In our view, sustainability has to be redefined on each and every project in relation to its cultural, social, geographical, topographical, climatic, geopolitical and local political context. Sustainable architecture cannot be achieved if the culture in which it stands is ignored.
One of the biggest misunderstandings, of twentieth century modern or contemporary international style architecture is that architects thought they could build the same buildings all over the world, ignoring all cultural and physical contexts. [30] It was possible, but it required a massive input of energy. So long as this energy was available, architects could afford to ignore all the very different locations in which they were building. As architects and planners we have a broad sphere of power and influence when it comes to the built environment.

In china, when we discuss sustainable buildings, we often narrow the subject down to purely quantitative aspects: annual kilowatt hours/square meter. [31]Of course energy is important, but it is not the whole story. At the moment the standard energy comsumption for a bank office building in Beijing is between 700 and 900 kilowatt hours/square meter annually, but now we are discussing being able to achieve annual values of just 100 kilowatt hours for future projects. These empirical standards are important and technically feasible but they are not everything, because we are not measuring other values which also contribute to good architecture. All the energy saving standards could be incorporated in a building and still result in bad architecture that nobody would want to use.

29. Earth Pledge(2005). Green Roofs. Ecological Design and Construction. Schiffer Books, Atgelen.
30. Newton, J.D Gege, P Early, and S Wilson(2007). Building Greener: Guidance in the use of green roofs, Green Walls and Complementary Features on Buildings. CIRIA, London.
31. Urbanska, KM, N Webb and P Edwardes(1997). Restoration Ecology and Sustainable Development. Cambridge University Press.

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

There are other factors. We should be considering annual working hours related to energy, building users' annual occupation times related to energy. We should be considering each person's carbon footprint while in the building. When we start investigating thesequalitative aspects of working and living in buildings our ways of calculating start getting more difficult, more fuzzy and imprecise. We can see this as no longer just a matter of mathematics.

We are trying to understand the fears we architects have when we think about designing sustainable environments. [32]We talk about the renaissance of urbanity, the metamorphosis of our societies, including changes in organizations and lifestyle, new ways of integtrating work and home in so-called loft spaces, made possible by new processes? We often forget that not only do our buildings affect the lives of those who occupy them, but also the lives and attitudes of those who experience them from the outside, while passing in the street. Buildings are the walls of everyone's "public living room". [33]

32 Fox, H R, H M Moore and A M McIntosh(1998). Land reclamation. Achieving Sustainable Benefits. A A Balkema, Rotterdam.
33 Eades, P, L bardsley, N Giles and A Crofts(2003). The wetland restoreation manual. The Wildlife Trusts, Newark.

3.2 Urbanity---public realm

The public realm is what makes our cities lively entities. [34]Architects have a tendency to overvalue the appearance of buildings, but as you walk through a public space your sphere of awareness is actually limited to a few meters in height. Anything further up you see only as a blur. Anyone in a city craning their neck to look at details high up on building facades is probably an architect. Facades influence the distant view, but in the public realm it is much more subjective.
What makes for a lively public space? [35]Activities. Most city planners think this is reduced shopping, but shopping is only one form of activity. Other important factors are protective structures against adverse weather elements and crowd management. Masses of people, unless on the Champs Elysees,are not usually very attractive, but density is. People are attracted by other people.[36,37]

34 How to think like a forest, Green design-From theory to practice. Black Dog publishing, UK

35 Kendle, T and S Forbes(1997). Urban Nature Conversation. E&FN spon. London.

36 Harvey, P(2000). "The East Thames Corridors: a nationally important invertebrate fauna under threat." Bristish Wildlife, 12(2):91-98

37 Morris, RPK, I Alonso, R G Jefferson and K J Kirby(2006). "The Creation of Compensatory Habitat- Can it Secure Sustainable Development?" Journal for Nature Conversation, 12(2):106-116

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

Case study 3.2 “Rambles Verdes” - 1st-prize entry for Europan 12 Spain, Barcelona

Still at a metropolitan scale, It is recognized that the Nus de la Trinitat as a gateway to the city and as a crossroad where parallel and perpendicular axes to the sea meet. At this singular location we propose the construction of a tower which completes the sequences of tall buildings situated along the axes that intersect here, and which, furthermore, provides an urban character to the Santa Coloma Boulevard as it crosses the Sagrera Linear Park.

*fig*3.2.1 "Rambles Verde" project masterpplan

*fig*3.2.2 "Rambles Verde" project green connection perpective

Case study 3.2 “Rambles Verdes” - 1st-prize entry for Europan 12 Spain, Barcelona

Moreover, the parallel axes to the sea have the capacity of establishing transversal connections between the neighborhoods at the north of Besòs river, until now split by major infrastructures as the railways. The proposal strengthens these transversal connections through an adaptation to the scale and speed of the pedestrian, a renaturalization of the public space, and an insertion of new programs in synergy with the present industrial uses.

Finer grain transversal connections also appear that extend through the project site and beyond it: to the west, towards Sant Andreu neighborhood, by means of pedestrian paths through the Sagrera Linear Park; and to the east, towards Santa Coloma de Gramenet city, through the construction of three pedestrian bridges over the Besòs river.

*fig*3.2.3 "Rambles Verde" project mobility control

*fig*3.2.5 "Rambles Verde" project rambles section

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

At the scale of the project’s site, project proposes again to use the transversal connections as the clearest and most effective way of linking the adjacent neighborhoods of Sant Andreu and Bon Pastor. These connections materialize into a system of public spaces, the “Rambles Verdes” (Green Ramblas), that cross the site along the lines of maximum slope.

Between these ramblas, bands of buildable space will absorb, through time, the different programs, building typologies, inhabitants and ways of life. In addition, the “Rambles Verdes” are conceived as the most important social focus, allowing for a new vibrant neighborhood to come alive.

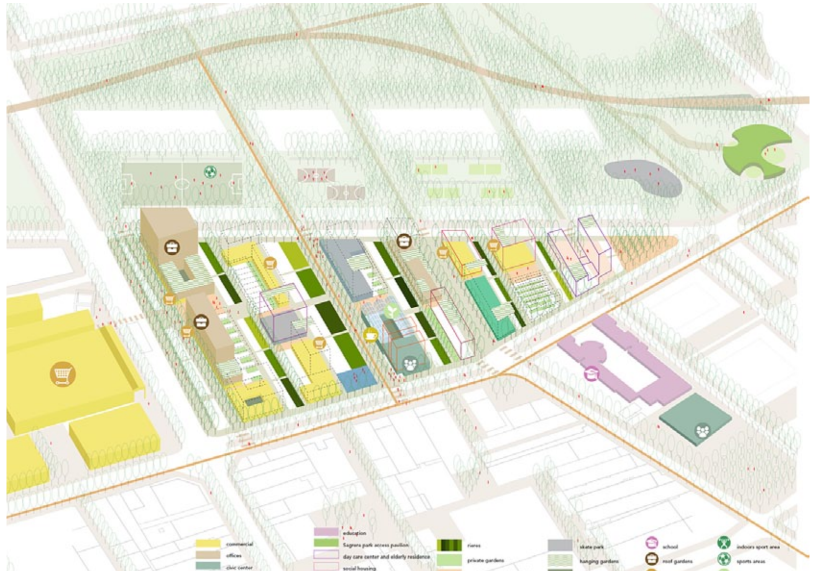
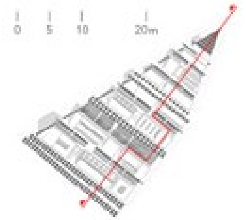


*fig*3.2.4 "Rambles Verde" project mixed use program



3.3 Sustainable culture—Learning from urban context

Ozeaneum, the German Oceanographic Museukm in Stalsund completed in 2008, is a great example of architecture as a cultural asset. This hanseatic city in northern Germany is a World heritage site, a trading city with ferries, a harbor and many handmark buildings and they wanted a new aquarium.

*fig*3.3.1 The German Oceanograhic museum photo

*fig*3.3.2 The German Oceanograhic museum surroundings photo

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

CASE study 3.3 the German Oceanographic Museukm

A competition was held in which 400 architects took part. Many of the sub brick buildings. Most of the entrants had thought this material, similar to that historical structures, would be most acceptable. They failed to understand th not want to be condemned to adopt this same image for eternity. A site c limits might demand a contemporary solution. Brick is also highly inappropria over the volumes needed for a aquarium and for the larger dimensions of buildings. An architectural design using brick would have had to be brickwork In contrast, the wining project consisted of four free forms with facades co steel manufactured at a nearby shipyard with experience of spherical forms fc In which kind of way it also restored the historical memory of the local city. A was also nominated for approval of World Heritage.

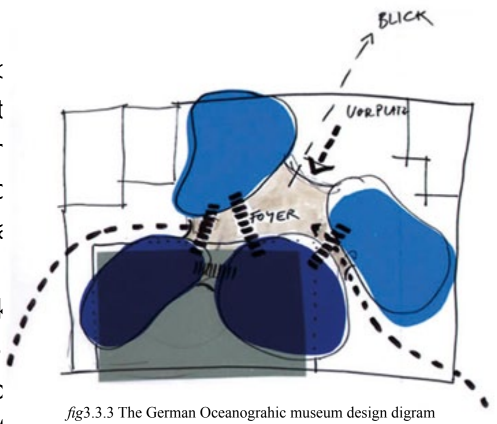


*fig*3.3.3 The German Oceanograhic museum design digram

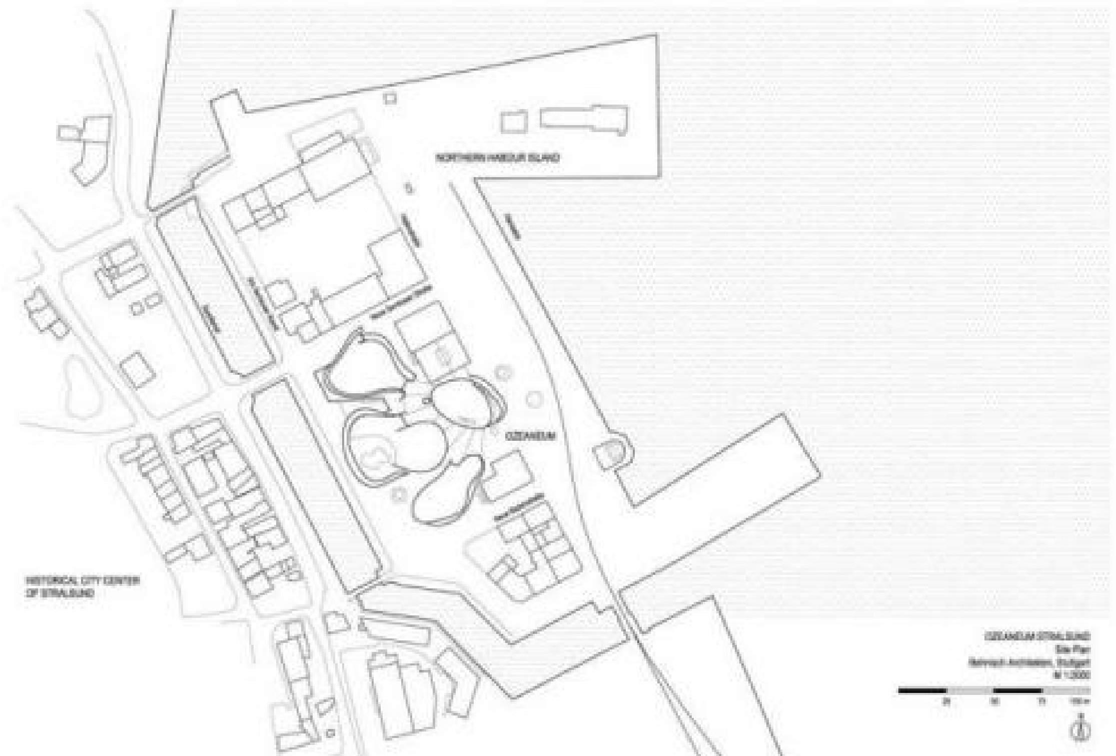


*fig*3.3.4 The German Oceanograhic museum msterplan

3.4 Ground versus Green roof---'biodiversity provision' versus 'greening'

In practice, it is still often the case that green infrastructure is equated with general 'greening' with limited focus on biodiversity. The results of an increasing number of studies, however, are showing that(comparing between similar habitat types) biodiverse urban areas or spaces provide significantly enhanced eco-system services compared with comparable species-poor areas or spaces.

Of particular interest in this regard is a recent study that has shown clear links in a UK context between the biodiversity content of comparable urban landscapes and the well-being of the observer. [38] Attitudes towards 'wildscapes' in town, already fairly positive in some northern mainland European countries like Germany (witness Emscher Park, Duisburg) may also be changing in countries such as the UK, where the traditional preference has been fro highly manicured greenspace. [39,40]

The history of living roofs, from eclectic roof gardens to biodiverse roofs based on contruction rubble, is a fascinating journey through green design. Control over substrate composition and isolation from polluted surfaces and groundwater flows increase the chances of good natural/semi-natural habitat analogues being created on roofs, given time and patience. [41]

38 Fuller, R A, K N Irvine, P Devine-Wright, P HWarren and K J Gaston (2007). " Psychological Beneifts of Greenspace Increase with Biodiversity". Biological Letters, 5: 352-255

39 URBED(2004). "Biodiversity by Design. A Guide for Sustainable Communities'. Town and Country Planning Associaton, London

40 Harrison, C and G Davies (2002), " Conserving Biodiversity that Matters: Practitioner's Perspectives on Brownfield Development and Urban Nature Conservation in London'. Journal of Environmental Management, 65:95-108

41 Hochschule Wadenswil and living Roofs(2005). Green Roofs and Urban Biodiversity. Science and Technology Transfer. Howschule Washensil

42 Jorgensen, A(ED.)(2007). Urban Wildscapes. Sheffield University. UK

The examples, on the Rossetti building of the Cantonal Hospital in Basel next to the River Rhine, is an analogue of a river gravels habitat. This stony grassland with an undulating depth of local alluvial/gravel soils(mitigation for loss of these riverine habitats to industry) is again an excellent habitat for wildlife despite its limited size(1,500 square metres). It supports various uncommon invertebrates including several species of river edge habitats. It even partially floods in winter rains, further improving the niche diversity and similarities to flooded river edge gravels. As aris conditioning is restricted in this part of Basel and the attractive architecture is achieved by glazing, the roof has a significant function in cooling the upper floor in summer.

*fig*3.4.1 The rossetti building of cantonal building green roof

A further example is on the Moos Lake water filtration plant in Wollishofen(Zurich, Switzerland). These living roofs were created in 1914 by transfer of displaced meadow soils onto some two hectares of concrete slab roofs, as it was thought that this would help stabilize temperatures in the stored water. The cross-sectional make-up is beautifully simple- some 15-20 cm of soil placed on a five cm sand and gravel drainage layer over a bitumen waterproofing--- the whole roof draining naturally via a slight slope to an edging of 'Roman'tiles. The bitumen has only weathered close to the edges of the roofs, elsewhere being in perfect condition after 90 years. The vegetation, developed from the natural soil seedbank of the emplaced soils, is stunningly biodiverse.

*fig*3.4.2 the living roof of Wollishofen temple

Moos, Zurich-Wollishofen (Foto: Pia Zanetti)

Oberboden mit Kies (Foto: Stephan Brenneisen)

Case study 3.4 vertical forest---BoscoVerticale, milano

Vertical Forest increases biodiversity. It helps to set up an urban ecosystem where different kinds of vegetation create a vertical environment which can also be colonised by birds and insects, and thus becomes both a magnet for and a symbol of the spontaneous recolonisation of the city by vegetation and by animal life. The creation of a number of vertical forests in the city will be able to create a network of environmental corridors which will give life to the main parks in the city, bringing the green space of avenues and gardens and connecting various spaces of spontaneous vegetation growth.

*fig*3.4.3 Boscoverticale pespective

*fig*3.4.4 Boscoverticale vertical forest irragation illustration

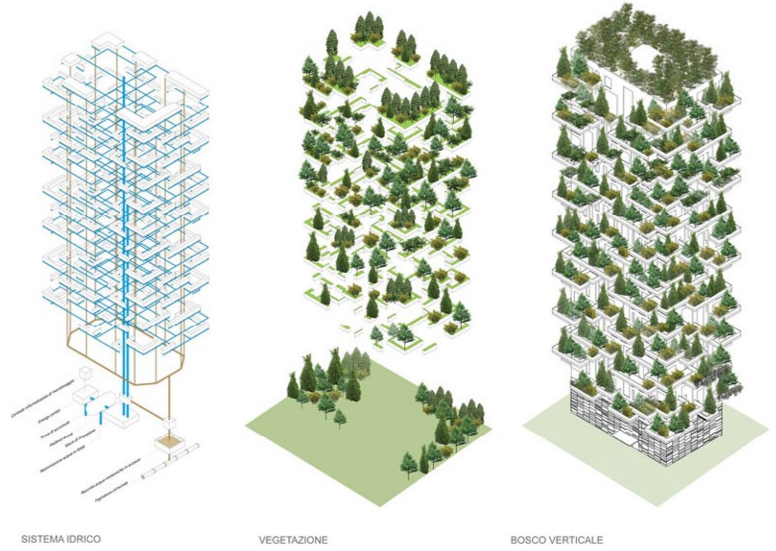
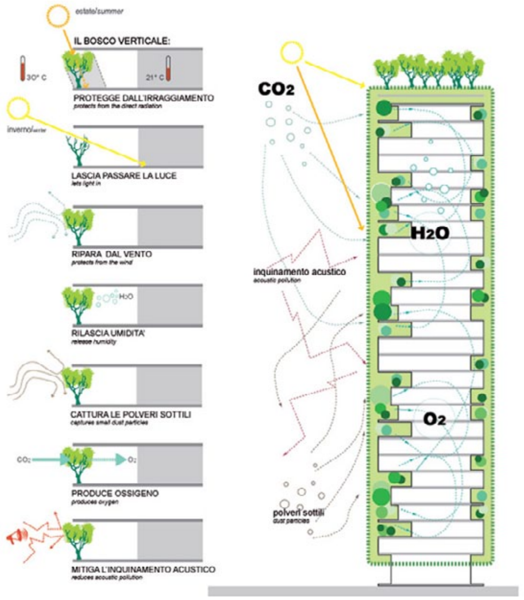


*fig*3.4.5 Boscoverticale vertical forest irragation eco-system



Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

Trees are a key element in understanding architectural projects and garden systems. In this case the choice of the types of trees was made to fit with their positioning on the facades and in terms of their height, and took two years to conclude alongside a group of botanists. The plants used in this project will be grown specifically for this purpose and will be pre-cultivated. Over this period these plants slowly got used to the conditions they will be placed in on the building.

Ecology billboards Vertical Forest is a landmark in the city which is able to release new kinds of variable landscapes which can change their form in each season depending on the types of plants involved. The vertical forests will offer a changing view of the metropolitan city below.

Management the management of the trees' pots is under building regulation, as well as the upkeep of the greenery and the number of plants for each pot.

irrigation in order to understand the need for water the plan for these buildings took into account the distribution of plants across various floors and their positioning.

*fig*3.4.6 Boscoverticale vertical forest plants diversity

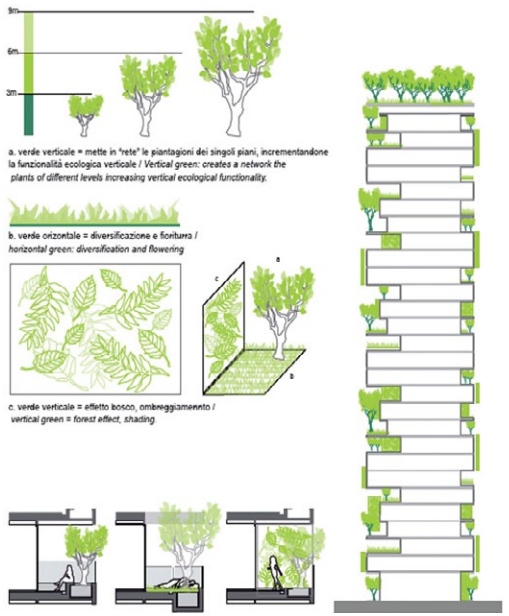
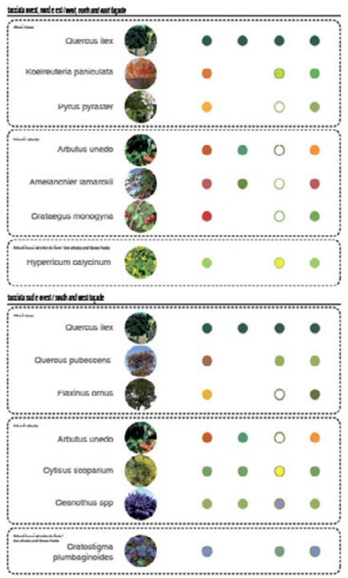


*fig*3.4.7 Boscoverticale vertical forest plants type



3.5 Sustainable forms---inspiration from natural systems

Technology that would allow manufacturing at a moleculer level is clearly some way off but rapid prototyping represents a very promising direction. [43]Rapid prototyping approximates molecular manufacturing in that it allows the material to be placed exactly where it is required. If we look at the way we build things at the moment, the technology is relatively crude. Stell tubes, for instance, are uniform[44] along their length even though the bending moment varies enormously. If rapid prototyping were to become rapid manufacturing, we could create far more efficient structures with a fraction of the weight.[45]

A number of organizations have looked at natural systems for ways in which man-made systems and products can be rethought to yield much greater efficiencies. [46]Eco-systems are a wonderfully rich interaction of different species that thrive in exactly the ways that human civilization will need to develop---closed loop and living off current solar income[47], In eco-systems, the waste from an organism always becomes the nutrients for something else in the systems. While traditional economists have consistently denied that there are limits to growth, we are becoming increasingly aware of the finite nature of our resources and there is an urgent need to adopt solutions based on the densely inter-connected and cyclical efficiencies found in nature.

43 Janine Benyus, Biomimicry---Innovation Inspired by Nature

44 Hill, D.(Ed)(2007)"Making the Connections: A Role for Ecological Networks in Nature Conversation". Proceedings of the 26th Conference of the Institute of Ecology and Envrionmental Management. IEEM. Winchester

45 "Energy Efficiency in Buildings: Facts and Trends, World Business Council for Sustainable Development", 2007. Http://www.wbscd.org/DocRoot/H94WhkJolYq5uDstLfxR/WBCSD_final.pdf

46Thomas, R(Ed.)(2002). Environmental Design: An Introduction for Architects and Engineering, 2nd Editons. Spon Press. London

47 Yudelson, J,(2009). Green Building Through Integrated Design. McGraw-Hill, Maidenhead

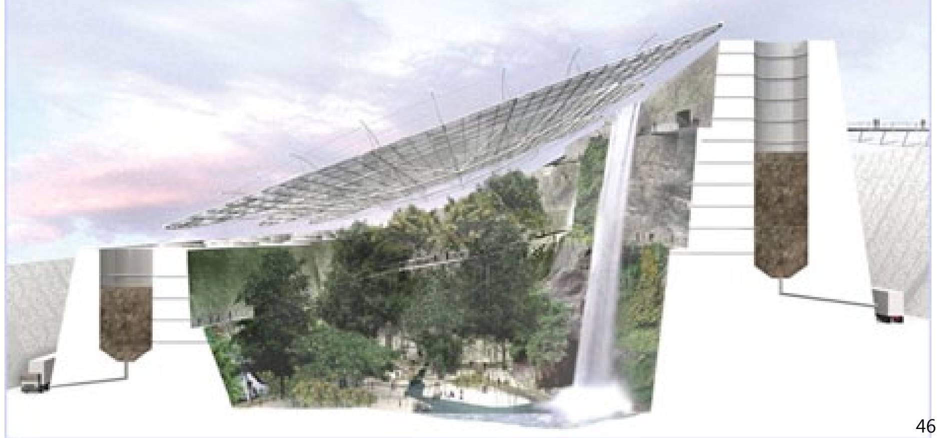
Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

Case study 3.5 eco-Rainforest by Grimshaw Architects

The Eco-rainforest project is a profound example for systems-thinking. Its location was between two major conurbations(Liverpool and Manchester) and it was being used as a landfill facility. The building is made from and heated by waste. The walls could be built up out of rubble waste, stockpiled during the remaining period of the landfill site and then locaded into gabion wire baskets. The roof would be a south-facing ETFE structure so that for a lot of the year the building would be self-heating using passive solar gain and a lot of thermal mass in the heavy walls. Whithin the walls it is proposed to incorporate large vertical bio-digesters that would produce heat from the decomposition of biodegradable waste. These would be connected to the internal surfaces of the walls with heat exchangers so that during the colder times of the year it could drew heat from the decomposition process and use that to heat to the building. The potential existed for the scheme to handle most of the biodegradable waste from a whole city and for various other waste streams to be handled on site in a way that transformed a big problem into valuable opportunities.

For the Eco-rainforest, we see an opportunity to explore the complex inter-relationship of species in natural systems. As the project developed it became clear that there was an interesting parallel between the exhibit and the way that the site was operating: one was to be actual eco-system and the other was to be a man-made system reconceived on the principles of natural systems, creating more value out of the same resources and approaching zero waste.

*fig*3.5.1 "eco-rainforest" project section



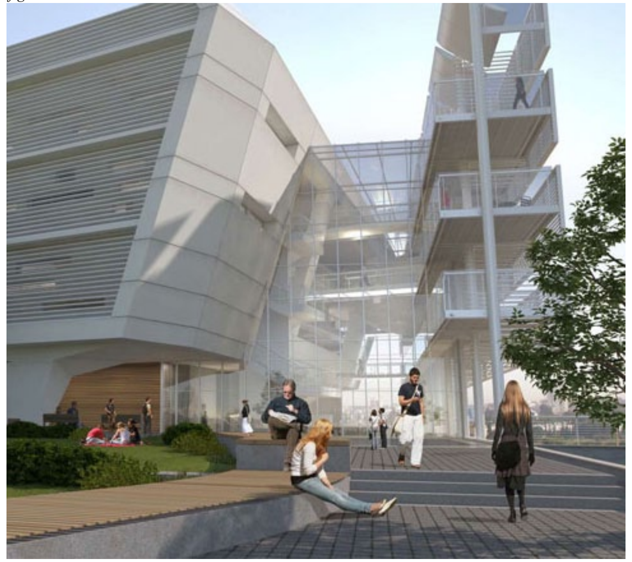
3.6 Water—grey water, Stormwater, Low Water Consumption and Plants

The landscape ardhitects, together with the drainage engineers and architects, examined different water treatment options with green roofs and constructed wetlands, grey water treatment and vertical green walls to meet LEED standards, reduce heat island effect and deliver water efficient landscaping.

Case study 3.6 Porter School of Environmental Studies by GEOTECTURA STUDIO

The new Eco-Building of the Porter School of Environmental Studies is a result of a design competition held in 2008 by Porter Foundation, to design the first Green Building in the Tel Aviv University. The building is designed to employ a range of environmental technologies, and to be used as a laboratory for studying green building and environmental research. The building is expected to comply with LEED "platinum" accreditation and the Israeli green building standard.
The landscape architects' objectives include the use of captured rainwater and grey water for irrigation, stormwater management, paving from recycyled materials, low water-consumption plants, shade, purification of the air and much more. Stormwater penetration will be used for experimental and educational studies as well.
50% of the roof area will be a green roof, with local and water efficient vegetation that will moderate the temperature beneath it during summer and winter. It will also serve as a learning centre and an open classroom for the students.

*fig*3.6.1 Porter school of environmental studie coutryard
*fig*3.6.2 Porter school of environmental studie main entrance

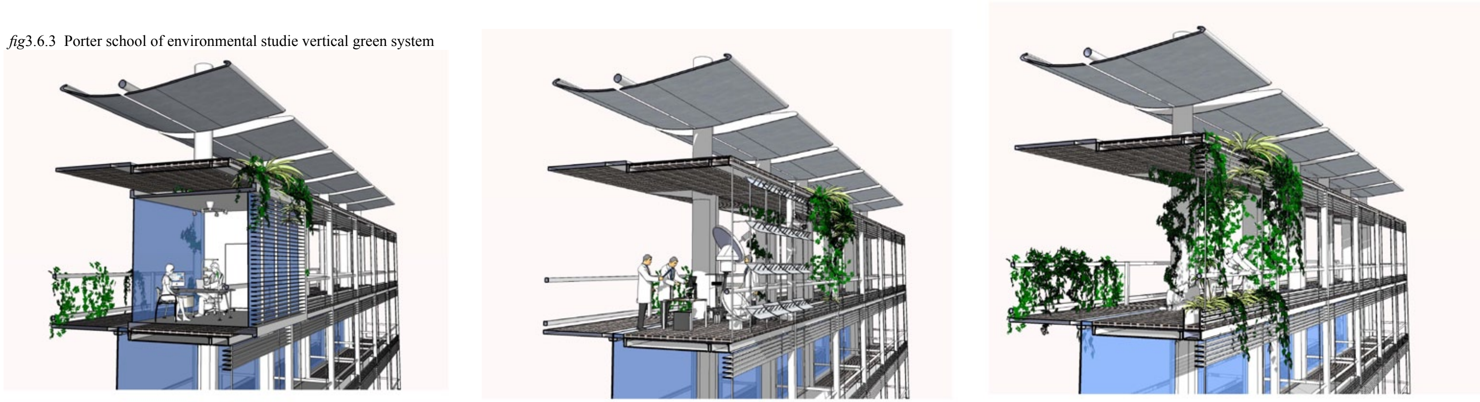


Case study 3.6 Porter School of Environmental Studies by GEOTECTURA STUDIO

The aim of the draginage systems was to save water and energy through the use of sanitary fixtures with water-saving devices and two separate sewage systems[48]- a drain water system, known as grey water and a sewage water system(black water). The grey water system, that was to be treated in biological pools and re-used by the irrigation system, was subject to the approval of the Health Minsitry, which is against grey water in general in Israel. [49]
The building acts as a cup for the water--- the walls and roof direct it to different locations---all water is welcome! Rainwater, dew, moisture, grey and black water are all being tested, collected and exhibited. Water goes hand in hand with the landscape outside but also with the interior of the building. [50]It is being handled with care as a scare resource and is at the forefront of the design process.
Things have evolved since water was assiocaited with intuition. In a sustainable design, intuition has less impact.

48 Loftness, V, V Hartkopf, P Mill. " A Critical Framework for Building Evaluation: Total Building Performance, Systems Integration and Levels of Measurement and Assessment"". In Wolfgang F E Preiser(Ed.) (1989). Building Evaluation. Plenum Publishing Corporation, New York.
49 Gallarher, M P A C O'Connor, J L Dettbarn Jr(2004). "cost Analysis of Inadequate Interoperability in the US Captial Facilities Industry". Research report sponsored by National Institute of Standards and Techonology. Advanced Technology Program.
50 Wilson, A (April 2005). "Making the case for Green Building". Enviromental Building News, No,4

*fig*3.6.3 Porter school of environmental studie vertical green system



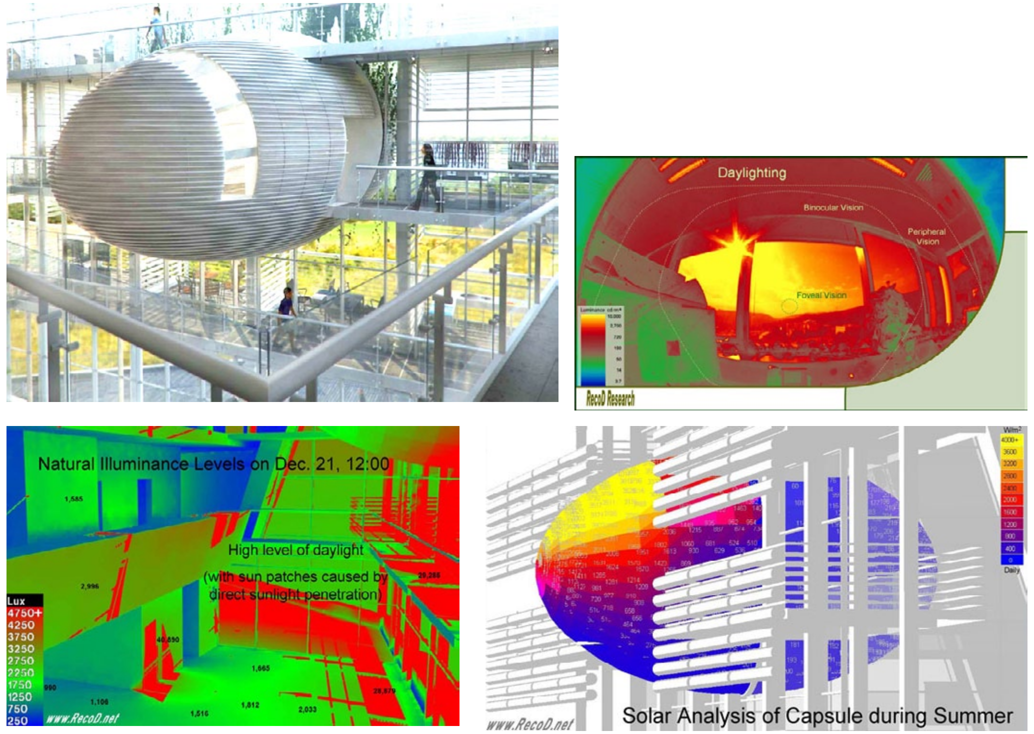
Plug-In Study : Room for expansion
Research Pod : Space for innovation/exhibition
Green Balconies : Letting nature in

3.7 Daylight----natural light, efficient artificial light

Using daylight is a problem in cities where street layouts are based on colonially influenced grid systems. Either the grid is orientated in the wrong direction towards the sun or the city building blocks are too deep and too tall in relation to the narrow streets, so that very little natural light is able to infiltrate the interiors.

Example of daylight simulations and glare control is in the previous case of Porter School of Environmental Studies. Glare control for all windows were examined and influenced the design of the rooms and furniture layouts. This important aspect improves the woking and learning envrinment and saves a lot of money. The lighting presentation on the skin of the capsule gives information to those outside the building on the nearby highway and promenade about the energy production/ consumption level or the amount of air pollution on the highway below.

*fig*3.6.4 Porter school of environmental studie natural light analysis



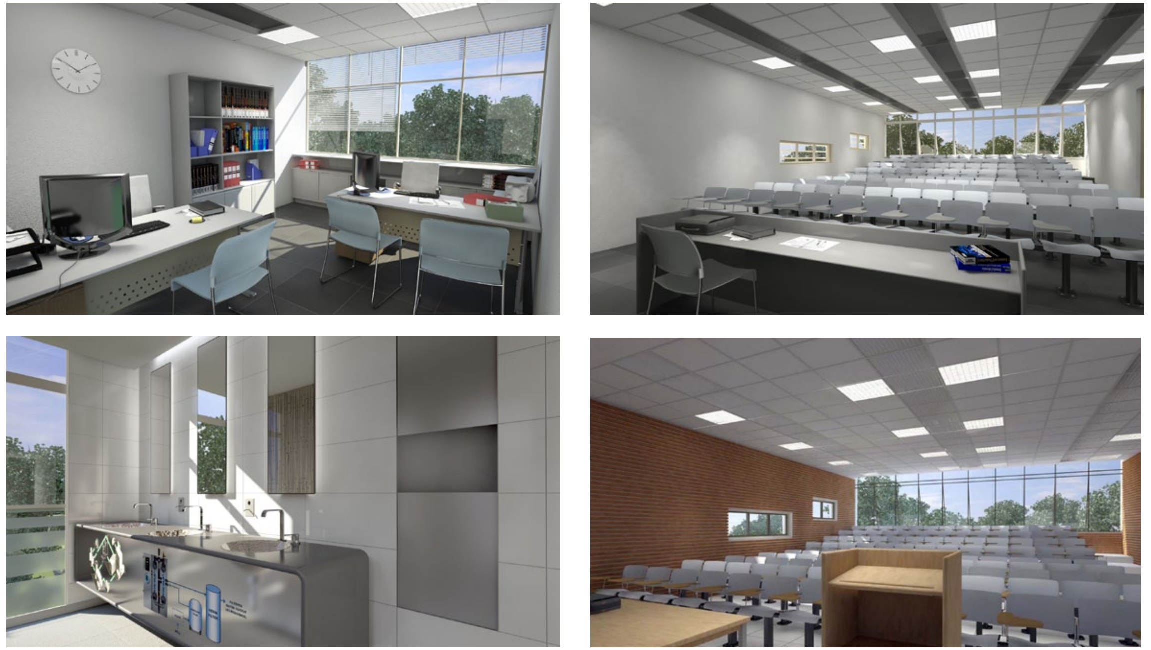


*fig*3.6.5 Porter school of environmental studie natural light simulation

*fig*3.6.6 Porter school of environmental studie natural light simulation

3.7 Conclusion

Our planet is at peril due to a number of factors, including population explosion, urbanization, excessive energy use and associated global warming, water scarcity, and inefficient waste management. A number of solutions have been proposed for sustainability. A few of the sustainable solutions are discussed. The construction industry consumes 40% of the total energy and about one-half of the world's major resources. Hence, it is imperative to regulate the use of materials and energy in this industry. Green building rating systems such as LEED and Green Globes certification have been evolved for sustainability of the construction industry. Life cycle costing and life cycle management of resources play an important role in the development of sustainable construction. However, unless the means of making these green buildings affordable for the common man are developed, we cannot attain full sustainability.

For every problem that we currently face---whether it is generating energy, finding clean water, designing out waste or manufacturing benign materials---there will require the different urban design disciplines to develop a deeper shared understanding of the functional characteristics of urban infrastructure and to work together in more synergistic co operations than is often currently the case. The future of urban sustainability lies in learning from nature, in making buildings and public spaces that lift our spirits, and perhaps most of all, in designing each city to perform, even to think, like a forest.

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

Food & waste system principle

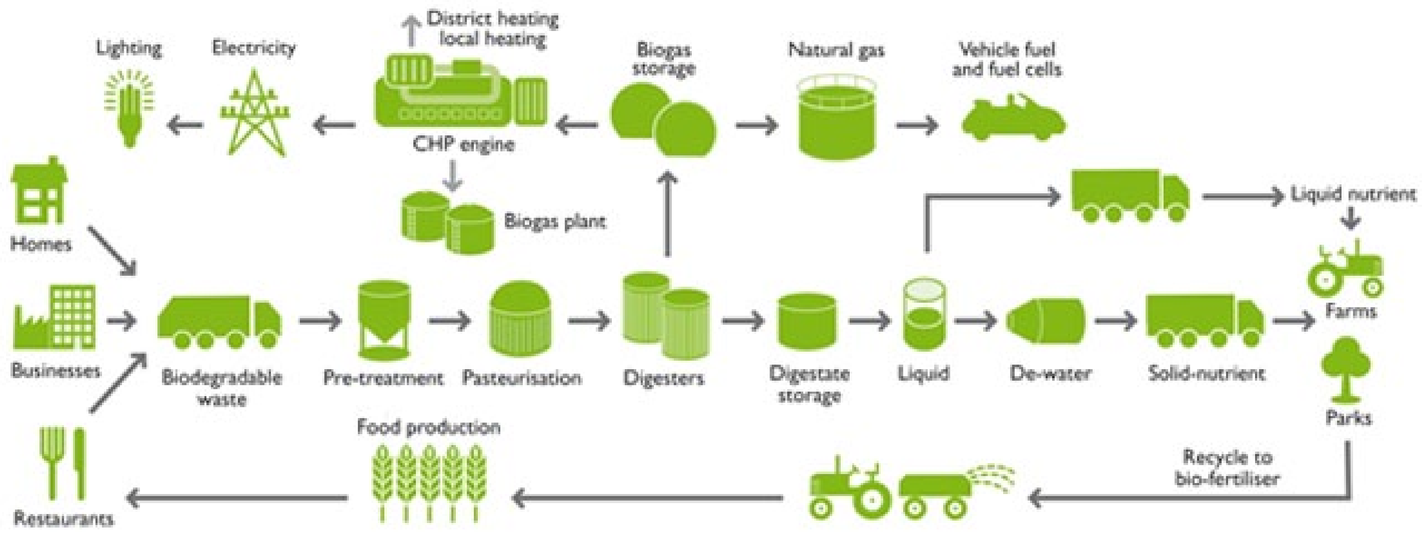


*fig*3.7 food & waste system principle

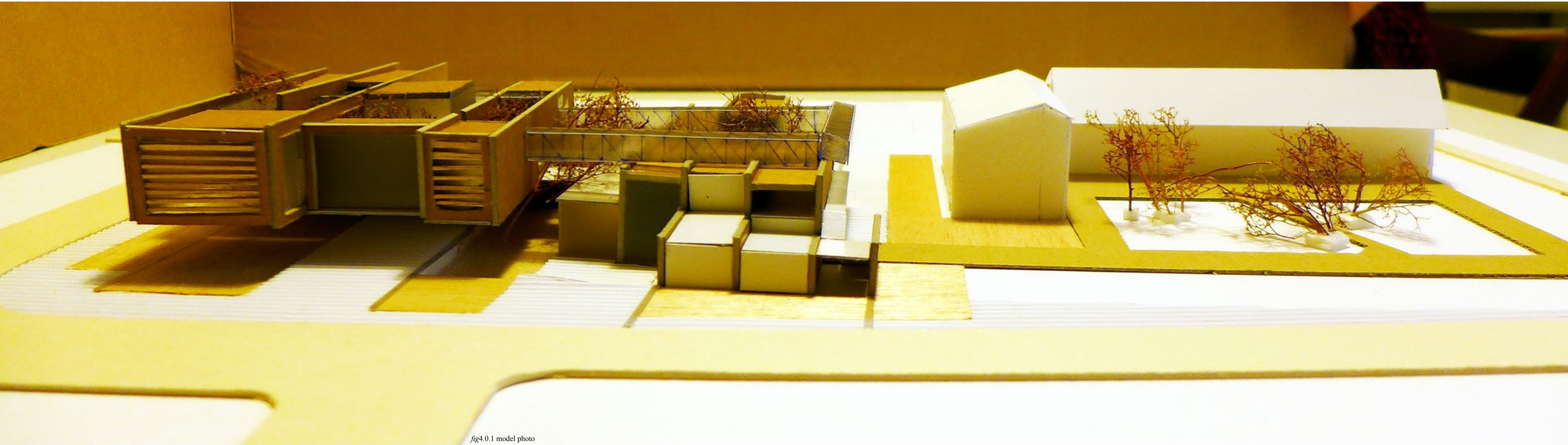


*fig*4.0.1 model photo

Cascina Rosa Botanical research center Project

Client: Cacina Rosa reserch center

2013

Area: 6966m^2

Construction Area: 4042m^2

We start from attending a course held by the research center and then interview a neighbout going jogging with his dog.

4.

WE: Do u think that there is something wrong with yhis area?
HE: This area is pretty closed. Although the botanical garden seems to open every weeks to public, but there is no parking and other services that allows other acitivies.
WE: What do u think about the neighbourhood infrasctures and other college servides?
HE: They are widely used by children., by people want to do jogging or study.Many neighbours go jogging with their dogs.But ther Via glogi green space is not big enough to allow acitivities,
WE: Do u know much about the botanical garden and have u taken one or two coursed held by Cascina Rosa research center?
HE: not much, since it is often closed
WE: Are u interested at if they hold cooking course like for organic food?
HE:Of course. And i would like to buy organic food.

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

Historical evolution

1934

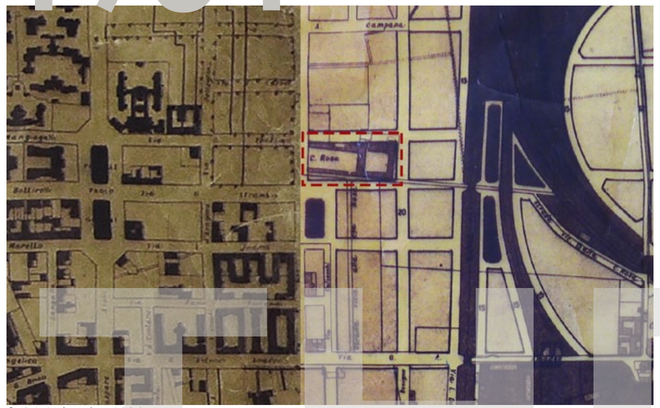


*fig*4.1.1 site plan 1934

1946

*fig*4.1.2 site plan 1946

1965

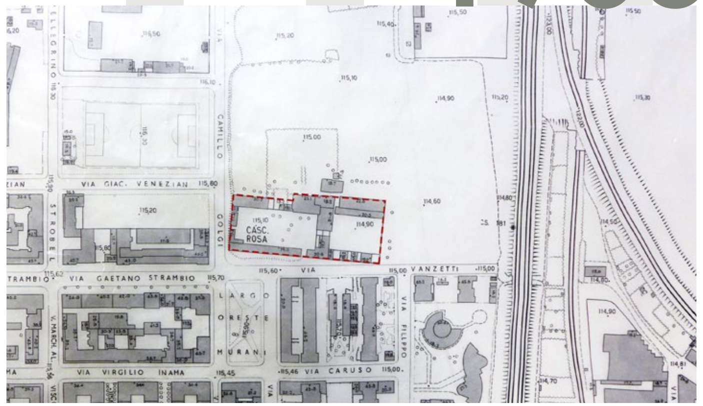


*fig*4.1.3 site plan 1965

1992

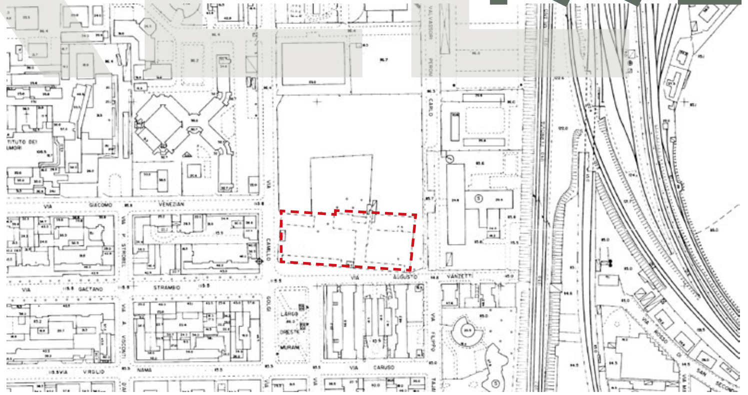
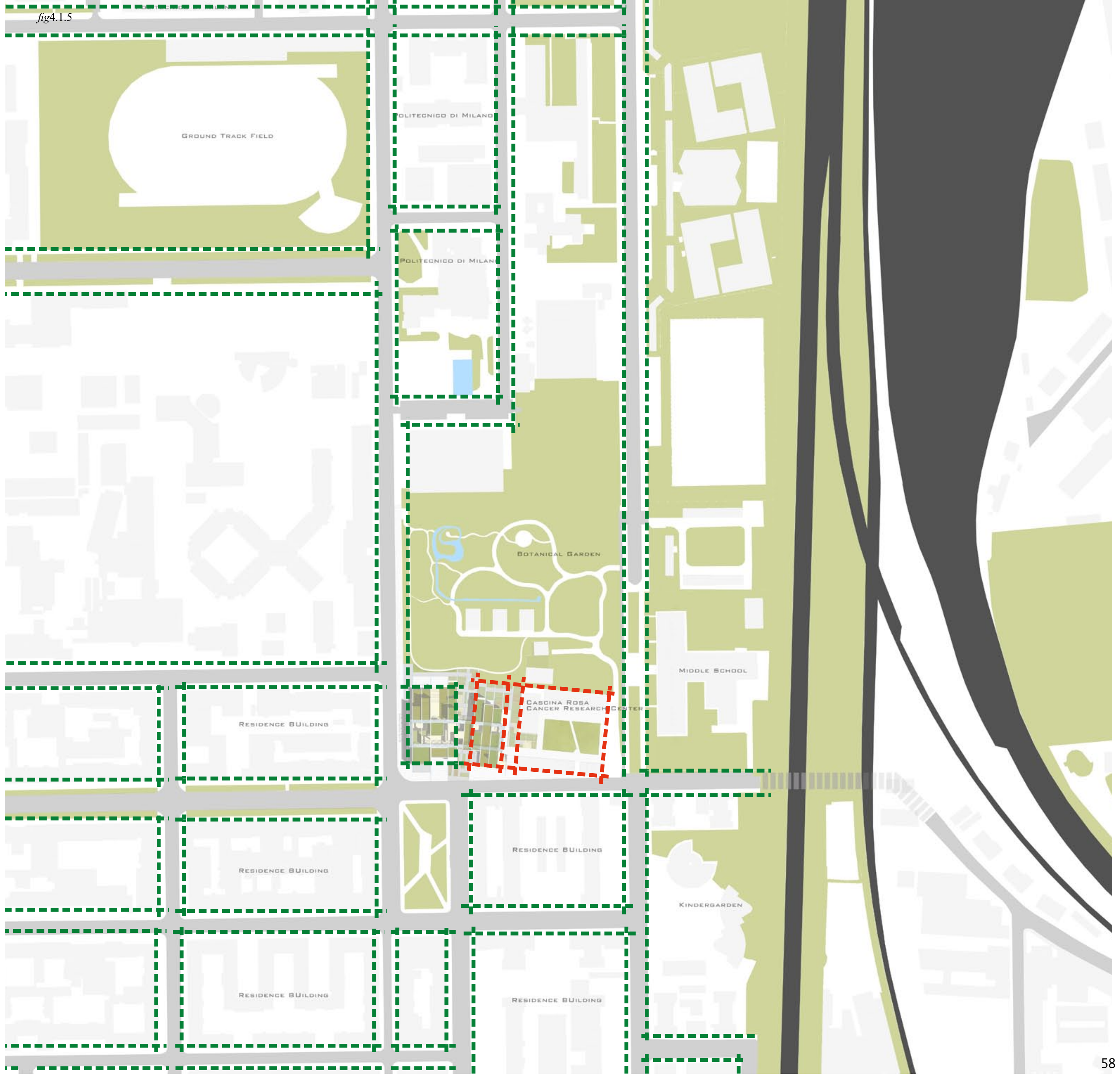


*fig*4.1.4 site plan 1992

Modern Axis VS historical Axis

*fig*4.1.5



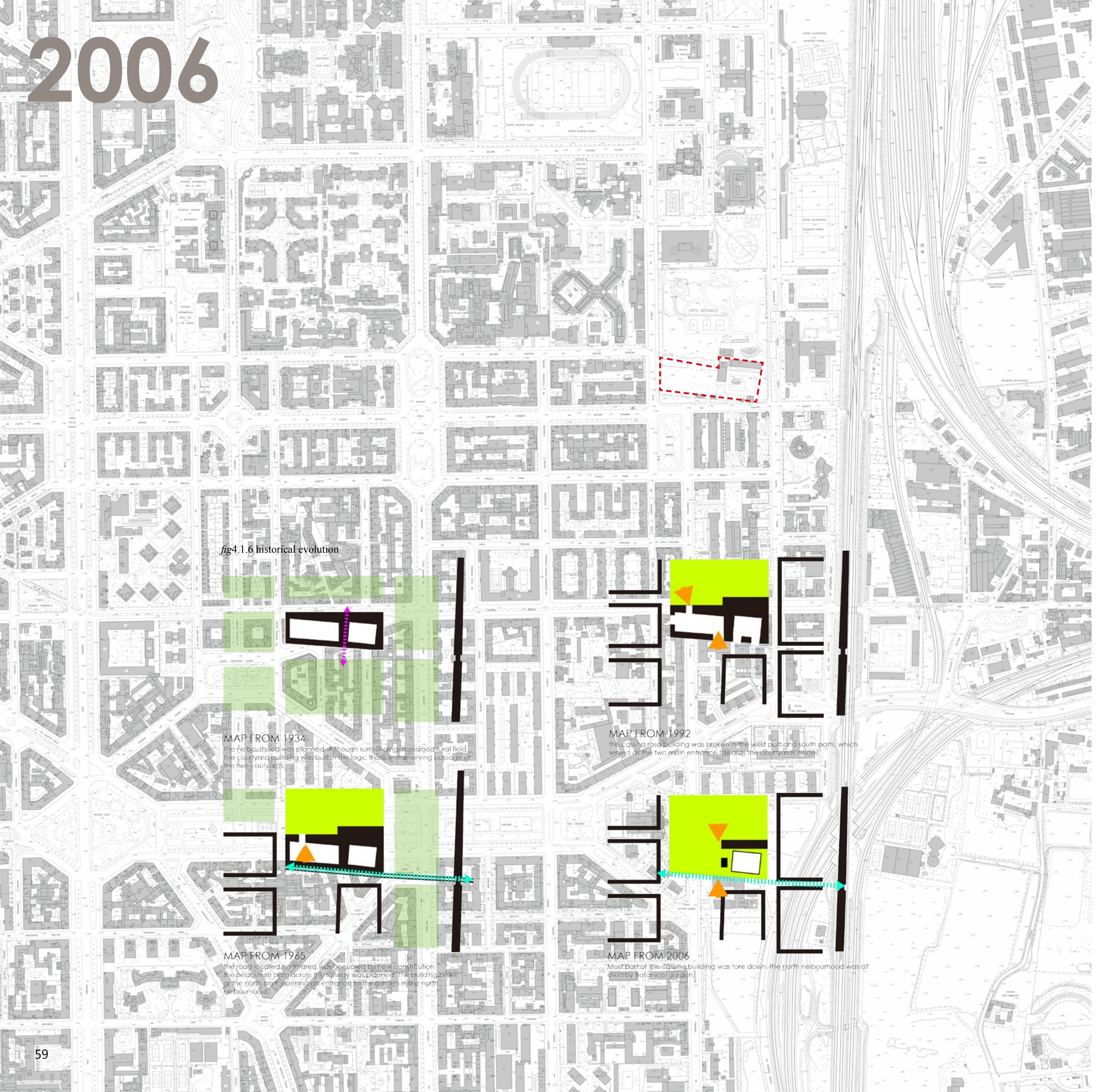


*fig*4.1.6 historical evolution

Conversation between infrastructural diversity and ecological inhabit

-------- at a scale closer to urbanism

*fig*4.1.7 site panoramic 1

*fig*4.1.8 site panoramic 2

*fig*4.1.9 site panoramic 3

Greenpath Connection

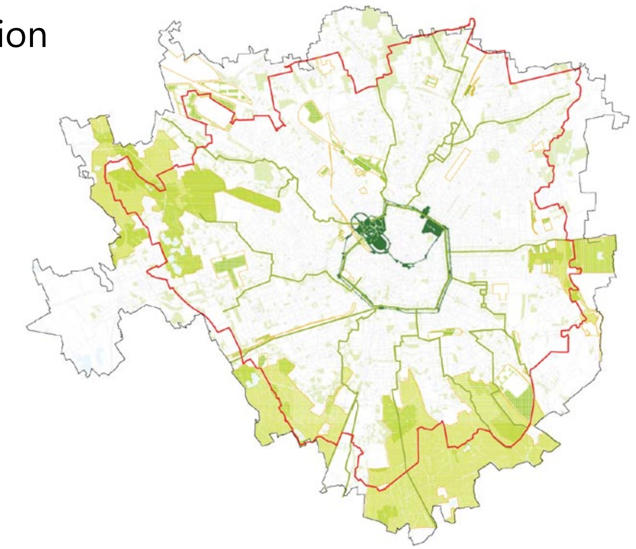


*fig*4.2.1 metropolitan greenpath

*fig*4.2.2 metropolitan greenspace

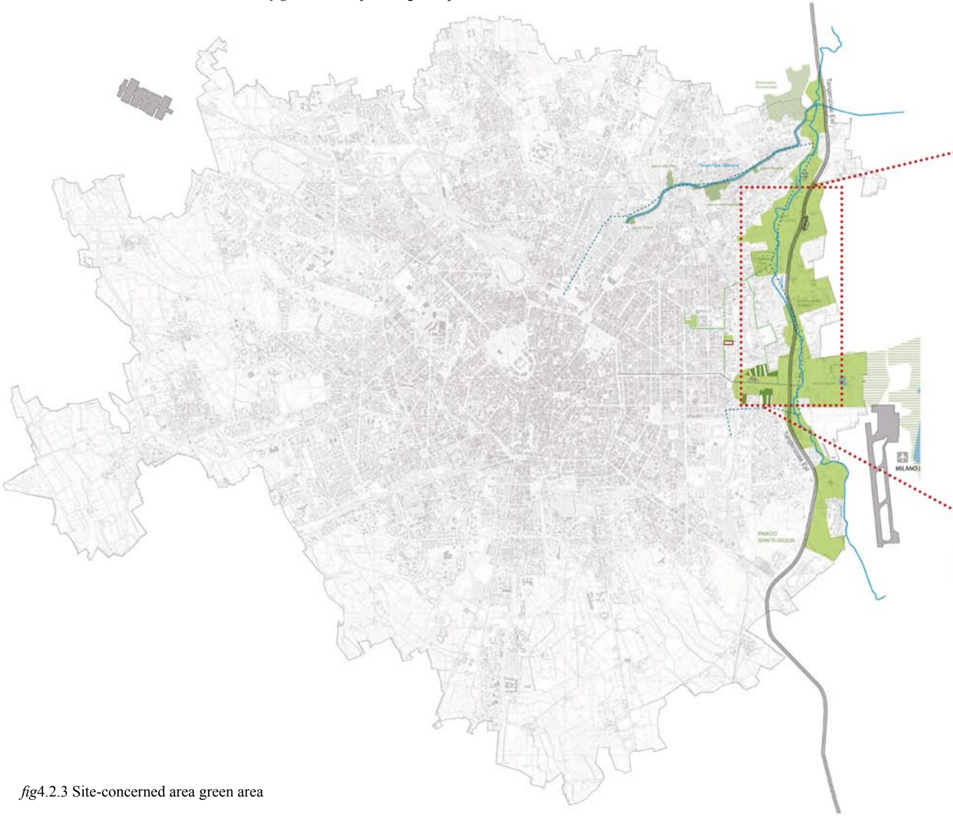


*fig*4.2.3 Site-concerned area green area

INVARIANTI
CITTÀ PUBBLICA NEGLI EPICENTRI

- Parchi / spazi vuoti _di progetto
- Parchi periurbani di progetto
- Parchi / spazi vuoti _esistenti
- Ambiti di Trasformazione
- Rete Idrografica

Mobilità individuale

- Autostrade / Tangenziale
- Percorso ciclopedonale _di progetto

*fig*4.2.4 local area green area

Pedestrain/Bycle path connection

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

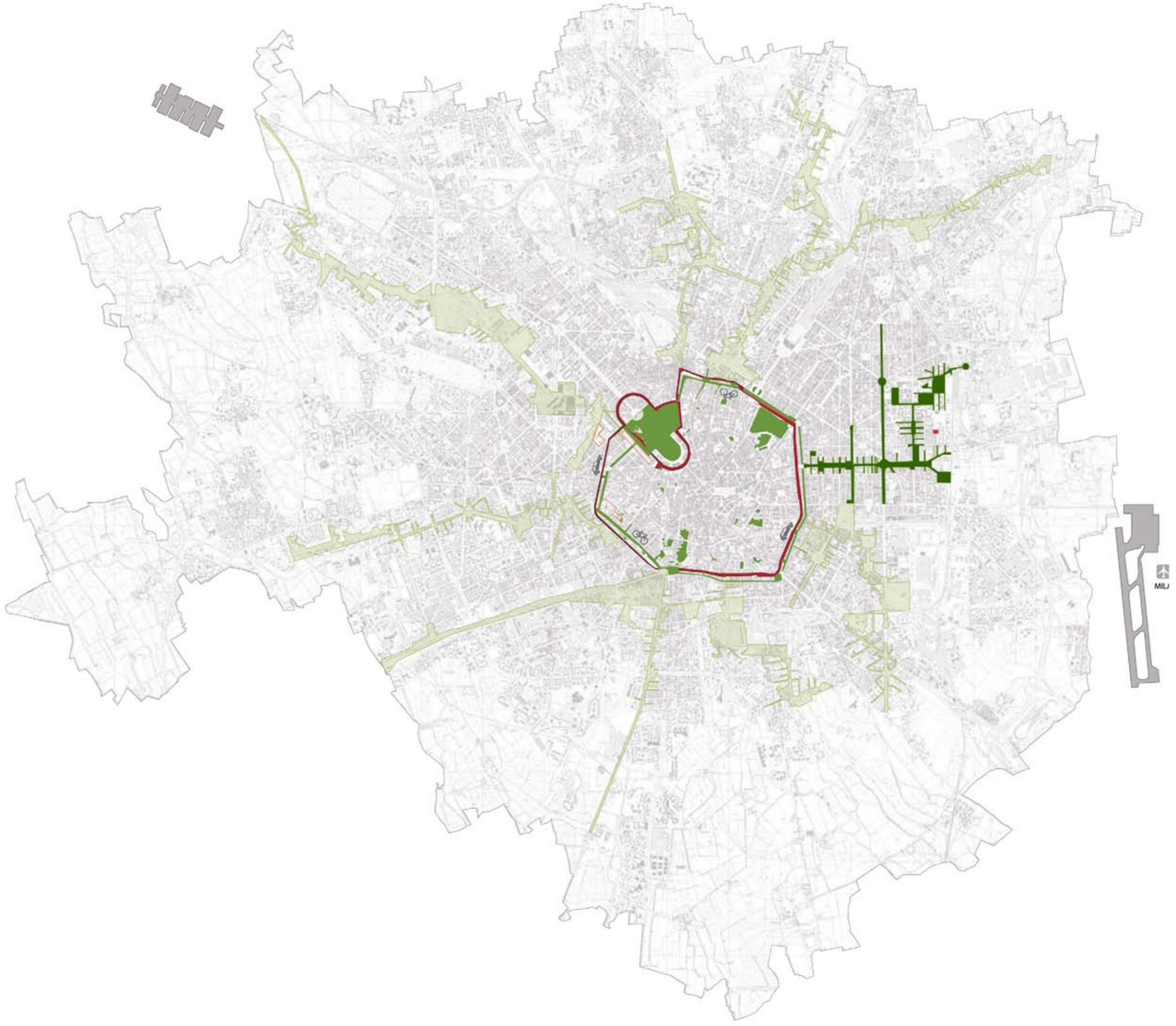


*fig*4.3.1 metroplitan pedestrain and bicycle path

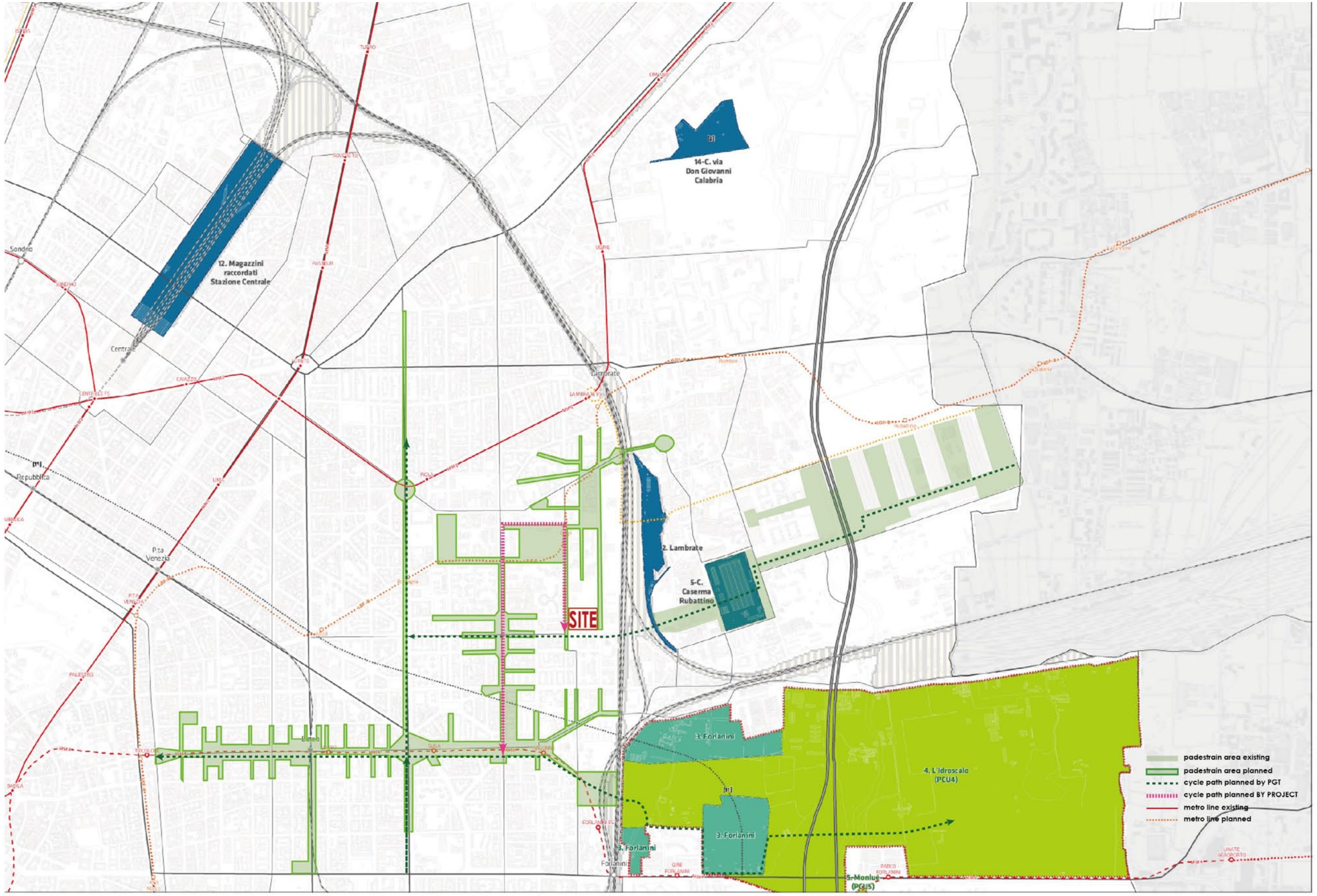
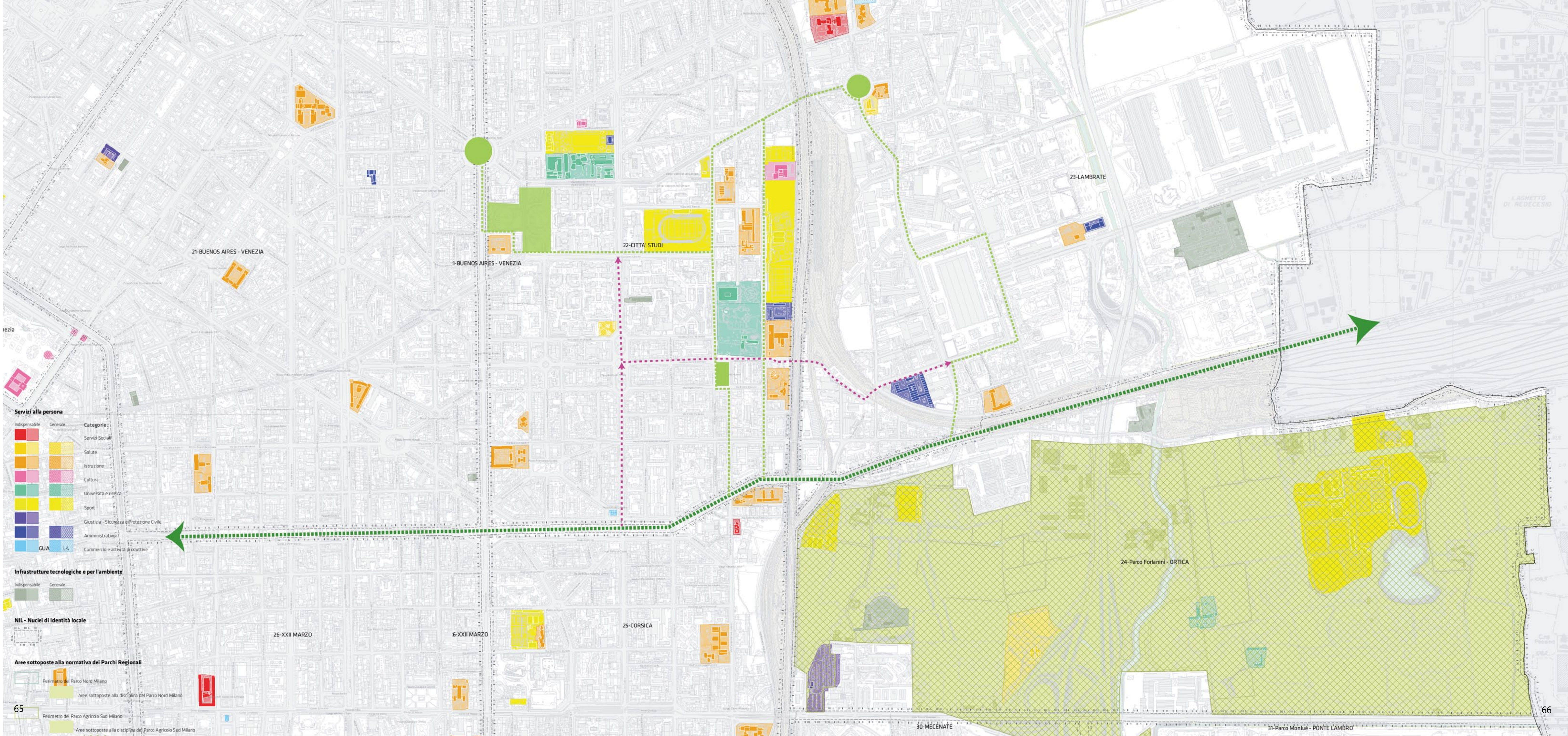


*fig*4.3.2 local pedestrain and bicycle path

Service allocation

*fig*4.4 service allocation



Question?

*fig*5.1 question of the site

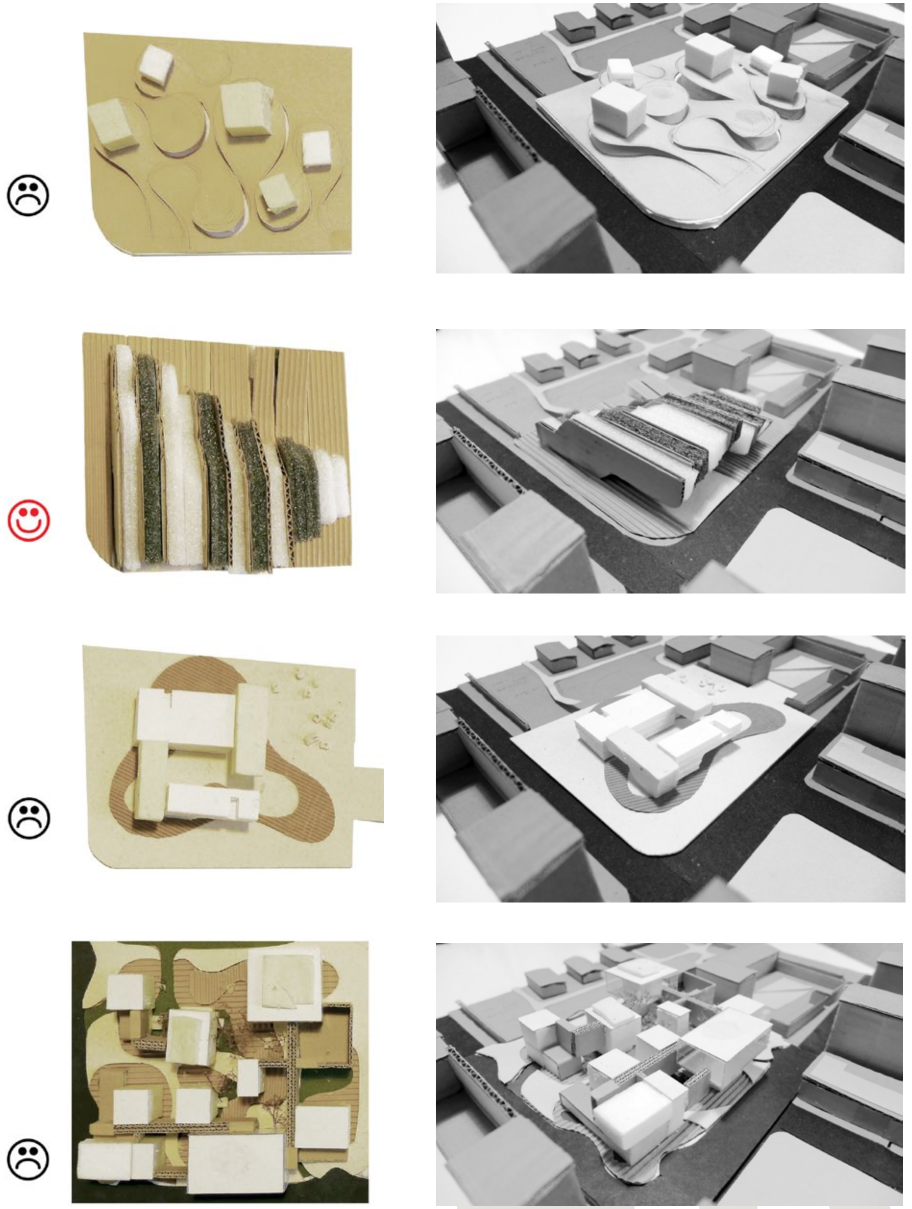


*fig*5.2 model evalutaion

To reponse to the current context there is main four issues:
How to connect the Botanical garden with Via golgi public green and how to deal with the corner and the border of cross roads,

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

Response

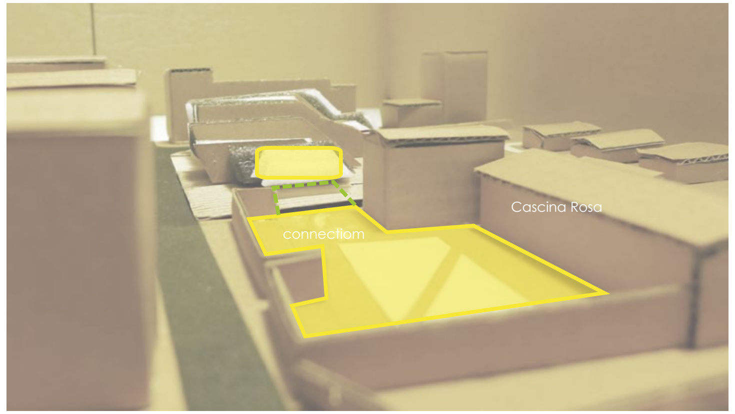
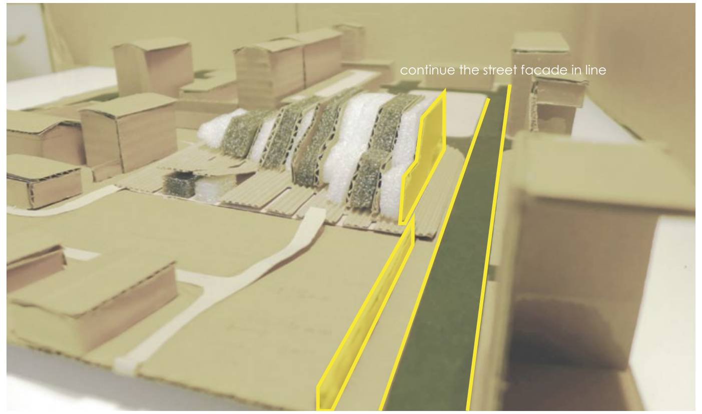
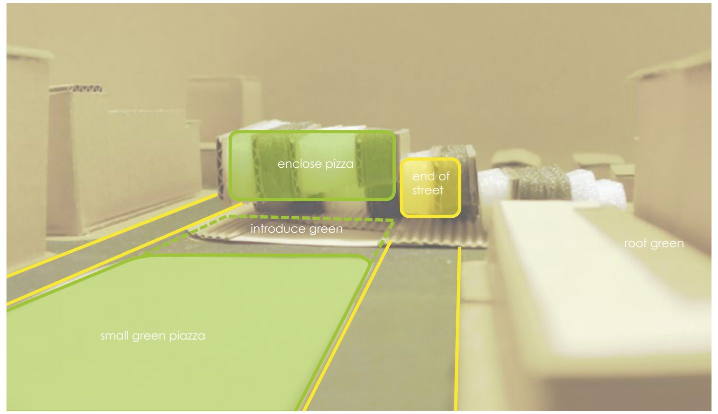
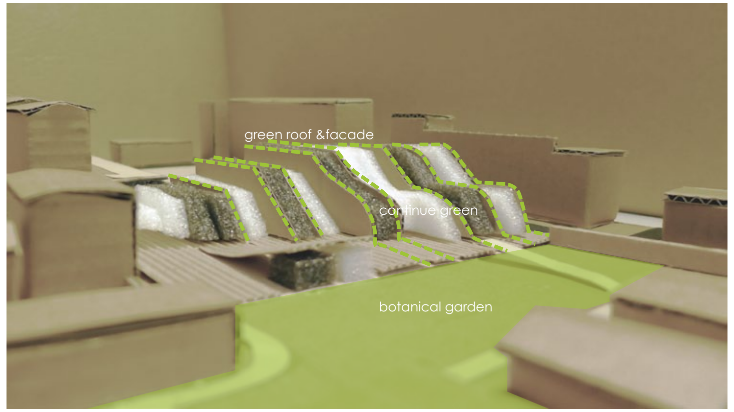


*fig*5.3 resonse to the question by model







LE MARCITE

Already in ancient centuries, using a thin film of water that continually slide on the ground, did it happen the cultivation of lawn Marcido, which allowed more cuts the lawn watered normally. The ability of the Cistercians in water management manifested itself also in the transformation of growing a lawn in Marcido in that rotten, then perfected by Leonardo da Vinci at the Sforza, the estate created by the Sforza of Milan at Vigevano.
In the cultivation of lawn rotten, exploiting the waters of springs and fountains, properly channeled on the ground and read with different gradients, is slid on the same plot with a thin film of water even in winter, because these waters have a temperature that never drops below 5 ° C.

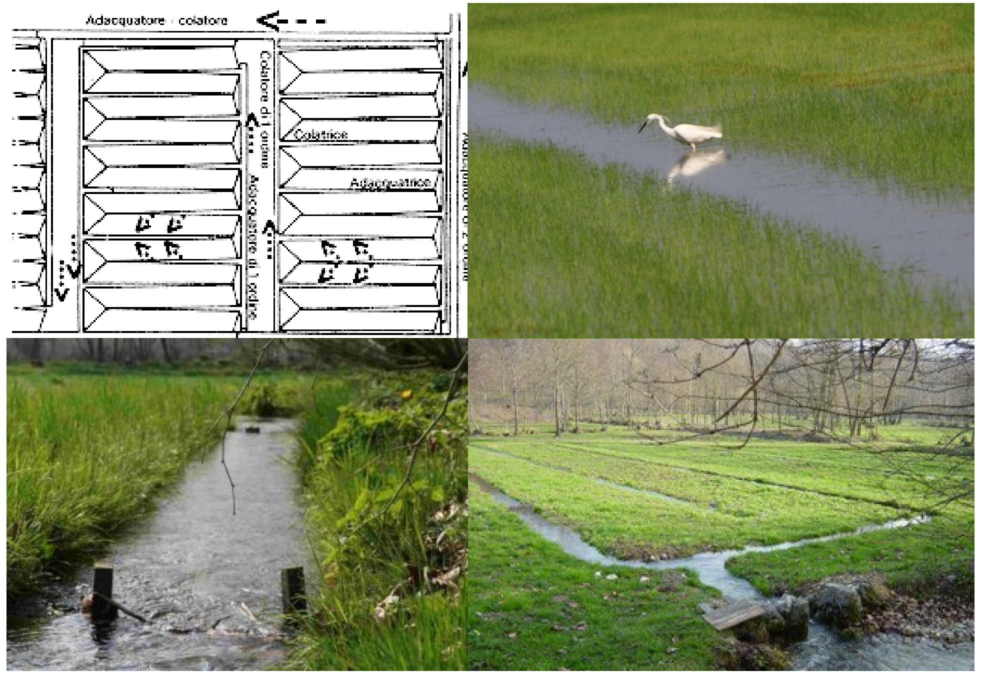
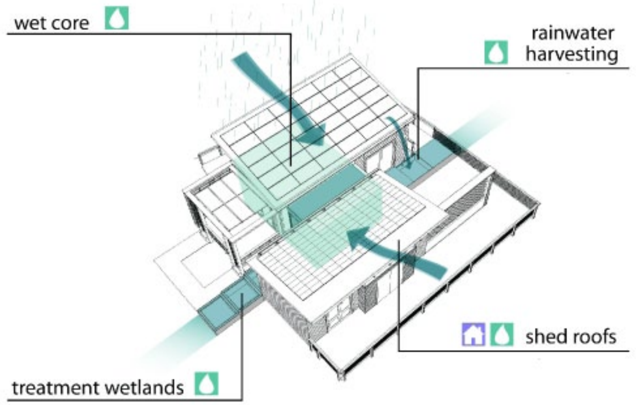


*fig*5.4.1 le marcite photos

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

WaterShed project



In WaterShed, potable water, rainwater, greywater and blackwater are all handled differently. Potable water is not used for irrigation, but rainwater is collected for that purpose instead. All wastewater that does not come from the toilet or kitchen sink is captured and filtered in subsurface greywater-treatment wetlands, which break down nutrients and remove pathogens

WaterShed
AT THE UNIVERSITY OF MARYLAND


*fig*5.4.2 watershed project photos

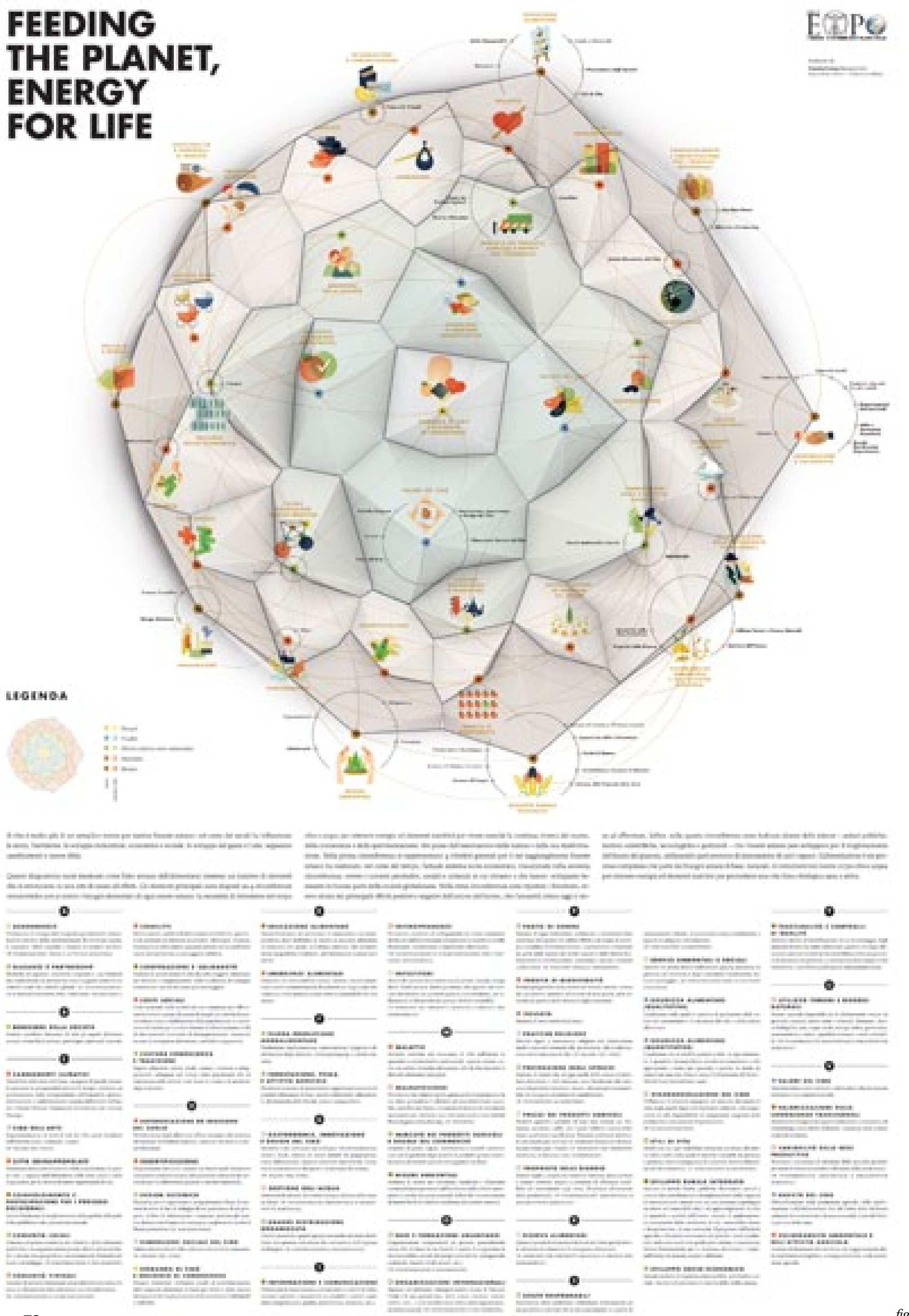
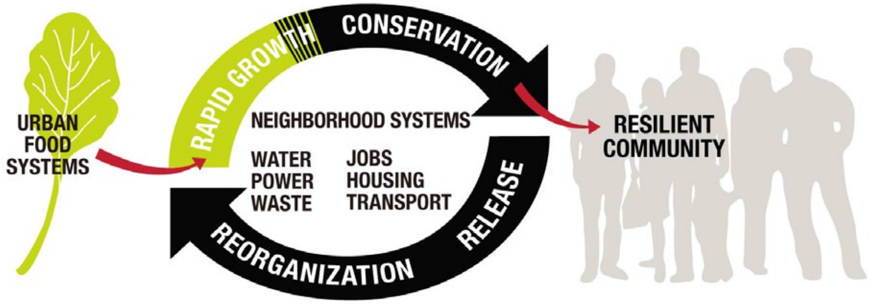


*fig*5.4.3 food and energy by 2015 milan expo

WHERE DO WE START?



Our plan focuses on spaces undergoing re-organization and rapid growth. We borrowed these terms from the 'adaptive cycle,' a key point of reference in resilience thinking. Re-organization is a moment when a system is open to change.

HOW DO WE DO IT?

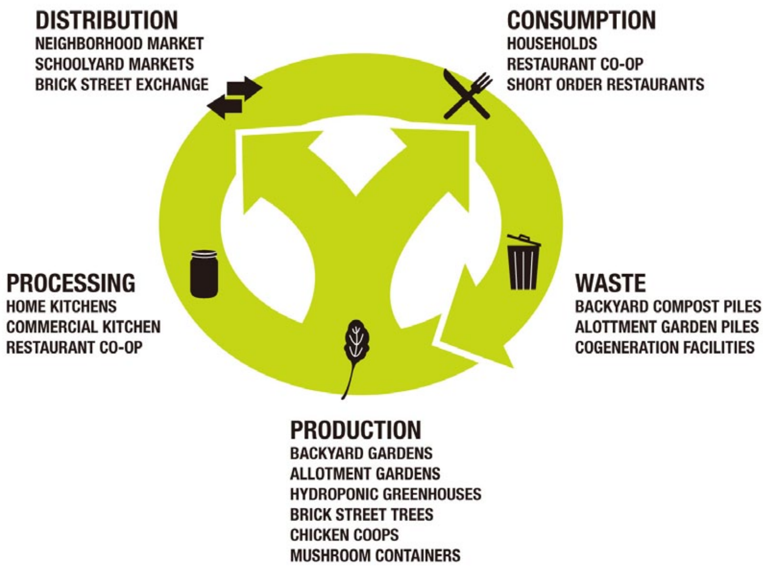
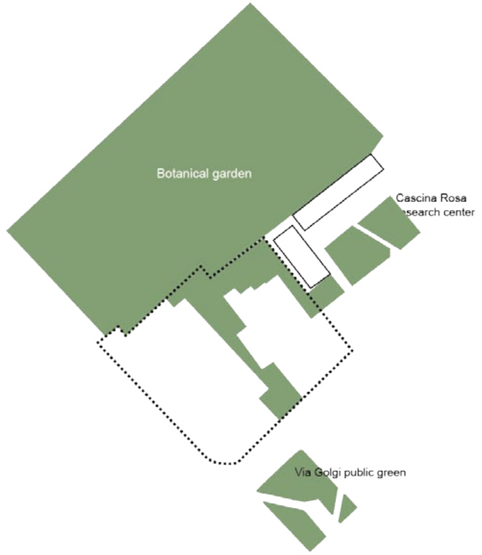


*fig*5.4.4 food contribution system

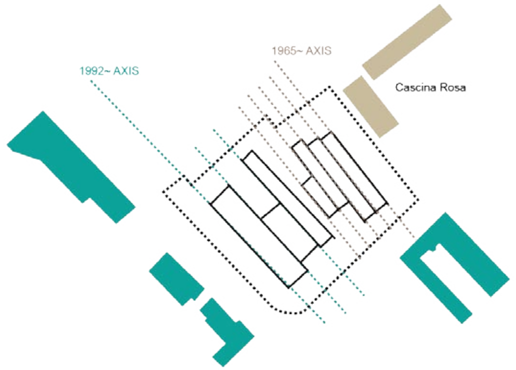
Strategy

*fig*6.1 main strategy

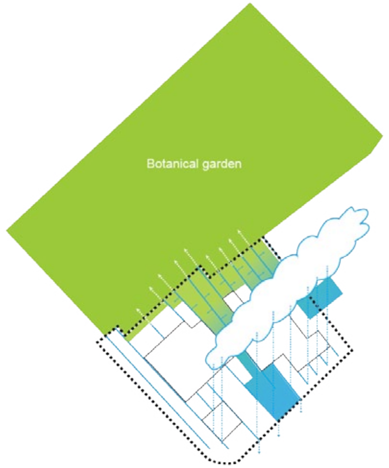
6 masterplan strategy



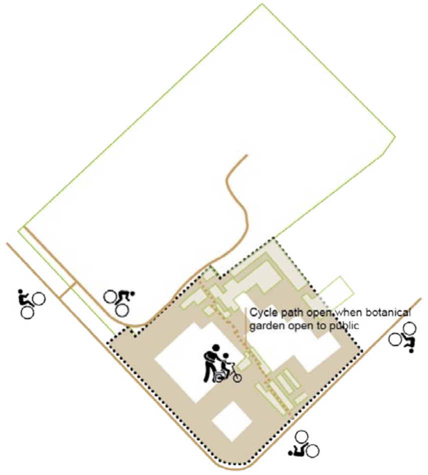
CONNECTION WITH BOTANICAL GARDEN, CASCINA ROSA AND VIA GOLGI PUBLIC GREEN



RESPONSE TO MODERN AXIS AND HISTORICAL AXIS

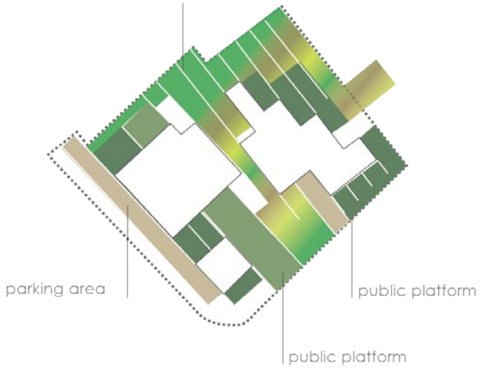


RAINFALL COLLECTION, BIO-FILTER, IRRAGATION----SELF SUFFICIENCY WATER CYCLE

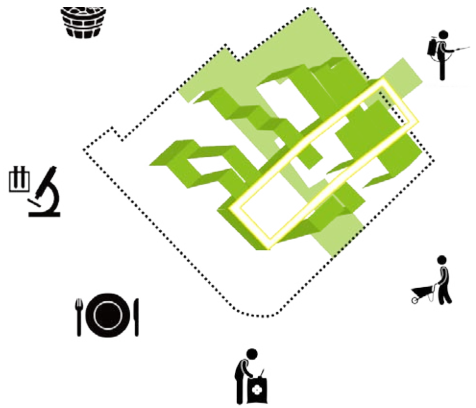


PEDESTRAIN SUPRA BLOCK

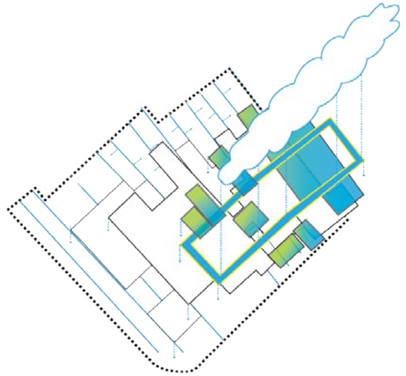
Building strategy



DIVERSITY OF PUBLIC PACES



RADIUS FARMLAND SYSTEM

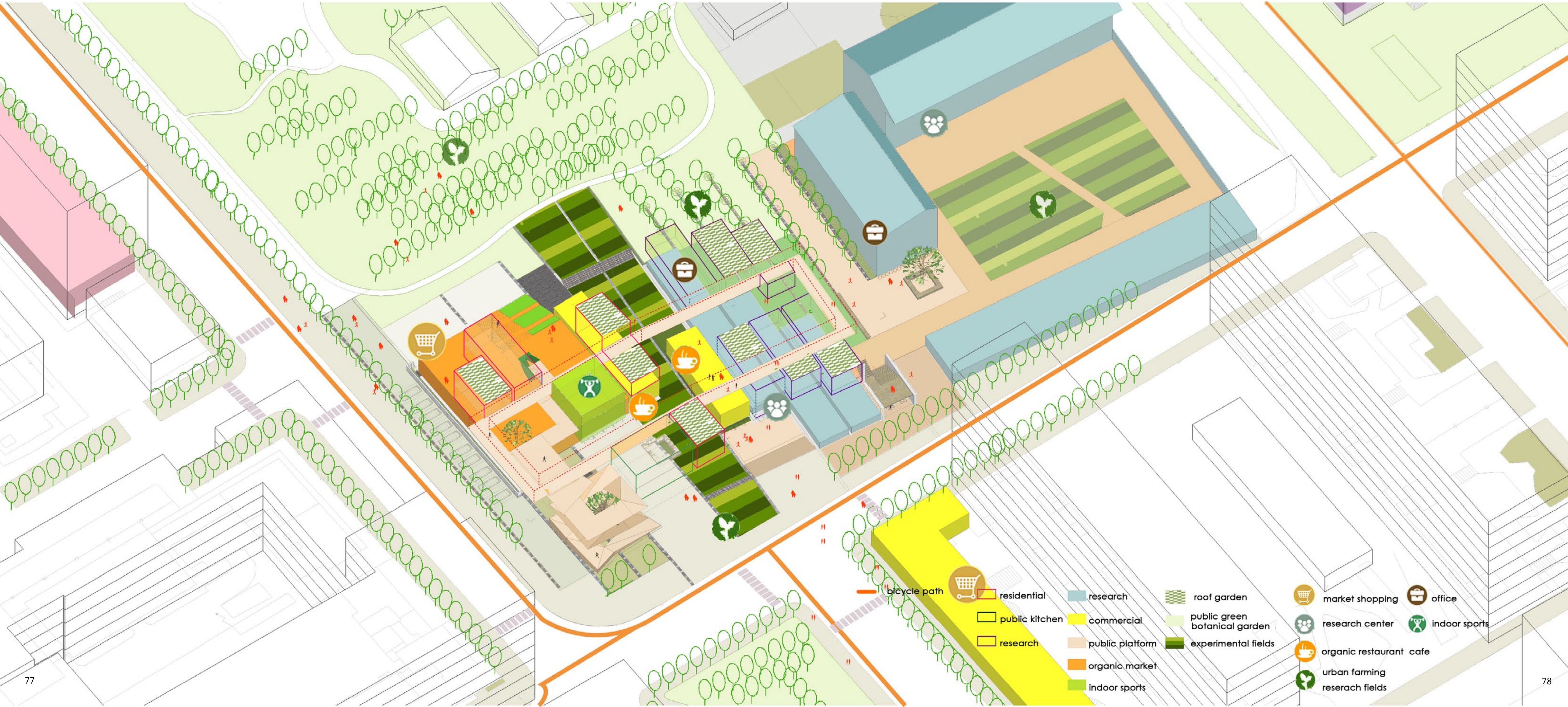


WATER CYCLE STRASS

MIXED PROGRAM AND SOCIAL SYNERGIES

Program

*fig*6.2site program



Masterplan

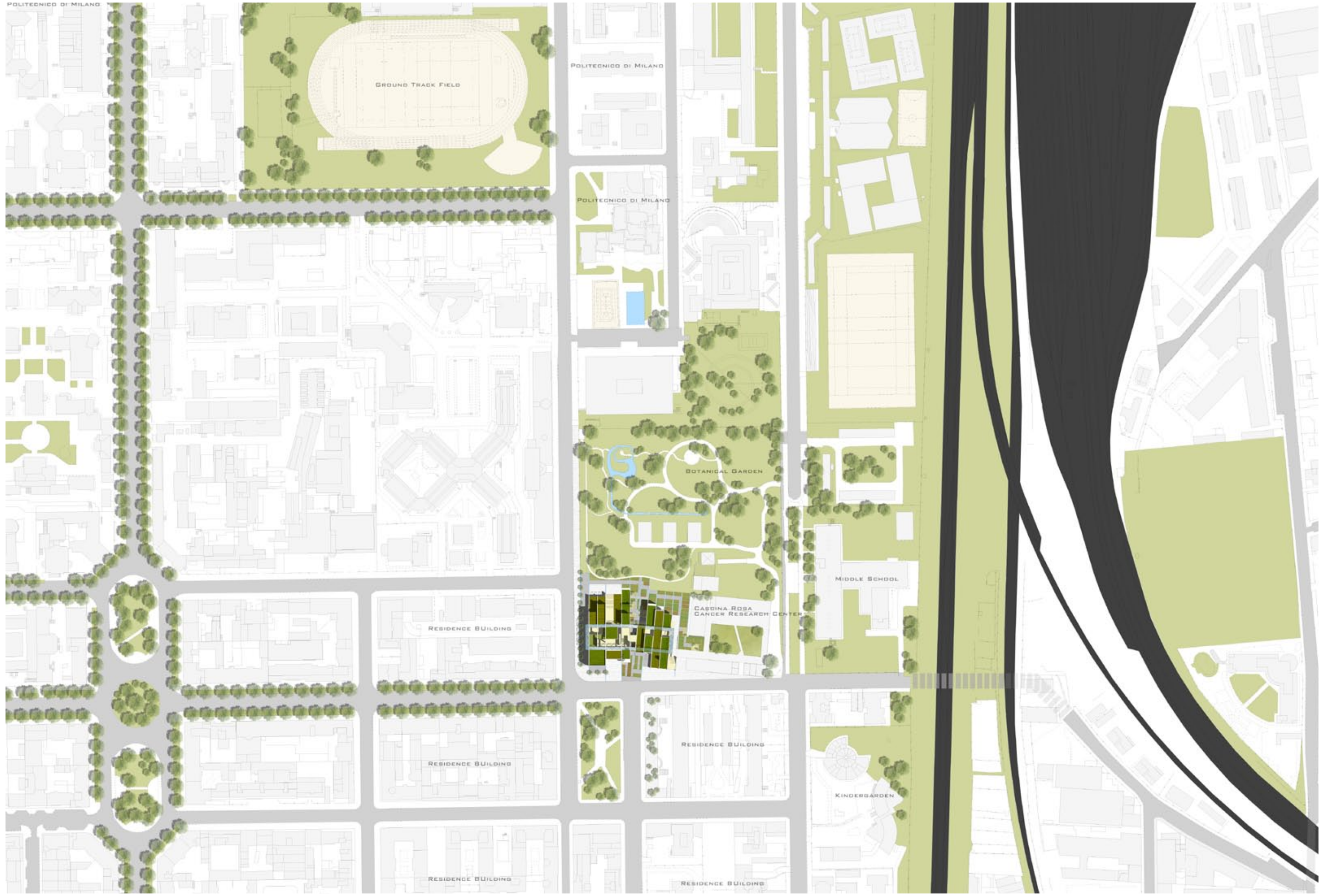


*fig*6.3 masterplan

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

*fig*6.4 bird view rendering

7

Plant Eco-system

The shared public area of the complex

WaterCycle

collect rainfall, process usewater,irrgation, biofilter, recharge

StrussRainCollector

Use bigstruss to collect rainfall water

StrussIrrigation

Hirzonial irrigation of plant on the roof garden

Ribpipe

using pipes combined in the reinforce rib structure to collect and send water, and vertical garden irragtion

GroundCannels

Hirzonial irrigation of plant on the roof garden

Bio-wetland

process usedwater through bio-filtering and recharge to Botanical garden

VerticalIrrgation

using the pipes combined in the vertial ribs to send water and irragating in different level

Lifeforlight

solar and aritifical light system

StussSolarPanel

Use solar pandels on the bigstruss to collect sunshine to provide energy use for irragation system

Sun&ShadeArea

divide grounfloor area according to sunlight analysis to sun plants and shade plants

VerticalGreenShade

Vertical petri-dish bars hanging on the south of the building to provide shade in the summer

Ground LEDbelt

LED light equiped on the ground cannels to provide light iat the night

Plant

diversity of plant field on the complex

OpenPlatform

platform open to the public for leisure time

PrivateField

private grassland located on the apartment balcony offering private caltivating work experience

Bio-Wetland

located on the main greenpath on the ground floor growing waterplant to offer bio-filtering of water

GreenCorridor

the crossing struss on the 2nd floor to connect roofgarden with 2nd floor, with access to roofgardens and covering by vertical plants

TopGarden

green roof garden with experimental fields for research center growing crobs and plants for research

Veritcalgarden

hanging petri-dish to grow plants for creating shadow and lanscape

QuietLab

the fitnesscenter which refresh the body

SmartRoom

Meeting for the presentations of the researchers who makes full use of various devices.

ToolShed

Supply depot for storing all the tools and equipment for cultivation and research activities, on the way to experimental fields

OpentoPublic

public meetingroom to meet college students, community, and merchadizer to discuss about research or business

P-school

classroom holding class on weekends for planting or cultivation

CompostitionCenter

Compose plants waste to fertilizer or further use

FitnessCenter

the fitnesscenter which refresh the body

FeelgoodLounge

An after-hours socail drinking club and cafe

OraganicRestaurant

organicfood supplied by bio-field

OpenKitchen

open 24-hour offering food in casual relaxed setting. Or where one can cook themselves

OrganicMarket

market sells organic vegetable or organic semi-finished food

PublicLivingRoom

a living-room like space for simple relax, reading, and meeting

SmartLibrary

small local library for research center

HomelikeApartment

A simple, comfortable apartment for visiting professors and free agents.

Bio-field

The green infrastucture of the complex, offering landscape and cultivation works

ResearchCenter

Cascina Rosa botanical research center

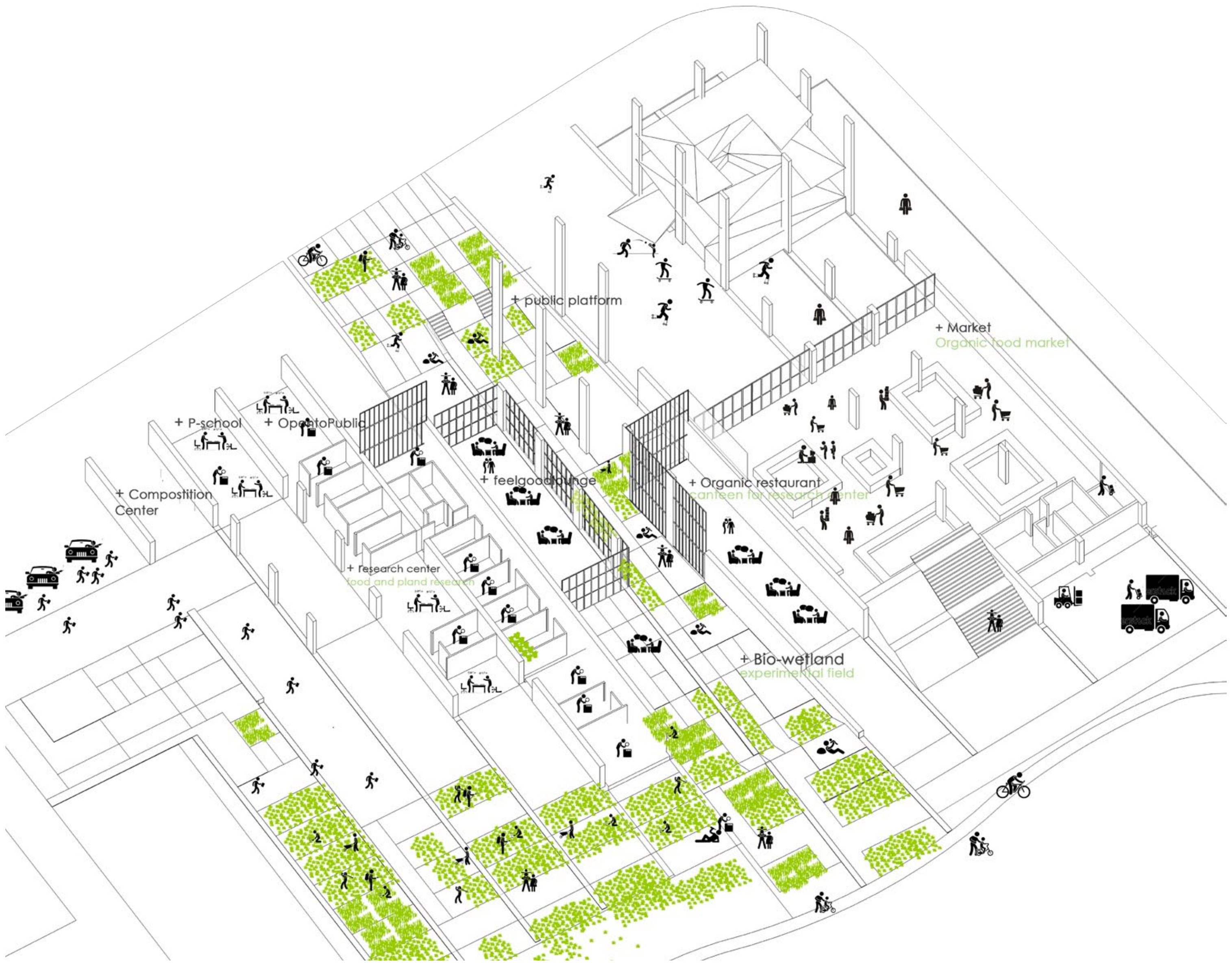
ServiceStreet

The shared public area of the complex

Agri-Urbanism

Programmatic Scene *fig*7.1.1

*fig*7.1.2 programmatic scene



Circulation & timetable

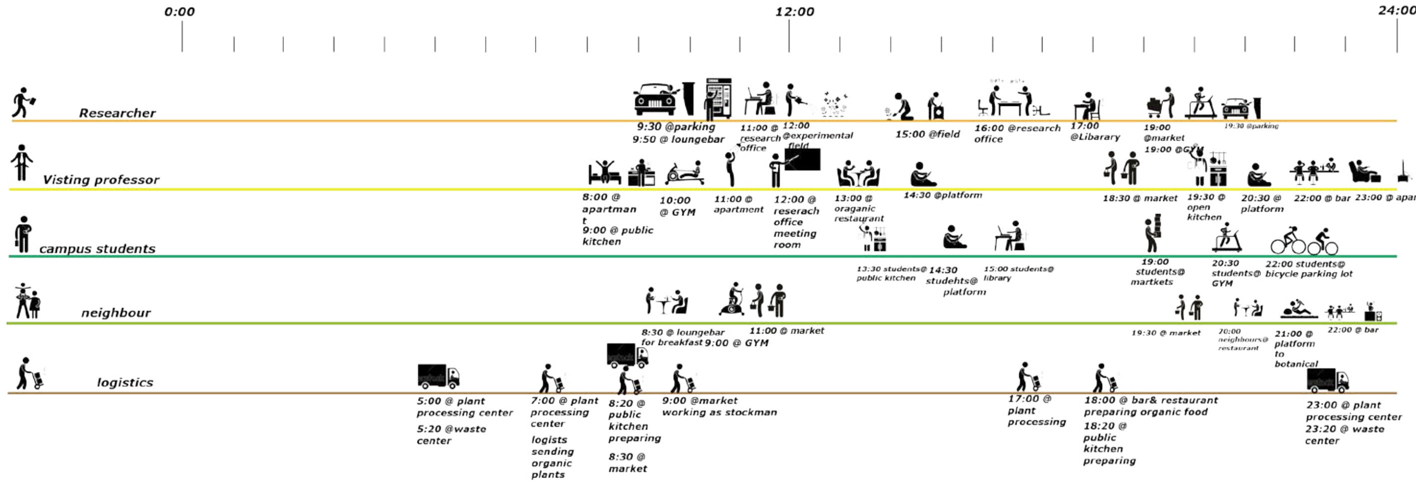


*fig*6.2.1 timetable

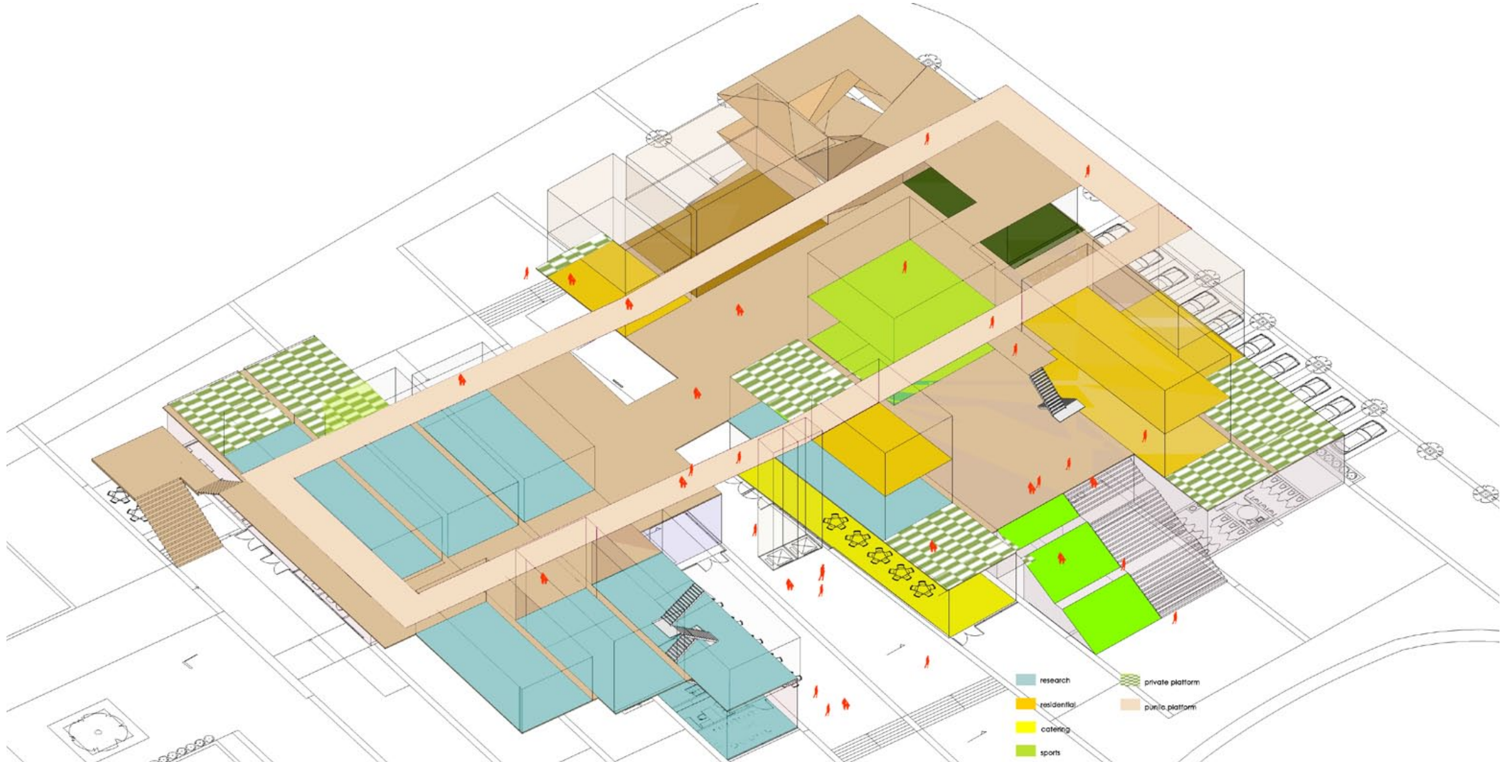


*fig*7.2.2 circulation digram

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

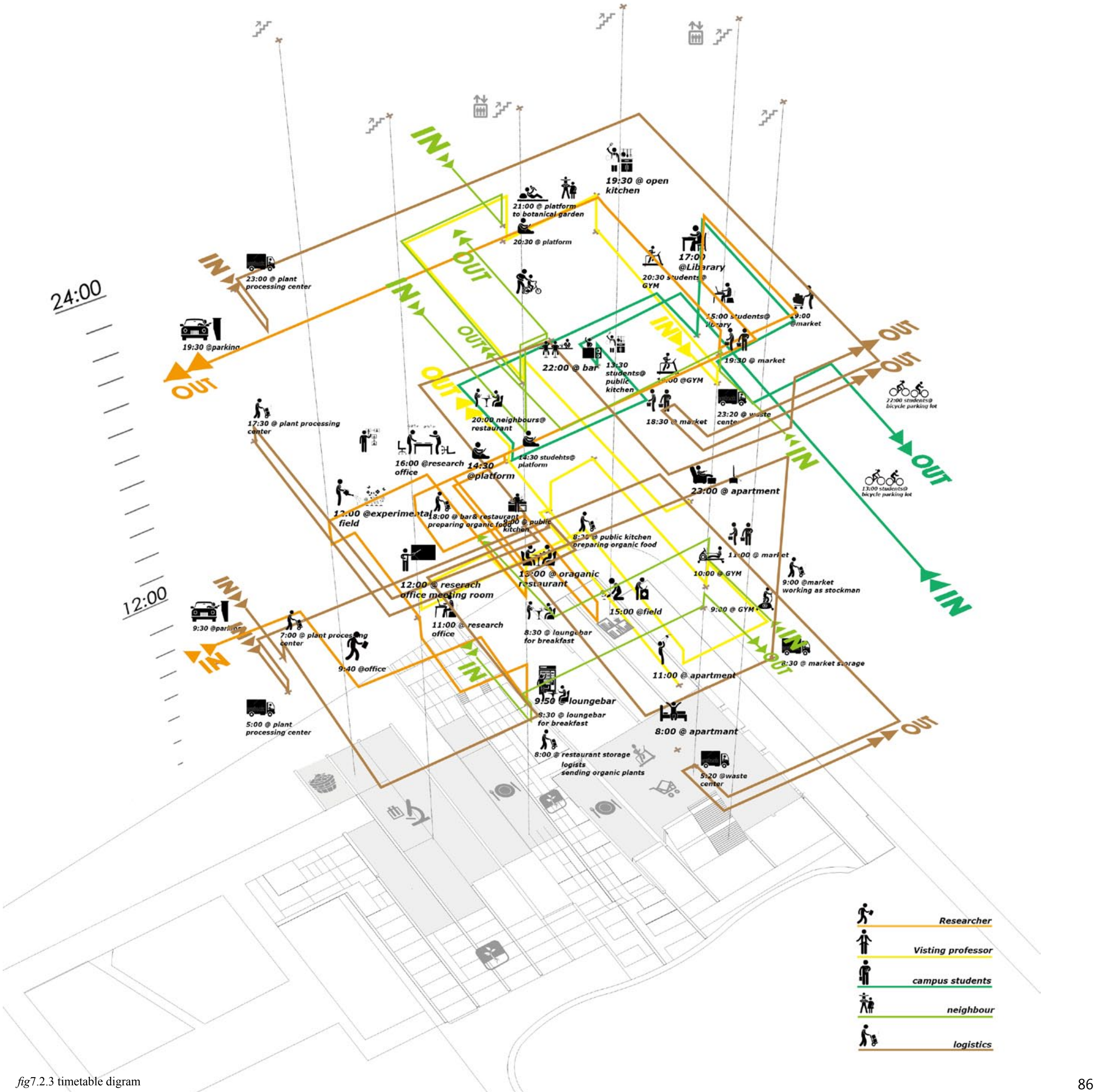


*fig*7.2.3 timetable digram

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

fig7.3.1 Ground Floor Plan

fig7.3.2 1St Floor Plan

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

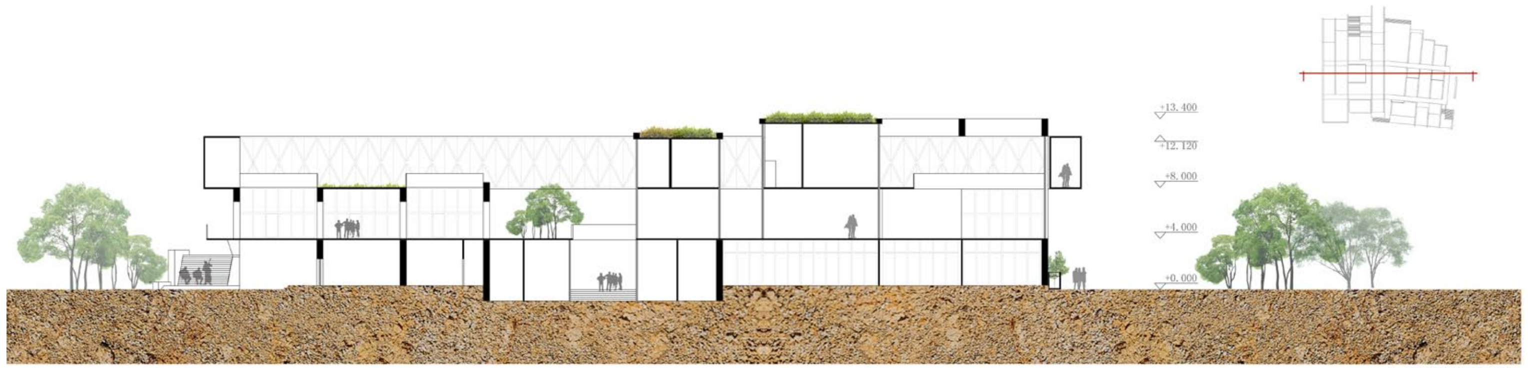
fig7.3.2 2nd Floor Plan

fig7.3.2 Roof Plan

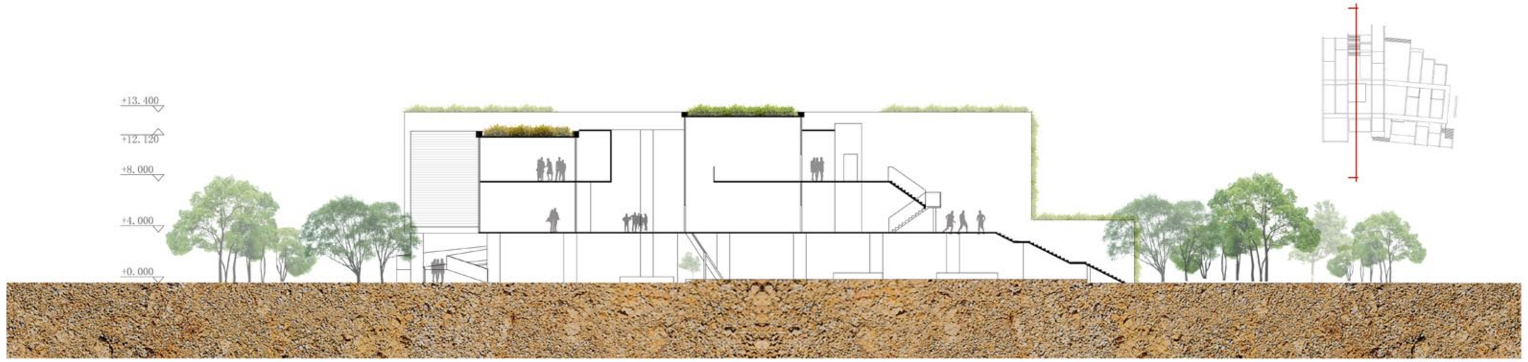
Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

*fig*7.4.1 section rendering

*fig*7.4.2 section

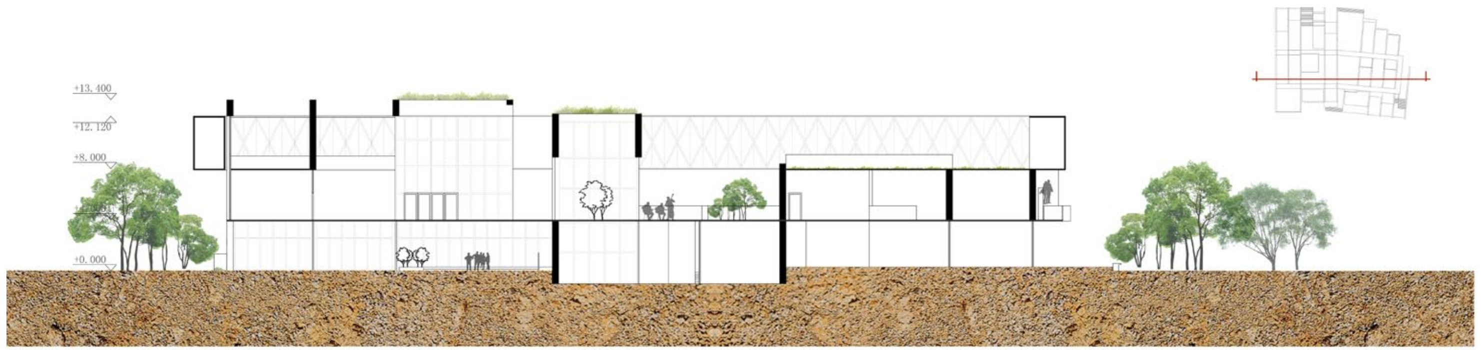


A-A SECTION 1:200

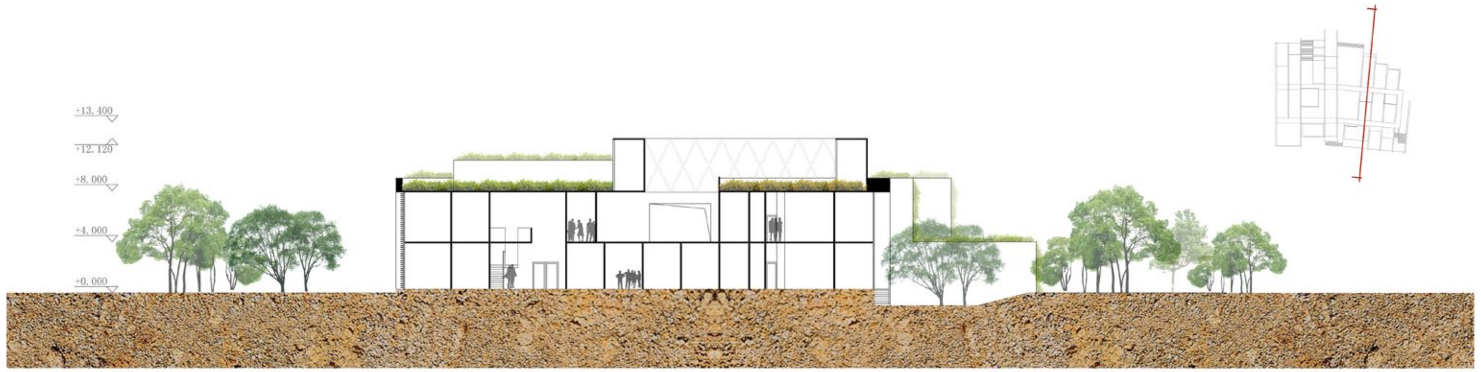


B-B SECTION 1:200

*fig*7.4.3 section



C-C SECTION 1:200



D-D SECTION 1:200

STRUCTURE

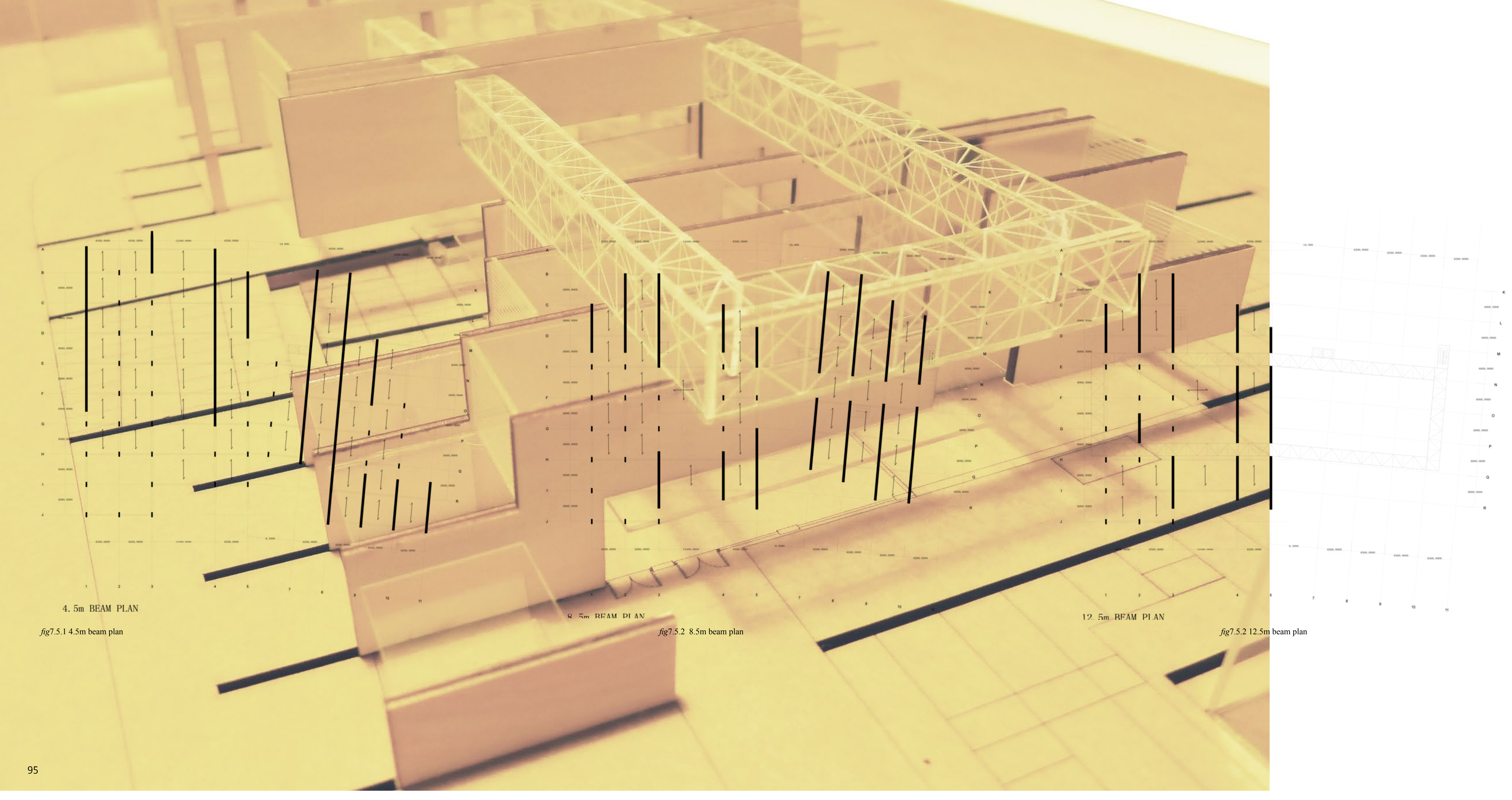


*fig*7.5.1 4.5m beam plan

*fig*7.5.2 8.5m beam plan

*fig*7.5.2 12.5m beam plan

*fig*7.6.1 scene rendering


*fig*7.6.2 scene rendering

8 PLANT ECO-SYSTEM

Digram
water cycle digram
rainfall collection system
daily use water system
irrigation water system
solar system
solar analysis
plant ditribution
LED system

DIAGRAM

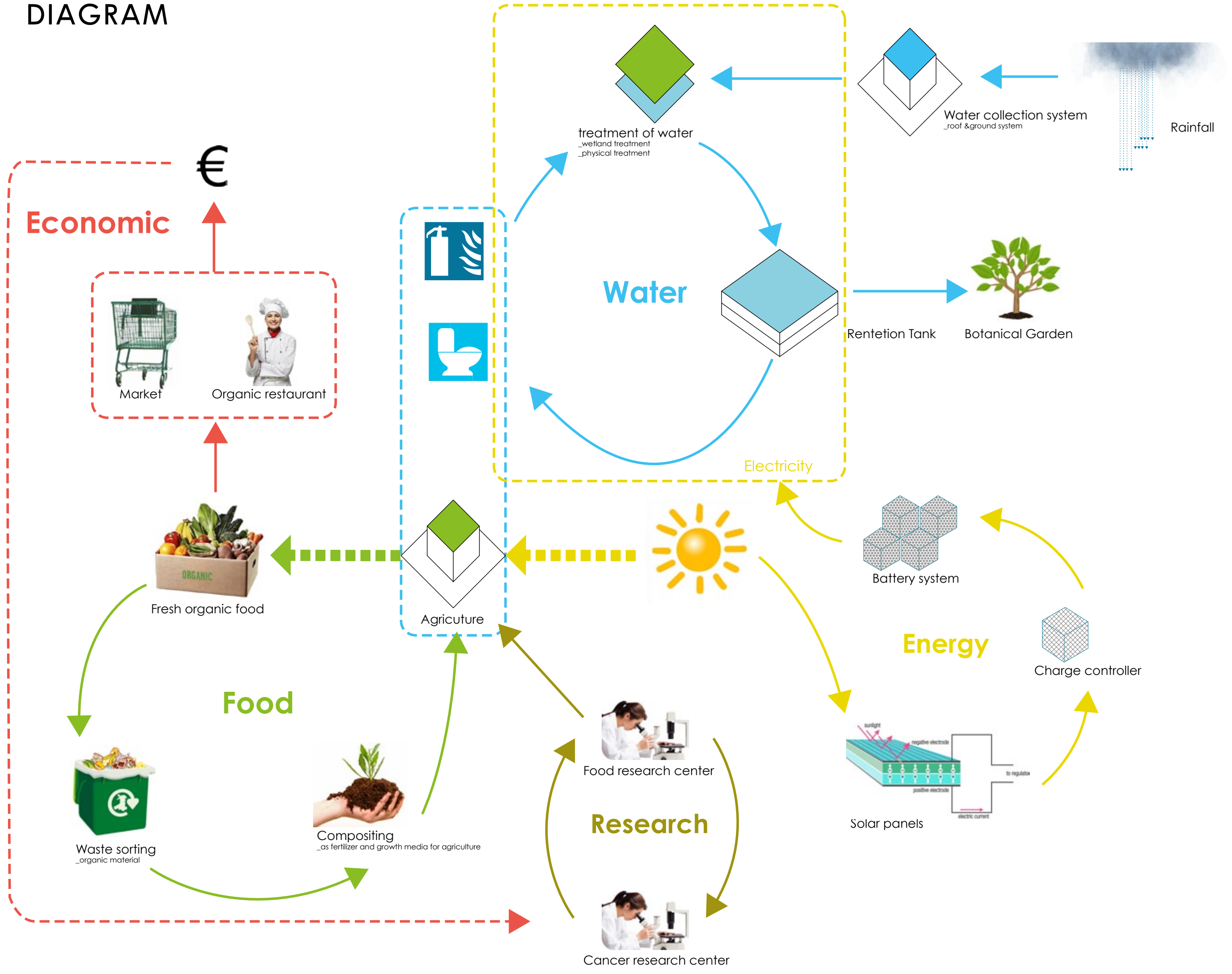


*fig*8.1.1 Plant eco-system Scheme digram

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism

fig8.2.1 WATER CIRLULATION DIAGRAM

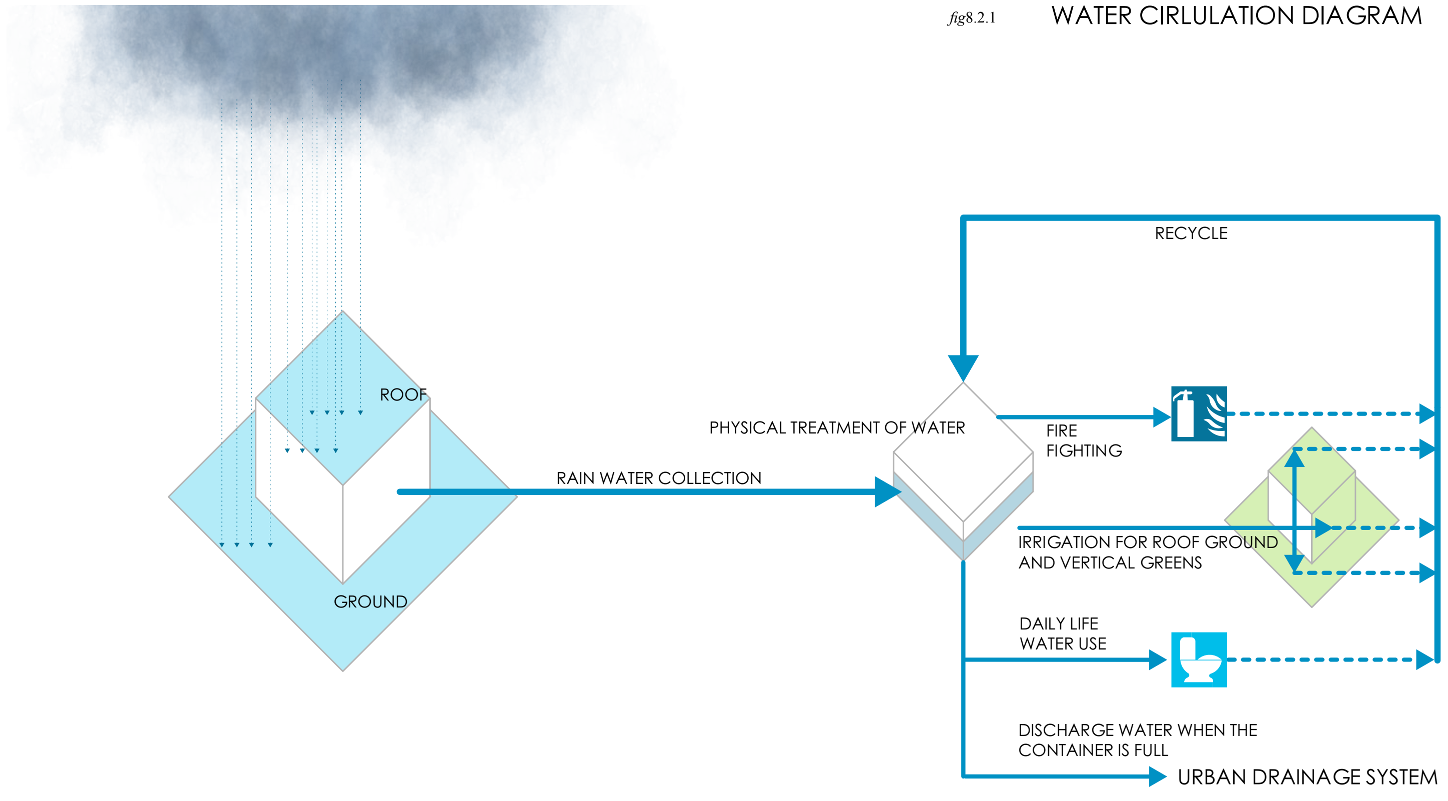
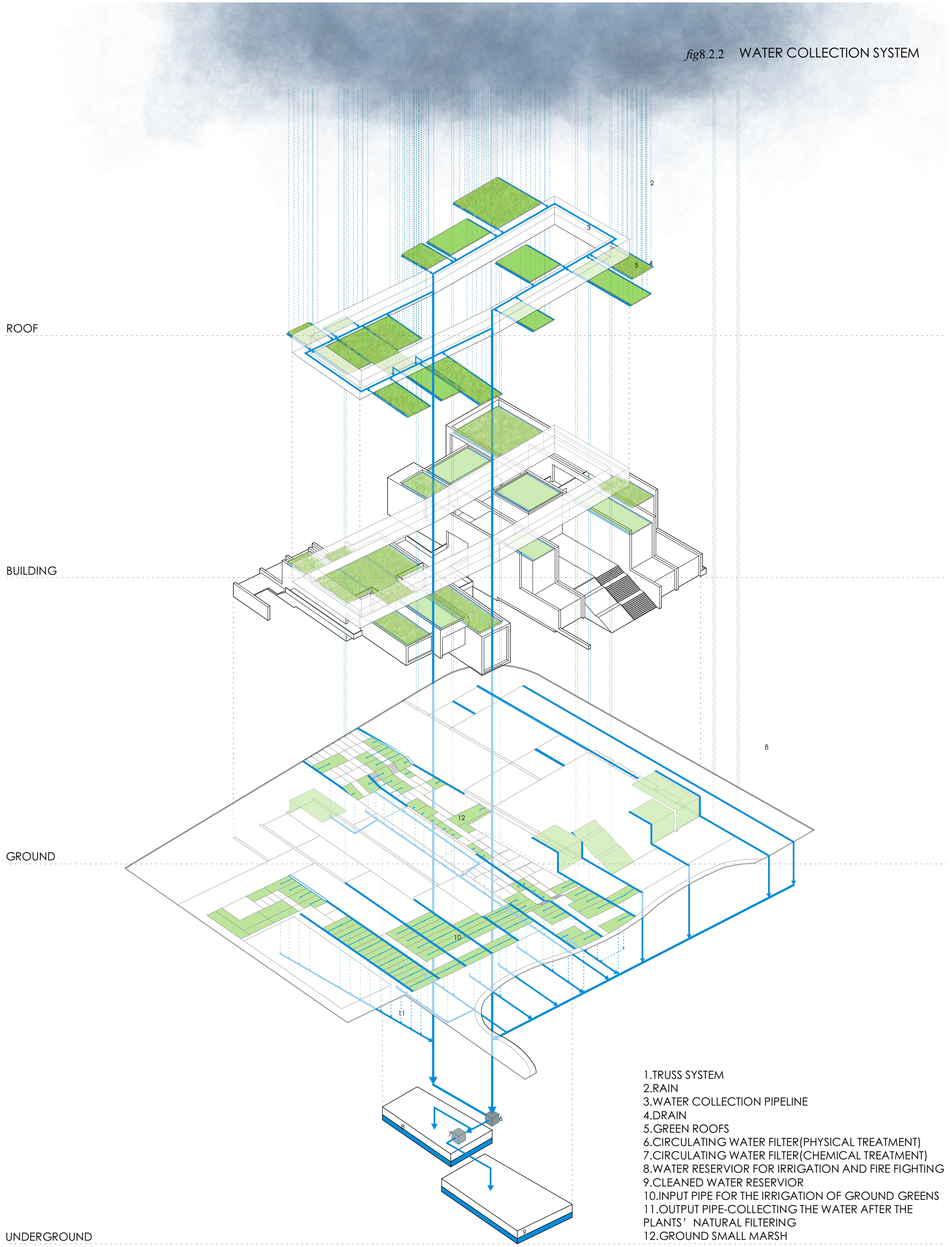


fig8.2.2 WATER COLLECTION SYSTEM



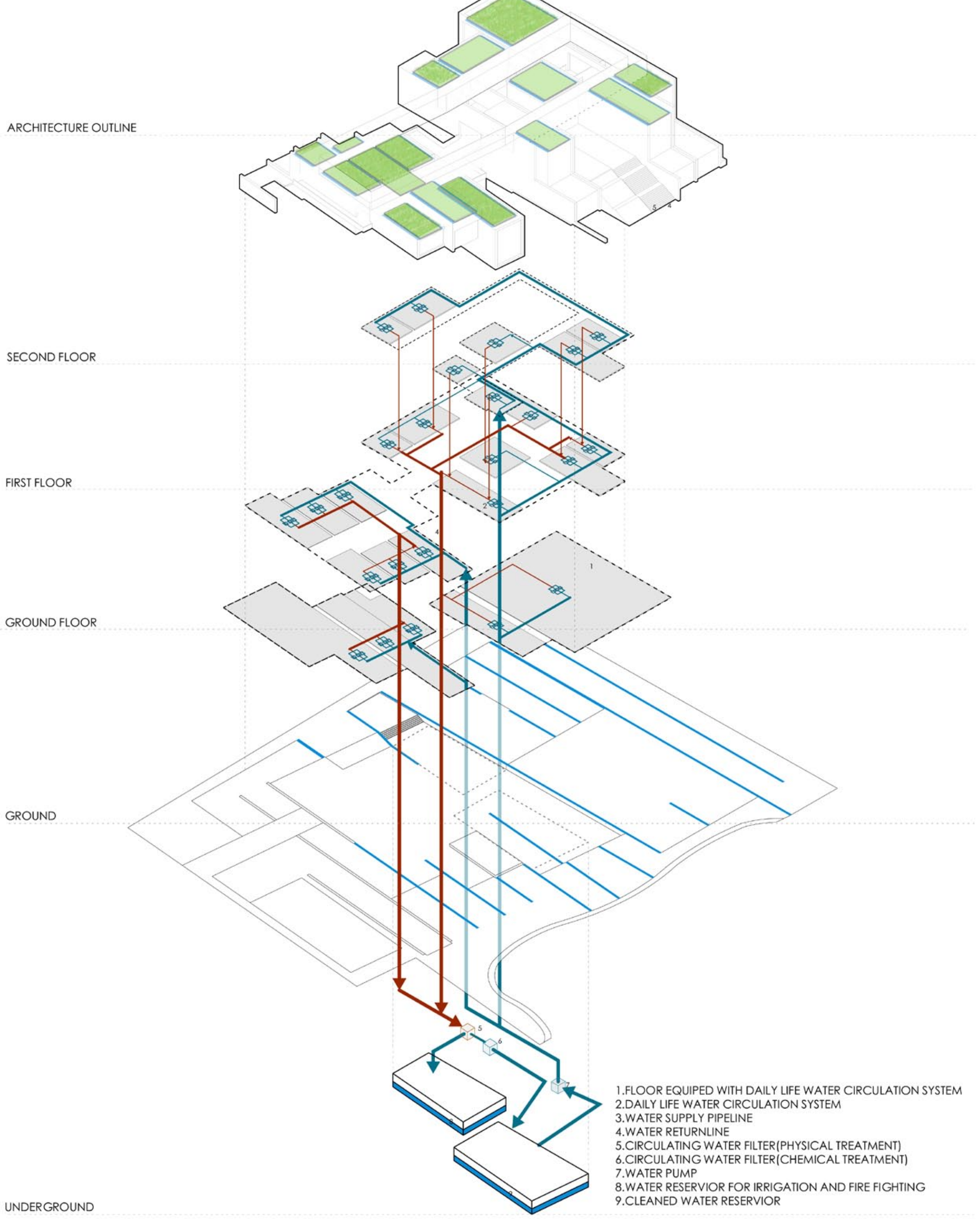


*fig*8.2.3 DAILY LIFE CIRCULATION SYSTEM

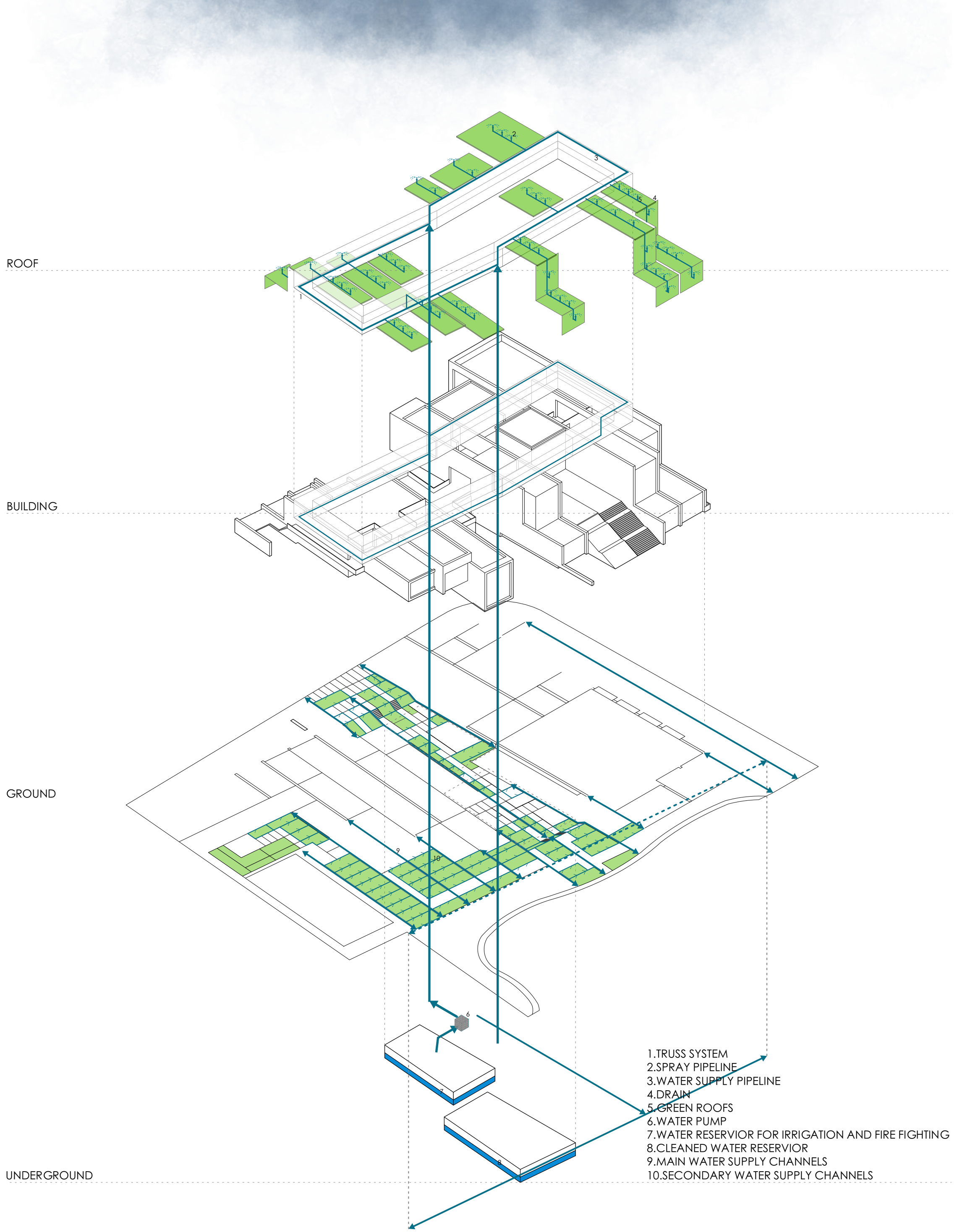


*fig*8.2.4 IRRIGATION SYSTEM

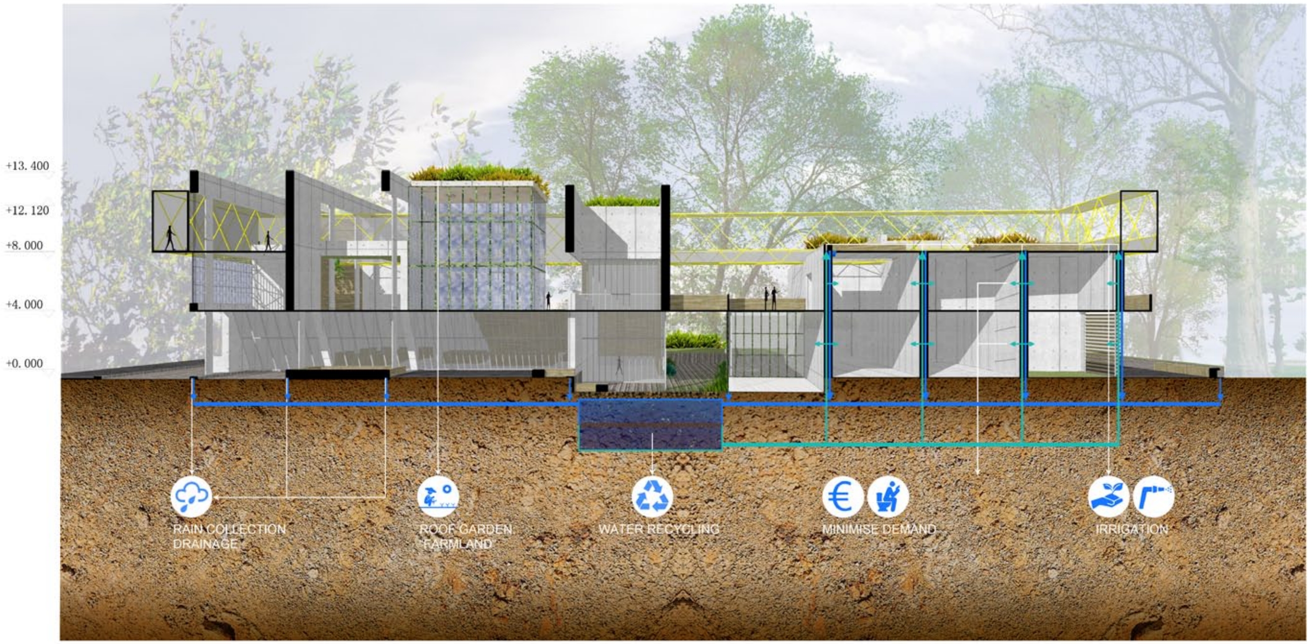
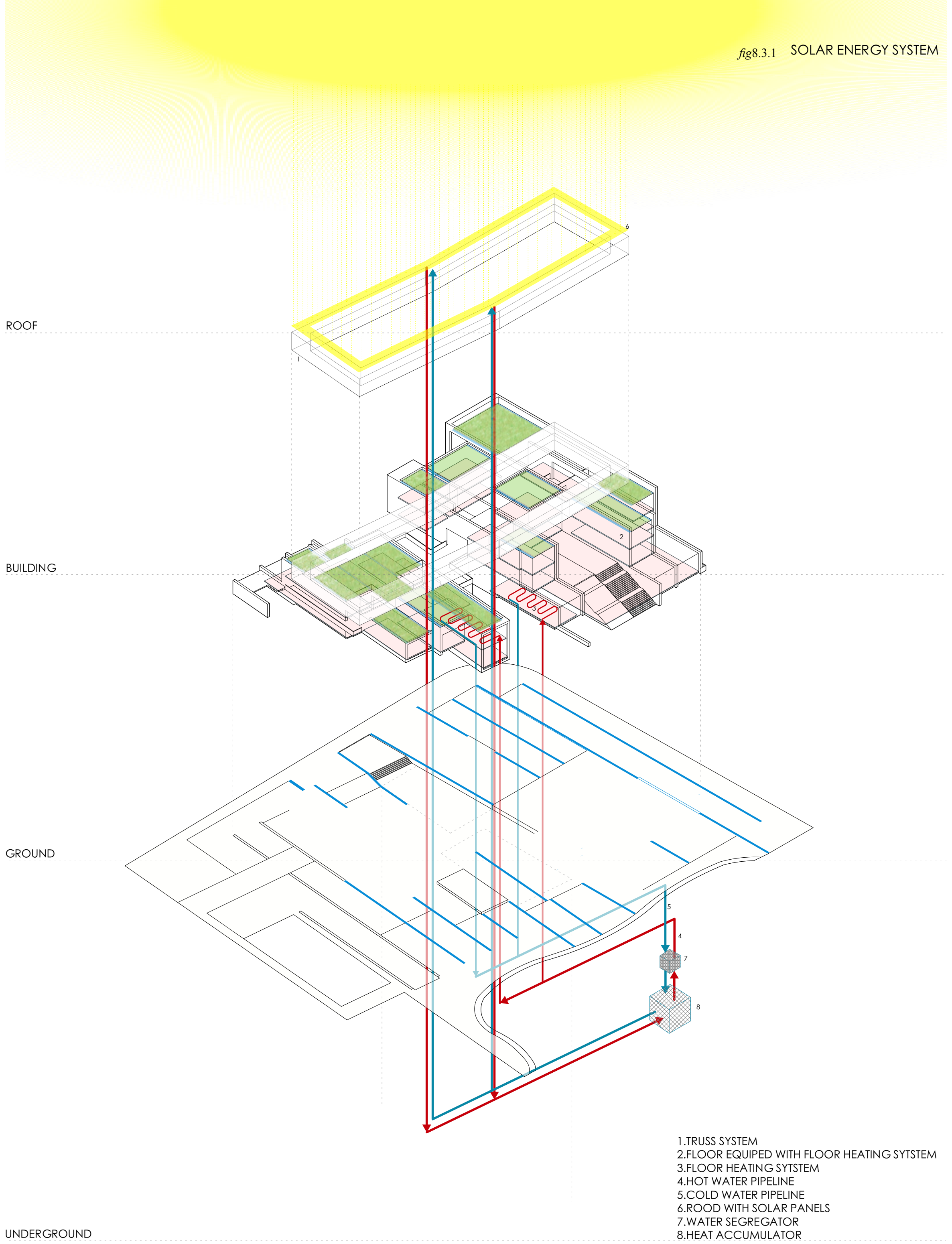


*fig*8.2.5 water circulation section

*fig*8.3.1 SOLAR ENERGY SYSTEM



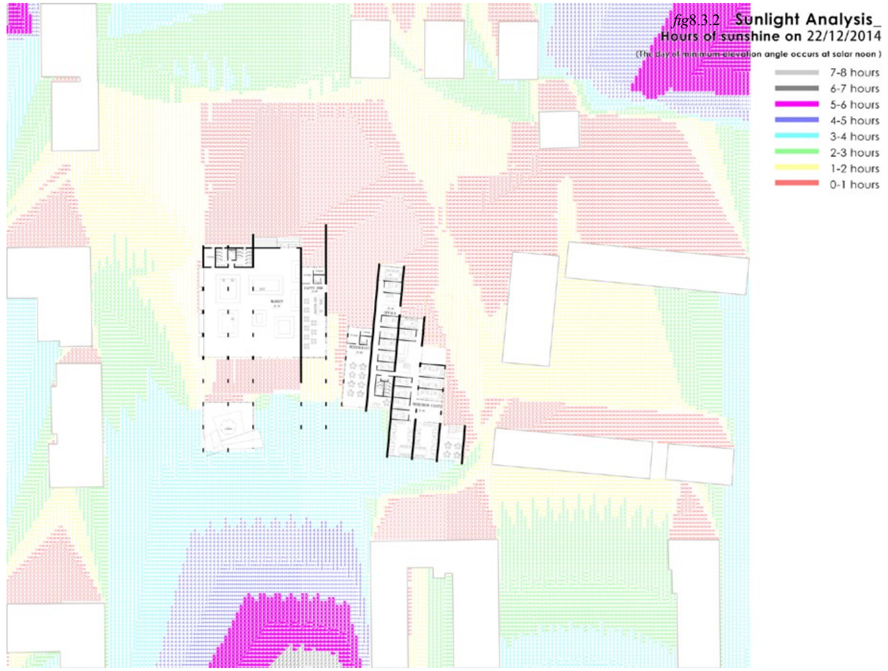


*fig*8.3.2 Sunlight Analysis_ Hours of sunshine on 22/12/2014

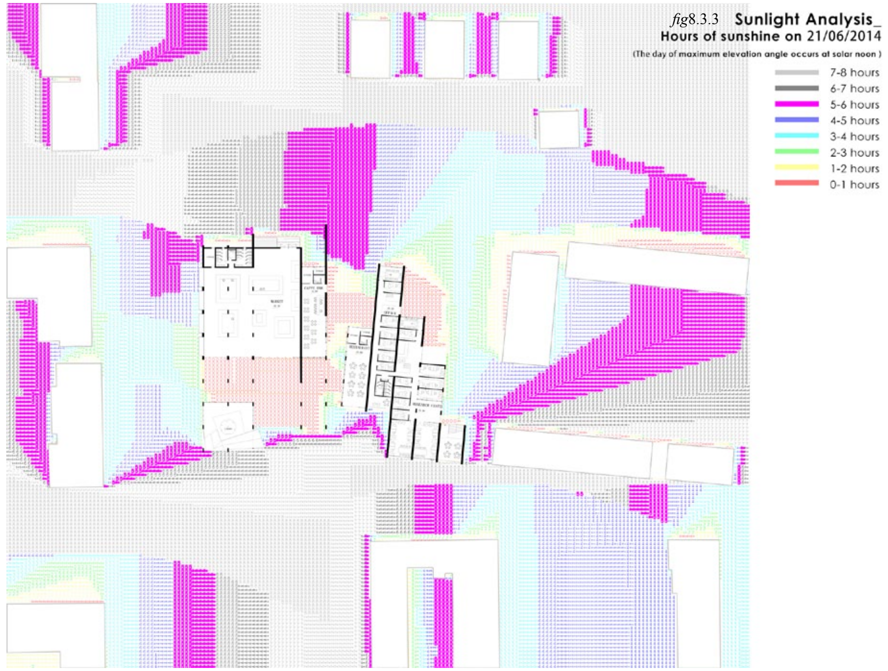


*fig*8.3.3 Sunlight Analysis_ Hours of sunshine on 21/06/2014

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

*fig*8.3.5 ground floor plants speices

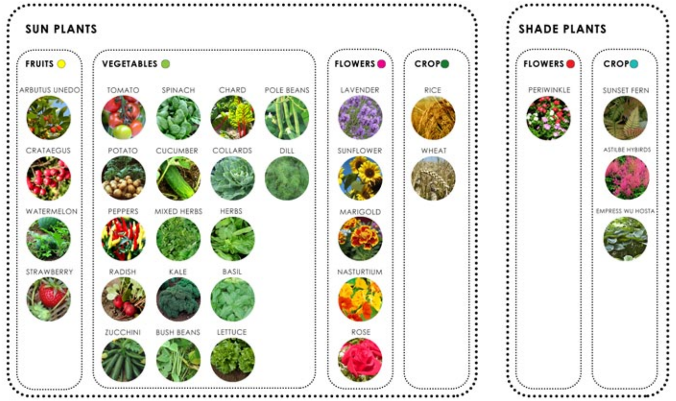
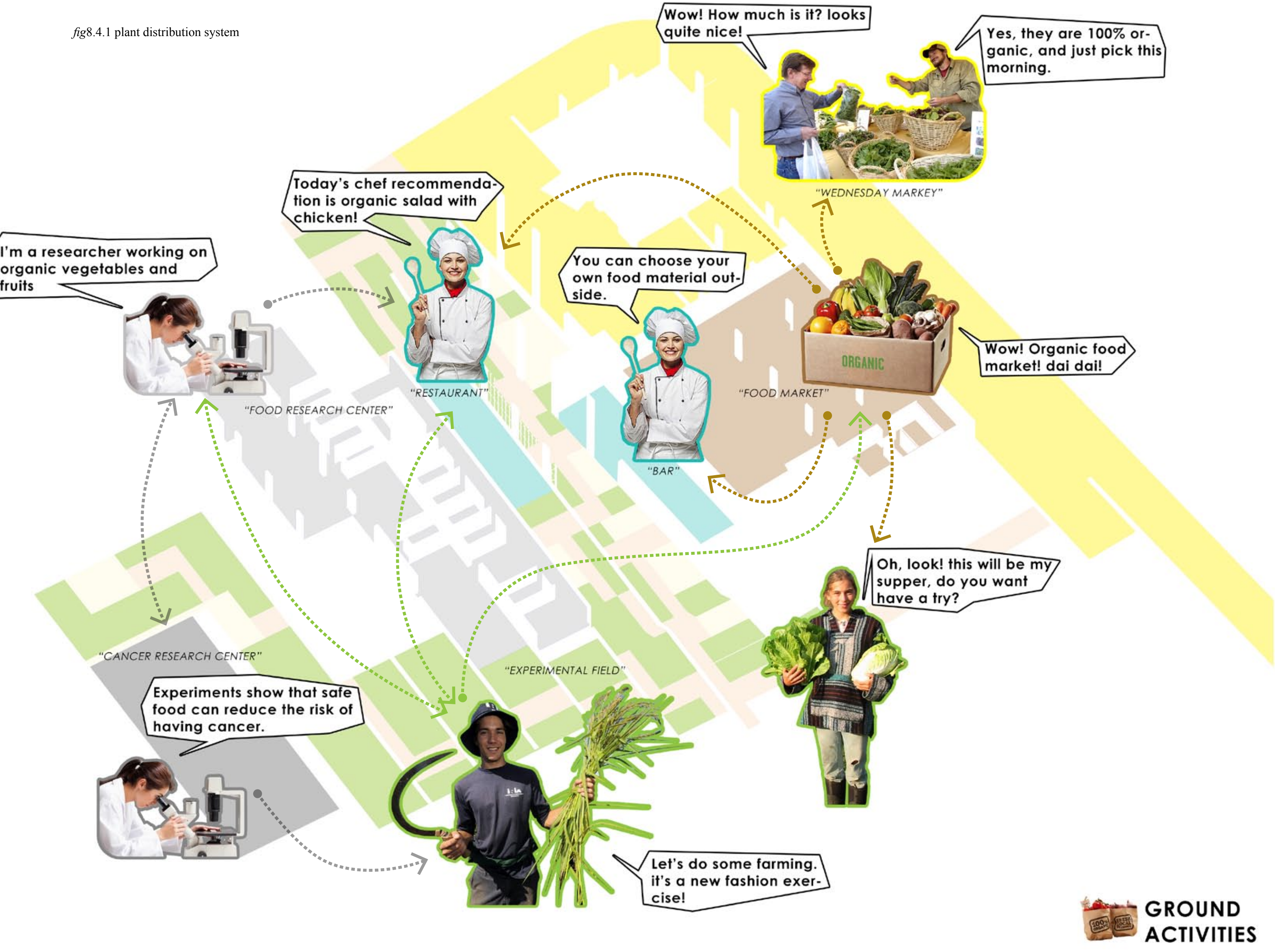


*fig*8.3.4 ground floor plants arrangement *fig*8.4.1 plant distribution system



NORTH FACADE

*fig*8.5.1

SOUTH FACADE

*fig*8.5.2

EAST FACADE

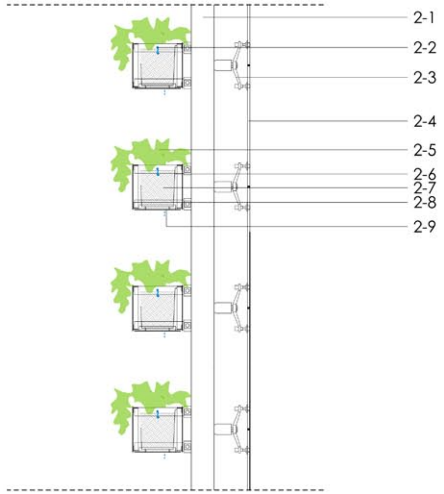
*fig*8.5.3

WEST FACADE

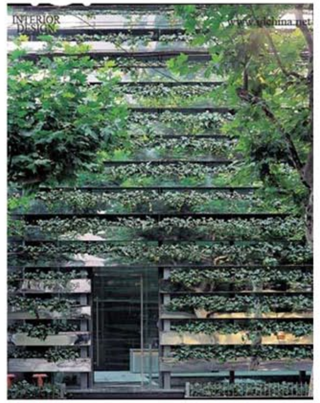
*fig*8.5.4

Conversation between infrastructural diversity
and ecological inhabit
-------- at a scale closer to urbanism

Conversation between infrastructural diversity and ecological inhabit
-------- at a scale closer to urbanism



2-1.Column 75*150
2-2.Water supply pipe
2-3.Glass fulcrum
2-4.Float glass
2-5.Vegetation
2-6.Planter
2-7.Fill substrate
2-8.out panel mirror finish
2-9.Drain hole



reference: Kengo Kuma, Z58, Fanyu Road, Shanghai

VERTICAL GREENS SYSTEM
VERTICAL GREENS IRRIGATION SYSTEM

*fig*8.6.1 vertiacal green details

*fig*8.6.2 wall section details

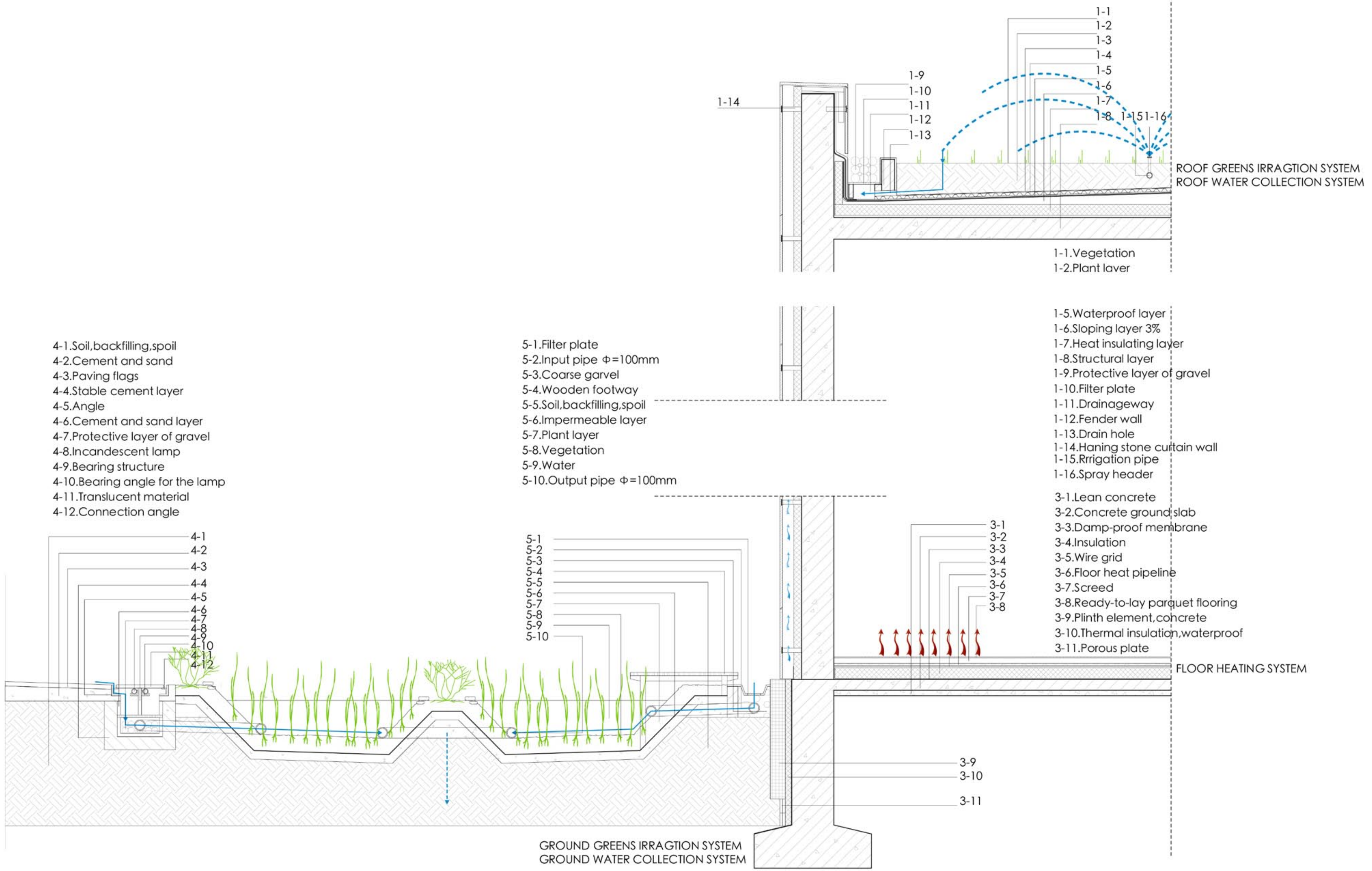


*fig*8.7 LED light rendering

BIBILOGRAPHY

1 Contanza.R.R d'Arge, P Sutton and M van den Belt(1997). "The value of the World'sEcosystem Services and Natural Capital". Nature,387:253-260.

2 Goode, D(2006). "RECEP Urban Envrionments Desk Study: Green Infrastructure". Royal Commission on Envrionmental Pollution,London.

3The Royal Commission on Environmental Pollution(2007). "26th Report. The Urban Environment: Chtr 4: The Natural Urban Environment". HMSO, Norwich.

4 Town and Country Planning Association (2008). "The Essential Role of Green Infrastructure: Ecotowns Green Infrastructure Worksheet. Advice to Promoters and Planners'. TCPA, LONDON.

5 Yeang,K(2009). Ecomasterplanning, Hohn Wiley and Sons, London.

6 Town and Country Planning Association.(2008)

7 CABE Space(2003). "Does Money Grow on Trees?" CABE, London.

8 Lancaster University and Center for Ecology and Hydrology(2004). "trees and Sustainable Air Quaility'. Lanchester University, UK.

9 Mentens, J H,D Raes and M Hermy(2006). " Green Roofs as a tool for solving the rainwater Runoff Problem in the Urbanized 21st century?' Landscape and Urban Planning,77:217-226

10 Rhode, C L E and A D Kendle(1994), Human Wellbeing, Natural Landscape and Wildlife in Urban areas----A review. English Nature, Peterborough.

11. Ulrich, R S(1999). '"Effects of Gardens on Health Outcomes: Theory and Research". In C C Marcus and M Barnes(Ed.)(1999). Healing Gardens. Wiley, New York pp.26-86

12. Ulrich, R S, RSimons, B d Losito, M Miles(1991). "Stress Recovery During Exposure to Natural and Urban Environments". J.Exp. Psychology: 11,201-230

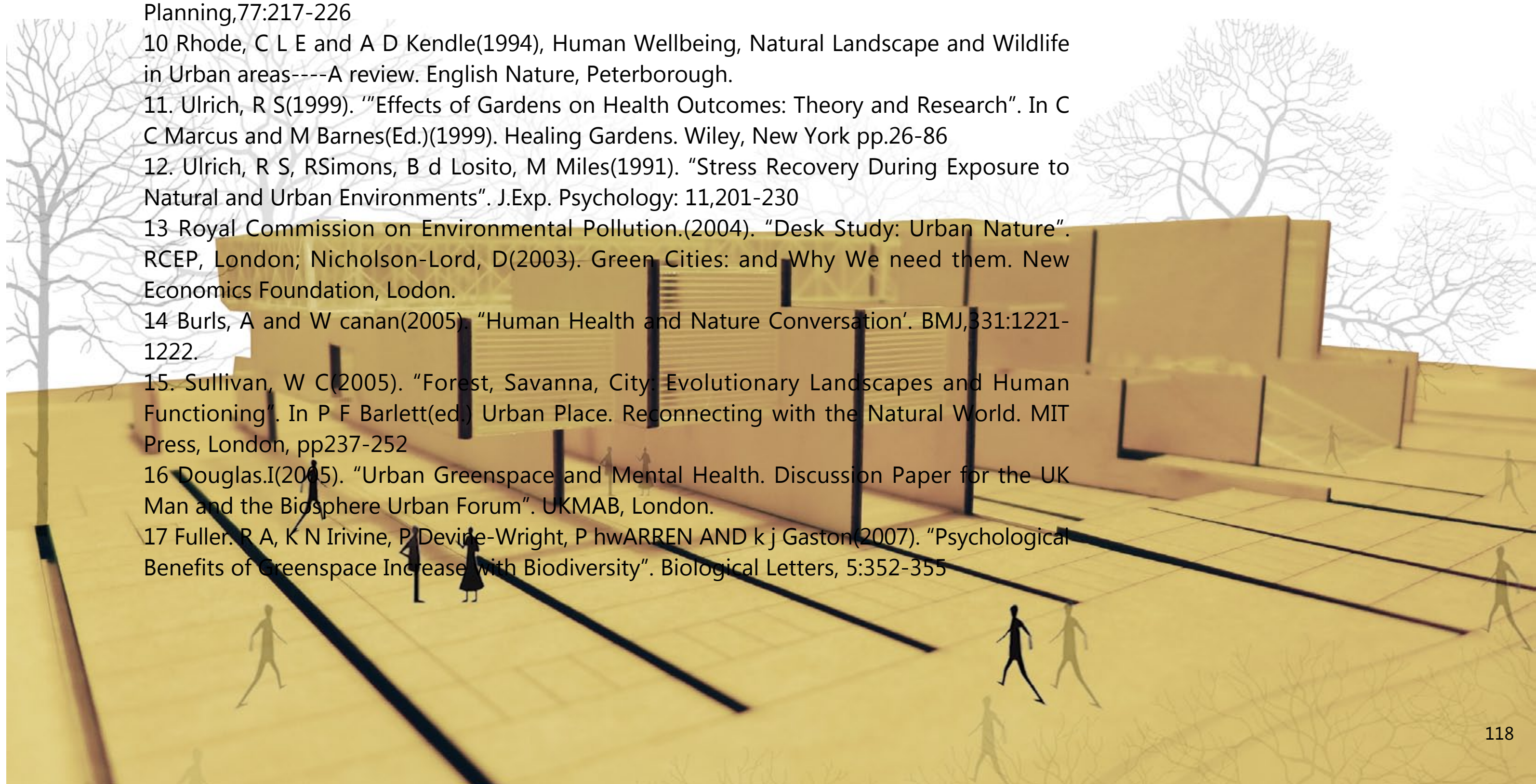
13 Royal Commission on Environmental Pollution.(2004). "Desk Study: Urban Nature". RCEP, London; Nicholson-Lord, D(2003). Green Cities: and Why We need them. New Economics Foundation, Lodon.

14 Burls, A and W canan(2005). "Human Health and Nature Conversation'. BMJ,331:1221-1222.

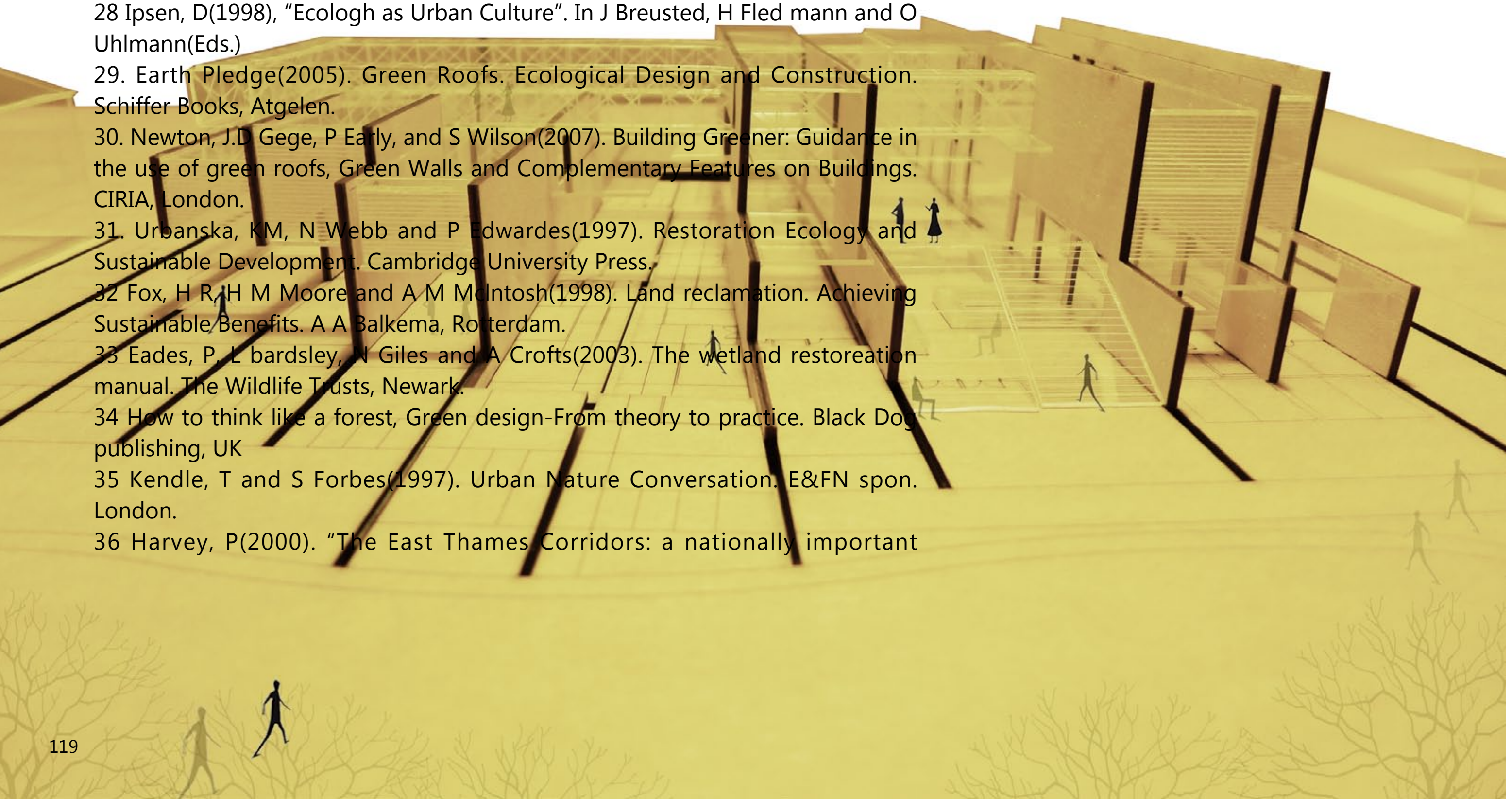
15. Sullivan, W C(2005). "Forest, Savanna, City: Evolutionary Landscapes and Human Functioning". In P F Barlett(ed.) Urban Place. Reconnecting with the Natural World. MIT Press, London, pp237-252

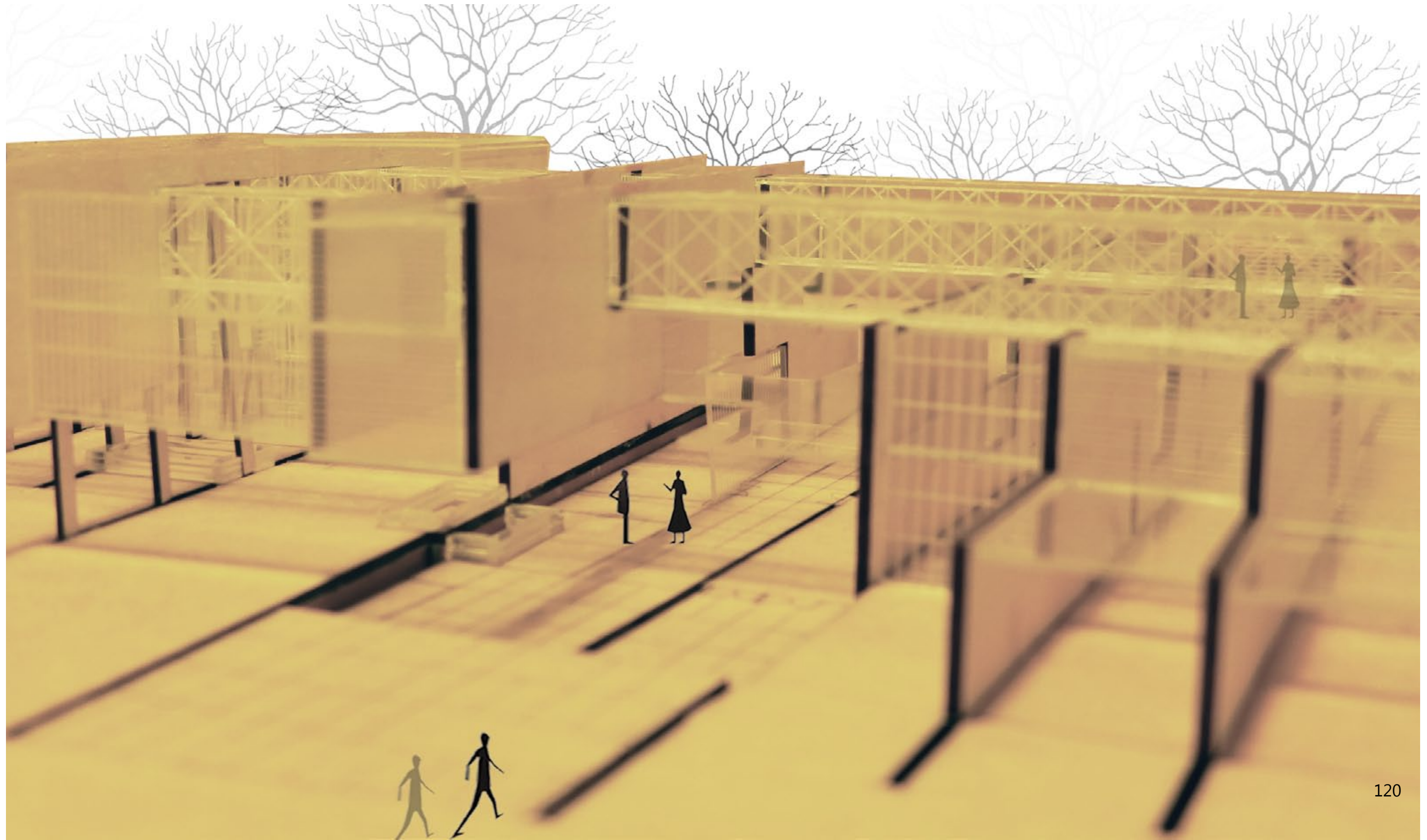
16 Douglas.I(2005). "Urban Greenspace and Mental Health. Discussion Paper for the UK Man and the Biosphere Urban Forum". UKMAB, London.

17 Fuller. R A, K N Irivine, P Devine-Wright, P hwARREN AND k j Gaston(2007). "Psychological Benefits of Greenspace Increase with Biodiversity". Biological Letters, 5:352-355



18 Dunnett, N and J Hitchmough(2004). The Dynamic landscape. Spon Press, London
19 Andrews, J(1993). "the Reality and Management of Wildlife Corridors". British Wildlife,5(1):1-8
20. Giradet, H(1999). Creating Sustainable Cities. Grenn Books, London
21. Goodes,D(2000). "Cities as Key to Sustainablity". In D Poore(Ed.) Where next?Reflections on the Human Future. The Board of Trustees, Royal Botanic Gardens. Kew.
22. Register, R(2006) Ecocities: Rebuilding Cities in Balance with Nature. New Society Publishers, Canada.
23. Glaeser. E L92009) "Green Cities, Brown Surburbs". City Journal. 19(1):1-5
24. Hall,P(1999). "Sustainable Urbanism: Urban design with Nature. JohnWiley & Sons, London
25.Ruano, M(1999). Ecourbanism: Sustainable Human Settlements:60 Case studies. Gustavo Gilli, Barcelona
26 Gill, S E, J F Handldey, A R Ennos and F Pauleit(2007). "Adapting Citites for Climate Change: The Role of the Green Architecture". Built Envrionment, 33(1):115-133
27 American Society of Landscape Architects(2009). "The case for Sustainable landscapes'> ASLA, Washington DC.
28 Ipsen, D(1998), "Ecologh as Urban Culture". In J Breusted, H Fled mann and O Uhlmann(Eds.)
29. Earth Pledge(2005). Green Roofs. Ecological Design and Construction. Schiffer Books, Atgelen.
30. Newton, J.D Gege, P Early, and S Wilson(2007). Building Greener: Guidance in the use of green roofs, Green Walls and Complementary Features on Buildings. CIRIA, London.
31. Urbanska, KM, N Webb and P Edwardes(1997). Restoration Ecology and Sustainable Development. Cambridge University Press.
32 Fox, H R, H M Moore and A M McIntosh(1998). Land reclamation. Achieving Sustainable Benefits. A A Balkema, Rotterdam.
33 Eades, P, L bardsley, N Giles and A Crofts(2003). The wetland restoreation manual. The Wildlife Trusts, Newark.
34 How to think like a forest, Green design-From theory to practice. Black Dog publishing, UK
35 Kendle, T and S Forbes(1997). Urban Nature Conversation. E&FN spon. London.
36 Harvey, P(2000). "The East Thames Corridors: a nationally important





38 Fuller, R A, K N Irvine, P Devine-Wright, P HWarren and K J Gaston (2007). " Psychological Beneifts of Greenspace Increase with Biodiversity". Biological Letters, 5: 352-255
39 URBED(2004). "Biodiversity by Design. A Guide for Sustainable Communities'. Town and Country Planning Associaton, London
40 Harrison, C and G Davies (2002), " Conserving Biodiversity that Matters: Practitioner's Perspectives on Brownfield Development and Urban Nature Conservation in London'. Journal of Environmental Management, 65:95-108
41 Hochschule Wadenswil and living Roofs(2005). Green Roofs and Urban Biodiversity. Science and Technology Transfer. Howschule Washensil
42 Jorgensen, A(ED.)(2007). Urban Wildscapes. Sheffield University. UK invertebrate fauna under threat." Bristish Wildlife, 12(2):91-98
37 Morris, RPK, I Alonso, R G Jefferson and K J Kirby(2006). "The Creation of Compensatory Habitat- Can it Secure Sustainable Development?" Journal for Nature Conversation, 12(2):106-116
43 Janine Benyus, Biomimicry---Innovation Inspired by Nature
44 Hill, D.(Ed)(2007)"Making the Connections: A Role for Ecological Networks in Nature Conversation". Proceedings of the 26th Conference of the Institute of Ecology and Envrionmental Management. IEEM. Winchester
45 "Energy Efficiency in Buildings: Facts and Trends, World Business Council for Sustainable Development", 2007. Http://www.wbscd.org/DocRoot/H94WhkJolYq5uDstLfxR/WBCSD_final.pdf
46Thomas, R(Ed.)(2002). Environmental Design: An Introduction for Architects and Engineering, 2nd Editons. Spon Press. London
47 Yudelson, J,(2009). Green Building Through Integrated Design. McGraw-Hill, Maidenhead
48 Loftness, V, V Hartkopf, P Mill. " A Critical Framework for Building Evaluation: Total Building Performance, Systems Integration and Levels of Measurement and Assessment"". In Wolfgang F E Preiser(Ed.)(1989). Building Evaluation. Plenum Publishing Corporation, New York.
49 Gallarher, M P A C O'Connor, J L Dettbarn Jr(2004). "cost Analysis of Inadequate Interoperability in the US Captial Facilities Industry". Research report sponsored by National Institute of Standards and Techonology. Advanced Technology Program.
50 Wilson, A (April 2005). "Making the case for Green Building". Enviromental Building News, No,4
51 Longcore, T and C Rich(2004). "Ecological Light Pollution". Front Ecol Environ,2(4):191-198

THANKS