an AGRICULTURE COMMUNITY IN MIRAFIORI
An agriculture based community in Turin Mirafiori

Supervisor: DAGLIO LAURA
Assistant supervisor: OSCAR EUGIENIO BELLINI
Author: JIA WANG (780861)
Co-author: YIMING YIN (781368)
12/2013
4 MASTERPLAN DESIGN
4.1 Steps Toward The Design
4.2 Masterplan and Illustrations

5 AGRICULTURAL SPACES AND ACTIVITIES
5.1 Shared Agricultural Space
5.2 Private Agricultural Spaces
(agriculture integrated with building)
5.3 Application of The ICT System

6 RECREATIONAL AND EDUCATIONAL SPACES AND ACTIVITIES

7 SUSTAINABLE OPERATION SYSTEMS
7.1 Water Treatment
7.2 Waste Treatment and Energy Generation

8 TWO DWELLING TYPOLOGIES INTEGRATED WITH AGRICULTURE
8.1 Semi-detached Typology
8.2 High-density Typology

BIBLIOGRAPHY
THANKS

LIST OF FIGURES

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 1</td>
<td>COMPETITION BACKGROUND</td>
<td></td>
</tr>
<tr>
<td>fig1.01</td>
<td>Logo of the competition</td>
<td>Competition document</td>
</tr>
<tr>
<td>fig1.02</td>
<td>Map of the design area</td>
<td>Competition document</td>
</tr>
<tr>
<td>Chapter 2</td>
<td>URBAN AGRICULTURE</td>
<td></td>
</tr>
<tr>
<td>fig2.01</td>
<td>Timeline of the Urban agriculture development</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig2.02</td>
<td>Energy crisis</td>
<td>From google search</td>
</tr>
<tr>
<td>fig2.03</td>
<td>Disafforestation</td>
<td>From google search</td>
</tr>
<tr>
<td>fig2.04</td>
<td>Water scarcity</td>
<td>From google search</td>
</tr>
<tr>
<td>fig2.05</td>
<td>Environmental impact of swiss consumption and production</td>
<td>Self-made illustration based on ref.4</td>
</tr>
<tr>
<td>fig2.06</td>
<td>Detailed fuel cost of a standard white loaf</td>
<td>Self-made illustration based on ref.5</td>
</tr>
<tr>
<td>fig2.07</td>
<td>Total fuel cost of a standard white loaf</td>
<td>Self-made illustration based on ref.5</td>
</tr>
<tr>
<td>fig2.08</td>
<td>Global freshwater withdraw</td>
<td>Self-made illustration based on ref.6</td>
</tr>
<tr>
<td>fig2.09</td>
<td>Agriculture water use and population growth</td>
<td>Illustration made at ref.6</td>
</tr>
<tr>
<td>fig2.10</td>
<td>Extensive treatment of water in the city</td>
<td>Self-made illustration based on ref.7</td>
</tr>
<tr>
<td>fig2.11</td>
<td>Urban community independently water treatment</td>
<td>Self-made illustration based on ref.7</td>
</tr>
<tr>
<td>fig2.12</td>
<td>Closed water loop systems</td>
<td>Self-made illustration based on ref.7</td>
</tr>
<tr>
<td>fig2.13</td>
<td>Food loop - food waste treatment</td>
<td>Self-made illustration based on ref.8</td>
</tr>
<tr>
<td>fig2.14</td>
<td>Activities related with healthy issue</td>
<td>Illustration made at ref.9</td>
</tr>
<tr>
<td>fig2.15</td>
<td>Activities related with Education issue</td>
<td>Illustration made at ref.9</td>
</tr>
<tr>
<td>fig2.16</td>
<td>Activities related with Social issue</td>
<td>Illustration made at ref.9</td>
</tr>
<tr>
<td>fig2.17</td>
<td>Activities related with Economic issue</td>
<td>Illustration made at ref.9</td>
</tr>
<tr>
<td>fig2.18</td>
<td>Four types of existing urban agriculture</td>
<td>Illustration made at ref.9</td>
</tr>
<tr>
<td>fig2.19</td>
<td>Vegetables catalogs according to the depth of growing media</td>
<td>Illustration made at ref.11</td>
</tr>
<tr>
<td>fig2.20</td>
<td>Layers of the green roof construction</td>
<td>Illustration made at ref.10</td>
</tr>
</tbody>
</table>
Chapter 3

SITE ANALYSIS

83.01 Location of Turin in Italy
Self-made illustration

83.02 Location of site in Turin
Self-made illustration based on ref.33

83.03 Interregional connection
Self-made illustration based on ref.34

83.04 Urban mobility plan
Self-made illustration based on ref.33

83.05 Main public transportation
Self-made illustration based on ref.33

83.06 Green space system
Self-made illustration based on ref.33

83.07 Corso marche section
Illustration made at ref.35

83.08 Corso marche plan
Illustration made at ref.35

83.09 Sangone green space project
Illustration made at ref.34

83.10 Selected important features of Turin
Self-made illustration based on ref.36

83.11 Administration boundary of Turin and the surrounding rural regions
Self-made illustration based on ref.33

83.12 The existing situation of the infrastructure system
Self-made illustration based on ref.36

83.13 The reorganized situation of the infrastructure system as in PUMS
Self-made illustration based on ref.36

83.14 The important elements of the infrastructure system
Self-made illustration based on ref.5

83.15 The green open space system
Self-made illustration

83.16 The recreational spaces
Self-made illustration

83.17 The agriculture spaces
Self-made illustration

83.18 The logo of CAAT
Illustration made at ref.37

83.19 The logo of VCV 102 Farmers’ market
Illustration made at ref.38

83.20 The logo of Cascina Roccatrancia
Illustration made at ref.39

83.21 The logo of Miraoti
Illustration made at ref.40

83.22 The logo of The agricultural Park
Illustration made at ref.1

83.23 The main features of the area
Self-made illustration

83.24 The plan of the TNE project
Illustration made at ref.36, 41

83.25 Selected important features of the site surrounding area
Self-made illustration

83.26 The panoramic view of the site
Illustration made at ref.1

83.27 The important features of the site
Self-made illustration

Chapter 4

MASTERPLAN DESIGN

84.01 Flow from city to countryside cross the site
Self-made illustration

84.02 Flow from neighbourhood to the site
Self-made illustration

84.03 Linear green space
Self-made illustration

84.04 Interaction zone facing the street
Self-made illustration

84.05 Density of the area
Self-made illustration

84.06 Classification of the dwelling units
Self-made illustration

84.07 Arrangement of different typology on the site
Self-made illustration

84.08 Main open space structure of the site
Self-made illustration

84.09 A range of different open spaces
Self-made illustration based on ref.56

84.10 Different type of agriculture spaces
Self-made illustration

84.11 Agricultural network
Self-made illustration

84.12 Sustainable operational cycle of the community
Self-made illustration

84.13 Masterplan
Drawing

84.14 Layering of the design
Self-made illustration

84.15 Residential buildings distribution
Self-made illustration

84.16 Commercial buildings distribution
Self-made illustration

84.17 Public buildings distribution
Self-made illustration

84.18 Section 1-1
Drawing

84.19 Section 2-2
Drawing

84.20 Section 3-3
Drawing

84.21 Masterplan zoom in
Drawing
Chapter 5

AGRICULTURAL SPACES AND ACTIVITIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Image Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>fig5.01</td>
<td>Shared agriculture spaces</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.02</td>
<td>Agriculture spaces in the community building</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.03</td>
<td>CROPS for different types of community agricultural spaces</td>
<td>Self-made table</td>
</tr>
<tr>
<td>fig5.04</td>
<td>Possible Products</td>
<td>Self-made table</td>
</tr>
<tr>
<td>fig5.05</td>
<td>Agriculture spaces in typology 1</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.06</td>
<td>Agriculture spaces in typology 2</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.07</td>
<td>Crops for kitchen garden</td>
<td>Self-made table</td>
</tr>
<tr>
<td>fig5.08</td>
<td>Illustration of the ICT system</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.09</td>
<td>The expert systems based on ICT system</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.10</td>
<td>The trading system based on ICT system</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.11</td>
<td>The Loop of the food delivery and collecting service</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.12</td>
<td>The process of the food delivery and collecting service</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.13</td>
<td>Example of the information list</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.14</td>
<td>ICT system in habitants daily life</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.15</td>
<td>supermarkets around the site</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig5.16</td>
<td>“From farm to fork” process</td>
<td>Self-made illustration</td>
</tr>
</tbody>
</table>

Chapter 6

RECREATIONAL AND EDUCATIONAL SPACES AND ACTIVITIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Image Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>fig6.01</td>
<td>Recreational spaces and activities</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig6.02</td>
<td>Educational spaces and activities</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig6.03</td>
<td>Imagining a day visiting the community</td>
<td>Self-made table</td>
</tr>
</tbody>
</table>

Chapter 7

SUSTAINABLE OPERATIONAL SYSTEMS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Image Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>fig7.01</td>
<td>Corso marche masterplan</td>
<td>Self-made illustration based on ref.35</td>
</tr>
<tr>
<td>fig7.02</td>
<td>Water and food loop</td>
<td>Self-made illustration based on ref.7</td>
</tr>
<tr>
<td>fig7.03</td>
<td>Water management plan</td>
<td>Self-made illustration</td>
</tr>
</tbody>
</table>

Chapter 8

TWO DWELLING TYPOLOGIES INTEGRATED WITH AGRICULTURE

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Image Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>fig8.01</td>
<td>Volume of the basic unit</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.02</td>
<td>Plan of the basic unit</td>
<td>Drawing</td>
</tr>
<tr>
<td>fig8.03</td>
<td>The surface toward the sun</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.04</td>
<td>Section of the basic group</td>
<td>Drawing</td>
</tr>
<tr>
<td>fig8.05</td>
<td>Potential of expansion</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.06</td>
<td>Diagram to show the agriculture spaces</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.07</td>
<td>Agriculture spaces in this typology</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.08</td>
<td>Photos of the unit composition process</td>
<td>photos of the model</td>
</tr>
<tr>
<td>fig8.09</td>
<td>Basic units</td>
<td>Self-made illustration based on ref.52</td>
</tr>
<tr>
<td>fig8.10</td>
<td>Secondary units</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.11</td>
<td>Unit combination 1</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.12</td>
<td>Unit combination 2</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.13</td>
<td>Unit combination 3</td>
<td>Self-made illustration</td>
</tr>
<tr>
<td>fig8.14</td>
<td>Ground floor plan of group1</td>
<td>Drawing</td>
</tr>
<tr>
<td>fig8.15</td>
<td>First floor plan of group1</td>
<td>Drawing</td>
</tr>
<tr>
<td>fig8.16</td>
<td>Second floor plan of group1</td>
<td>Drawing</td>
</tr>
<tr>
<td>fig8.17</td>
<td>Ground floor plan of group2</td>
<td>Drawing</td>
</tr>
<tr>
<td>fig8.18</td>
<td>First floor plan of group2</td>
<td>Drawing</td>
</tr>
</tbody>
</table>
The project is based on the The “Tur(i)nto green” competition, which is aimed at transforming the previous industrial area, South Mirafiori, into an agriculture based community. This community, designed for low income people, younger generation and immigrants, will provide Turin with a new model of urban life.

It will become part of an agricultural urban system, and be integrated with the adjacent farms situated on the outskirts of the city.

In the design process, we make an effort to deal with the operative grounds instead of just designing the houses.

With a careful research of Urban agriculture, we create spaces for agriculture as well as the related activities and services. The process of agriculture will be integrated with other sustainable aspects: waste, water and energy. All these aspects act together to operate this sustainable community.

At the same time, through the application of ICT (information communication technology) system, we are able to make the food production and consumption cycle more efficient, inhabitants could gain easier accesses to the information they need.

For the layout of the masterplan, our approach has a psycho-social dimension. We preliminarily shaped the open spaces of the public realm, tried to connect the community life with nature, later we defined an open space system which is as rich a hierarchy as possible. The arrangement of the dwelling clusters shows the consideration of the identity of the community and the sensation of belongingness, a feeling of home, which is very important for these immigrants.

The project is interesting not only for its form and visual appeal, which is never the less considerable, but also for the new lifestyles we proposed and the rich variety of experiences we would offer.

Il progetto si basa sul concorso "Tur(i)nto green", che mira a trasformare l’area di Mirafiori in una comunità basata sull’agricoltura. Questa comunità è per le persone a basso reddito o disoccupati e gli immigrati.

Sarà il principale quartiere produzione alimentare della città, e la comunità sostenibile principale di Torino.

Nel processo di progettazione, l’obiettivo è di affrontare gli aspetti gestionali e non solo la progettazione delle case.

Con un’attenza ricerca di agricoltura urbana, creiamo spazi per l’agricoltura, e per le relative attività e servizi. Il processo di integrazione dell’agricoltura con il trattamento dei rifiuti, trattamento delle acque e la generazione di energia sono tutti aspetti che agiscono insieme per rendere questa comunità sostenibile.

Allo stesso tempo, attraverso l’applicazione del sistema ICT (tecnologia di comunicazione informazioni), siamo in grado di rendere la produzione alimentare e il ciclo di consumo più efficienti, gli abitanti possono ottenere un facili e accesso alle informazioni di cui hanno bisogno.

Per il layout del masterplan, il nostro approccio ha una dimensione psico-sociale. Abbiamo in primis, conformato gli spazi aperti della sfera pubblica, cerchiamo di collegare la vita comunitaria con la natura, in seguito definiamo un sistema di spazi aperti, che è ricco di una gerarchia possibile.

La combinazione cluster per l’abitazione mostra una attenzione per l’identità e la sensazione di appartenenza, una sensazione di casa, che è molto importante per questi immigrati.

Il progetto si concentra non solo sulla forma e impatto visivo, che non è mai di secondaria importanza, ma anche per la ricchezza delle possibili esperienze che vorremmo offrire.
CHAPTER 1: 
THE COMPETITION BACKGROUND

1.1 Introduction of the competition

Background:
The CRD-PVS (Research and Documentation Centre in Technology, Architecture and City in Developing Countries) at the Politecnico di Torino (Italy), hold an International Student Design Competition turintogreen - Farms In A Town.

Topics:
The massive transformation of the global economy, the redistribution of wealth and rights, new locations and methods of production of goods and services are transforming the boundaries of the contemporary city; the fragile balance between rural areas and urban settlements is quickly evolving. Younger generations from the rural areas in the whole world continue to move into the cities, claiming the right to share the benefits supplied by joint services, wealth and employment, peculiarities of the city even if they imply unacceptable life conditions. This has already led to an increase in urban population that generates the demand for new architectural solutions ensuring dignity and integrated living conditions. In order to assure a bright future to Turin, we need to consider transforming or replacing the current models of urban management, life and development. One of the possible models refers to the concepts of agro - housing and urban - farming, which are becoming more and more widespread: the use of open spaces - also unconventional - for diverse agricultural and cropping technologies and methods along with innovative production and management processes within a highly populated urban realm.

1.2 Requirements of the competition

The narrow area of the FIAT production area car parking will be the chance to provide Turin with a new model of urban life. Dwellings integrated with food production, in traditional (surface field) or innovative (vertical) models; housing for low income people and immigrants, with agricultural skills; spaces, services and features to let the younger generation reinvent their own way to work; urban farming that opens towards a new economy, including education, documentation, food retailing, agricultural and zoo-technical services.

SPATIAL Requirements:
1. land use:
   Area 1: 60 % agriculture;
   Area 2: 40 % agriculture;
   Area 3: 20 % agriculture
2. Dwellings:
   Dwellings with high quality of life delivered at an affordable standard.
   They should be designed with a community orientation in mind.
   These buildings should contain parts for self-construction and/or self-maintenance.

SERVICES
New facilities, services and spaces for habitants
These may include spaces for temporary jobs, shared spaces and workshops, public ICT facilities.

Employment opportunities for the new citizens to engage with others in new forms of social enterprise.

TECHNOLOGIES
Integration between residential and agricultural activities, through the definition of new building typologies and integrated solutions.
Integration of residential requirements and waste with the agricultural productive process.
2.1 What is Urban Agriculture

The expression “urban agriculture” is originally used only by scholars and the media, and then been adopted by a lot of agenda. It has been broadly defined as:

- all agricultural activities located within (intra-urban) or on the periphery (peri-urban) of a settlement, city or metropolis, independently or collectively developed by people for self-consumption or commercialization purposes; involving the cultivation or raising, processing, and distribution of a diversity of products be these edible or not largely via the (re)utilization of human and material resources, products and services located in and around the urban area in question, in turn contributing considerable material and human resources to that area.

The actors involved in urban agriculture

Many actors are involved in UA, they are the suppliers of resources, inputs services, the producers, the transporters, the retailers, the consumers, the promoters and the managers. These actors pertain to the public and private sectors, the formal and the informal economy.

Areas used for urban agriculture

Areas used for agriculture are of all sizes, from tiny home spaces (windowsills, containers, fences, rooftops, basements, walls) to recreational grounds, utility and transportation rights-of-way (stream or roadides), to suburban public or private estates. On the other hand, those areas are used in a complementary way. For instance, year-round homegardens often serve as nurseries for rainfed off-plot fields; the same streamside field may carry vegetables in the dry season and grain crops in the wet season. In this way can maximize the outputs within critical inputs and ensure the stability against crop loss and market evict.
2.2 Why Talking About Urban Agriculture

2.2.1 Challenges from population growth

- **FOOD SUPPLY**
  World population is expected to increase by 1.8 billion as of 2030 and by 2.5 billion as of 2050, reaching 9.2 billion. Food demand is expected to increase by 50 percent by 2030 and 100 percent by 2050, because of continued population growth and higher incomes.

- **LIMITED RESOURCES**
  People are accustomed to being able to find domestic or exotic foods all the year around in the supermarket. Thanks to the technologies of farming and distribution, people are enjoying this convenience and easiness of urban life. However, when this pattern of food consumption is being formed, few people know that such a common daily habit brings a whole range of costs.

2050

- 90 000 000 people
- 70% live in city
- 100% more food

- **TODAY**

2.2.2 Influences of the traditional agriculture

The supermarket food relies on the importation of food worldwide to maximize choices of the customers. Long distance trade leads to specialization in farming. The crops will be grown over large scales in industrialized conditions to achieve the economies of scale.

- **Influence on LOCAL ECOLOGY**
  During last years, agriculture in developed countries has been transformed to be more capital intensive. The supermarket food relies on the importation of food worldwide to maximize choices of the customers. Long distance trade leads to specialization in farming. In the modern farm, the crops will be grown over large scales in industrialized conditions to achieve the economies of scale.

- **Influence on ENVIRONMENTAL FOOTPRINT**
  Worldwide, agriculture and related up-stream activities such as fertilizer manufacture plus land use change are responsible for about one third of the world’s greenhouse gas emissions.

*Fig 2.02* Energy crisis

*Fig 2.03* Deforestation

*Fig 2.04* Water scarcity

*Fig 2.05* Environmental impact of swiss consumption and production
Influence on ENERGY\textsuperscript{5}

There is dependence on energy throughout the food chain: from the manufacture and application of agricultural inputs, such as fertilizers and irrigation, through crop and livestock production, processing and packaging, distribution services, cold storage, disposal equipment in food retailing and in home kitchens. It was estimated that vegetables have traveled 2000 kilometers on average before they arrive at the store where people buy it.

The detailed breakdown of fuel cost of a standard white loaf

A research done by Peter Chapman in 1975 illustrates the embodied energy for a loaf of bread. It shows the energy consumed in making the food is hundreds times as much energy as calories the food actually contains.

- The total cost is 5.6kwh/loaf
- Fertilizer and Transport account for 37.6% of embodied energy

Influence on WATER\textsuperscript{6}

Global average freshwater withdraw

Access to fresh food for many cities is a constant challenge, while unsustainable consumption of potable water for non-potable uses is increasingly threatening our freshwater resources. However, agriculture withdraws the most amounts of the available freshwater every year. Great amount of agricultural runoff, which contains pesticides and other wastes, is produced due to the water inefficient irrigation. The resulting contaminated agricultural runoff is the leading source of water quality impacts on rivers, lakes and other ground water. It represents not only a waste of agricultural chemicals, but also an environmental threat to downstream ecosystems.

Agriculture, Water Use and population growth
2.2.3 Benefits of Urban Agriculture

Water Efficiency

Open-loop (linear) potable water usage pattern

As cities continue to grow, more and more resources will be channeled into them generating more waste in the form of urban wastewater. The larger the growth in population, the larger the volume of wastewater generated. Thus, the current urban population growth trend will correlate to urban wastewater as an ever-growing resource for water as well as nutrients in it.

Current flow of resources into and out of the city is linear and wasteful.

Conventionally, in the developed world, urban wastewater moves through an extensive network of hidden infrastructure to large-scale, centralized wastewater treatment facilities that remove suspended and dissolved toxins and then discharge the treated water into oceans and freshwater bodies. Even where extensive, responsible wastewater infrastructure exists, in many developed countries it is showing its age. Water pollution, soil contamination and spread of waterborne diseases due to leakage and spillage are increasing, costing the local government and the residents in terms of both health and wealth. The prospect of reinstalling a new city-wide network for wastewater collection and treatment is tremendously daunting to local governments.

Closed-loop systems

Localized, individual fixes in the next couple of decades will cost billions of dollars. Thus, regarded in the context of long-term viability, an ecological and economical approach that advocates decentralizing the process in order to treat water locally and naturally and allow it the opportunity to be reabsorbed back in the local ecosystem emerges as the best solution. This on-site wastewater treatment and reuse mimics the closed cycle of a natural ecosystem. As illustrated in below, this decentralized system will regenerate the urban ecosystem, manage urban wastewater and serve as a building block for a green economy by way of urban farms.

Wastewater treatment process

Primary: to remove suspended solid
Secondary: to remove pathogenic organisms, absorb the nutrients
Tertiary: to remove any traces of chemicals and salts

Risks involved

Potential Health Risks;
Risk of Soil and Water Pollution;
Maintenance Issues;
Physical Challenges;
The combination of urban organic wastes (UOW) and urban agriculture (UA) creates particular issues in the modern urban setting. On the one hand, the interests of urban waste reduction mesh well with the promotion of UA, since urban and peri-urban farmers are in need of organic matter as soil conditioner/fertilizer and animal feed, and cities and towns wish to conserve disposal space and reduce the costs of municipal solid waste management (MSWM).

**ENVIRONMENTAL BENEFITS --- Waste reuse**

The new FoodLoop

![FoodLoop Diagram](Image)

- **Residues**
  - Collected by staff
  - Composite on site

- **Food Waste**

- **Urban Farm**

- **Compost**

**SOCIAL BENEFITS**

- **Health**
  - Distributing food
  - Soil remediation

- **Eucational**
  - Class about nutrition and cooking
  - Environmental education

- **Social**
  - Reuse abandoned land
  - Social gathering spaces

- **Economic**
  - Selling food
  - Tourism

**Activities related with Health issue**

- To improve the health of participants through providing access to fresh and safe food and fruits, involving people in farming as physical activity.

**Activities related with Education issue**

- Motivating people to have healthy diet that to consume more vegetable and fruits, educating people the relationship between nutrition and food.

**Activities related with Social issue**

- Transforming the vacant public space to urban farms to offer spaces for people to meet and working together. Residents in the neighbourhood establish and join the Community based organizations and institutions in order to operation to farms.

**Activities related with Economic issue**

- The farmers market helps getting income form selling what they grow. Some of the farms provide jobs of managing farm operations and participating in leadership programs, and this will attract more tourists to consume here.
2.3 Existing typologies of Urban agriculture

**Institutional Farms and Gardens:**
Affiliated with an institution (such as hospitals, churches, prisons, schools, public housing) whose primary mission is not food production, but which have goals that urban agriculture supports.

**Community Gardens:**
Located on publicly-owned land or land trusts. Typically managed by local resident volunteers, mainly grow food.

**Commercial Farms:**
In general, commercial farmers try to maximize crop performance in order to achieve profitability, however, some share many of the health and ecological goals of the broader urban agriculture community.

**Community Farms:**
Tend to be communal growing spaces operated by a nonprofit organization that engages the surrounding community in food production but also social and educational programming.

http://www.fiveboroughfarm.org/urban-agriculture/4-types/

<table>
<thead>
<tr>
<th>Institutional Farms and Gardens</th>
<th>Commercial Farms</th>
<th>Community Gardens</th>
<th>Community Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Institutional Farms and Gardens" /></td>
<td><img src="image2" alt="Commercial Farms" /></td>
<td><img src="image3" alt="Community Gardens" /></td>
<td><img src="image4" alt="Community Farms" /></td>
</tr>
</tbody>
</table>

245

Institutional Farms and Gardens

117

Community Gardens

3

Commercial Farms

500

Community Farms

390

Affiliated with an institution (e.g., school, housing development, green, etc.)

Located on publicly-owned land.

Typically managed by nonprofit organizations/individuals.

Typically managed by nonprofit organizations/individuals who are engaged in food production.

Typically managed by nonprofit organizations.

2.4 Innovative technologies applied in Urban agriculture

**Green Roof**

**Construction:**

- **PLANTS:**
  - Growing Media
  - Filter Fabric
  - Drainage and Retention Layer
  - Insulation
  - Root Barrier
  - Waterproofing Membrane
  - Structural Support

**Irrigation Methods:**

- Sprinkler Systems
- Drip and Tubing Systems
- Capillary Systems
- Standing-Water Systems

**Plant Establish Methods:**

- Seed or Cuttings
- Pot-grown plants or plugs
- Vegetation Mats

**Living Wall**

<table>
<thead>
<tr>
<th><img src="image5" alt="Living Wall" /></th>
<th><img src="image6" alt="Living Wall" /></th>
<th><img src="image7" alt="Living Wall" /></th>
</tr>
</thead>
</table>

Fig. 2.18 Four types of existing urban agriculture

Fig. 2.19 Vegetables catalog according to the depth of growing media

Fig. 2.20 Layers of the green roof construction

Fig. 2.21 Green Roof Construction

Fig. 2.22 Living Wall Construction

Fig. 2.23 Plant Establishment Methods

Fig. 2.24 Irrigation Methods

Fig. 2.25 Construction Materials
## 2.4 Innovative technologies applied in Urban agriculture

### Substrate

#### Properties:
- **Physical properties:**
  - Pore size:
  - Bulk density
- **Chemical properties:**
  - pH:
  - Cation exchange capacity (CEC)
- **Nutrient holding capacity:**
- **Porosity:**

#### Soil-less substrate:
- gravel, sand, vermiculite, perlite, polystyrene, etc.

### Hydroponics

- **Nutrient Film Technique (NFT)**
- **Drip Irrigation System**
- **Flood and Drain (EBB), and Flow systems**
- **Deep Water Culture (DWC)**
- **Ventura Action drip system**
- **Aeroponics**
- **Aquaponics**

### Container

#### Different types:
- suspended
- cantilevered
- rised beds
- movable stands

### Greenhouse

#### Principle of Greenhouse

#### Example of Greenhouse

---

## 2.5 Case studies of urban agriculture

### 2.5.1 City scale

#### Continuous Productive Urban Landscapes (CPULs)

The concept of CPUL City is a strategic and associative framework for the theoretical and practical exploration of productive landscapes within contemporary urban design. Central to the CPUL concept is the creation of multi-functional open urban space networks that complement and support the built environment.

CPULs will be productive in various ways, offering space for leisure and recreational activities, access routes, urban green lungs, etc. But most unique, they will be productive by providing open space for urban agriculture, for the inner-urban and peri-urban growing of food.
The project aims to make people more aware of issues like food miles, and allows experimentation with productive, multi-functional green spaces. The long-term aim is for Middlesbrough to become a self-sustainable town by growing its own produce. The project takes place at 284 locations across the town. The activities include:

-the use and improvement of allotment sites
-the provision of vocational and community-based training in horticulture
-a town-wide meal
-the creation of local food co-operatives
-the establishment of a food policy council.

In the project Designs of the Time 2007, Bohn&Viljoen proposed a identified network of open spaces and indicates urban farming sites (small square raised elements) for Middlesbrough’s CPUL.

2.5.2 Community scale

R-URBAN

R-Urban initiates locally closed ecological cycles that will support the emergence of alternative models of living, producing and consuming between the urban and the rural. The strategy explores as such alternatives to the current models of living, producing and consuming in cities, suburbs and rural areas. It draws on the active involvement of citizen in initiating collaborative practices and creating solidarity networks, closing cycles between production and consumption, operating changes in lifestyles, acting ecologically at the level of everyday life.
The project will be developed on a number of sites in Colombes, a city located in the northwestern suburbs of Paris. The network of closed ecological cycles will include three Units, each with complementary urban functions.

**ÉCOHAB** is an Ecological Cooperative Housing Unit, cooperative and environmental, which includes housing experimental and public spaces, self-built part. These include housing innovative devices to reduce consumption energy, making gardens in height, establish a carpool, etc.

**RECYCLAB** is a recycling and green building which is formed around a series equipment for recycling waste urban and transforming them into subsets for eco-construction, thus contributing to significant reduction of local waste and CO2 emissions.

**AgroCité** is designed to introduce and support the dynamics of urban agriculture and provide support for the cultural and educational activities related to the R-URBAN project, currently emerging in the city of Colombes.

The unit consists of three parts:
- an ‘AgroLab’ specialising in experimenting with intensive organic agricultural production
- an area for community gardening
- an area for activities related to nature and agriculture

All three areas are made up of cultivable land and will include:
- an experimental urban agricultural farm
- a shared garden for residents of the neighbourhood
- an educational garden
- a shared greenhouse for plants and seedlings, equipment for collecting rainwater, phytoperfusion, solar energy and biogas, aquaponics crops, agricultural short circuits.

The buildings will include prototypes of organic intensive farming and a range of equipment and know-how covering: a seed library; a vegetable market and local agricultural products; collective Café and cooking facility; a collective bread oven.
Urban agriculture presents great opportunities in transformation and vitalization of disused urban area. Project Le 56, located in a disused urban interstice in the densely inhabited district of St. Blaise, demonstrate to us this opportunity. The project features an edible garden, a community gathering space, a composting laboratory and a striking but affordably built entry pavilion topped with photovoltaic panels. Now the site is used collectively by over 70 people from the community, transformed successfully from a negligible place to a place holding activities of gardening, the sale of organic food, exhibitions, screenings of films, meetings and workshops.
FOOD LOOP CYCLE

About 18 per cent of household waste (in the UK) is food waste, and could be as high as 40 per cent in some areas. Its decomposition in landfill sites creates methane, 23 times more powerful as a greenhouse gas than CO2, and it has been estimated that Emissions from household food waste directly account for 5 percent of UK annual emissions. Casting an eye into the not-so-distant future, when the scarcity of resources will completely change our current lifestyles, designers will need to not only create ways of doing things differently, but also make those new behaviours interesting. This will certainly mean working in different ways: addressing the redesign of services and infrastructure as well as stuff, learning to integrate innovative business models into the creative process, and being humble enough to facilitate the evolution of communities.

An in-vessel Rocket composter was installed in September 2009, and a contractor was brought in to carry out waste collections and run the machine. With the help of SEED Foundation’s design and enterprise skills, a core group of residents convinced the council to allow the community to utilise the equipment that was already on the estate, by demonstrating that it was possible to generate enough income from the composting to be able to run the service alone, with no financial support from the council except for the weekly provision of caddy liners.

FoodLoop is a project about food waste and food growing which began in 2008 as a partnership with the Policy Studies Institute. It is helping residents of Maiden Lane Estate in King’s Cross take over the running of a food waste collection scheme without council funding. The idea is to change residents’ perception of food scraps as a waste stream to instead being a resource, and making them more amenable to the idea of separating the scraps from their other rubbish and putting them out for collection once a week.

An in-vessel Rocket composter was installed in September 2009, and a contractor was brought in to carry out waste collections and run the machine. With the help of SEED Foundation’s design and enterprise skills, a core group of residents convinced the council to allow the community to utilise the equipment that was already on the estate, by demonstrating that it was possible to generate enough income from the composting to be able to run the service alone, with no financial support from the council except for the weekly provision of caddy liners.

But how could enough income be generated to pay people to carry out collections, operate the Rocket and manage the compost? A potential solution (on paper at least) was found to lie in the compost itself, which has been rebranded as Plantify. It is a crumbly, nitrogen-rich, soil-like substance containing a high concentration of many of the elements and offer an extraordinary boost to vegetable growth. With the recent boom in urban farming, the commercial future of Plantify is a distinct possibility.

FoodLoop is a project about food waste and food growing which began in 2008 as a partnership with the Policy Studies Institute. It is helping residents of Maiden Lane Estate in King’s Cross take over the running of a food waste collection scheme without council funding. The idea is to change residents’ perception of food scraps as a waste stream to instead being a resource, and making them more amenable to the idea of separating the scraps from their other rubbish and putting them out for collection once a week.

An in-vessel Rocket composter was installed in September 2009, and a contractor was brought in to carry out waste collections and run the machine. With the help of SEED Foundation’s design and enterprise skills, a core group of residents convinced the council to allow the community to utilise the equipment that was already on the estate, by demonstrating that it was possible to generate enough income from the composting to be able to run the service alone, with no financial support from the council except for the weekly provision of caddy liners.

But how could enough income be generated to pay people to carry out collections, operate the Rocket and manage the compost? A potential solution (on paper at least) was found to lie in the compost itself, which has been rebranded as Plantify. It is a crumbly, nitrogen-rich, soil-like substance containing a high concentration of many of the elements and offer an extraordinary boost to vegetable growth. With the recent boom in urban farming, the commercial future of Plantify is a distinct possibility.
HOUWELING’S TOMATOES, heat and power greenhouse project

The Houweling’s Tomatoes project, launched by General Electric Company (GE), uses natural gas engines and a carbon dioxide fertilisation system to provide heat, power and carbon dioxide to the 125-acre tomato greenhouse, except that it provides flexible energy generation and contributes electric power in peak times for the community in Camarillo, California. This CHP system, which is powered by natural gas, generates 8.7 MW of electrical power and 10.6 MW of thermal power from hot water to heat the large on-site glasshouses. Its total thermal efficiency is almost 90%. The thermal energy produced during power generation can be transferred to the greenhouse immediately in cooler periods kept in existing thermal storage tanks to use at other times. Thermal energy is recovered in exhaust gas heat exchangers to be used in the ultra-efficient greenhouse, which uses extremely low water temperatures in its heating system to cool exhaust temperatures under the dew point. Carbon dioxide from engine exhaust gasses will be purified and piped into the greenhouse to fertilize tomato plants through the photosynthesis process. The technology for the carbon dioxide fertilization system was developed by GE’s Center of Excellence in Holland.

![CO₂ Fertilization Process](image)

**CO₂ Fertilization Process**
- CO₂ from engine exhaust is purified and piped into the greenhouse as fertilizer; creating 21,400 tons of CO₂ yearly, which equates to emission from 625 cars.
- The process provides power: water: CO₂ fertilization for Houweling’s Tomatoes.
- Heat produced from engines during power generation - more than 10.6 MW of thermal power - is captured in thermal storage tanks and used to heat greenhouse.
- 8.7 MW of electrical power is generated - enough for approximately 8,800 homes - also meet energy need of greenhouse.
- Water is condensed out of exhaust gas system, providing 9,500 gallons of water per day to greenhouse operation.
- Heat from engine exhaust is captured in heat exchangers to be used in the ultra-efficient greenhouse.
- Condensed water.

**From Waste to Value**
- Community
- Power Grid
- **Heat**
- **Power**
- **Condensed water**

The green roof sits on top of a warehouse owned by the Brooklyn company Broadway Stages and was designed by the green roof company Goozie Green. It is the first commercial organic rooftop vegetable farm with a community scale in US.

**Growing a “Greener” Tomato**

**2.5.3 Building scale**

EAGLE STREET ROOFTOP FARMS

The green roof sits on top of a warehouse owned by the Brooklyn company Broadway Stages and was designed by the Green roof company Goozie Green. It is the first commercial organic rooftop vegetable farm with a community scale in US.

![Eagle Street Rooftop Farms](image)

**Design and Installation**
- The green roof base system is comprised of 2” of built-up components: polyethylene, drainage mat, and retention and separation fabric.
- With the approval of the building’s engineer, 200,000 pounds of growing medium were lifted onto the roof by crane in “super-sacks” over the course of a single day. The growing medium, laid directly onto the green roof base, is a mixture of compost, rock particulates and shale and is manufactured in Pennsylvania. Here are 30 food-growing beds facing north-south and measuring 1.2m wide, and these were divided by a central, mulch-covered aisle. The growing medium in the beds is 100-175mm deep. A buried pipe irrigation system delivers water. It is a green roof component that at the same time retains water, allows for air circulation and is lightweight.
- The green roof can hold over 1.5” of rain, providing a significant reduction in storm water runoff. The captured water, in turn, can help to cool the warehouse before yielding a reduction in cooling costs.
- Installation cost was approximately $10 per square foot. This is significantly lower than most green roof installations due in part to two main factors: the three story building and open expanses of roof were very accessible, and that recycled materials such as used rafters were utilized for edging. The urban farming unit is a module consists of a shipping container with a greenhouse extension on its roof which may be moved and placed anywhere there is space. Its purpose is to be used to produce food according to the needs of local residents, as well as enhance the existing fabric of our boroughs.
The operation: Eagle Street operates as a for-profit farm and staffed by the Farm Manager. In addition, each week during the growing season, the farm hosts volunteers, who assist with seasonal tasks, harvest and composting. They get successful crops include tomatoes, salad greens and microgreens (lettuce and mustard greens harvested when about 25mm high), onions and herbs. Their production is sold directly at the farm’s own market and to local restaurants. The farm also runs a community-supported agriculture scheme, which generates a lot of social benefits.

This roof garden is located on the top of shed in Berkeley California to produce food and manage stormwater. It was totally DIY and use very low-tech materials and method.

Installation: It is a timber-frame structure with metacrylics as waterproofing. Above is 425mm square planting trays made from black plastic with 75mm high walls and a plastic mesh base. The tray are filled with the three-eighth coconut coir. Three-eighth household compost, one-eighth composted grape seeds, one-eighth chicken manure, and lava rock.
The urban farming unit is a module consisting of a shipping container with a greenhouse extension on its roof which may be moved and placed anywhere there is space. Its purpose is to be used to produce food according to the needs of local residents as well as enhance the existing fabric of our boroughs.

The units employ aquaponics. Each of the units is comprised of two cubic meters of water, flowing in a closed circuit in which fish feces are broken down by bacteria in a sewage tank, transformed into minerals which serve as fertilizer for the plants, which they filter - the water returning back to the pool of fish. In the case of installing several containers, one can imagine filling a bio-gas plant to collect and recycle organic waste. Each structure is designed with standard components: hydroponics, an industrial greenhouse, scaffolding, and an open-top container: adaptable to various situations. Since 2010, three farms have been built in Zurich, Berlin, and Brussels.

Edible Schoolyard is designed by Work AC, in collaboration with Edible Schoolyard NY and the Alice Waters’ Chez Panisse Foundation. It is a new schoolyard designed as a series of interlinked sustainable systems, offering the young New Yorkers a different learning experience. The garden will allow the children to care for plants, providing a unique learning environment for kids. It’s centered on a kitchen classroom that is surrounded by a mobile greenhouse on one side and a “systems wall” on the other.

The systems wall integrated many technical systems all together ensure the building’s self-sufficient. It includes a cistern, space for composting and waste-sorting, solar batteries, dishwashing facilities, a tool shed and a chicken coop, rests on the opposite side of the yard.
Designed to meet the Living Building Challenge, this theoretical project for a block in Seattle’s Belltown neighborhood, won the 2008 Natural Talent Design Competition. It is a two-building conceptual project, incorporates vertical farming with residential/merges existing neighborhood amenities, neighborhood market, vocational training facility and a public sustainability educational center – into a financially viable development.

The design incorporated a myriad of innovative and sustainable features. Those interconnected systems are able to create a closed cycle so that building and community are almost completely self-sustainable.

Water facilities: Rainwater Collection System, Hydroponic garden, Biological wastewater treatment system, and greywater cisterns.

Energy: design harnesses wind, solar, biofuel and hydrogen

ECO LABORATORY

fig2.68 Axonometric view of the ECO Laboratory building

fig2.69 Interior view of the growing area

fig2.70 Water harvest system of the ECO Laboratory

fig2.71 Energy diagram of the ECO Laboratory

fig2.72 Water facilities of the ECO Laboratory

fig2.73 Water treated system of the ECO Laboratory
2.6 CONCLUSION

Through the study of Urban Agriculture, we understand that Urban agriculture is not just about the cultivated land, but an organized system, a closed cycle of production and consumption.

The application of Urban agriculture not only creates job opportunities to benefit the local economy, but also helps to foster the weaker strata of the society, and give these new citizens a feeling of belongingness, a sense of home.

Urban agriculture is not just about the food, but also the integration of food production, waste treatment, water management, and energy generation, all these aspects work together to achieve a sustainable living.

It produces healthy food for society at the same time offers spaces for recreational and educational activities.

Therefore, the integration of Urban agriculture and community design will help us achieve the objective established by the competition.

Here is the system we made. It is a preliminary structure for our design which contains the important programs of this community.
Chapter 3: Site Analysis

The territory of the site is observed on 3 consecutive scales: the city/the south-western area/ the site.

3.1 City scale analysis
3.2 Local scale analysis
3.3 Site scale analysis

The competition site area, located in South Mirafiori of Turin, used to be a parking lot for the stock of the newly produced cars. It has been a barrier to the expansion and integration of the neighbourhood.
Interregional connection

The site is the south gate of Turin.

Urban mobility plan

The site is an important node of the infrastructure system of Turin. It will also be one of the important nodes of the future plan according to the PUMS.
Main public transportation system

The site will benefit from the new public transportation plan, with the new line of metro, the site will have a better connection with the city.

Legend
- Tram network
- Metro line 1
- Metro line 2
- Metro line 1 in plan
- Metro line 2 in plan
- Railway network and station
- Railway network and station in plan

Green space system

The site is part of the green belt system, it is the missing link of the belt.
The new Corso Marche is one of the 3 centralities of the new Turin master plan. It integrates the Po river and the avenue of Spina.

The axis is a compact system which appears like a great boulevard, but has the fast pass way and railroad underneath, to guarantee the quick connection between Venaria Reale and Stupinigi.

Considering the green areas, large parks, the peri-urban agriculture spaces, the fabric of Turin metropolitan area appears fragmented and inhomogeneous.

The west territory seems much more urbanized by the presence of industrial settlements and infrastructures. Yet the West Quadrant is bordered on the north and south by two river systems, the Sangone with River Po and the River Dora Baltea, along which stretched important natural areas, the two ecological corridors, which suffer from the lack of reciprocal links.

Just on this point the project will intervene between the peri-urban and Rural area, make use of the agricultural land overlooking the corso Allamano.

The project has a key role in the redevelopment of the entire environmental system of this area. The aim is to balance the pressures of development and increase the profitability of the existing agricultural activities in the metropolitan area.
3.2 Local scale analysis

3.2.1 Location in-between Urban and Rural area

3.2.2 Infrastructures
3.2.2.1 The existing situation
3.2.2.2 The reorganised situation as in PUMS
3.2.2.3 The important element for the site

3.2.3 Green Open spaces
3.2.3.1 The existing open spaces
3.2.3.2 A recreational system contributed by the project
3.2.3.3 An agriculture net work contributed by the project

3.2.4 Main features on the site

3.2.5 Conclusion

1. The site area will be one of the main gates to Turin, strengthened by the Corso Marche project.
2. The underground line 2 (still in development) will allow people to change transportation means right here.
3. As an important node of the infrastructures located between the peri-urban and Rural area, the food productions can be easily transported to the rest part of the city.
4. The city’s development plan aim to foster the southern district to become the leading sustainable community. The site as a link of the ‘green belt’, it will contribute to the entire environmental system of the area.
### 3.2.1 Location in-between urban and rural area

- Rural regions around the site

Right to the area is the small village of Beinasco, which is now integrated with Turin, the site is the transition area between urban and rural.

### 3.2.2 Infrastructures

- **The Existing Situation**

![Map showing exchange junctions between motorway and the local infrastructure](image)

**Current situation:**
No continuity of the ground vehicle system, because of the interruption of the motorway infrastructure.

![Map showing the existing situation of the infrastructure system](image)
3.2.2 Infrastructures - The Reorganised Situation as in PUMS

New situation:
With the Corso Marche project, the local vehicle system and the motorway system are separated.

Coming from north towards our site along the corso Marche, one may release from via Drosson and leave the motorway bypass. Commute between Turin and Beinasco may take corso Orbassano or strada torino within the local vehicle system. And the Mirafiori is a node for changing transportation.
3.2.2 Green Open Spaces - The Existing System

The open space of the community could be integrated to the city recreational structure, used by citizens for the recreational activities.

3.2.2 Green Open Spaces - Recreational Spaces
3.2.3 Green Open Spaces - Agricultural Spaces

Agricultural Park

Affected by the Corso Marche project, the connection of the area and the city is enhanced. Therefore the area may act as the main gate for food supply to the city.

**Corso Marche**

To the city center

**CAAT**

Agricultural Park

**Cascina Roccafranca**

Introductions about the existing agricultural projects

**The Agro Alimentary Centre of Turin**

The CAAT is the new, highly efficient, site for operators in the fruit and vegetable sectors.

**Vov 102 Farmers’ Market**

Promoted and realized by Coldiretti with the collaboration of Enzo Blon non-profit organization. On the road Onorato Vigliani 102, is opened VOV 102, a real market with a very short chain of capital and food. The producers have a specific space in which to present their products, strictly seasonal and 0 Km.

**Miraoiti**

Miraoiti is a project started in october 2011 during the regeneration of the area comprised between the stream Sangone and South Mirafiori neighbourhood. It is a participative design process in support of Turin municipality, that deals with agriculture in urban area. A new way to faces with urban transformation, focus on social relations, brings together stakeholders, citizens and institutions. Aim of the project is to increase understanding and knowledge of this important district of the city, to involve citizens at local and urban level, to experience a methodology to legalize and organize private illegal allotment fostering to strengthen the image of Mirafiori as the agro-urban district of the city.

**The Agricultural Park**

The area comprised in the Agricultural Park is an example of the farming and irrigation system in the Turin surroundings, using Dora and Sangone as a water reservoir, not being affected by the industrial revolution. The aim is to keep the existing farms working, decreasing the physical pressure around the area caused by factories, houses and warehouse getting a new high environmental standard to the city boundary area.

**Cascina Roccafranca**

Roccafranca farm is a cultural center. A place where to participate into Mirafiori life, to meet neighbours, to spend some times expanding hobbies and interests. There are no other centers in Turin, where every activity and service focuses on values such as participation and integration.
3.2.4 Main Features of The Area

Introductions about the On-going Mira- fiori / TNE project

- **zoneA** (Corso Settembrini, corso Orbassano)
  The project for zonA involves the construc- tion of services for individuals and com- panies, which is closely articulated and complementary to the productivity of the FIAT abandon land.

- **zoneB** (Strada della Manta, corso Orbassano)
  ZoneB is occupied by the ex Center Style, ex Mercato Italia and ex Fiat Engineering with attached offices. The zone B is under prelimi- nary feasibility studies, aims at reuse of the existing buildings.

- **ZoneC** (Via Anselmetti)
  ZoneC provides spaces to link production and service area, along the road via Anselmet- ti, creates cycle line and green pedestrian to link the future Piazza Mirafiori and the bank of Sangone.

- **Mirafiori piazza**
  The piazza joining Corso Marche, Via Settem- brini and Via orbassano will represent an infrastucture system with high accessibility to the area.

- **The Centre of Design** (Corso Settembrini, corso Orbassano)
  The project transforms the ex Dai sheded space into the Centre of Design, which will combine the educational activities of Politec- nico di Torino, laboratories and experiments related to production. Under the large metal structure and covered sheet placed 6 building blocks of 2 levels, each of them has a different cladding.

A 310,000 square meter portion of more than 3 million square meter area making up Fiat Mirafiori industrial complex has recently been dismissed and transferred by the City of Torino. The project include the Center of Design, Zone A, Zone B, Zone C, and Mirafiori Piazza.
3.2.5 Conclusion

3.3 Site scale analysis

3.3.1 Important features around the site
3.3.2 Potential and Problems of the site
3.3.3 Accessibility of the site
3.3.4 Photos of the site
3.3.1 Important features around the site

- One of the two cemeteries of the city is located right besides the motorway.
- The triangular area with several abandoned industrial warehouses, today often used by homeless people to take shelter during the night.
- The FIAT manufacturing plants there are still in use.
- There are high rise residential buildings and several community services.
- The wide agricultural areas are already targeted for different projects.

3.3.2 Potential and Problems of the site

1. Existing geometry:
   - with a sunk space 6m below the ground level.
   - Respect the situation, make use of the different height.

2. Previous parking lots for the stock of newly produced cars
   - The space will be given new programs and increase the property values.

3. Existing underground path
   - The design will enlarge this under pass, and think about add other pass.

4. High density community
   - The habitants here will be a certain flow for the site.

5. Existing underground path
   - The design will not keep this under pass, but create new pass to enhance this connection.

6. Existing buildings:
   - these are recent built buildings with poor conditions which are not sustainable in terms of reservation cost.
   - Demolish materials will be reused by the adjacent TNE project.
3.3.3 Accessibility of the site

The site [owned by the FIAT group and other companies].

3.3.4 Photos of the site

The site [owned by the FIAT group and other companies]. Photos about the current situation of the area.
4.1 Steps Toward The Design

STEP 1 Understand the Potential flow of people

The main flow of the site is longitudinal. People go between city and rural to enjoy the nature or the city life.

There is another flow which is transversal, that people come from the new cultural center and the adjacent community.
STEP 2  Guide the flow of people

Create a linear park following the direction of the flow to enrich the recreational experience. Build bridges with green cover, to give continuity to this linear park.

Open spaces as interaction zone to welcome the people from neighbourhood, this transversal flow stopped at the edge of the sunk space, and join the main flow.

STEP 3  Define the density of each area

Area 3 adjacent with the new Mirafiori piazza and the Metro station of line 2, these give the area a good accessibility, therefore the area is more urban.

Area 2 has a medium density, next to the culture center, the area may contain a center amount of residential building as well as open spaces.

Area 3 is next to the high-density community. In order to balance the density of the area, this area has less residential area, but provide more open spaces which area shared with the neighbourhood.
STEP 3  Choose typologies for each area according to the density

“A ‘large’ number of smaller building elements or a small number of ‘large’ ones? In both these extreme cases (or somewhere in-between) it involved the accommodation of a large number of people, and that is no small thing!”


![Classification of the dwelling units](image1)

![Arrangement of different typology on the site](image2)
STEP 4 Define a range of open spaces

we try to shape a considerable range of open spaces in our project. A major element in this is a broad boulevard and 2 main squares.

fig4.08  Main open space structure of the site

Interface zone
this area face the street will introduce a series of social connections

we want to propose an open space system as rich a hierarchy as possible and then interwoven to create maximum diversity of places, locations and opportunities for encounter.

fig4.09  A range of different open spaces
STEP 5  Define the agriculture typologies

Agriculture land use

<table>
<thead>
<tr>
<th>Competition requirement</th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%</td>
<td>Greenhouse, Roof garden, traditional farm, live stock</td>
<td>Greenhouse, Roof garden, traditional farm</td>
<td>Greenhouse, Roof garden</td>
</tr>
<tr>
<td>40%</td>
<td>Greenhouse, Roof garden, traditional farm</td>
<td>Greenhouse, Roof garden</td>
<td></td>
</tr>
<tr>
<td>60%</td>
<td>Greenhouse, Roof garden, traditional farm</td>
<td>Greenhouse, Roof garden</td>
<td></td>
</tr>
</tbody>
</table>

STEP 6  Create the agriculture network

Fig 4.10 Different type of agriculture spaces

Fig 4.11 Agricultural network
STEP 7  Agriculture integrated with other sustainable issues

4.2 Masterplan and Illustrations

- **MASTERPLAN**

![Diagram showing sustainable operational cycle of the community]
**LAYERING**

The layering shows the different elements of the design: buildings, water, farmland, open spaces, site with its own geometry. These elements interwoven to create maximum diversity of places, locations and opportunities for encounter.

**PROGRAMS**

The programs below show the distribution of habitants, and the services provided by the community.
Chapter 5: Agriculture Spaces and activities

5.1 Shared agricultural spaces

5.2 Private agricultural spaces
   (agriculture integrated with building)

5.3 Application of the ICT system
   ref. 42, 43, 44, 45, 46, 47, 48

Materplan Zoom in
5.1 Shared agricultural spaces

These public and semi-public farm lands have the potential to strengthen community, reinforce social cohesive dynamism among neighborhoods. With appropriate technologies, citizens can still enjoy the process of cultivation in a modern cozy way.
CROPS for different types of community agricultural spaces

<table>
<thead>
<tr>
<th>Grow on the tree</th>
<th>Grow on the ground</th>
<th>Grow in the green house</th>
<th>Grow on the vine</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Trees" /></td>
<td><img src="image2" alt="Ground" /></td>
<td><img src="image3" alt="Green house" /></td>
<td><img src="image4" alt="Vine" /></td>
</tr>
</tbody>
</table>

Consider of the climate in Turin and the eating habit of the Italians, here is a catalog of crops and the possible modes of planting.

5.2 Private agricultural spaces (agriculture integrated with building)

Agriculture spaces in typology 1

Agriculture spaces in typology 2
5.3 Application of the ICT system

ICT information and communication technology

The ‘green revolution’ carried on the site is driven not only by new technologies of pesticides and fertilizers but also by changes in demographics and the information communication technology landscape.

The objectives of the work
is to suggest a frame work create a information data base shared by habitants in this community and accessed by ci-

tizens at the same time.

The end users of the system
habitants(famer), market, community service workers.

Application of ICT system in the agriculture activities

- In the community scale

1. An expert systems which helps famers in determining market-
ing alternatives and optimal crops management. it will assist farmers in disease treatment and give produc-
ing advices.
2. A trading system which is an information sharing system that makes crop collection and distribution process more efficient.

The LOOP of the food delivery and collecting service inside the site:

- Habitants bring their crops for sale to the shelves.
- Crops to be sold.
- Deliveryman collects the crops.
- Deliveryman puts the crops required by the families to the shelves.
- Crops desired by families.
Exemple of the information list transferred within habitants and deliveryman

1. Habitants will get the supply list for the day, to get the idea of what they could get.
2. The delivery man will receive the supply list from habitants to know what he may collect.
3. The delivery man will update his supply list after passing each house.
4. At the end of the day, the delivery man need to calculate his daily cash flow.

<table>
<thead>
<tr>
<th>Deliveryman’s Supply list</th>
<th>Habitants’ Supply list</th>
<th>Habitants’ Desire list</th>
<th>Deliveryman’s daily balance list</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/03/2013 supply list</td>
<td>24/03/2013 desire list</td>
<td>24/03/2013 desire list</td>
<td>24/03/2013 Daily balance</td>
</tr>
<tr>
<td>species quantity (kg)</td>
<td>species quantity (kg)</td>
<td>species quantity (kg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>price (€/kg)</td>
<td>price (€/kg)</td>
<td></td>
</tr>
<tr>
<td>14 0.30</td>
<td>6 0.30</td>
<td>6 0.28</td>
<td></td>
</tr>
<tr>
<td>10 0.19</td>
<td>5 0.22</td>
<td>2 1.08</td>
<td></td>
</tr>
<tr>
<td>8 0.20</td>
<td>12 0.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 0.24</td>
<td>3 0.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total income: 6.74

---

<table>
<thead>
<tr>
<th>COLLECTED</th>
<th>SOLD TO HABITANTS</th>
<th>SOLD TO MARKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>species</td>
<td>house num.</td>
<td>quantity (kg)</td>
</tr>
<tr>
<td>15 0.15</td>
<td>10 0.11</td>
<td>15 0.20</td>
</tr>
<tr>
<td>10 0.30</td>
<td>10 0.16</td>
<td>15 0.31</td>
</tr>
</tbody>
</table>
Fresh milk delivery

The yard of the XX office need the goat-weed-control service.

There have 5 families asked for compost.

Why are my crops so small?

The honey festival is on Thursday.

Agriculture

Gelato made by fresh fruit

A image to show how the ICT framework service intergrated with habitants daily life.
In the city scale

It serves as The Whole Chain Traceability Consortium, which helps citizens to follow food throughout fragmented food systems—a really transparent system where data is more fluid throughout the chain.

From ‘farm to fork.’

Through which the consumers are able to (by pointing a smart phone at a food product bar code) retrieve all the steps a product took from the farm to the store.

information about the whole producing process of the food

Where it grows

Which kind of seed (native / imported / transgene etc)

Who is the Farmer

What is used during the growth

How is it packaged

supermarkets around the site within a distance of 5 km
Chapter 6: Recreational and Educational spaces and activities

Through the community education program, kids know very well where the food they eat every day comes from, and are aware of saving the food. Agricultural fields will become the common grounds for citizens to meet and communicate.
Chapter 7: Sustainable Operation Systems

7.1 Water System

7.2 Waste treatment and Energy generation
7.1 WATER SYSTEM - city scale

Wastewater (referred to here as ‘used water’) is a rich resource of fresh water, nutrients and energy that can address issues of water scarcity, food security and climate change. Resource Loop reclaims ‘used water’ locally through ecologically-advanced treatment processes and reuses it in food producing - constructed wetlands, aquaculture ponds and urban farms to successfully create decentralized resource recovery ecosystems.

Corso marche masterplan

7.1 WATER SYSTEM - site scale

water sensitive design

The on-site naturalized creek and pond system, along with some underground storage to treat and control flows. The plants selected in the naturalized creek and pond system are native and adaptive species. The greenway will be a significant amenity and featured landscape area.
7.1 WATER SYSTEM - site scale

- **Wastewater treatment**
  - Membrane Bioreactor Technology

The membrane system is a compact, odor-free, in-house system which can reuse all of the grey and black wastewater produced within a commercial or residential complex.

Inorganic solids are removed in an anoxic chamber (no-air bioreactor) and an aerobic bioreactor, in which bacteria consumes the biodegradable waste product. Membrane which forms a physical barrier to any impurities in the wastewater & filters wastewater through microscopic pores.

An ultraviolet light or ozone generator is used to prevent bacterial growth in the treated water reservoir. Treated water can be used in landscape irrigation, toilet flush and the laundry facilities.

---

[Diagram of wastewater treatment system: Collection tank, Anoxic chamber, Aerobic chamber, Membrane, UV or Ozone generator, Storage tank.]

---

7.1 WATER SYSTEM - site scale

schematic drawings of space around the bioswales

schematic drawings of space around the retention ponds
7.1 WATER SYSTEM - site scale
7.2 WASTE TREATMENT AND ENERGY GENERATION
Chapter 8: Two Dwelling Typologies Integrated With Agriculture

8.1 Semi-detached Typology
8.2 High-density Typology

The basic unit has a ‘L’ shape plan, with 2 floors, made up by two overlapped boxes which is 4 meters wide 12 meters long, the boxes are placed at the right angle, that the floated part of the upper box is supported by the columns which provide a piloii, and the roof of the lower box can be used as roof garden.

The advantages of this unit is that it provide each family the cross ventilation, a side wall toward south, as well as the possibility of future expansion according to the growth of the family.
The Generative potentiality

After having studied some projects about the expandable dwellings, in some cases, the expansion resulting in the loss of outdoor spaces, of direct access to all rooms, and a serious reduction of light and air in the surrounding rooms.

In our basic units, the expansion was in a fixed frame, which will provide alternative use of space without loss of quality of the living spaces.

The DIY zone

Specific residential freedom

96 mq 96 + 32 = 128 mq 96 + 32 + 32 = 160 mq

The Generative potentiality

After having studied some projects about the expandable dwellings, in some cases, the expansion resulting in the loss of outdoor spaces, of direct access to all rooms, and a serious reduction of light and air in the surrounding rooms.

In our basic units, the expansion was in a fixed frame, which will provide alternative use of space without loss of quality of the living spaces.

The DIY zone

Specific residential freedom

96 mq 96 + 32 = 128 mq 96 + 32 + 32 = 160 mq

How big should the self sufficient garden be?

A garden of 50-60mq will be able to support a Family of four in all of the basic Vegetables all year around.

http://www.aselfsufficientlife.com/how-big-should-the-vegetable-garden-be.html

64 + 48 = 112 mq 32 + 48 = 80 mq 32 + 80 = 112 mq 80 mq

These are the possible planting area at home, the habitants could decide the exact area to be used for food production. At the same time in their shared courtyard and the community allotments, they may apply for further place to cultivate crops for family use or for sale.
8.1 SEMI-DETACHED TYPOLOGY --- Family group scale

Each individual dwelling possesses the potential to develop, by means of configurative multiplication, into a group (sub-cluster) in which the identity of each dwelling is not only maintained but extended in a qualitative dimension that is specifically relevant to the particular multiplicative stage to which it belongs. Whilst the resulting group is, in turn fortified in the next multiplicative stage by a new identity which will again enrich that which precedes it.

How should these basic units be arranged in the area?

Steps towards a configurative discipline
By Aldo Van Eyck

No-end expendable system, lack of the sense of identity.

Infinite expenditure in one direction, the outdoor spaces are uniform.

Selected combinations

Different form of common space
Diverse movement and tension of the space.
How are the units combined together?

We have two units, below are the basic combination of these units.

**A + A**

**B + B**

**UNIT COMBINATION 1**

Group 1 has 8 families

The path of each family from the upper ground to the sunk space.
UNIT COMBINATION 2

Group 2 has 7 families

The path of each family from the upper ground to the sunk space.

UNIT COMBINATION 3

Group 3 has 9 families

The original group

The homogeneous group which has 8 families

The path of each family from the upper ground to the sunk space.

this combination contains 2 groups
PLANS OF GROUP 2

FIG 8.17
Ground floor plan

FIG 8.18
First floor plan

FIG 8.19
Second floor plan
PLANS OF GROUP 3

Gound floor plan

First floor plan
SECTIONS OF THE 3 GROUPS

Section 1-1 FIG8.22

Section 2-2 FIG8.23

Section 3-3 FIG8.24

VIEWS OF THE 3 GROUPS
8.2 HIGH-DENSITY TYPOLOGY --- Family group scale

The different typology of can be combined to a regular cubic shape which is easier to be add up as a whole residential building.

A

D

B

B

C

8.2 HIGH-DENSITY TYPOLOGY --- Community building

This typology has a higher density. It is a terreced building which has a central corridor to connect apartments. An opened platform for each floor to have shared activities.

The building is rised up on the ground floor which provide penetrated movement and hold the commercial units.

FIG8.28

FIG8.29
8.2 HIGH-DENSITY TYPOLOGY --- Single family scale

There are 4 layout of the apartments, all of them with sufficient living space plus a planting area that is 15 mq.

- **A**: 70 mq
- **B**: 70 + 24 = 94 mq
- **C**: 94 mq
- **D**: 94 + 24 = 118 mq

3D Explanation of the type 2
REFERENCES

8. www.pumeo.com/main/C01_FoodWater
11. Edwards, Tom, and Nigel Dunnett. "Vertical Farms - Mobile Edible Wall Unit (MEWU)", Green living technologies, international llc
13. Edible Schoolyard", Cilento , Karen
14. Edible Schoolyard", Cilento , Karen
16. "How to grow hydroponically - Overview of Grow Systems", Sunny Dallo
17. "Aquaponics System more productive than conventional gardening & farming"}

Bibliography

REF.1 www.polito.it/turintogreen "Turintogreen | International Student Design Competition." Turintogreen RSS. N.p., n.d.
REF.6 www.eusem.com/main/CE/I_FoodWater
REF.9 www.fiveboroughfarm.org/urban-agriculture
REF.14 http://www.southcoastfarmers.com/urban-agriculture
REF.15 Jeffrey Winterborne, Hydroponics - indoor horticulture, Pukka Press,2008
REF.17 www.foodparadox.com/?p=88, "Aquaponics System more productive than conventional gardening & farming"
REF.18 www.yankodesign.com/2012/11/19/herbed-windows/, "Herbed Windows", Hsu Hao-Po, Chang Yuhui, Chang Chun-gWei
REF.20 www.gylgardens.com/how-it-works.html, G.I.Y Gardens
REF.24 www.earthtimes.org/business/a-first-us-greenhouse-power-project-co2-fertilisation/2149, "First US greenhouse heat and power project with CO2 fertilisation", Lindan Volsun
REF.25 http://www🐉"vertical farms - mobile edible wall unit (MEWU)", Green living technologies, international llc
REF.26 http://www.brookyngrangefarm.com/
REF.27 www.mdesignboom.com/architecture/shipping-container-greenhouse-urban-farm-unit-by-damien-chivialle/?utm_campaign=daily , "shipping container greenhouse urban farm unit", Damien Chivialle
REF.28 www.archdaily.com/47183, Edible Schoolyard", Cilento , Karen
REF.30 http://www.comune.torino.it/geoportale/pums/cumil/ "PUMS-Plan urbano della mobilita sostenibile, Citta di Torino", divisione infrastrutture e mobilita
REF.32 http://www.southcoastfarmers.com/urban-agriculture
REF.34 www.archdaily.com/47183, Edible Schoolyard", Cilento , Karen
REF.39 www.cascinaroccafranca.it

134

135
We would like to thank Professor Laura Daglio for her visionary guide, Oscar Eugenio Bellini for his constructive suggestions.

Also, we would like to thank Politecnico Di Milano for providing us with great study resources during two years' master courses.

Finally, we would like to show most gratitude to our parents, who have supported us for studying all these years. / Jia Wang & Yiming Yin 2013

Thanks