Reclaiming the industrial landscape through sustainable transformation
Reclaiming the industrial landscape through sustainable transformation

Master Thesis
Shing Rong Wu
Student ID 1530968
Department of Urbansim
Faculty of Architecture
TU Delft

Studio:
Landscape Metropolis

Mentors:
Willem Hermans, Ir. W.J.A.
Dr. Thorsten Schuetze
René van der Velde, J.R.T. van der
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Introduction

The title of the graduation project is Reclaiming the industrial landscape through sustainable transformation. The generalized crisis of several industrial sectors contributed to the appearance of derelict industrial areas. The establishment of new and more severe environmental legislation associated with an increasing public pressure related with the need to protect the environment and the people's desire for interaction with nature or the natural world increase the development of landscape reclamation project. An important step towards a sustainable city is represented by enhancing the cast-off industrial areas with the optic of the recovery and of reuse of the existing heritage. The transformation of derelict sites into parks and public spaces represents a significant enhancement to the quality of life and land use, and at the same time marks a new commitment to the transformation of once-industrial sites to new cultural, programmatic and environmental uses from sustainability point of view.

The Industrial Revolution was a period from the 18th to the 19th century where major changes in agriculture, manufacturing, mining, and transport had a profound effect on the socioeconomic and cultural conditions starting in the United Kingdom. Take London for example, in the pre-war period, 1934-1938, expanding industry was mainly concentrated in Greater London: nearly half the total number of new factories, employing 25% or more opened in the country were in the Greater London Region, especially in East London.

However, through the change of economy, the most of industrial areas become the underuse space. How to redevelop old industrial area is the main issue of London. Therefore, the study case of this project is Lower Lea Valley, the deprived industrial area, in east London. Today, it has the opportunity to redevelop by 2012 Olympic Game. How to emphasize the unique industrial landscape and improve the quality of open space and open up the accessibility are the main tasks of this project.

1. A general view of industry in east London
2. A view of regent’s park, 1829
3. A view of Lower Lea Valley
Theoretical framework

Key word: Industrial Heritage, Industrial Landscape, Sustainability, Transformation, Lower Lea Valley

Since the 1970s developed Western cities have experienced significant changes induced by numerous factors (e.g., accelerating globalization, developing technologies, differences in power relations) but with respect to their industrial bases, these changes can be traced back to shifts in the world economy. The industrial equipment placed large portions of land; however, after the decline of heavy industry, it is necessary to develop new strategies to reclaim derelict spaces. The intent of this paper has been to lay out a framework for applying the concept of reclaiming industrial heritage, focusing on restructure of industrial landscape, quality and multi-functionality of the space, with attention to historic and sustainable aspect.

What is industrial heritage and how it influence on regional identity?

Industrial heritage consists of the remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education (TICCIH, the world organisation of industrial heritage, 2003).

From the literature I understand that industrial heritage is an interdisciplinary which comprises material and immaterial, of documents, artifacts, stratigraphy and structures, human settlements and natural and urban landscapes, created for or by industrial processes. It makes use of those methods of investigation that are most suitable to increase understanding of the industrial past and present.

How to deal with the industrial heritage in the urban principle?

“The matter of what to do with these industrial elements is becoming increasingly important on governments agenda’s” (Feilden, 1988). Some see it as a burden others see it as a possibility. There are 7 types of “intervention” when it comes to heritage: Deprivation, Preservation, Conservation,
restoration, Rehabilitation, Reconstruction, Demolition. In this theoretical framework, the main attention is toward to conservation and rehabilitation under the urban principle and fabric. The industrial city or industrial field normally has strong symbolic meaning and memory for local people and city itself. Therefore, the transformation could be one of the methods to conserve the industrial heritage. In addition, the structure of communities in industrial city may have the gap in between new urban development. Rehabilitation could be the possibility to reduce the fragmentation in term of social sustainability. Prossek, Achim (2005) mentions re-use without being clear about re-using the building and its function, or giving it a new function. For the remainder of this document, reusing could comprise existing building, equipment, infrastructure, landscape, function and structure. The urban development is dynamic with times. Furthermore, the transformation is a bridge to connect the historical memory and new experience.

How to implement the industrial transformation?
According to the different industrial area has different component, I take Lower Lea Valley to be a case to represent how to implement the industrial transformation. Lower Lea Valley has high industrial position of East London in 19 century. However, it came one of the most deprived area in London after the decline of heavy industry. Although a large part of land is derelict now, it comprises rich natural resource and industrial elements such as gas holder, curly water course. The waterway is the main foundation of Lower Lea Valley and it is preserved from the industrial period. Nevertheless, lots of gas holder is the iconic feature to represent the history. The transformation of industrial landscape has the potential to implement in this area. The unequalled water form, plot of green space and huge gas holder could integrate into a perfect symbiosis between the pass, present, and the future industrial landscape.
Industry is one activity that can occur practically anywhere on the planet’s surface. It is a human endeavor that is practiced in both development and underdevelopment countries. In the past, industry was often abandoned without performing any reclamation. Today, with the increased ability to disturb and affect large portions of the landscape, there is a deep public concern performing any reclamation work. It is necessary to reclaim these industrial elements when the new development place in these areas, focusing on the sustainability, quality and multi-functionality of the space, with attention to historic, socioeconomic and cultural aspects.

In the graduation project, I take Lower Lea Valley for example because it has the important position from industrial period of east London. As time goes by, the economic goes down and it loses the population and position. But it still leave unique industrial feature. LLV has opportunity to redevelop now by 2012 Olympic Games. Nevertheless, from the proposal of Greater London Authority mention that they will demolish two third existing buildings to build up the new Olympic facilities and new function. Therefore, the identity of LLV will deteriorate by moving out the industrial components. It not only destroy the cultural heritage but also diminish the memory of local people. This is the main problem statement of this project.

Moreover, the curve waterway is also the main element to represent that LLV rely on water to develop economy in the industrial period. However, the waterfront in LLV become unattractive waterfront now. Most of vacant industrial areas are along the River Lea in Lower Lea Valley and it lack of promenade so people cannot walk and close to the waterfront. Reorganize the open structure along the waterfront would be foundation to enhance the position of LLV to transform this old industrial area into new attractive node in East London.
Except industrial heritage, the accessibility is another big issue of LLV. The accessibility is relevant to how to reach this reclaimed industrial area. Open the possibility for people to attend LLV. In the current situation, it lacks of the access from the neighborhood. Therefore, it is difficult to reach LLV from surrounding by walk or bike. How to improve the well public connection to this area would be addressed in this project.

LLV lacks a vital open space. There are some green spaces spread around in this area but it does not have the systematic open space. Most of residents are unemployment and live in the poor housing within this post-industrial wilderness. The low quality of living environment is the main component of social segregation in between high class and middle class. Furthermore, it lacks a vital open space to harmonize or communicate two level classes. The open space could create with industrial component in this area to let people reusing and understanding the history of industrial LLV.
Define Project

Inventory
Description
Motivation

History Geography Survey Policy Literature

Analysis / Making question

S.W.O.T. Regional context Local context Supposed proposal

Design research

Make up Composition Case study Resolution

Design experiment

Design concept / Proposal

Resolusion

The diagram of methodology

In addition, I will apply the landscape analysis methodology into the project. Define the plantation and theater area to represent to built and unbuilt area for whole Lower Lea Valley. And also view how people can reach Lower Lea valley by public transport to improve the accessibility from flowscape aspect.
Structure & Methodology

The structure of this graduation project is to decide and select the industrial component. Mainly focus on how to combine landscape and industrial elements, infrastructure, new program. In addition, it could be implemented by the different combination with landscape element such as waterway, open space, and urban fabric like formal urban pattern or campus concept. Then I will have an alternative planning to represent why it is could be changed or reinforced from the proposal of Greater London Authority (GLA) and furthermore, choose the key acupuncture node to make the alternative design production which is the intervention area.

The principal statement of this project is to be flexible, possible, and sustainable. Firstly, is to review the literature about sustainable development in urbanized for instance, Cities as sustainable ecosystems, 2008 and Sustainable urbanism urban design with nature, 2008. I can know more what kind of essence is needed to achieve the sustainable development. Moreover, take the journal article, Use and Perception of Post-Industrial Urban Landscapes in the Ruhr for example. It can be the reference for case study and understand how Ruhr area transform the industrial area into industrial park. In addition, I will criticize the Lower Lea Valley developing proposal and policy of GLA to evaluate how they deal with the industrial heritage and how to integrate with new Olympic development.
The development of London
Analysis: from XL to S

The analysis part comprise four aspects in terms of different scale. The first scale is XL: metropolitain scale.

The 19th century was a period of rapid growth for London, reflecting an increasing national population, the early stirrings of the Industrial Revolution. Expansion continued and became more rapid by the beginning of the 20th century, with London growing in all directions. To the East the Port of London grew rapidly during this period, with the construction of many docks, needed as the Thames at the City could not cope with the volume of trade. The first founded Letchworth Garden City is projected into the real countryside 40 km north of London. The arrival of the railways and the Tube meant that London could expand over a much greater area. By the mid-19th century, with London still rapidly expanding in population and area, the City had already become only a small part of the wider metropolis.

The major event of spatial planning in the world was in 1944 Abercrombie Plan. This plan provides a concept of the city as a termination by Green Belt to the growth of London in a ring of New Town. Within the Green Belt Abercrombie gives the global village with densities, ring roads and traffic reduction program for the functions such as live, work and green in London. Revitalization and expansion of the green belt happened in 1988 to conserve the green space. (Tummers, L. J. M. and J. M. Tummers-Zuurmond, 1997)
introduction

London population density 2001
Source: The London Plan, 2004

The location of industry in London, 1938
Source: Administrative county of London development plan, 1995

Areas for Regeneration
Source: The London Plan, 2004

Insured employment, 1958
Source: Administrative county of London development plan, 1995
The development of east London

The development of east London can divide three periods which are the past, present and future.

In the past--- the main location of industry

The main industrial distributions are located in the east and south-east. The River Lea area in Hackney, the eastern part of Poplar, together with the Limehouse Cut area, and river users on the Isle of Dogs. The greatest industrial acreage to be found in the north-eastern area, which contains the Boroughs of Stoke Newington, Hackney, Bethnal Green, Shoreditch, Stepney and Poplar. The industrial area is 914 acres, or over 10% of the total area. There are about 7,000 factories. In addition, the employment is more related to clothing, textiles and engineering and metal goods in east London.

Present--- deprived area

The centralized development of central London leads east London to become the shrinking and deprived area. Most of population and facilities distribute in the central London. The east London has high rate of unemployment and destitution. From the figure shows the 20 per cent most deprived areas which are mainly located in east London. These have been identified as the strategic areas for regeneration in the future.
The East London sub-region is the largest of London’s sub-regions. Promote and plan for the Olympic bid in east London and enable the necessary development for a successful sustainable Olympics in 2012, enhancing London’s facilities in a sustainable way in order to have maximum benefit for Londoners after 2012.

East London not only could become London’s gateway to mainland Europe, building particularly on the Stratford International Railway Station in Lower Lea Valley, but also on access to the City and Stansted airports, the Channel Tunnel and the Port of London. Economic development should be geared for the long-term opportunities these present. It has many of the capital’s largest development sites and a large number of areas suffering multiple deprivations.

East London will plan for a minimum 104,000 additional homes and 249,000 jobs up to 2016. Development in this sub-region should continue well beyond the plan period as the impacts of major new transport infrastructure, and of programmes of land assembly stimulate a virtuous circle of development and environmental improvement.
The accessibility is centralized in central London. Compare with central London, the infrastructure connection in east London is weaker. Therefore, how to improve the accessibility especially public transportation connection should be taken into account in this project.
In London, it has the famous huge green space, green belt which is conserved cultural landscape. Moreover, there are several big metropolitan lands in London as well. In east London, it has different kind of green space such as regional park, urban park, district park, and neighborhood park. And also east London has rich water resource. However, the green space and water basin are fragmented. It lack of the connection and continuous landscape. If can stitch the missing link space or void space then can improve landscape system in east London.
**Identity**
rich nature resource and cultural heritage

Lea Valley regional park
4000 ha

**Meaning**
London’s biggest open space

**Structure**
along Lea river three zones

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**XL**
>4000ha region

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local park
district park
urban park
metropolitan park
regional park
The park could be analyzed from three aspects which are identity, meaning, and structure. The identity means the unique feature and it is the important difference from others. Meaning means the position and what kind of program does this park have. The third one is structure which means the structure of park. Take the regional park for instance. It has the rich natural heritage which is the feature and identity. Moreover, Lea valley regional park is the biggest open space in London that is the meaning of LLV. The structure of regionally park is to divide four different zone terms of it’s context. It can provide different kind of activity as well.
The Position of Lower Lea Valley
Past, present, and future…….
Lower Lea Valley is located in east London and it was the most important industrial area in east London in the past. The area of Lower Lea Valley is around 1200 ha. From south part to north part is approximately 6 km. In addition, from LLV to central London is around 7km which is within the range of bike catchment. LLV had the high position in the industrial economic period but it became the most deprived area after economic changed. However, LLV has the potential to redevelop by Olympic games now. What is the possibility of LLV in the future?
The connection of LLV

Existing road system
Existing public transport system
Existing walking system
There are four main connections, railway, road system, underground, and pedestrian route, reach to Lower Lea Valley (LLV). There are five main roads cross this area. Blackwall tunnel northern approach road is the main road to connect northern part of LLV to south. East India Dock road and high street can link to central London. Moreover, Aspen way can link to Docklands, and east way can link to north and east LLV. On the other hands, there are three underground lines which are central line, jubilee line, district line and can connect from central London to LLV. And also can transfer to DLR (Docklands Light Railway) to this site. There are 15 stations of underground and DLR system within this area that is the high accessibility to reach LLV by public transport.

We can see from the map that the pedestrian and cycle routes are not available in LLV. It is difficult to approach LLV and cross the river Lea from neighborhood by walk or cycle. It only has few pedestrian streets along the riverside in the core of LLV. How to create the enough walking space and quality of pedestrian street in LLV should be took into account in this case.

Connection framework in LLV
The existing green space is centralized in the middle of LLV. The small green space spread around in this site. Some areas lack of green space and has missing link with the greenway system in LLV. The two main big parks which are Lea Valley regional park and Victoria Park located in the surrounding of the north LLV.

The waterway, River Lea, is the main body of LLV. The unique form of River Lea has the strong feature of landscape for this vast area. It is devoted from industrial period. The waterway runs through whole area and the waterfront could be the attractive space instead of vacant space. The Lea Valley is subject to both tidal and fluvial flood risks especially south part which has the combination of tidal and fluvial flood risks.

Moreover, form the geologic layer map, we can see the most of land in LLV is peat and alluvium. In the pass, it generally avoided by development until early 19 century. The high density development is not appropriate of this area.
River Lea has different form in the different period which is related to the landscape and economic condition. The water flow is from north to south into Thames river. Moreover, the strata between the top of the Basal Sands and the London Clay are predominantly clays with occasional layers of more coarse-grained material. It is generally accepted that these clay strata act as a confining layer to the Chalk and Basal Sand aquifers. In addition, clay is less permeable and difficult to keep water. Furthermore, void space in the aquifers, made available by the fall in water level, is being replenished by artificial recharge.
Flooding from rivers or sea without defences shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded: from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year. or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Extent of extreme flood shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance of occurring each year.

Flood defences

Areas benefiting from flood defences benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200) chance of happening each year. If the defences were not there, these areas would be flooded.

Water problem - flooding

Water problem is the important issue in London. The first problem is flooding. The inefficient sewer system combines rainwater and waste water. When the population increase and the storm happen in short time, it can not offer rainwater and waste water discharge into Thames River then flooding happen. Therefore, it is important to divide the rainwater and waste water sewer system. Moreover, we can see from the illustration that the extreme flood area should be the lower point that could be the space to create the open space to be the flooding buffer zone which is the room for water flow.
Water problem - water shortage

London is built up on the clay which is less permeable and difficult to keep water. Therefore, it has less groundwater can use in London. In addition, because of climate change, the heat island problem becomes more and more serious in London. We can see from the illustration, LLV is one of high land surface temperature area and it cause drought problem in summer. How to store rainwater in winter and also improve infiltration from surface become important for water management in London.
How to address water problem in Lower Lea Valley?

Flooding
Flooding buffer zone

Water shortage
Strengthen infiltration from surface

Lower position to be room for water

Water flow from higher position

Water storage
Government plan

Most of Olympic facilities distribute in Lower Lea Valley. It has the opportunity to regenerate by Olympic development. The government of London has the future proposal for LLV. From the connection aspect, the idea is to enhance the linkage in Stratford and the connection between two sides of river Lea. Furthermore, increase the bus route on the main road and it connect to the railway and underground station. However, the accessibility from the neighborhood and from the station to main facilities and key spot should be emphasized. The Valley will have at its core a series of connected open spaces linked by revitalized waterways. The new linear park will create much needed neighborhoods parks and spaces, varying in character, width and configuration. Some of these spaces will be designed for active sport and recreation including Olympic legacy sports facilities. Some will be more ‘wild’ in their character creating wetlands and wildlife refuges. All will be accessible through a network of green paths, footpaths and cycle tracks and many new bridges that will be built to span the waterways and existing roads and railways.

From the vision of the government of London (Vision for the Lower Lea Valley, London Thames Gateway Development Corporation, 2006), there would be 30-40,000 new homes; up to four new secondary schools, and up to 9 new primary schools in LLV. The aim is to create stable and balanced communities and this will mean providing a high proportion of new housing in a form suitable for families – with targets of over 40% of all new housing to be for families – and half of all new housing to be affordable housing for rent or shared ownership. There are five existing clusters of specialized industrial activity, including the creative/cultural industries at Three Mills/Sugar House Lane and on the Leamouth peninsula, printing in Hackney Wick, and ethnic food or food wholesale, based around Fish Island and new Spitalfields market.

The function along the river should keep flexible and provide more possibility of mixed use area. It’s not only the opportunity to improve the quality of open space but also strengthen the living and working environment.
Regional park

Olympic component

Industrial component

River basin
The potential development elements of LLV

Originally LLV has natural and cultural elements that could be feature to be strengthened. Moreover, the new elements, Olympic facilities, will replace in the middle of LLV. It gives the opportunity to get attention to redevelopment. LLV could be recognized into three areas in terms of site context and future opportunity. It is also related to different spatial quality and structure. The north part has natural resource connect to regional park. The middle part is occupied by Olympic facilities and bottom part has more industrial cultural elements.
Integrated approach by green, water, industrial elements, infrastructure, programme

- Combination between landscape with industrial component, and landscape with infrastructure

**Concept of LLV**

Lower Lea Valley has rich natural resource and unique industrial landscape and element. It is divided by infrastructure and waterway to little plots of land. In the current situation, the accessibility from neighborhood is not available. Strengthen the accessibility and also enhance attractive waterfront. It could integrate by landscape and continual horizon and experience through the iconic element to represent the history and indicate the open space along the waterfront. Moreover, the main concept of this case is to consider LLV as a park which comprise four parks and inner park along the waterfront. The location of LLV is connected to the Regional Park and also green belt. Therefore, it has potential to be main open space for east London. South park of LLV is the high potential flood risk area and mainly has deposits and alluvium that could place the new waterway and water storage to store water for summer and also a part of landscape feature.
**M scale: intervention area**

The condition of intervention area is under construction because preparing of Olympic Games. The industrial equipment is occupied along the waterfront and there is no space for promenade. The gas holder is underuse now that could transfer into other function.
The condition of industrial elements

worth industrial elements to conserve

demolish area
The worth industrial elements could be conserved to be the feature of transformation. It is related to age and condition of building and the indication of industrial history. For example, the gas holder is the most significant industrial in this area. It is under use now so could be transferred into new function. In addition, there are several business office are located in the business centre. Therefore, it should be keep as business centre to attract more business replace in this area. However, some areas are vacant space and messy condition buildings. It could be demolished and open up the space for new housing area or appropriate program in the future. Moreover, the green space in the intervention area is fragmented. Therefore, it has potential to create green corridor to connect green space in order to enhance the continuous landscape. And also could consider combining industrial component with green space that not only can conserve the industrial elements but also open to visitor for leisure.
The component of industrial transformation

What does Lower Lea Valley have from the pass:
- water
- green space
- industrial infrastructure

What is possible development of Lower Lea Valley:
- new program
- campus concept

Landscape + water storage
Landscape + industrial component
Landscape + infrastructure
Key node project 1: landscape + water elements

- New waterway + water storage
- High accessibility to close water and green
  -- Three green passage
- Reuse gas holder
Key node project 2: landscape + industrial elements

- Walk able promenade along waterfront
- Industrial park, floodplain
- Facilities: restaurant, café, museum, exhibition, studio, observatory, spot
- Green space: grassland, playground, agriculture, slope or hill
Key node project 3: landscape + infrastructure

- Improve accessibility from neighborhood to cross infrastructure
- Core program for gateway image
- Unbuild area for floodplain
- Mixture of new program and green space
The industrial transformation could be represented by three node projects which have different topic to deal with. It is basic on the context of that area and the potential in the future. The first one key node area has 8 containers of gas holders. Some messy and vacant temporary buildings are located in this area. How to reuse gas holder and organize the open space, waterway and structure of urbanized area should be took into account. The second key node area is along the Lea river basin and also has three containers of gas holders. Because there are several local artists in Hackney and newham, it could provide space for them to emphasize the cultural creative industry. In addition, open up the waterfront to be the attractive and walk able promenade would be the potential of this area. The third key node area is surrounded by heavy infrastructure. How to integrate infrastructure with landscape and also create the possibility to cross railway and main road from surrounding would be the main task in this area.
Research question

The main research question that should be answered is the following:
How to re-use the industrial heritage to provide east London a sustainable environment for living, working and leisure?
The following sub-research questions would be considered and represented within this thesis plan.

A. Evaluation aspect
- What is the definition of sustainability from urban development point of view?
- How to balance development and historical heritage through urban regeneration in east London?
- How to reduce the social segregation by spatial planning to balance social integration?

B. Global and local spatial aspect
- How to use landscape design to reclaim industrial heritage?
- How to convert the unattractive waterfront into welcome open space by transformation?
- What kind of elements can contribute to regenerate the waterfront of Lower Lea Valley?
- What kind of industrial component could be conserved and transform in Lower Lea Valley?
- How to advance environmental qualities in Lower Lea Valley?
- How to use the existing natural resource into new urban development?
- How to improve the network between surrounding, central London and Lower Lea Valley?
- Is the strategic planning proposal from the Greater London Authority really appropriate to Lower Lea Valley?
- How does local people think about the future of this area?

Aim of the project

The main aim of the research and design project is to establish the possibility to re-use industrial heritage and also improve the better quality of open space by landscape design.

Furthermore, the objective of the graduation project is searching for appropriate instruments to strengthen the environment in post-industrial city. And the integrated approach would be applied to enhance the position of Lower Lea Valley to be the sustainable Olympic development centre with cultural feature in east London. Lower Lea Valley could contribute as the main open space which connect to the green belt in east London.

For this project, mainly focus on dealing with the open structure in Lower Lea Valley. It can represent to the relation between the waterway, landscape, industrial elements and accessibility. Create the better living, working and leisure space in east London.
The illustration of build up area and open space in London
Greater London = Gray London?
Greater London is the top-level administrative subdivision covering London. The administrative area was officially created in 1965 and covers the City of London, including Middle Temple and Inner Temple, and 32 London boroughs. There are approximately 60% open space which is including green belt in Greater London. The urbanized area area more centralized in the central London and extend to suburban area as well. Because population increase and urban extension, open space is occupied by urban development. However, in terms of environmental sustainability and climate change, landscape extension could be seen as the new approach especially to solve the water problem in London.

Landscape extension

Why landscape extension?

Because

Climate change
- storm
- drought
- water problem
- flooding
- shortage

So

Landscape extension
- more green space
- increase ground infiltration
- reduce heat island

urban extension

landscape extension

The diagram of urban extension and landscape extension
Stitch the missing link of green structure

There are several kinds of metropolitan open land such as park, woodland and garden in London; meanwhile, the historical green belt appeared to prevent urban sprawl by keeping land permanently open and its essential characteristic is its permanence. Moreover, the project of gateway and parkland start to emphasize the landscape quality along Thames river and East London. Although there are 60% open space in London, they are fragmented. Therefore, the first idea is to stitch the missing link of open space in order to reinforce the green web in London. Furthermore, create new waterway to build up recycling water system. The approach to create landscape web can strengthen the continuous landscape that could provide the continuous movement experience and scenic perception.

<table>
<thead>
<tr>
<th>Metropolitan open land</th>
<th>Green belt</th>
<th>Gateway / parkland</th>
<th>Green web</th>
<th>Landscape web</th>
</tr>
</thead>
<tbody>
<tr>
<td>60%</td>
<td>70%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Greater London
The potential of landscape extension in Lower Lea Valley

The big amount of green space distribute over the periphery of London, however, in the middle of London has less green space. Take Lower Lea Valley for example, the location is connected to Regional Park but lots of vacant space or wild area in Lower Lea Valley. It is like a missing link for green structure in London. Moreover, Lower Lea Valley has unique industrial landscape feature could be strengthened as the key point to drive the spatial quality of east London. Therefore, Lower Lea Valley has the potential to restructure the open space framework in terms of reclaiming the industrial landscape.
The potential development of Lower Lea Valley

In the current situation, Lower Lea Valley has high potential position to connect Lea Valley Regional Park and Thames River but the quality and quantity of open space are defective in Lower Lea Valley. Therefore, the main concept is to consider Lower Lea Valley as a park. It has potential to be main open space for east London. Lower Lea Valley not only could be the green spine to connect Thames River to Regional Park and green belt but also can provide different and vital spatial experience of urban landscape, cultural landscape and natural landscape. It could comprise theme park, liner park and waterway to integrate different feature and potential elements such as industrial factory or gas holder and Olympic sport facilities. The idea of strategic plan of Lower Lea Valley is to organize the multi-functional open space and also enhance the industrial and Olympic identity for the future vision.
When Industrial Lowe Lea Valley meet with Park Lowe Lea Valley
Spatial experiment

What is the possible spatial experiment of Lower Lea Valley? According to problem statement and context, it can be tested as four schemes to illustrate what Lower Lea Valley could be in the future. The first notion is to set up the criteria of experiment. The core principle is to reflect the problem and potential of Lower Lea Valley. The low spatial quality, weak pedestrian and bike accessibility, and water problem are the main problems need to be addressed. Therefore, the experiments will consider about spatial quality, accessibility and sustainability three aspects.

1. Improve spatial quality
   -- Create vital and useful open space
   -- Reorganize road and open space structure
   -- Continuous landscape system
   -- Dynamic spatial experience
   -- Walkable and attractive waterfront

Create vital and available open space can attract people to use space and also keep the attractive spatial quality with living, working and leisure. In addition, provide continues space for walking and cycling with continual landscape perception. It is not only for promenade but also could be ecological corridor for animal to keep the biodiversity in Lower Lea Valley.

2. Sustainability
   -- Reduce carbon dioxide emission
   -- Increase green space to slow down the affect of climate change and improve the infiltration
   -- Release flooding and water shortage problem
   -- Reuse industrial component

Moreover, in terms of sustainability, address the water problem such as flooding and drought by green network and water network. Furthermore, the industrial component is the important feature for this area so how to reuse industrial elements should be took into account.

3. Accessibility
   -- Open pedestrian and bike accessibility from neighborhood
   -- Easy to close to water and green

The bike and pedestrian connection should be improved from neighborhood to reach to waterfront. Open up the walk able waterfront could contribute to generate Lower Lea Valley as the new attraction in east London.
Plantation - theater concept

Programmatic park

Liner park

Node oriented park

Integrated park

- sport park
- cultural park
- Plantation+theater
- Two district parks
- floodplain
- Plantation+theater
- gas holder
- infrastructure node
- stadium
- three mill
- infrastructure node
- Integrate green, water, facilities
- Plantation+theater
According to context and potential development, there are four schemes, programmatic park, node oriented park, liner park and transformation park, to represent different green space in terms of location, size and purpose. The concept of programmatic park is to create two main district parks as sport park and cultural park. The sport park mainly has football field and Olympic facilities. The cultural park includes industrial factory and gas holder could reuse as recreational function. In addition, the second scheme is node oriented park which means to emphasize the combination of different key node such as infrastructure node, stadium, and industrial component. The third scheme is liner park to create green space along the water course and enhance the quality of waterfront. The green space in this scheme could function as floodplain. The final scheme is transformation park which combine previous three schemes. The idea is to integrate water, green and urbanized development. The natural resource, woods or forest area, could be seen as the extension of Lea Valley regional park. Moreover, sport field and Olympic facilities distribute in the middle part as sport park. Furthermore, it also consider about to apply the cultural elements and ecological field which basic on industrial landscape component such as gas holder, curved water course and rich biodiversity.
Evaluation for 4 schemes

The principle of spatial experiment

<table>
<thead>
<tr>
<th>Feature</th>
<th>Programmatic Park</th>
<th>Node Oriented Park</th>
<th>Linear Park</th>
<th>Transformation Park</th>
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<tr>
<td>Vital and useful open space</td>
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<td>Conversant waterfront and open space</td>
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<tr>
<td>Increased green space</td>
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<td>Release water problem</td>
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<tr>
<td>Reuse industrial component</td>
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<tr>
<td>Open pedestrian and bike accessibility</td>
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It is important for LLV to transfer the industrial component into new function or part of landscape. Moreover, what kind of program and spatial perception could represent as metropolitan park? I take the central park and Westergasfabriek in Amsterdam for example to test how to reuse industrial land as a park. From the illustration we can see, the central park and metropolitan park in Amsterdam both have sport field, forest and the reservoir. It could be applied into LLV. Restructure three main green spaces as district and urban park, and promenade as green corridor. On the way, people can experience different spatial perception and variety. For instance, the natural park, Olympic sport park, industrial park which reuse gas holder as reservoir and provide water recreation as well.
Landform

Green structure

- existing green space
- proposed attional green space
- future combined green space
- Landscape design
Green structure

The continuous park system performs for LLV, aiding development and facilitating recreation, and performs for the local ecology, improving habitat and the environment. The main notion is to stitch void space as green space to emphasize continuous landscape experience and diversity in terms of unique cultural landscape. Restructure landscape infrastructure to treat storm water and remediate brown fields. On the way can enjoy different character of green space; for instance, from north is including woodlands and meadow landscape which are more natural perception. After natural park, people can use sport field such as Olympic stadium and sport facilities which are more active green space with activity. Then there is the green corridor with path trees to connect to industrial park and water park which combine with industrial elements, and also ecological field to use native planting with wetland that could revive the environment in LLV.
Current strategy of water management

Wastewater

Collect from building

- treatment facility
- use recycled water

Rainwater

Collect from street

- rainwater reservoir
- stormwater cleansing
- collect from pedestrian zone
- collect from street

Collect from hill to lake

- silt and precipitation
- artificial lake to collect rainwater
- rainwater reservoir

Future water management

- water wetland (water cleansing system)
- Lea River basin
- underground water storage
- reservoir lake
- ecological pond
- Thames River basin
- new waterway
- fresh water
- water cleansing system
- rainwater storage
- water cleansing system
The concept of water structure in LLV is to divide wastewater and rainwater in order to reduce the pressure of water. In addition, a multifunctional network of open space along waterway and functions is created as a system of reservoirs for excess water during floods, for water purification and, at the same time, as a productive public park landscape. Because London lacks groundwater, the idea is to create the lake and transfer gas holder as reservoir. Moreover, the large green space can strengthen the infiltration to store water under green space. Furthermore, wetlands and water treatment facility cleanse this water, which is used on site for irrigation in dry season and also fill into the waterway and lake. In this case, integrate landscape and industrial component as the tool to reduce the water problem, meanwhile, could provide the space for people to be closed to water and green.
Pedestrian and bike circulation

existing pedestrian and bike path

green space
pedestrian route
bike route
boardwalk
In this project, one of the main tasks is to improve the public accessibility which means pedestrian and bike connection. In the current situation, the pedestrian and bike circulation system is weak and people are difficult to cross the infrastructure from neighborhood. Therefore, the idea is to open up the boundary of waterway and infrastructure by bridge or terrace, and provide the opportunity to reach waterfront. The pedestrian and bike connection mainly connect to open space, waterfront and key spot. The continuous movement in LLV will integrate with continuous landscape that user can experience the activity without interruption and strengthens the performance of the landscape to create a social space for work, play, and life as well. Moreover, create a new boardwalk path can directly connect two industrial transformation parks and the Abbey Mills sewage pumping station museum. People can choose different movement and perception to enjoy the diversity landscape in LLV.
The vital open space could provide activities full of variety. The concept is to organize the framework of open space then posit the appropriate facilities and program in LLV. Visitors can experience the combination of cultural landscape, urban landscape and natural resource at the same time. The aim is to re-establish the identity of LLV by reclaiming industrial landscape and also integrate with new phenomenon.
Destination is green Lower lea vally...
Existing condition in intervention area
The concept is based on the context of the intervention area. We can see from the illustrator that the present open space is fragmented and it is only 20% of unbuilt space in the whole area. In addition, it is mainly industrial land use in this area. It lacks an attractive program. Moreover, because of industrial use occupying the whole area, it is related to the connection of this area being more car movement oriented. A lot of industrial old factories are distributed in the area, and some of them are temporary buildings, which make the messy condition of urban fabric.
1. Restructure framework of landscapes and urban fabric

- Water course + Lake
- Patch + Linear green space
- Formal form: grid fabric
- Campus form
- Urban structure

2. Transfer industrial component

- Gas holder + Storehouse + Container

3. Reorganize walking and cycling route

- Curved route or promenade
- Boardwalk path
- Straight path

4. New topography

- Lower and flat land of LLV
- Dynamic topography and landscape perception

5. Typology of landscape and building

- Wetland
- Grassland
- Artificial lake
- Garden
- Landscape typology
- Function and building typology
- Mixed use
- Business
- Residences
- Studio
Design concept for intervention area

The design concepts of intervention area comprise 5 points to emphasize the identity of industrial landscape transformation.
1. Restructure framework of landscape and urban fabric
Restructure framework of landscape in terms of sustainable water management and continuous green space. Moreover, the present situation in LLV is occupied by industrial equipments such as vacant container or temporary factory. It has messy condition of urban fabric. Therefore, reorganize the urban stricture according to context and potential development. It could combine existing grid road system and campus form to provide space for potential program in the future.
2. Transfer industrial component
The intervention area has rich industrial components such as gas holder and storehouse. It could transfer into other function and also integrate with landscape to enhance the cultural value and open for public user.
3. Reorganize the walking and cycling route
The idea is to create the curved and straight promenade along the waterway that could provide walkable waterfront. In addition, connect the main spot or facilities by boardwalk which can integrate with environment.
4. Create new topography
LLV has lower and flat topographic feature from industrial period. However, it has possibility to reuse gas holder as an observatory and also create the artificial slight slope and lake to increase the water flow and store water. Moreover, visitor could experience the dynamic landscape and wider horizon by new topography.
5. Variety of landscape and building typologies
Create different kind of landscape to emphasize the diversity of activities and also reflect to the environment, for instance, the wet meadow could be the floodplain in the high flooding risk area. Furthermore, open up the multi proposed field for the potential program. It is relation to different function and building typology which can integrate with landscape in the future.
Plantation_theater

Program

- increase continuous open space
- transfer available industrial component
- new residential area
- new mixed use function
- business centre

connection

- car oriented pattern
- unsystematic

keep main road system
improve pedestrian and bike system

urban fabric

- messy condition
- grid pattern
The main design concept of this area is to open up the public space along the Lea river. And also create new waterway as the branch of Lea river to bring the new phenomenon. The new water way not only influence the new living environment but also could be the element to solve the flooding and water shortage problem.

In addition, provide the different subject in the open space which can enhance the vital open space but also give the space for potential program in the future. Moreover, extend the grid urban pattern from surroundings. It could provide the new residential area as the extension living area for the requirement of housing from neighborhood.
Green network
Open space

Open space is very important for the city development. In this project, restructure the framework of open space is also the way to reorganize the public space, semi public space or private space. We can see from the illustrator that the main open space is along the riverside. And in the built area also have some small scale green space as the neighborhood park. There are some neighborhood backyards as well. The percentages of open space increase to 50% and it have different kind of green space. Enhance the amount of green space not only can reduce the effect of urban heat island but also can integrate with pedestrian and bike route to emphasize the continuous landscape. In this project, I suppose to create the new water park and cultural park that mainly reuse the gas holder as the facility. In addition, also provide the floodplain and wetland in the high flooding risk area to solve the water problem.
Open up the boundary of cultural park. And it also faces to the neighborhood park that could be the main entrance of cultural park. Reuse the gas holder as museum and cultural centre which means to provide more space for local artist and exhibition. In this gas holder cultural centre, it could organize some cultural course by artist and also could be the meeting point of residents in the area.
Create vital open space by using small hill and big grassland. People can have picnic or sport game in here. However, integrate the gas holder with green space which can reduce the pressure from the 30 m high gas holder. And it could be a view tower that means people can climb the museum gas holder to see the widen horizon.
Water network
Water cleansing system
Rainwater catchment area
Wet meadow
New water way
Floodplain
Lea river basin
Fresh water wetland
Create the new residential area to improve the messy living environment. The new residential area next to the water park and also integrate with green and water elements. The new recycle water management will be strengthened in this area.
The water park is not only the recreational park but also the example of reusing gas holder as the water cleansing facility. Collect rainwater from the residential area to the new water way then flow to the new artificial lake which deals with the meditation. Then pump up to the gas holder for sand filtration to clean the water to be fresh water. Furthermore, the water container could storage fresh water also to be recreational use such as swimming pool and diving centre. The swimming pool keeps the framework of gas holder and also combines with the spiral slide. People not only play with water but also can feel the history of industrial period in the area.
Connection network & program
open up the accessibility to waterfront

connect to transformation spot

cross infrastructure

neighborhood

connect to station

2 promenade along waterway

curved route along Lea River basin

straight route along new water course

2 boardwalk path

connect to industrial elements

cross wetland and infrastructure
perspective of main road
strategy  design  relevance  time-schedule  bibliography
The new mixed use function will distribute along the main road. The mixed use building is 6 to 8 stories. The ground floor and first floor could be commercial using such as shop, cafe or other facilities. In addition, the housing face to the new water way will be 5 to 6 stories. The front side will face to the water way and green space to have the better view. Then office or factory in the business centre is mainly existing building which are 1 to 2 stories. The idea is to increase the green space in terms of sustainable development. Therefore, it will be the low density in this area. And it can provide around 2700 dwellings which can reach the requirement of governmental proposal.
Key node

1. Information centre
2. Diving centre
3. Gas holder reservoir
4. Artificial lake
5. Fresh water wetland
6. Water container
7. Recreational swimming pool
8. Sport field
9. Water park
10. Floodplain
11. Wet meadow
12. Residential area
13. Business centre
14. Mixed use waterfront
15. Park lot + ferry
16. Cultural park
17. Gas holder museum
18. Cultural centre / exhibition
19. Fresh water wetland
20. Ecological park
21. Lea River basin
22. Boardwalk / terrace
**Master plan**

The principal of design is to provide vital open space and continuous landscape with complete pedestrian and bike movement from sustainable development point of view. Therefore, reuse the gas holder to be reservoir and create recycles water system for recreation and irrigation. In addition, the new residential areas are mainly embracing the open space and new waterway. It could integrate different kind of typology and density of housing, for instance, the formal housing form contribute along the straight promenade and campus form housing are located along the curved promenade. Moreover, conserve the existing business centre and organize open space and road, pedestrian system to attract more business replace in this area to enhance job opportunity. Furthermore, reinforce the cultural identity of LLV by open up industrial elements, for example, reuse gas holder to be cultural centre and studio for local artist. It could reclaim the industrial identity of LLV as well.
The present situation of intervention area

New vision of intervention area
new vision of Lower Lea Valley
New phenomenon of green Lower Lea Valley
Relevance

Societal Relevance:

Social segregation is the latent problem in Lower Lea Valley. The Greater London Authority plan to demolish most of existing building and provide 3000-3500 new housing for high class and middle class. It not only break the mutual memory of local people but also enlarge the social segregation. For this graduation project, the target is to build up a mixture of living, work and leisure place. It not only decreases the mobility, heavy traffic but also increases the accessibility of open space for everyone to use frequently. Transformation of industrial elements could conserve the reminder of Lower Lea Valley and provide more public space as well. That is the way to achieve the social sustainable development by spatial structure. Moreover, the waterfront transformation could be the start point of investment to boost the economic development in Lower Lea Valley.

The original waterway and green space are the rich natural resource for improving landscape of this area. The main idea is to integrate the transformation from old industrial material with waterfront regeneration.

Scientific Relevance:

This project is indebted to a large amount of urban development in the sustainable environment from past until now. It stands on the future vision of the city, what is the Future City? What kind of city could be maintain of sustainable development, not only for this or next generation but also towards to the further generation? For example, the future city should comprise three patterns as mixed density, integrated and sub-centralized (cities as sustainable ecosystems, 2008). The sustainability is the popular issue that people want to live with urbanization for longer.

The transformation of the old industrial area requires a long-term strategy in terms of the sustainability. Each generation places a different interpretation on the past and derives new inspiration from it, contributing to the creation of a capital built up over the centuries; the destruction of any part of it leaves us poorer, since nothing new that we create will substitute that loss. The cultural heritage is not renewable, because it cannot be rebuilt once it has been destroyed (Selfslagh, B., 2002). One of the aims of the graduation project is to set the theoretical framework to get a clear view of re-using industrial heritage and combine with unique landscape. It will explore in this graduation project by finding the best solution to integrate the industrial elements with open space, housing area, or mixed use functions.
Literature


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