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The Spectacle



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I Introduction

1.0 Starting Off

The following work is about the design of a vertical farm titled "The Spectacle". Both in text and pictures it tries to exercise the possibility of such a building on a site on the South Bank's riverside next to the Tower Bridge. The whole project is an attempt to create a vertical farming building by taking into account the full range of external influences starting with the historical context and ending with an analysis of food consumption in Britain. The comparison of and the conflict between traditional urban farming practices and the theory of the vertical farm (which is a concept especially for urban areas too) provide the theoretical background and at the same time develop the main design idea which can be seen as splits between the two of them. At first, crucial contradictions between urban farming and the vertical farm seemed unsolvable, but historical and spacial contexts did their twist to the design that finally resulted in a proposal very specially and uniquely adapted to the site.

The idea to create a vertical farm on the London site formerly known as the Potter's Fields was originally initiated by the Architecture Workshop of Rome (AWR), who called for an architectural competition in spring 2011 dealing with this very task. Moreover the task was to design a vertical high-rise building mixed with housing and sports on a projected surface of 30,000m² whereby the built-up area should not exceed a total of 50,000m². The share of the facilities should approximate 40% vertical farm, 40% housing, 15% commercial and 5% services. Looking at the "Development Capacity Assessment", released by the London Council in 2010, the task matches city planning ambitions and the land plot designation. (More on the site's specifications in chapter 2.1). The text in the call for proposals explicitly referred to the book "The Vertical Farm", published in 2010 and written by the US American researcher Dickson Despommier, who claims the necessity of growing vertically inside cities in order to guarantee food supply in the future. With this reference the AWR joins in an intellectual examination with the current debate on growing food shortage within the architectural field.

Encouraged by the depth of the topic, the research for The Spectacle spread over many different fields in order to contribute a serious statement to the debate. Indeed it is the author's opinion that the building of a vertical farm would set an example and represent an architectural contribution to the sustainability discourse, especially encouraging people to start thinking about food consumption and how alimentation of the world's entire population might be achieved in the future. Though the final design must be interpreted as being polemic and slightly sarcastic to some of the premises, it claims a holistic relevance to the demand of the site and a productive dealing with the worries those premises imply.

In part 1, `The Vertical Farm' describes the essence of the conflict the project is based on, followed by a report on an internship absolved on an urban farm called `Prinzessinnengarten' and an interview with the company leader Marco Clausen.

The chapter `Design Strategy' wages the arguments for and against vertical farms with a special focus on the proposed site and tries to answer the question if a vertical farm was meaningful or reasonable even though the UK neither suffers any food shortage, (which is shown in part 3), nor claims the need for a vertical farm tower in the first place. Leaving aside the intentions of the competition, that part tries to constantly question both its meaning and consequences by at the same time separating useful ideas from commercial gimmicks and resulting in a design strategy for the site.

Part 2 compiles researches concerning the Thames as well as English gardens and the history of the South Bank. Eventually, it overviews the site's designation plan and it's current state.

Part 3 contains all information about the design in plan, section and renderings, informs about the food production on site and the basic output assumptions.

The conclusion summarises the main achievement of the design with a final statement in part 4.

1.1 The Vertical Farm

Ranging from the allotment garden to community gardens, from greenhouses to `guerilla gardening´, the term `urban gardening´ stretches over a wide field of urban agriculture practices which have become a driving force of the discourse about the supply of food for a rapidly growing humanity.

Recently the urban gardening debate has been stirred up by a microbiologist and ecologist called Dickson Despommier, who released a book on the principle of stacking greenhouses in 2010, titled `The Vertical Farm'.

The book disputes ecological issues traditional agriculture produces, i.e. air and water pollution, waste, spoiled ground-water and seas, CO₂ overcharge and climate change, the growing need for food with a growing number of people and water shortage; for all those problems Despommier estimates one general solution: "Repairing nature and still having enough good, healthy food choices may seem like mutually exclusive goals". But the "solution lies in the vertical farm."¹

The assumption is that a vertical farm building reduces CO₂ that is usually emitted during harvesting procedure and transportation of crops. This is achieved by simply eliminating transport ways and skipping harvest work on large fields with stacking up "`high-tech'greenhouses on top of each other and locat[ing] these `super' indoor farms inside the urban landscape, close to where most of us have chosen to live."² Inside there would be no conventional soil but only lightweight substrate clean, reduced to a minimum volume. Calling to mind the depletability of fossil fuel, the vertical farm seems a considerable alternative to traditional agriculture. Not only fossil fuel may end, though.

The WWF Life Report 2010 states that the world will run out of agricultural land. "If 9.2 billion people [Estimated World population in 2050] were to aspire to the equivalent of the diet of today's average Malaysian, we would still need 1.3 planets by 2050."³

This is a hard-hitting argument for going vertical, though it does not calculate possible changes in nutrition habits i.e. the reduction of meat which would save grazing land for agricultural use.

Moreover a vertical farm could contribute to clean the polluted urban air: CO_2 would be filtered out to feed the plants inside the farm tower and would receive only pure oxygen in return. Further the recaptured agricultural land would, if reafforested, again massively contribute the CO_2 reduction.

Furthermore, controlled and calculated hydroponic drip-irrigation would be able to reduce water wastage ("Some 70% of all the available freshwater on earth is used for irrigation [, ...]"⁴ and thus make it possible to grow plants in regions where water is a scarce good. Generally speaking the vertical concept seems really lucrative for countries where soil conditions do not allow to grow any vegetables and a vertical farm would facilitate the availability of rare or not available vegetables and fruits. Why would any country continue to import food if growing it themselves was easier and cheaper?

In addition, the vertical farm would not know diseases because air and water were permanently monitored and bacteria and pests eliminated before they would reach the plant. No longer was there need for herbicides and pesticides that contaminate our groundwater and the crop would always look perfectly fresh and tasty. On top of that, the vertical farm building would recycle energy, water and biological waste to minimize its ecological foodprint.

The arguments are convincing and there is no doubt that the plenty of promises the vertical farm makes are impressive. Why would anyone not want to have a vertical farm for it apparently is the solution for almost every ecological problem we have right now. And while the topic itself mainly concerns technical facts, the reception, driven by the blasting prospect on a better future, became a highly romantic one.

`The Vertical Farm' book initiated a run on architectural competitions on the design of such a building. Thousands of pictures and utopias have been drawn since then and by today only the word vertical farm recalls in us a ready-made topology of a building that practically does not exist.

In fact, those utopian ideas impress with the drawing of a better world where energy supply, environmental pollution, sustainability or alimentation are issues of the past. Nicely rendered, we perceive pictures of green megastructures covered in trees instead of walls, all filled up with dense agricultural cultivation. Civilisation is romantically pushed aside and only acts as a contrasting backdrop strengthening the green appearance of the building itself. Even if on the one hand those utopias might seem far from reality, which they probably are, they act as the bearer of the vertical farm idea on the other hand. Being persuaded by romantic pictures, we do not recognize the rigidity a `real´ vertical farm contains. We only need to recall the first and by the date only actually existing example of a vertical farm. A five storey high totally controlled and monitored greenhouse, opened in Korea during spring 2011, is formally a factory like cube, a laboratory for future nutrition.⁵ And indeed - this building has nothing in common with anything romantic.

Because many of those projects are being planned just now $^{\rm (6)}$, the typology `Vertical Farm' will surely play a major roll in future architecture.

However, we cannot overlook obvious contradictions connected to farming towers. The necessity for artificial lighting, a sterile and controlled atmosphere and growing without soil carry problems in terms of energy supply just as they make it hard to accept the crop being organic even though it technically is. Furthermore, the building itself very much conflicts the traditional and actual practices and forms for urban agriculture. Looking at practices like allotment gardening, `guerrilla gardening', `permaculture' or community gardens, all forms of urban agriculture are unseparably connected to the active engagement of people in their gardens. It seems like all forms of urban agriculture until now necessarily had that feature.

Intense discussions with the urban agriculture activist and specialist for permaculture, Richard Mahringer, triggered my idea to experience forms of urban agriculture myself, to get a better insight in how these practices work today and to figure its main qualities. Therefore, I undertook a journey to Berlin in August 2011, where I did a one month internship in a community garden named Prinzessinnengarten.

1.2 Prinzessinnengarten

"Since summer 2009, the Prinzessinnengarten is situated at Moritzplatz in Berlin, Kreuzberg. Where abandoned area created discomfort for more than 60 years, today a manifold of vegetables and herbs is grown in the middle of the city. In summer 2009 we began to clear the 6,000 unused square meters from waste and convert it into a lively kitchen garden. In a district with high density, few green and many social issues, kids teenagers and adults, neighbours, laymen, passionate gardeners and fresh air enthusiasts – with one word everybody who wants to – can learn how to locally produce food and create a place for urban living on this social and biological farm in the city."⁷

This is what the homepage of the garden titles and in fact it somehow is the best explanation of what the garden really is. The Prinzessinnengarten, probably the best known urban farm/community garden in German-speaking Europe, had overwhelmingly much publicity in all kinds of media since its opening in 2009. The concept they pursue seems successful. Focussing on the factors `community' and `social engagement' they receive helping hands from all over the neighbourhood and do survive without public subsidies. The garden does not, and would never be able to aliment a larger number of people. Instead the garden acts as ambience for people meeting, communicating, having lunch or seek recreation. Thereby, the garden never simply becomes a backdrop. Dishes made from fresh and home-grown vegetables with fresh herbs, served in between vegetable and flower beds; people harvesting for their own demand; kids trying to plant their own vegetables; all kinds of workshops on organic food; a library full of books on plants; and numerous interns and assistants coordinating all that. In summer the Prinzessinengarten

literally is a prosperous place. And although nobody can live off the crop, plants are the starring actor in this play.

1.2.1 Internship

The internship in the Prinzessinengarten during August 2011 included following main activities:

One. Sale

During my stay a garden container was completed. On the one hand it functioned as a storage for seeds and gardening material but also acted as a counter for selling seeds, herbs and harvested vegetables on the other hand. Usually people came to talk about the garden or wanted to be shown around and asked for gardening advice. Some brought seeds and plants they had raised themselves, among which were curiosities from foreign countries or specialities people only knew from their grandmother's garden.

Two. Escorted Harvesting

When people wanted to pick vegetables for their own demand, they were accompanied by a garden member who pointed out ripe things ready for harvest and gave advice how to do so.

Three. Maintenance

Irrigating, seeding and clearing off weeds were mostly done before noon. Refilling beds with self made compost, repotting or planting in the afternoon.

Four. Coordination

Twice a week, people were invited for a `day of garden work'. Usually a variety of different people showed up to help out

with things that needed a bigger amount of people to get them done. The garden workers coordinated the building of teams and advised them. Usually people joined and left whenever they wanted. Some kept working until the break of dawn and mostly people stayed to have a drink and kept on conversing when work had already stopped.

Besides, I was able to realise a self initiated survey on the yield of certain products grown in the Prinzessinnengarten for I was curious about the output and efficiency of that kind of urban agriculture. My research revealed that, up to this day, no such survey on the output of organically grown food of community farms has existed. Even though the timespan of the observation was really too short to produce comparable results and the range of the vegetables was limited to seven in total, I see this as the starting point for a serious dealing with the matter. I called the project Urban Yield.

1.2.2 Urban Yield

Today hardly any comprehensive public statistics on the yield of any organic farming exist. While organisations like Fibl, Eurostat or Ökolandbau continuously work on the monitoring of organic farms, the output and the extent of home grown food is about to remain a trial and error business. The project Urban Yield should initiate the process to monitor urban self grown vegetables in urban areas. It monitored the output of carrots, chard, savoy, lettuce, red beet and several herbs over a one month period in August 2011.

Since today's urban gardens and urban farms do not only seek to grow food but at the same time are also trying to contribute to a local urban community, many laymen are involved in the growing process. This is what makes it difficult to monitor continuous yields because of the permanent harvesting and planting by many different people. Furthermore the application of herbicides or pesticides is more difficult than in professional organic farming and is sometimes even denied by people engaging.

Nevertheless, the number of people supervising the garden related to the actual amount of plants is really high. Hence it is very easy to effectively care about plants if they suffer from a disease or parasite. This might be the reason why the yield of some vegetables is disproportionally high.

Organic Urban Vegetables, a Field Study Grams per grown box [40x60cm]



Yield at Prinzessinnengärten [kg/m²] and compared to conventional Yield, but doesn't include crop failure

Carrots	6,160	97%	The study was undertak at the Prinzessinnengä 2011 and is still a vague able numbers! But it ir monitor their yield outp numbers for Urban Gard For Germany and the U yield still do not exist, b countries give reason to about 20% to 30%.
Chard	5,640	-	
Lettuce	7,000	250%	
Mint	1,100	-	
Parsley	3,000	-	
Red Beet	5,680	160%	
Savoy (Cabbage)	11,06	314%	

en during an internship rten, Berlin, in August approach to comparnitiated the process to out to get comparable dens in the future! JK numbers for organic out numbers from other o expect a reduction of



1.2.3 Interview with Marco Clausen

Marco Clausen together with Robert Shaw is the manager of the Prinzessinnengarten. The following interview, held in January 2012 via e-mail, should capture and confirm important impressions and insights that I experienced during my work in the garden.

> Der Prinzessinnengarten ist ein unglaublich schönes und bemerkenswert funktionieriendes Kleinod der Kreuzberger Community, wie würdest Du kurz den Hauptverdienst des Gartens beschreiben, was sind die Stärken des Gartens?

Zunächst haben wir gezeigt, dass wir ohne professionelle Hilfe und Förderung aus lokalen Initiativen heraus und mit der Unterstützung von zahllosen Freunden, Interessierten und Nachbarn, einen liegen gelassenen Ort vollständig transformiert haben und uns dabei selber finanzieren. Zu den Verdiensten zählt sicherlich auch, dass wir mitgewirkt haben auch dem Thema urbanen Gärtnerns im allgemeinen eine große Sicht-barkeit zu verschaffen und mit ihm auch Aspekten wie der Erhaltung der Biodiversität, lokaler und regionaler Produktion, informeller Bildung etc.

> Welche sind die Hauptbestandteile der Finanzierung des Gartens und in welchem ungefähren Verhältnis setzten sich diese zusammen?

Was die Einnahmen angeht, die in den gemeinnützigen Teil fließen, so kommen 20% aus der Gastronomie, weitere 20% aus Gartenbauprojekten und Beratungen (für andere Gärten und Kommunen), 10% aus Spenden, 30% aus Geldern für bestimmte Projekte (etwa Koch- und Gartenprojekte für Kinder und Jugendliche, Projekte zu Beteiligiungsmethoden etc.), 10% aus dem Gemüse- und Pflanzenverkauf und weitere 10% aus Vorträgen, Führungen und Bildhonoraren.

> Eine der Hauptstärken der Gartenorganisation sind, wie ich selbst mitbekommen habe, eine sehr dichte und sensible Vernetzung, sowie auch der Tausch und Austausch von Leistungen und Waren mit Unternehmen oder Privatpersonen vorort. Wie habt ihr es geschafft in einer Großstadt wie Berlin in so kurzer Zeit so tief in die Mikrostrukturen der ansäßigen Bevölkerung vorzudringen?

Auf der einen Seite sind sehr viele Menschen und Projekte zu uns in den Garten gekommen, nachdem wir die Pforten erst einmal aufgemacht hatten. Auf der anderen haben wir gerade in der Anfangsphase sehr viel Netzwerkarbeit geleistet, mit Unternehmen gesprochen, mit Einrichtungen und Initiativen in der Nachbarschaft, mit anderen Gartenprojekten, aber auch mit Hochschulen wie der FH Eberswalde.

> Soweit ich weiß, gibt es den Versuch den Prinzessinnengarten ohne öffentliche Subventionen durchzubringen, geht diese Rechnung auf?

Wir bekommen keine direkten, institutionellen Förderungen. Bisher geht die Rechnung auf und wir konnten uns die Miete, eine weitere Mitarbeiterin im Büro und die Materialien, Betriebskosten, etc. finanzieren. Für die Bildungsarbeit müssen wir aber auch zusätzliche Mittel (etwa in Form von Projektgeldern oder Spenden) akquirieren. in diesem Bereich gibt es sicher noch Potential.

Ist der Garten eine Attraktion, wenn ja, warum?

Attraktion im Sinne von Anziehungspunkt, ja. Ich glaube es ist schon etwas Ungewöhnliches, dass Leute anfangen mitten in der Stadt Gemüse anzubauen, und zwar nicht um sich selbst zu versorgen, sondern um in Form eines Gartens einen öffentlich zugänglich Ort zu schaffen, der gleichzeitig der Entspannung und Erholung dient, wie der Auseinandersetzung mit weitergehenden Fragen, die sich um die Themen Ernährung, Stadt, nachhaltigen Umgang mit Ressourcen drehen.

> In Detroit übernehmen sogenannte Urban Farms einen wichtigen Teil der innerstädtischen Versorgung mit frischem Gemüse, da Einkaufsmärkte weitgehend abgesiedelt sind. In wie weit beschäftigt euch die Idee der innerstädtischen Versorgung mit biologisch wertvollem Gemüse?

Ich glaube für uns spielt die Versorgungsfrage bisher keine wichtige Rolle. Bei der Fläche die wir bewirtschaften und der geringen Produktivität, mit der wir das tun, wäre es lächerlich zu sagen, wir leisten einen signifikanten Beitrag zu den 10 Millionen Mahlzeiten, die in einer Stadt wie Berlin täglich verzehrt werden. Ein solcher Garten kann mit Informationen, aber auch symbolisch auf die Frage der Versorgung aufmerksam machen, und darauf, dass man sie nicht als selbstverständlich hinnehmen kann (Beispiel Degradation von Böden, Abhängigkeit von billigem Erdöl, Lebensmittelverschwendung etc.). Dieser Garten ist meiner Einschätzung nach in erster Linie ein Vermittlungsort.

Gibt es eine Message?

Ich glaube, jeder verbindet seine eigene Message mit dem Garten. worauf sich vielleicht alle einigen könnten: Es lohnt sich, einfach mal anzufangen.

Vielen lieben Dank!

As foreseeable, the garden concept very much focusses on social features, much more than it does on gardening itself. Those answers, together with my own experience in the garden, build the basis for the main functions and the community concept in The Spectacle which will be explained in detail in part 3.1.5 and 3.1.6.

1.3 Design Strategy

The comparison of the experiences on an urban farm to the theory of Dickson Despommier reveales the following three main contradictions that became crucial for the design of The Spectacle.

One. To substitute artificial lighting for daylight consumes an incredible amount of energy. The same amount of energy plants would naturally receive in form of sunlight by growing outdoors. All conceptions of vertical farms have so far tried to counter this fact by applying numerous technical installations that either produce or save energy in order to make up for the actual energy-inefficiency.

Waging the pros and contras of the vertical farm, we need to distinguish two things that are mingled in its conception. The agricultural and environmental advantage of growing vertically and the gimmicks installed for energy reduction that can technically be part of any kind of building and do not really count for the quality of a vertical farm itself - gimmicks such as wind turbines, water purification or the recycling of biological waste. The unique quality of such a building must not incorporate those gimmicks. The unique quality is to gain land.

Two. What we actually do by building a vertical farm is, we exchanging surface for energy. Facing an upcoming shortage of agricultural land, this seems reasonable. But the vertical farm, due to crop control, necessarily is a closed off space not accessible for visitors. By putting vertical farms into cities we thus cut off urban space to live. Especially a city centre should be a beautiful townscape with parks for recreation and built up structures that include the action of citizens instead of locking them out.

Three. Is not an actual contradiction but a simple calculation that makes the vertical farm theory appear slightly out of proportion.

To start at the beginning, the idea to go for the principle of stacking greenhouses was initiated by a research project that Despommier carried out together with his students: "Despommier had originally challenged his class to feed the population of Manhattan (About 2,000,000 people) using 13 acres (53,000 m²) of usable rooftop gardens. The class calculated that, by using rooftop gardening methods, only 2 percent would be fed. Unsatisfied with the results, Despommier made an off-the-cuff suggestion of growing plants indoors, vertically."⁸

Though this assumption seems promising, further calculations result in the demand of much more surface. The vertical farm homepage shows a calculation for the proportioning of a 30 storey high farming tower with following output:

"It has been estimated that it will require approximately 300 square feet of intensively farmed indoor space to produce enough food to support a single individual living in an extraterrestrial environment (e.g., on a space station or a colony on the moon or Mars)[...]. Working within the framework of these calculations, one vertical farm with an architectural footprint of one square city block and rising up to 30 stories (approximately 3 million square feet) could provide enough nutrition (2,000 calories/day/person) to comfortably accommodate the needs of 10,000 people employing technologies currently available."9

We can compare this calculation to the population density of two recently built Manhattan housing projects: The first, an eight storev housing block, built by John Pedersen Fox from 2005 to 2009, has a population density of 692 people per hectare. The other one, a high-rise (23 storeys) project of Jean Nouvel (2006 – 2008) has a population density of 1511 people per hectare.¹⁰ If 692 people live on 8 storeys we get a density of 86.5 people per floor and hectare. Doing the same calculation with 1,511 on 23 storeys we get a result of 65.69 people per hectare on one floor. In a comparable tower of 30 storeys (like the proposed farming tower), we, by taking the lower value of 65 people, can assume 1,950 persons per hectare living in a 30 storevs high tower. Further meaning that 1.950 persons live on 30 hectares of plantable area. We conclude that 19,500 people live on the same 300 hectares that in Despommiers calculation nourish 10,000 people and that 19,500 is approximately the double of 10,000. For a dense urban area like New York we figure that one out of three blocks have to be a farming tower to supply enough food for the citizens.

Having one third of the city's surface covered with vertical farms would essentially interfere not only with the assemblage but also with the practice of urban life. Hence it is simply not a realistic possibility for any city planning to have vertical farms like Despommier imagines.

This led to the following design premises:

1.Going vertical by keeping natural lighting.

2.Excluding technical gimmicks

3.Making The spectacle as accessible as possible

4.Creating a maximal additional value for the citizens by embedding the design into historically grown local traditions and responding to the site's conditions and demands

References

¹ Despommier, Dickson: *The vertical farm; feeding the world in the 21st century.* p3

² (ib.) p23

- ³ Living planet report 2010 (WWF), http://wwf.panda.org/about_our_ earth/all_publications/living_planet_report/2010_lpr/
- ⁴ Despommier, Dickson: *The vertical farm; feeding the world in the 21st century.* p31
- ⁵ cf. Kretschmer Fabian: "Ackerbau im Hochhaus", in: der Standard, (May 26) 2011, p 10
- ⁶ cf. http://www.verticalfarm.com/ Videos
- ⁷ http://prinzessinnengarten.net/wir/
- ⁸ http://en.wikipedia.org/wiki/Vertical_farming
- ⁹ http://www.verticalfarm.com/more?essay1

¹⁰ cf. Fernández Per, Aurora; Arpa, Javier: Density projects: 36 new concepts on collective housing. p252, p290

II Preconditions

2.0 London's South Bank

2.0.1 London's urban development until the First World War

The rectangular grid system that Londinum, founded by the Romans, initially underlay, was abandoned after the Goths conquered the city in 410 A.D. During the 7th century the city developed more eastbound and was named Lundenwik. This agglomeration had almost disappeared by 850 A.D under the state depredations of the Danes, but could recover towards the end of the 9th century. In 886 A.D., King Alfred re-founded London formally as "Burgh". The Roman city wall was restored as a fortification that represented the boundary of the city until the early 18th century. An important change in the administration of the city brought the intermediate occupation of the Danes in the 11th century, when the city was sectioned into 24 districts, so called wards, smaller wards "within" the centre and bigger ones "without". Not until the reign of Edward the Confessor London gained the status of the capital of England. Edward chose London as the royal residence for the proximity to the Benedictine abbey at Westminster, founded during the beginning of the Conversion to Christianity in the 7th century. In 1066 his successor William the Conqueror established the tradition of the coronation ceremony in Westminster Abbey. He also initiated the extension of the castle, the construction of Westminster Hall and the Tower as well as the St. Stephen's Chapel. This assemblage of royal buildings of representation inside the city of the burghers built a duality that until today displays the mutual dependency between the state and the finance market.

With Henry VIII and the Reformation, the dissolution of the monasteries and the expropriation of church property came. A new class of landlords arose and 35 big Estates developed

that where the predecessors of London's new suburbs of the 17th century.

In the 16th century the king's residence moved westwards to the St. James Palace and in the 18th century further west to Buckingham Palace, which is still residence today. This movement was accompanied by the erection of palaces and the takeover of formerly clerical estates by the nobles. The gentrification of the west caused the development of a third city core of settlement besides the old city that developed more east and the agglomeration at Bankside, a city district to the south of the Thames.

Bankside (today's Southwark) was the district of workers, craftsmen and seamen, of warehouses and jails. "Wirtschaftlich und steuerrechtlich ein Teil der City, war er in Bezug auf Rechtsprechung eher eine Grauzone". [Economically and fiscally a part of the city, it (South Bank) was a grey area in terms of jurisdiction].¹¹ This fact facilitated the development of everything twilight. Thus Bankside has always been the district of amusement full of bars, brothels and theatres.

Between 1600 and 1700 London's population reduplicated⁽¹²⁾ and there were two major possibilities for the town to grow. Either along the main streets leading through the slums of the east or by densifying the structure inside the city walls. Trying to stop the city growth in the east, Elisabeth I established a law saying that no one shall be allowed to build in a circuit of three miles around the city walls, except onto existing walls. Moreover, each house should accommodate only one family. It is assumed that this law triggered the development of the English terraced house as we know it. The great fire of London in 1666 devastated about three quarters of the city and Charles II intended to rebuild the city with an all-over plan. Therefore he consulted André Le Nôtre (a landscape architect and the principal gardener of Ludwig VIX of France) and Christopher Wren (architect of e.g. St. Paul's Cathedral) to develop plans. But financial straits caused by the expenses on the wars against France and the Netherlands made those vast Baroque plans and ideas impossible to realise. The only thing adopted was a law that regulated building typology and hight as well as fire prevention and building materials. Houses out of brick in straight aligned rows with a unified hight were the result that should become characteristic for the whole city.¹³

Even though the crown had no money, the industry and the financial market prospered and were boosted during the time of reconstruction. Further, The Glorious Revolution of 1688 brought a variety of changes that triggered the speculative real estate market. Francis Russell, Earl of Bedford, initiated the construction of Covent Garden, London's first major building project. The square typology of Covent Garden became a prototype for the construction of many of the Estates in the 18th and 19th century. All Estates repeated the same pattern of developing inside out, so that problems appeared where Estates bordered each other or larger roads intersected. This led to a general patchwork layout in terms of urban design and social segregation.

With the London Building Act from 1774 London got its first building control authority, which meant that twenty seven District Surveyors controlled all new building projects in London's 89 districts.¹⁴ By 1800 the shipping trade had grown a multiple and the Pool of London and the Legal Keys ran out of capacity. To accommodate the risen number of ships and simplify the ware exchange, new docks were built east of the Pool of London. The London Docks steadily expanded over the following century. With the erection of two new bridges. Westminster Bridge in 1750 and the the Blackfriars Bridge in 1769, the accessibility of the South Bank rapidly improved. Ideas for an over-all city plan arose again and in 1766 John Gwynne (architect and one of the founder members of the Royal Academy) submitted the London and Westminster Improved catalogue. Amongst others it contained London's most significant planning project of the 19th century and a case study for an early public private partnership. Regent's Street, a connection between Regent's Park and Carlton House (the former city palace) should link the Royal Estate to the inner city in order to create direct access and raise its market value by laying it out as a boulevard accommodating markets and shops. Many areas were redesigned and rebuild at that time (Trafalgar Square and Hav Market, for example) not only to upgrade their value but also for hygienic and social reasons.15

In the years of 1831 and 1842 as well as is in 1854 and again in 1866 London suffered devastating Cholera epidemics that killed tens of thousands of people. They were caused by careless spoilage of the Thames through industrial and domestic sewage, whilst the Thames again fed water treatment plants that were not under public observation. Generally, the hygienic situation grew a major threat because the urban assemblage and the technical infrastructure were not able to keep up the growing needs of the rapidly growing number of citizens during the industrialisation. The environmental pollution reached its peak in the hot summer of 1858 when unbearable stench arose from the Thames waters. "The Great Stink" made adjourn even the parliament. Finally, between 1859 and 1865 the expansion of the sewage system was initiated and with it the construction of a wide spanning traffic infrastructure system containing streets and tubes. Large parts of the sewer network as well as parts of the subway were installed underneath the Victoria Embankment that stretched from Blackfriars Bridge over to Westminster Bridge along the northern riverside. The newly founded "Metropolitan Board of Works" (MBW), which administered the building of the streets and sewers, had the allowance to confiscate property in order to realise thoroughfares at first only along the riverside but later also in other parts of the city to, as already mentioned, clean up slum districts and implement traffic systems.

The construction of the railway caused the demolishing of large housing areas inside the city. It is estimated that about 100,000 people had to abandon their homes and clear the way for the railway line cutting through the city. From 1980 on electric railways accessed new suburbs which witnessed a building boom. London grew Europe's biggest urban area.¹⁶ The rising competition in a growing global economy, the falling price of land and the inability of many tenants to pay their rents made the big Estates of the nobles disappear in between a few years. US capital started dominating the estate market.

2.0.2 The South Bank in the 20th century

"Zwischen 1855 und 1905 hatte sie vier Fünftel ihres Bestandes ersetzt. Aber nur ein Fünftel des Bestandes wurde in den folgenden vier Jahrzehnten erneuert." [Between 1855 and 1905 four fifths of its building stock (London) was replaced. But only one fifth of the stock was rebuilt in the following four decades].¹⁷ That mainly concerned the city area north of the Thames. All the big bank- and insurance-buildings arose at that time.

Even the Second World War did not hit London that hard. The effect it had on the city planning was vast, though. In 1947 Charles Holden and William Holford, commissioned by the government, started to design an new over-all city plan that stood model for the planning of a manifold of English towns. It rejected the narrow corridor streets of the past and came up with new paradigms of Modern Architecture: Light, Sun and Air.¹⁸

But there were much more radical ideas such as the city plans of MARS (Modern Architecture Research Group, founded by Sigfried Giedion) that ignored all the building stock trying to recreate a modern London from scratch. Moreover, the issue of the uprising individual traffic led to a variety of plans and visions. Triggered by Colin Buchanan's "Traffic in towns" (1963), a report that underlined the future importance of individual traffic in city centres, ideas of a pedestrian mega-structures consisting of bridges and walkways stretching over large zones of traffic areas arose. The housing area Barbican (1950s) underlay these ideas. The planned 50 km long "Pedway-Network" was only partly realised but is still visible in some parts of the city.¹⁹

The county of London Plan (1943) defined the reconstruction areas and the Town and Country Planning Act (1944) revealed eight so called Comprehensive Development Areas (CDA)

best suited for a reconstruction containing a total structural realignment of the urban layout. Issues like the upgrading of slums and the equilibration of social differences were still omnipresent and played a decesive role in the selection of those areas.

One of those CDAs was the South Bank. During the 20th century industry had moved downstream and shipping trade constantly lost its importance as the new means of transport for trade commodities was the railway. In the 1920s and 1930s several office buildings arose in this area but were surrounded by more and more decaying wharfs and industry that was abandoned.

Charles Holden was still working on plans to develop a huge office area along the South Bank's riverside as the Festival of Britain took place in 1951. The centenary of the world exhibition of 1851 took place in different spots along the South Bank.

"Within these 27 acres the story is told pavilion by pavilion of British achievement in science, technology and industrial design, a story told not only through the objects which these buildings will contain, but through the language of the craftsmen, architects, designers and artists who have made or embellished them."²⁰

The festival took place in many locations all over London. At Kensington the topic was science, at Polars "live architecture" was shown on an area of 124 acres that had been devastated during the war. At Battersea Park (Formerly Festival Gardens), open airs took place, there was ballets at Covent Garden, cinema at the British Film Institute and literature exhibitions at Victoria and Albert Museum. Even the St. John's Church in Waterloo Road was rebuilt for festival purpose. ("The Christian Faith is inseparably a part of our history"²¹)

Not only the whole city of London was involved, all over Britain cities contributed exhibitions and entertainment. "As this whole Festival is an act of national autobiography, cities and towns throughout the country are presenting their own account for themselves, of industries, trades and crafts in which their citizens are employed, their local traditions and entertainments, their practice an appreciations of the arts, their sports and hobbies."²²

The festival site itself lay between the today's Jubilee Gardens and Waterloo Bridge. Its main facilities were the Royal Festival Hall, where ballets and dramas took place, and the Discovery Dome with a diameter of 100 meters, where Britain's contributions in modern science were told.

Diagram 2B shows the abstract layout of the festival site including its access, ways and main facilities

All temporary structures especially erected for the festival were torn down immediately afterwards. Still, the impact of the festival was enormous. Eventually it started off the development towards the entertainment mile the South Bank's riverside represents today, but the main improvements did not come until the 1990s. With the newly established GLA (In 1888 the London City Council (LCC) succeeded the MBW. The LCC was dissolved during the Thatcher administration but reinstalled in the 1990s as the Greater London Authority (GLA)) it was again possible to coordinate the multitude of planning entities and organisations on a communal level.

London's South Bank Diagram 2A

Queenswalk, Bridges to it

— – Jubilee Line





From the late 1980s on, London's South Bank has developed to a highly attractive borough, for both tourists as well as the real estate market. Stretching from Lambeth to Southwark, the South Bank has gotten a lot of new representative buildings such as the Tate Modern or the City Hall, and there are many more to come (i.e. London Bridge Shard). On the Thames Path (1990s), which is a promenade along the southern riverside, it is possible to walk all the way down to Butler's Wharf, crossing whole London. Doing so feels like a showcase of London's most important modern buildings.

As a mentor of the South Bank's recent revitalization, Richard Rogers published several books and pleas during the 80s and 90s claiming a pedestrian friendly London and the revival of the central function of the Thames for London's development. Nevertheless there has never been an overall master plan for this area, except the so called "Holden Line" which remained from the master plan by Charles Holden from the 50s and refers to the building alignment behind a green strip along the river which became a guideline for all future building projects on the South Bank.²³

Today the Thames Strategy (1995) and the London Plan (2004) build the foundation for future planning.

Diagram **2A** (above) shows all the important cultural buildings along the southern riverside that appeared during the last century.

2.0.3 Lambeth

In the 18th century site known as the Potter's Fields (American for graveyard for unknown or indigent people) were a church-

yard and a burying ground of the St. Olaves Church which stood near today's London Bridge Station. Adjacent to the site stood the St. Olaves School.

Later, The Potter's Fields accommodated two graneries of the Hay's Wharf Company along the river, a small charity school and the Queen Elizabeth Grammar School building. Warehouses, which were built along the riverside while shipping on the Thames increased, covered wide parts of the Potter Fields.

At the end of the 19th century, a larger school was built by Edward Mountford - the only building that remained standing after the Second World War had destroyed wide parts of the fields.

The building, which was again called St. Olaves School, was taken over by the Lambeth College in 1968 and still carries that name (even though it is no longer a college). From 1977 - 1985 the derelict land along the river including the Potter's Fileds was turned into the William Curtis Ecological Park.

In 1982 a masterplan defined the today's layout of the site including the riverside walkway and a three acres park which was supposed to be called the London Bridge City Park, but was renamed to Potter's Fields after protests by the local community.²⁴

Large parts of vacant land next to the site were purchased by London Bridge Holdings Ltd. in 1998 which developed the now known More London district (Masterplan by Norman Foster).

2004 the Lambeth College building was sold to Berkeley Homes, and the Potter's Fields Park was refurbished in 2006.

The layout of the Potter's Fields, as it is today, is shown in Diagram $2\mathsf{C}$



2.0.4 Southwark city planning

Most recently Berkeley Homes are planning to build a 356 homes for private sale as well as new shops and a cultural centre. The building site, today situated in the borough of Southwark, covers the so called Coach Park between the old Lambeth College and the Potter's Fields Park. The Lambeth College is planned to be converted to a 43 beds hotel.

Until 2026, Southwark Council is aiming to create 1600 new homes in Bankside, Borough and London Bridge (Potter's Fields) by building mixed use flat schemes as well as converting warehouse buildings. 35% of those should be affordable housing. 60% must at least have two bedrooms and 20% three, a maximum of 5% should be studios and only for privat housing and at least 10% of all have to be wheelchair accessible. The minimum internal floor area of the different types are: studios (36 m²), one bedroom (50 m²), two bedrooms (70 m²), three bedrooms (86 m²) and four bedrooms (92 m²).²⁵

The following three maps, Diagrams 2D-2F, contain information about the current state of Southwark's city planning







2.1 London and the River Thames

The Thames played a major role for London's historical development, as discibed above.

Diagram 2.1A and 2.1B combine a variety of informations displayed as lifetimes of famous or influential buildings along the river. It shows the timespan, in which the Thames grew an important transport route and thus became a big factor in the industial development of the city.

It also clearly shows how the shift from water- to road transport brought the traffic use of the Thames to an end. Eventually this contributed to the rediscovery of the riverside as a public open area for entertainment and recreation, which is the basis for The Spectacle project

Diagram 2.1C shows the installation of the new sewage system after the devastating Cholera epidemics

Diagram 2.1D and 2.1E try to refer to the revitalisation of the Thames as a habitat for fishes, caused by the improvement of the water quality in recent years.

Though, the result of this analysis was that the water quality is still too low to use it for the irrigation of plants




Historical Sites Diagram 2.1B







UK inland Fisheries Diagram 2.1E



2.2 The English Garden

The Spectacle assembles a variety of features that have been important for the design of an English garden through history trying to conflate its most important ones into facilities adaptable to modern needs.

The following pages overview the historical development of the English garden with its special features and distinct appearance. They focus on the transition from the formal- to the landscape garden to emphasise the unique evolution the English garden has undertaken.

2.2.1 Historical facts

The Romans, widely living on vegetarian diet, were the first to bring a broader knowledge of agriculture to England and cultivate a larger surface of land. When they left England in the end of the fifth century, wide parts of that land were recaptured by wilderness and horticultural knowledge was inherited by monasteries each having an inner vegetable garden that provided for self sufficiency. The medieval garden included an obligatory `infirmary garden', a medical garden where herbs and plants were grown for domestic use. It provided a plant for all practical and medical issues and was highly connected to mystical ideas.²⁶

But also flowers were grown and ponds and orchards were laid out for the garden was at the same time a safe place for recreation.

In the 12th and 13th century population grew and the agricultural use of the land was on the march. That trend was abruptly interrupted by the occurrence of the black death that almost halved England's population in the 14th century. Towns an fields were again left abandoned. At that time there were three times more sheep than people in England and many subsisted on sheep farming.

Not until the Tudor period agriculture developed into a driving economical force. One third of the country's surface was cleared and cultivated under their reign. Towns grew and gardening culture became an important part also of urban living. "Almost everyone owned either an orchard or an enclosed garden or at least an allotment."²⁷ Nobles on the other side preferred their manors in the countryside. The land became a place for gentlemen with comfortable houses and large gardens. A place for hunting, leisure and playing games like tennis or bowls.

The fifteenth century witnessed a land house building boom and the country became a rich and prosperous place. "The dissolution of the monasteries, carried out between 1536 and 1540, made it even easier to become a country gentleman"²⁸, and many got rich on sequestering those goods. Gardens were an essential component of mansions in all sizes.

And even the smaller gardens were meticulously separated in four quarters intersected by paths, where usually one quarter was planted with vegetables and herbs, another one was a knot and one was turfed. Larger ones had so called `mounts´, little observation platforms, and terraced walks. They had orchards and alleys, roofed galleries for exercising in all weathers and banquet houses.

The Tudor garden invented the so called "knot", rectangular beds with weaving hedges in different patterns. The knot was a specific English feature and became part of each and every English garden over centuries. In that period tulips, sun. flowers, lilacs and other plants and flowers arrived from all over the word. In the seventeenth century the garden layout underwent only subtle changes; mostly concerning symbolism. Christian motives had almost vanished after the dissolution of the monasteries and were replaced by signs of wealth and power. "The owner's initials were now carved out in turf or sculpted in box."²⁹ Gardening more and more became a recreation for the gentry, and it came into fashion to collect knowledge about gardening as well as to plant rare and exotic fruit and flowers. Admirer, botanists and researcher met in Coffee House Clubs where they examined and exchanged plants.

Gardening was the subject of literature and many noblemen were writing about their garden and gave advise how to design it. So, for instance, Francis Bacon did in his essay `Of Gardens´. The spirit of nature started to be admired and the idea was born, that a garden should be as near to the Garden Eden as possible.

"The internal state of the country became more settled."³⁰ Land had been "cultivated as arable, pasture or meadow".³¹ Outside the enclosed gardens the landscape had been tamed and wide parts of the forests had been cleared during that age. Some landowners started to reafforest the landscape around their cottages by extending their formal gardens by symmetrical plantations. "No longer was it necessary to have walls and towers to defend one's home against predatory neighbours."³² Walls were removed and replaced by iron fences if it could be afforded and the inner sectioning of the garden became more loose and transparent. The will to expand the view into the surrounding landscape gave birth to the 'ha-ha', a ditch with a lowered fence bordering the garden making it possible to have a continuous view from the garden into the surrounding landscape. "Orchards and kitchen gardens more and more moved out of the view"³³ and were seen as unattractive.

In the early 18th century, the fashion for geometrical formalism reached its peak. Gardens were laid out after foreign models like the Dutch, French or Italian style. There were guidelines for the width of paths, for the proportion of the pond, for the staggering of plants and flowers in a bed, almost everything was in given scale and exaggeratedly symmetrical.

"Though the prevalent style in English gardens in the first decade of the eighteenth century remained the frenchified William III style, English gardenists increasingly established their own insular variants, not least with regard to avenues, forecourts, garden walls, parterres and wildernesses."³⁴ During the wars with France, England developed its own gardening features guided by ancient and rural motives. Even if that "meant arcades in clipped yew"³⁵, the installation of grottos, huge water basins and quarters of planted forests.

"...Nature in England was so thoroughly subjugated by the beginning of the eighteenth century that control was becoming tedious and horticultural fashion was ripe for some change which would add a small stimulus to the excitement of life, and at the same time satisfy the dawning desire for that pleasurable melancholy which could be so agreeably increased by the contemplation of Nature more or less in the rough."³⁶

The liberties of the Constitutional Monarchy and the flair of democracy led to a conception of free rural landscapes. From then on strict formalism was perceived as a representation of despotism, such as Versailles represented feudal domination. Not least economical circumstances affected the upcoming change in garden design to a more natural, rural style. "Great magnates prospered, while the decline of the small landowner both encouraged and allowed the spacial distancing of the great landowners from the surrounding communities, as land-scapes of `taste´ were wrapped around their houses, excluding everyone else in ways both obvious and subtle."³⁷ The early forerunners of landscape design, trying to introduce a more natural way of laying out, intended to balance the growing gap between the the great landowners and the gentry. Those had banished all agricultural facilities from their surrounding land and had replaced it with ostentatious luxurious gardens.

Two important garden designers of that time, Charles Bridgeman and William Kent, soon followed the call for natural landscapes and created splendid landscapes like the one at Houghton Hall or Alexander Pope's villa garden at Twickenham. Many of the former symmetrical layouts were destroyed to make way for the new rising garden fashion. Often long stretched walking circuits theme-park-like led through a changing landscape with different strategic points to observe attractions such as a gazebo, a grotto or an artificial ruin. Historically, the landscape garden was indeed the only independent particularly English contribution to the development of gardens.

At end of the 18th century the appreciation of the act of gardening itself increased. No longer was the garden simply a peaceful place to relax, recreation meant activity. Smaller gardens and town gardens remained quite formal. There was simply no space for landscape design. Those layouts were to fulfil the practical purpose of gardening. In order to facilitate garden activity and shade the gardener while working. The town gardens were just as narrow as the terraced houses, separated by high hedges or party walls covered with climbers. The regular shape did not leave much space for variation.

With the industrialisation in the 19th century cities grew. England's population almost doubled and people left the country to find work in the cities. Villages were left abandoned and decayed. In the prospering cities the middle class increased and with them the demand for gardening space. Still everyone tried to keep a garden if he could afford and therefore many laid out gardens outside the city, detached from their residence. Those were often gardens located together only separated by hedges. It was the beginning of allotment gardening as we know it today.

"[B]y the middle of the century, the nurseries would turn those rare curiosities into affordable commodities[...]".³⁸ As exotic and fancy plants had become affordable, woodlands and exotic landscapes appeared to be the new gardening style and there were gardens all over England matching the landscape of different foreign countries, from Mexico to New Zealand and From India to China. Oriental or mystic figures along Chinese pagodas decorated the scenery. Some of those landscapes had become pilgrimage-like sites and developed into Disneylands of the former days.

The Victorian age again brought symmetry into the garden landscape. The style can be compared to the one under the Tudor regency but had a manifold of exotic and colourful plants available. Formal garden bedding and topiary again were a trend though controversially discussed. The style succeeded over age and represents the majority of historical gardens today. "[T]he bedding scemes and squares of Cheltenham, for example, are outstanding" and still display the exuberance of those gardens. (The Engl Garden, p213)

From the beginning of the 20th century on garden designers started to look back, deriving inspiration from past ages. Styles differed and were applied arbitrarily, but the main features of the English garden remained the same way they had been hitherto and were still applied during the 20th century. They form a vocabulary of architectural elements that build the essence and characterize each and every English park or garden.

2.2.2 Features and follies

A great variety in features, some more typical, others less, characterize England's gardens. Follies like bridges, pavilions, gazebos, dovecotes, terraces or gateways; horticultural design such as topiary, knots and detailed designed parterres; hedges structuring the inside and building up `rooms' and lawns or corridors intersecting them; all kinds of figures and decoration and also fountains and ponds demanding technical installations.

Many things have changed over the centuries but some things have always remained essential.

The following lines compile the most typical implementations of English gardening tradition considered as still topical and useful for modern application. The layout of The Spectacle, which is furthermore an homage to that tradition, derives from those implementations by trying to condense them into functions that are suitable for a modern park connected to a vertical farm.

The Kitchen Garden has not changed much since the Middle Ages. Till this day it has always been a garden where amongst vegetables, herbs and healing plants, plants for domestic use or ornamental shrubs were grown. Especially during the 18th century, when edible and decorative plants were grown hidden and detached from the generously laid out landscape, "the kitchen garden was the refuge for everything prospering."³⁹

Hedges and walls around the vegetable plot had the additional function to protect those from wind and weather and above that give shelter to the gardener. The colourful borders of the kitchen garden were the model for the later `flower borders'.

Colour Gardens and *flower borders* were long and narrow beds containing a huge amount of all kinds of flowers and shrubs with all kinds of colours as well as a broad variety in appearance. The compilation neither regarded the species nor did it pay attention to price or value of the plant. The impression to the beholder and the opulence in colour was the only thing considered. Nevertheless, the plants were selected and composed with scientific accuracy for the bed should bloom all season long.

The Orchard was a very monotonous and rigidly arranged collection of fruit trees appearing as a closed unit in the garden

that was strictly separated from any other clamp of trees. Just as the kitchen garden, it was banished from the landscape gardens of the 18th century because it represented a part of working life.⁴⁰ All the more, it was admired during the Victorian era and attained a status far beyond a crop garden. Since that time the orchard is appreciated as a decorative part of the garden.

A Lawn can usually be considered as typically English. It had already been part of the formal garden and in contrary to most of the other parts of the garden it was a place meant to be stepped on. From early times on it was a place to carry out games such as the highly favoured bowls. The invention of a lawn mower in 1830 made it possible for the first time to cut lawns as short as we know it today.⁴¹

The Garden Pavilion was mostly a representative object to look at. It usually had a square plan and was covered with a pyramid roof. It gave shelter from rain and was a destination for tea breaks during summer, even though most pavilions could not accommodate more than a handful of people. Because of the aesthetic notion of the era the pavilion changed its look from a rural shed to a classical gazebo and could be a pagoda as well in the late 19th century.

The small observation platform that should not be missing in the layout of the 17th century's formal garden was called `mount'. For the visitor it provided an idea of a bird's eye view on the properly proportioned and well, after strict formal criteria, arranged pattern of the garden.⁴² One should step up and perceive the geometrical idea behind the layout.

2.2.3 Functions for The Spectacle

The functions mentioned above build sections in the groundlevel layout of The Spectacle's park landscape. Each section is allocated to one of the `machines'. (Look up the design method and maps in part 3) Together they create theme-zones that focus on different plant topics.

Based on the conception of the Prinzessinnengarten, the kitchen garden became a community garden-like communication garden, where people can offer their help to maintain the garden and are trained in gardening skills in return. School classes that visit the garden learn about urban gardening and growing vegetables which is shown directly on site. Visitors can see, touch and smell the plants. They can plant and harvest on their own and things harvested will be used as ingredients for the café's lunch and dinners. This part of the garden stands for the reintroduction of gardening knowledge in urban areas and aims at educating people and animating them to grow sustainable and organic food for themselves.

The colour gardens find their equivalent in flower beds lining the entrance area along the Thames. By the flowers' splendour and fragrance people will be attracted to enter the farm. Colours and appearance display the season and add their special atmosphere to each of them.

An orchard is traditionally laid out and provides all kinds of fruit growing on trees. Shrubs and berries are grown above on the associated `machine'. At the same time the orchard serves a haven for recreation and gives shade during hot summer days. The lawn is a slightly raised terrace, a place for just enjoying yourself. People play badminton or soccer or just lie in the grass taking a sunbath, listening to the continuous flow of the river and watching the machines perform.

The garden pavilion simply became a café. This section is located along the Queen's Walk and lies slightly lower than the rest of the park rather belonging to the walk. It is a collecting point where the circuit through the landscape starts.

Finally, the `mount' is a platform attached to - and accessed via one of the `machines'. It is lifted thirty meters and provides a tremendous view over London.

2.3 The final Design and its Intentions

As pictured above, The Spectacle assembles a variety of local references from, the urban historical context to English gardening tradition. These references allow the design to react sensitive to local conditions and create something very unique for the site.

It was never intended to create sculpture-like `machines' instead of a `proper' building. In contrast The Spectacle claims to be very much of a functional building considering all facets of the topic. And in fact it is a building totally opened and unsheltered, exposed to wind and weather like plants are in nature. Therewith the design tries to be both a building and a landscape. And it is the attempt to again open up our minds for thinking the vertical farm differently. Therefore, it leaves aside all technical installations identified as gimmicks above, to focus on community, landscape and the essential agricultural cultivation.

The Spectacle represents a green lung for London's polluted and foggy air and accounts for the craving for a healthy organically grown diet. Additionally the elevation of the growing surface creates space and extends a park landscape lying underneath. This landscape is fully accessible and open to the community. It is a place for excitement and relief, there is place to just stay and lie in the grass as well as there is a training lawn, where people are introduced to gardening practices. People can sit at the pond, consume at the café or enter a lifted platform floating at the top level of the garden giving a tremendous outlook. All that is accompanied by the calming movement of the manifold of lawns, slowly but steadily crossing the sky drawing complex arrangements of shadows onto the ground. Their movement is perceivable from all over the northern riverside between London Bridge and Wapping as well as from wide parts of the South Bank itself. The `planting machines' stand like windmills in the scenery, they can be climbed and harvested and are thematically bound to the sections on the ground floor. Their spectacularly moved plants come so close at one point and so far and high at another that the observer loses a sense for proportion and size. It examines the plants' demands for sunlight and water so overdrawn that anyone would not only understand how food grows and what it needs, but also how valuable it is.

References

- ¹¹ Bodenschatz, Harald (Ed.): *Renaissance der Mitte, Zentrumsbau* in London und Berlin, p18
- ¹² (ib.) p19
- ¹³ (ib.) p21
- ¹⁴ (ib.) p23 ¹⁵ (ib.) p27
- ¹⁶ (ib) p33
- ¹⁷ (ib.) p34
- ¹⁸ (ib.) p35
- ¹⁹ (ib.) p40
- ²⁰ Festival of Britain <1951>: The Festival of Britain, 1951
- ²¹ (ib.) p63
- ²² (ib.) p66
- ²³ cf. Bodenschatz, Harald (Hg.): Renaissance der Mitte, Zentrums bau in London und Berlin.
- ²⁴ cf. www.pottersfields.co.uk/park-history
- ²⁵ cf. Southwark Council, Planning Consultation, www.southwark council co uk
- London Bridge Investment Framework 2008, Southwark Council
- ²⁶ Fearnley-Whittingstall, Jane: *The garden: an English love affair;* one thousand years of gardening.

²⁷ (ib.) p54 ²⁸ (ib.) p57

- ²⁹ (ib.) p71
- ³⁰ Dutton, Ralph: The English garden.

³¹ (ib.) p95

- ³² (ib.) p31 ³³ (ib.) p31

³⁴ David Jacques: "The formal garden", in: Sir John Vanbrugh and landscape architecture in Baroque England. 1690 - 1730. p32

³⁵ (ib.) p42

³⁶ Dutton, Ralph: *The English garden*. London: Batsford, 1937, p2

³⁷ Tom Williamson: "Estate management and landscape design", in: Sir John Vanbrugh and landscape architecture in Baroque England. p28

³⁸ Mark Laird, "Exotica and botanical illustration", in: Sir John Vanbrugh and landscape architecture in Barogue England, p104

³⁹ cf. Mader, Günter: Neubert-Mader, Laila: Der architektonische Garten in England, p142

⁴⁰ (ib.) p148 ⁴¹ (ib.) p134

⁴² Dutton, Ralph: *The English garden*, p59

Diagram 2A Bodenschatz, Harald (Ed.): Renaissance der Mitte, Zentrumsbau in London und Berlin.

www.southbankcentre.co.uk

Diagram 2B The official book of the Festival of Britain, 1951

Diagram 2D - 2F http://www.southwark.gov.uk/info/200023/design conservation and archaeology

London Bridge Investment Framework, London Council 2009

Diagram 2G Croad, Stephen: Liquid history: the Thames through time. London Batsford 2003

Diagram 2H Croad, Stephen: Liquid history: the Thames through time. London: Batsford, 2003 en.wikipedia.org/Thames

Diagram 2I Croad, Stephen: Liquid history: the Thames through time. London: Batsford, 2003

http://www.guardian.co.uk/environment/picture/2011/jan/13/londonsuper-sewer-map

Diagram 2J http://maps.environment-agency.gov.uk/

Diagram 2K fishstat software from: http://www.fao.org/fishery/statis tics/software/en

III The Spectacle

3.0 The Society of the Spectacle

Using the term spectacle, the project automatically refers to a meaning of the word as it was first used in Guy Debord's (a French Marxist theorist, writer, filmmaker, member of the Letterist International, founder of a Letterist faction, and founding member of the Situationist International (SI))⁴³ essay on "The society of the spectacle" from 1967. In order to understand what Debord meant with spectacle, we need to look at two main developments that modern society has undertaken, as Debord locates them. The first one considers economy and labour conditions, the second one the experience of time in modern societies.

In the following, `The Spectacle' always refers to the project title, while `the spectacle' refers to what is meant by spectacle in "The society of the spectacle".

3.0.1 Economy and everything that appears

In a modern society literally everything has become a commodity. Not only what we consume but also that we consume, that we work and live. Nothing is left that would not be the matter of economic trade.

The fact that the worker, the producer of things consumed, became more and more specialised, a wheel in a bigger production process that he cannot overview any longer, made his action become separated from its result. In this process the work turns into an abstract entity, the individual is no longer the creator of his product. It is disposable and its working power turns a commodity. Cut off from the output, the worker finds himself working without sense. He himself experiences his work as abstract. It makes him a passive spectator in a process he is part of. "It shows what it is: separate power developing in itself, in the growth of productivity by means of the incessant refinement of the division of labor into a parcellization of gestures which are then dominated by the independent movement of machines; and working for an ever-expanding market. All community and all critical sense are dissolved during this movement in which the forces that could grow by separating are not yet reunited."⁴⁴

For Debord this change in production is neither systemic necessity, nor a result of a historical development, it is rather a conscious distinction, a cut that represents the modern class struggle. Though the means of production are administered by the bourgeois class, the stand-alone winner of this struggle is economy itself.

It constantly produces overvalue, things that are not necessary for survival. In this surplus, the actual use of things becomes abstract and alien. And at that point "the totality of use is already exchanged for the totality of abstract representation."45 This is the essence of the society of the spectacle, the crucial problem our society faces. "Considered in its own terms, the spectacle is affirmation of appearance and affirmation of all human life, namely social life, as mere appearance."46 Everything that is appearance, everything is a spectacle. The exchange value gained control over the use value and this triggers off a competition (that is communicated by advertisement) where products try to claim their right to exist via a mere fictive use. In this process new demands are created and so the exchange value not only rules over the use value but also over the use of things itself. A goal does not exist, the only development is nothing more than the permanent reproduction and growth of the economic system. Thereby the spectacle extends and invades all facets of life, changing them into representations of themselves. Now, instead of being, everything only appears. Everything turns into a picture of itself and all use of everything is exchanged for its abstract idea. Thereby the actual quality of a product loses its relevance. "The loss of quality so evident at all levels of spectacular language, from the objects it praises to the behavior it regulates, merely translates the fundamental traits of the real production which brushes reality aside: the commodity-form is through and through equal to itself, the category of the quantitative. The quantitative is what the commodity-form develops, and it can develop only within the quantitative."47 And as everything is quantitative everything turns into a commodity, even time which means, in terms of working hours, lifetime

3.0.2 Time, a commodity

The experience of time in archaic societies, Guy Debord states, is cyclical. "A more complex society which finally becomes conscious of time devotes itself to negating it because it sees in time not what passes, but only what returns."⁴⁸ When societies more and more accumulate capital/power (according to their hierarchic structure) and thus surplus value, time becomes irreversible because this surplus is achieved by the extensive exploitation of working lives which are limited. Therefore history is a history of power for it only occurs in hegemonically organised societies due to their conception of time.

Whereas in other societies history widely remains a story, in the society of the spectacle, history becomes reality. "With the development of capitalism, irreversible time is unified on a world scale. Universal history becomes a reality because the entire world is gathered under the development of this time."⁴⁹ In the process of rationalisation that linear and irreversible time is divided in an infinite number of units. Those units are treated as commodities, tradable, consumable and exchangeable. And this does not only affect working hours. Every passing minute is part of the spectacle.

"Whereas in the primitive phase of capitalist accumulation, 'political economy sees in the proletarian only the worker' who must receive the minimum indispensable for the conservation of his labor power, without ever seeing him `in his leisure and humanity', these ideas of the ruling class are reversed as soon as the production of commodities reaches a level of abundance which requires a surplus of collaboration from the worker. This worker, suddenly redeemed from the total contempt which is clearly shown him by all the varieties of organisation and supervision of production, finds himself every day, outside of production and in the guise of a consumer, seemingly treated as an adult, with zealous politeness."⁵⁰

For the worker is at the same time consumer, the world of the spectacle simulates spare time where the worker is invited to buy the commodities he has produced. Debord calls it the pseudo-cyclical time. Pseudo-cyclical because it imitates the natural rhythm of pre-industrial societies by actually keeping up the "exchangeable homogeneous units and the suppression of the qualitative dimension. But being the by-product of this time which aims to retard concrete daily life and to keep it retarded, it must be charged with pseudo-valuations and appear in a sequence of falsely individualized moments."⁵¹ This time is not even considerable as a part of making up what

is taken away during working hours, it is a completion of the total consume. The time given is the time needed to achieve a certain level of consumption. And as the use of the things consumed cannot make up for the meaninglessness all this stands for (because it has no direction, no aim, nothing more than the upkeep of the economy itself; as it creates fake needs and demands at random consumed and wasted randomly by expropriating the human his own history) the exaggerated commodity-value that is mere appearance is the only thing that remains. It is the collective belief of our time and the only access to the world that we know. Every moment of reflection that does not belong to the spectacle remains a fragment torn apart, not understood.

3.0.3 Résumé

The picture Debord draws is desperate and hopeless. Written in a strong Marxist tradition, the essay sees the only way to overcome the misery of the spectacle in the resumption of the class struggle. Though he seems convinced that the bourgeoisie is not capable of directing the autonomous economy, for Debord it still is the administering class. To stop the spectacle, the class must be overthrown. Thus Debord does not accept any argument leading to a conception of a societal system that would maybe distinct between mechanisms inside a society, not classes. Hence structuralist arguments are rejected in the forefront and pointed out as apologies that are themselves part of the machinery of the spectacle.

"The assertion of the definitive stability of a short period of frozen historical time is the undeniable basis, proclaimed consciously and unconsciously, of the present tendency toward a structuralist systematization. The vantage point from which anti-historical structuralist thought views the world is that of the eternal presence of a system which was never created and which will never end. "52

Even though the whole essay is very political it ends with the rejection of any kind of idealism. For Debord the time to act has come.

Summarising, the spectacle, as Debord describes it, is the way we experience our surroundings and exercise our daily life. It is not reflected and does not appear in our consciousness. Being part of it, we cannot distinct what is actually necessary and what needs are mere simulated and given by the spectacle. It is a life that only appears, and everything within is appearance. What does not appear is practically not there, because all that is appears. It is a life totally given over to a positivistic point of view. It technically is the metaphysic of appearance and in this vein is a collective belief. But for it is a lifelong competition where everybody has to fight for the trade-value of his produced commodities (be that working- or spare time or any physical thing), it internally separates the individuals from each other. Society is torn into fragments which again makes it vulnerable for the appearance of the spectacle, which remains the only common field inside the society.

Thereby, Debord never mentions the individual with its needs, wishes and mental state. The essay treats the individuals as lifeless objects that together build a society. And as the society and its state always come first, the human remains an inscrutable entity that is always just victim or, to speak with Debord, passive spectator. In a society that has lost all its bounds to its own history and that freezes in the certain state of economy's gaining of independence, people turn wheels, passively upkeeping the machinery. With this observation Debord denies the people their existence. A life in the spectacle must be worthless.

3.0.4 The participant of The Spectacle

In opposite the participant in this The Spectacle project is treated as a totally aware and responsible person. The Spectacle accepts the way people lead their lives and totally admits their demands. For there is neither knowledge about, nor a proposal for how an actual life should look like and what an actual life means, we cannot simply negate the current state implying an overall aversion for the actions of the individuals. Society is nothing more than the collection of individuals. We cannot believe that a society first needs to have its optimal form that can be filled with content afterwards. That would be idealistic, though.

For that reason The Spectacle, still being aware of all fake appearance, is a place for the people. And it is a place that intentionally very much admits consumption and appearance. It has everything a funfair has: Restaurants, cafés, showrooms, funrides, spectacular views and a lot of people converged on one point. It technically is a place Debord would never go if there was not a little twist in it.

3.0.5 Engagement versus consumption

The idea behind The Spectacle is to bring the process of food production into discussion. Not only that all vegetables and fruits are grown naturally, the process of this production is shown, even exhibited and also taught. A garden school functioning as a communication platform shall introduce people into the practice of urban gardening. Therefore, seminars, laboratories and showrooms together with a large planted park area (the `schooling garden') are installed on site. Privates can enrol in courses, school classes book guidances and everybody can observe the particular procedure of all food products. There will be staff and assistants constantly showing people around, answering questions and demonstrating planting methods. And people will be invited to introduce themselves to the process, to involve and to lend a hand. This will especially count for the neighbourhood. The garden shall build a centre point for urban gardening activities in the borough. It should represent the heart of a dense network of people engaging in gardening and creating an atmosphere of unity.

It will be a common acting, a communicating and playing and not a mere observing. It shall create something, Debord would probably call `actual producing'. It reintroduces the worker to the commodities he produces and consumes. The garden is the embodiment of a production that is not separated but integrated. Everything is transparent and no instance will direct it from the outside. People harvest their own food from the `machines' for themselves and can even cook themselves at the `self-cooking plants'. They are totally involved into the whole production process.

The Spectacle stands for the revelation of the food production process that people have already become cut off from; it stands for the subversive act of teaching people how to grow their own food making them independent from the industry and it stands for the reunification of the community that is dispersed in the society of the spectacle.

Thereby it is non commercially oriented. All profit is reinvested in the maintenance of the project and thus only serves the community.

3.0.6 The ambiguity

Inbetween all that, the planted machines represent an exaggeration, a multiple scaled show of this process. They both perform a spectacle and simultaneously reveal the spectacle by displaying the process that overdone. People somehow drop into the machinery, which is so obvious - even for those entering – that they suddenly start thinking about the conditions of food-production. The Spectacle reveals itself as a spectacle and therewith introduces the spectator into a reflection process.

This action is dialectical. On the one hand, those machines are mere spectacle, they shall fascinate, impress and attract people. It is the language of appearance, it is the spectacle. On the other hand, it captures the people. Once having entered, people are somehow enchanted by attractions just like on a usual fun fair. Only that everything they experience is radically different in terms of its content. Instead of being spectator they automatically become part of The Spectacle. What they consume is self grown, healthy and vegetarian. What they see reveals them a process of growing food that they probably had not known before. And they become aware of the necessity of inspecting the production of the food they consume. It reintegrates people into a common society and the process of urban farming. The Spectacle speaks the language of the spectacle but it actually undermines it with everything it does. Its form is spectacular but its content is revolutionary. (Referring to Adorno this might be a dialectic acting reverse a dialectic of enlightenment. While enlightenment practically produces the cage of administration (positive turns negative), the enchantment of The Spectacle produces freedom for the people (negative turns positive)).

3.0.7 Wastage

Obviously The Spectacle contains the wastage of energy. (As pictured above, it actually saves the energy that artificial lighting on a "traditional" vertical farm consumes, and spends it on the movement of the machines to expose the plants to natural light). Therewith it responds to the rising rationality that the public debate on ecology contains.

While the ecological trend at first seems revolutionary, a product of the working class to limit the wild growth of industrial production, it though runs risk to become its slave. (Just as Debord would say that anything except revolution would be a product of the spectacle itself). The Spectacle detects a tendency behind the rationalisation of the ecological era that comes close to the tendencies of Debords spectacle. It is the tendency to cut down everything spectacular inside the spectacle, which means, the ecological trend to save energy as much as possible in all parts of life implies the loss of exuberance. If that trend is part of the self-sufficient economy as Debord describes it, we run risk that the spectacle, in order to more and more rationalise itself, cuts down the glamour that it is based on. In doing so the world of the appearance that our society is based on (according to Debord) and that is keeping up our society will be replaced by the fear that ecological problems would rob society its resources. (Even the `Vertical Farm Project´ was triggered by the apparent necessity of rationalising food production in order to save the planet). Compared to Debord´s picture this would be a radical worsening because it is the next step of the dehumanization in an economically driven world.

Therefore the spectacular machinery of The Spectacle can also be seen as a monument to the era of glamour and appearance. It recalls the surplus value our world produces and questions a future world without that value (which implies a world without art in a modern sense).

3.1 Laying out the Site

The distribution of the `machines' on site is based on an algorithm that prevents thoses machines from shading one another. Therefore the arrangement is optimised to keep this shading on a minimum level.

3.0A shows how the algorithm allocates the machines

The radiation diagrams below display different configurations of different optimisations. There are two approaches for the calculation. One is shown in diagrams 3.0B - 3.0E, the other one in 3.0F - 3.0G. The calculations are divided to avoid excessive shading, which would be counterproductive.

The configuration in diagrams 3.0B - 3.0E are optimised for specific daytimes on each day in August and September

Those in diagrams 3.0F - 3.0H show the optimisation for an all-day-radiation in the months July, August and September.

The distribution of the `machines´, chosen for the plan layout, is based on an optimisation shown in **3.0H**

Diagrams **3.01** and **3.0J** show harvesting cycles for vegetables and fruit. They are the basis for the arrangement to be possibly optimised for the specific needs of single plants Another algorithm controls the sectioning of the ground floor. The diagrams **3.0K** - **3.0N** deal with the premises and assumptions that represent the background of this algorithm. Basically there are five sections, where each one belongs to one of the `machines'. As already mentioned above, each `machine' is associated to one of those specific topics: Orchard, Lawn/Park landscape, Flower beds, Kitchen garden and Café. Those topics are literally projected onto the ground surface. Thereby, the shadows - casted by the machines during specific timeintervals - define the area of those facilities. In shading the associated ground level area, the facilities are `activated' by the shadow-play of the `floating lawns'.

The time-intervals that define the applied shading are selected on the basis of the time-span in which those facilities are most used.

	Time	Month
Orchard	5 pm - 6:30 pm	6,7,8
Park landscape	7 am - 12 am	6,7,8,9
Flower beds	9 am - 11 am + 3 pm - 6 pm	5,6,7,8
Schooling g.	9 am - 10 am + 4 pm - 6 pm	6,7,8
Café	11 am - 1 pm	4,5,6,7,8,9

This process is explained in particular in diagram 3.0N



Layout 1 Radiation Optimum 12:00 Diagram 3.0B Layout 2 Radiation Optimum 13:00 Diagram 3.0C





Layout 3 Radiation Optimum 14:00 Diagram 3.0D Layout 4 Radiation Optimum 15:00 Diagram 3.0E





Layout 5 Radiation Optimum August Diagram 3.0F

Layout 6 Radiation Optimum September Diagram 3.0G

















Programme





Lambeth College, Proposal for Conversion Ground Floor










3.1.1 Function and capacity

The Spectacle is not only about `the machines', how they move and grow food. In terms of urbanism it is a festival site.

In summer, there will be hordes of visitors every day, informing themselves about planting and growing, harvesting, consuming food or enjoying the tremendous view from the platforms. Thus The Spectacle is much more than simply a spectacular vertical farm, it is a funfair! As a funfair it has to meet the needs of a large number of people.

Therefore The Spectacle provides the capacity for an estimated amount of 30,000 visitors a day.

Diagram **3.1A** draws the area where people move on site, where they queue and how they access the `machines'.

Diagram **3.1B** shows the paths where trucks can enter the site for mounting or unmounting the `machines' and stands and also deliver additional food for them.

Diagram **3.1C** contains information about the assumed capacity of the site's facilities

Functional Scheme







Site's Capacity Diagram 3.1C

	Amount	Capacity[m ²]	Supply [simultaneously]	Fluctuation	Supply [a day]	Queues
Site's Total Area		28000 m ²	3000		30000	
Outside Area		27787 m ²	2000		2300	
Snack Stands/Café	5	240 m ²	400		20000	_
WC (m/f) (narrow)	4/4	150 m ²	150		24000	
Harvesting Lift	5	36 m ²	250		12000	
Platforms	2	200 m ²	200		12000	
Park Landscape		5460 m ²	400	_	3000	
Schooling Garden		3933 m ²	300	-	900	
Inbetween		1000 m ²	300		30000	
School		3000 m ²	1000		15000	
Ticket Sales	1	200 m ²	100		(30000)	-
Admin	1	100 m ²	25		25	
Showrooms	3	460 m ²	400		6500	
Seminars	5	400 m ²	200	-	200 - 800	
Laboratory/Propagation/GH	6	800 m ²	50		50	
Workshop	1	200 m ²	100	-	100	
Dining	1	200 m ²	100		600 - 800	
WC (m/f) (decent)	3/3	200 m ²	100		100	

3.2 The Machine

3.2.1 Technical description

The Spectacle represents a five piece of planted machines which move plants along the sun in order to grow them vertically by not consuming any artificial light.

These machines are based on two pylons that together cover no more than 3.6 m^2 of the ground level's surface. (Which is 18 m^2 in whole compared to the projected surface which covers approximately 28,000 m^2). Each of those is anchored on three sides and carries a rotation axis that spans over to the other pillar on the fourth side. The axis carries a multitude of cantilevering beam – couples rotating and moving according to the sun. (Machine A)

The beds, in which the plants grow hang in scissors like deployable lightweight scaffoldings that span between the two endpoints of these two cantilevering beams (Machine B) (Later called floating lawns).

In the default position (when cantilevers are parallel) the folding is at its minimum extent (Machine C).

As the beams move divergent, the distance between the two endpoints grows, the scissors enfolds and grows up to 5.6 times its surface. In doing so, the structure opens up space to admit natural sunlight. The beds are then positioned perpendicular to the sun in order to expose all the plants perfectly to sunlight (Machine D).

When the plants rather need shelter than sunlight (due to weather conditions), the folding shrinks to its minimum. Now the plants are gathered closely and protect each other from being exposed to the weather.

One Module of the scissors like scaffolding is 50cm by 50cm folded up and 150cm by 150cm unfold. A non carrying substructure holds a rockwool cylinder that is planted vertically and remains vertical in every position (Machine C, E).

Only while harvesting the beds are tilted vertically by being folded up so the rockwool cylinder is held horizontally (Machine F).

In that case it is possible to pull out the cylinder and harvest plants. Via a lift people access the structure and pick themselves plants directly. It means that during the harvesting period the machine turns into a super fresh organic urban super market where people are able to pick and choose their plants directly from the field having an overwhelming view over the city of London (Machine H).

Two of the `machines' have an overview platform attached. The platform is accessed via the harvesting lift but also via emergency stairs. (Machine G)





































3.2.2 `Generative Movement Controlling' and weather feedback

The `machine' is totally parametric and modelled in 3D, what firstly makes it possible to read true values of all lengths during movement and secondly gives visual and calculable control over the structure in order to overview different movements happening simultaneously.

Moreover the parametric 3D control makes it possible to link the geometry to scientific software being able to calculate optimal sunlight radiation and simulate weather conditions. In the carried out example, lawns were replaced with surface meshes. The total radiation of all surfaces is measured by considering self-obstruction. (3.2A)

Transferred to real life, the radiation would be measured by sensors and forward the same information now simulated by a generative script.

The generative script component connected to the measured radiation optimizes the orientation of the floating lawns. The Spectacle can thus react to the slightest change of sunlight. It can evade the shades of clouds and readjust to the moving sun. Thereby it it does not know preprogrammed alignments but reconfigures simultaneously reacting to the true unique situation. (also 3.2A)

Another aspect of this interaction is the feedback function. As weather conditions are monitored, predicted and translated the movement itself acts as a display for the actual and upcoming weather. The structure shrinks when wind gets up or retracts during heavy rainfalls. Perceivable from far, The Spectacle informs the observer about upcoming or changing weather. And this is achieved by simply exercising its natural function. Analogue to plants which collapse by night and blossom in daylight, the movements of the `machines' are both functional and indicative.

For the modelled situation wind and weather are left aside but would indeed affect the movement just as sunlight does. Different forces would have to be calculated and balanced. For example if wind got so strong that it would harm the plants, the machine would retract even if the radiation was perfect.

The generative script thus is a mock up to simulate the optimization The Spectacle would experience in order to show the possibility of the direct feedback and create configurations true for specific sunlight states not considering wind or rainfall. Further the replacing of the real construction with plane surfaces for calculation purpose is a simplification but recognized and exercised in diagram **3.2D**

The diagrams 3.2B and 3.2C are screenshots taken during a generative fitness optimisation in `Grasshopper' and `Ecotect'

3.2E shows the weather conditions that the calculations are based on



Ecotect Optimum at 10 am Diagram 3.2B





Ecotect Optimum at 6 pm Diagram 3.2C



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Weather Conditions Diagram 3.2E



• 950-1250 • 850-950 • 750-850 • 650-750 • 450-550

Average Amount of Rainfall

30



● 1750-1900 ● 1650-1750 ● 1600-1650 ● 1550-1600 ● 1550-1600 Average Sunshine Hours







3.3 Food

3.3.1 Food, grown on The Spectacle

Even though the project is not about rationalised food production at all, it is still important for the The Spectacle to compare its food production to conventional agriculture and calculate its possible output for the projected site.

Diagram **3.3A** compares the cultivated vertical area with the measurements and proportions of the `machines´

Diagram 3.3B illustrates the personal demand for food

3.3C shows the dimensioning of the garden areas on site

Diagram 3.3D shows the selected planting method and possible others that were dismissed

In diagram **3.3E** plants that can be grown on site were selected due to special parameters and criteria.

Diagram **3.3F** shows what sort of plants the different `machines' grow

Finally **3.3G** contains calculations for the yield of The Spectacle


Dimensioning a sufficient Garden Size Diagram 3.3B Selecet by Purchase Quantity [Grams per person and year]



Dimensioning a sufficient Garden Size Diagram 3.3C





Which plants would suite Diagram 3.3E Hight/Width [cm]

	hight/width	Annial	Biannial	Perannial	Frost	Sun	Light Shade	MoistSoil	Heavy Clay	Pot	Shelter
Potatoes	60/60			Q				Q			
Tomatoes	200/40										
Runner Bean	300/100	-									
Cabbage	45/80								¢		
Carrots	50/30	-									
Cauliflower	80/80	-							¢		
Cucumbers	200/60								¢		
Leek	60/5										
Lettuce	90/30	-									
Onions	60/12	-				_					
Garden Peas	200/20										
Apple	900/900								¢		
Apricot	900/600								¢		
Cherry	1800/900							¢			
Raspberry	200/150	-				_					
Strawberry	20/30	-							¢		
Grape	150/tendril	-									
Kiwi	900/tendril	-									
Lemon	300/100	-							¢		
Orange	900/900	-							¢		¢
Peach	600/600	-									¢
Pear	600/500	-							ç		
Plum	1200/1000						b		6		b

Composition Diagram 3.3F



Lambeth College

Propagation of vegetables Greenhouse for non-hardy fruit







Area Comparison and Details Diagram 3.3G

Name	Area [ha]	The Spectacle		[ha]
Alexandra Park	80			
Battersea Park	83	Ground Level Area		2,78
Botanic Gardens, Kew	121	Additional Vertical Area		0,75
Bushy Park	450	Total Planted Area		1,70
Clapham Common	89			
Epping Forest	2476			
Green Park	16	Possible Crop	amount of people	[~t]
Greewich Park	73	[always for the whole	[alimented/year]	
Hainault Forest Country Park	136	cultivation area]		
Hampstead Heath	320			
Hyde Park	140	(Vertical Area 0,75)		
Kensington Gardens	110	Potatoes	1210	32
London Zoo	15	Tomatoes	67795	310
Mitcham Common	182	Cabbages	16328	32
Regent's Park and Primrose Hill	166	Carrots	6775	46
Richmond Park	1000	Cauliflowers	2688	9
South Norwood Country Park	47	Lettuces	5665	16
Southwark Park	63	Peas & Beans	2703	6
St. Jame's Park	23	Onions & Leeks	1126	7
Thames Barrier Park	35	Cucumbers	298319	633
Thames Chase	9842	Berries	5071	13
Trent Park	169			
Victoria Park	86	(Orchard 0,67)		
Wandsworth Common	73	Apples	1164	10
Watling Chase	18840	Pears	3967	9
Wimbledon Common	460	Kiwi	58831	12
Wildspace Conservation Park	645	Stone Fruit (Plums, Apricots, Peach)	3310	9

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3.3.2 Studies on Food Consumption in the UK

The whole dimensioning of The Spectacle was based on researches on statistics and tables on the consumption and purchase of vegetables and fruit in the UK.

The following pages overview this research providing an insight into the actual demands for food in the UK.

Diagram 3.3H generally illustrates the population trend since the 50s

Diagram 3.3I shows the main cultivation areas

And diagrammes 3.3J - 3.3L deal with general information about landuse, maket shares, import distances or wasted food

Finally food metabolisms (diagrams 3.3M and 3.3N) for vegetables and fruit display the amount of food produced in the UK and also what it is used for





Landuse and homegrown Food Diagram 3.3J



100% Homegrown Fruit and Vegetables

Tomatoes	
Onions and Leeks	-
Potatoes	
Beans	
Other Fruit	
Soft Fruit	
Apples	
Carrots	
Cabbage	
_ettuce	
Aubergines and Pumpkins	
Other Vegetables	



Distance of main Import Country in km (Capital to Capital)

Beer of Barley	466 Ireland
Wine	11082 Argentina
Bananas and Plantains	343 France
Sugar	9412 Mauritius
Soybeans	9255 Brazil
Oilseeds (+ Cake)	11705 Indonesia
Wheat (Flour)	5728 Canada
Potatoes	343 France
Cake of Palm Kernel	11705 Indonesia
Palm Oil	14481 Papa New Guinea





Packaging- compared to Content Waste

Manufacturing	2,4	
	0,4	
Household	8,3	
	3,6	
Retail	0,4	
	1,0	
Distribution	0,004	
	O, 1	

Food Metabolism, Fruits Diagram 3.3M [2.000.000 tonnes] Seed is excluded Export (processed) Waste 30% Bread \square 20% Cereals 0 24% Potatoes **B** Animal Feed C Industrial, Nonfood D A Eaten (processed) D С В А





References

43 http://en.wikipedia.org/wiki/Guy_Debord

⁴⁴ Debord, Guy: The society of the spectacle. p25

⁴⁵ (ib.) p49
⁴⁶ (ib.) p10
⁴⁷ (ib.) p38
⁴⁸ (ib.) p126
⁴⁹ (ib.) p145
⁵⁰ (ib.) p43
⁵¹ (ib.) p149
⁵² (ib.) p201

MachineB (deplayable scissors-like modules) cf. Petrova, Polina: The range and limits of deployable space frames based on scissor-like elements to create a large structure of totally arbitrary curvature.

cf. Calatrava, Santiago: Zur Faltbarkeit von Fachwerken.

cf. K.K. Vua, J.Y. Richard Liewa, Krishnapillai Anandasiv amb: "Deployable tension-strut structures: from concept to implementation", in: Journal of Constructional Steel Research 62 (2006), p195–209

cf. Tran Chi Trung: *Novel Deployable Membrane Structures: Design and Implementation*

Diagram 3.0A and 3.0B http://www.savvygardener.com/Features/ veg_garden_calendar.html

Diagram 3.2E http://www.metoffice.gov.uk/climate/uk/so/

Diagram 3.3B UK household purchased quantities of food and drink, www.defra.gov.uk/statistics/foodfarm

http://faostat.fao.org/site/

Diagram 3.3D Understanding substrate design (Grodan), http://www. horticom.com/pd/imagenes/75/118/75118.pdf

Substrates and their analysis (M. Raviv, R Wallach, A. Siber, a. Bar-Tal, 2002), http://www.fao.org/hortivar/scis/doc/publ/8.pdf

http://www.nasa.gov/vision/earth/technologies/aeroponic_plants.html

Diagram 3.3E and 3.3F Fern, Ken: *Plants for a future: edible & useful plants for a healthier world.* Hampshire: Permanent Publ., 1997

http://www.pfaf.org/user/cmspage.aspx?pageid=80

Diagram 3.3H http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=136&IF_Language=eng&BR_Topic=0

Diagram 3.3I http://www.ukagriculture.com/crops/crops_regions_arable.cfm

Diagram 3.3J - 3 3N Agriculture in the United Kingdom, 2010, Defra, www.defra.gov.uk/statistics/files/defra-stats-foodfarm-crosscuttingauk-auk2010-110525.pdf

http://faostat.fao.org/site/342/default.aspx

NON-FOOD CROP AREAS UNITED KINGDOM, 2009, archive.defra. gov.uk/evidence/statistics/foodfarm/landuselivestock/nonfoodcrops/ documents/nonfoodcrops.pdf, and dataset

GB ANIMAL FEED STATISTICAL NOTICE, 2011, www.defra.gov. uk/statistics/files/defra-stats-foodfarm-food-animalfeed-statsnotice-110609.pdf, and dataset

Household Food and Drink Waste linked to Food and Drink Purchases, 2010, www.defra.gov.uk/statistics/files/defra-stats-foodfarm-foodfoodwastepurchases-100727.pdf





IV Conclusion

Conclusion

The fact that The Spectacle moves in order to fulfil a practical reason transcends the boarders of only being an attraction like a landmark. Furthermore, it exceeds the functionality of a plant factory by purposely failing to grow economically compared to the people's demand. The Spectacle has never been intended to be a plant factory as classical vertical farms pretend to be. Very purposely, it rejects the call for the ultimate necessity for food factories in dense urban environments. Much more it denies that factories or laboratories should cover popular urban places. The essence of the Spectacle is the opposite. Instead of covering a valuable down town site with a building which will never be accessible for any civilian. The Spectacle attempts to gain an additional value for the public by underlining the factor of accessibility with even extending the existing park surface and providing a variety of park facilities for the community.

Additionally, it exaggerates this factor by being a spectacle permanently performing for both the plants and the people! The Spectacle does not intend to be a self sufficient structure providing for its own energy consumption. There is no plant, no electricity generating gimmick on site that usually covers building designs for vertical farms.

There is no real self sufficient building independent from its environment and much less in a dense urban context. Furthermore, a building is much more a metabolism not only in terms of energy but in terms of social life, use and atmosphere. A building must perform in terms of fulfilling functional demands and social desires just as it has to have a sustainable energy balance. Therefore, planning has to consider its usefulness on a specific site compared to what it provides. And indeed I dare to claim that a food laboratory has no business on the South Bank's riverside.

At last, the building typology of the vertical farm is not yet developed. There is so much space left for thoughts and ideas. And especially because the topic is so crucial and burning we must not cut down those ideas to the simplicity of a laboratory.









V Bibliography

Literature

Digital papers

Bodenschatz, Harald (Ed.): *Renaissance der Mitte, Zentrumsbau in London und Berlin*. Berlin: Braun, 2005

Calatrava, Santiago: Zur Faltbarkeit von Fachwerken. ETH Zürich: Diss.1981

Croad, Stephen: *Liquid history: the Thames through time.* London: Batsford, 2003

Debord, Guy: *The society of the spectacle*. Eastbourne: Soul Bay Press, 2009

Despommier, Dickson: *The vertical farm; feeding the world in the 21st century.* New York: St. Martin's Press, 2010

Dutton, Ralph: The English garden. London: Batsford, 1937

Fearnley-Whittingstall, Jane: *The garden: an English love affair; one thousand years of gardening*. London: Weidenfeld & Nicolson, 2002

Fern, Ken: *Plants for a future: edible & useful plants for a healthier world.* Hampshire: Permanent Publ., 1997

Fernández Per, Aurora; Arpa, Javier: Density projects: *36 new concepts on collective housing*. Vitoria-Gasteiz: a+t ed., 2007

Festival of Britain <1951>: The Festival of Britain, 1951

Kretschmer Fabian: "Ackerbau im Hochhaus", in: der Standard, (May 26) 2011, p 10

Mader, Günter; Neubert-Mader, Laila: *Der architektonische Garten in England*. Stuttgart: Dt. Verl.-Anst. , 1992

Petrova, Polina: *The range and limits of deployable space frames based on scissor-like elements to create a large structure of totally arbitrary curvature.* UT Vienna: Master Thesis 2008

Ridgway, Christopher; Williams, Robert (Ed.): *Sir John Vanbrugh and landscape architecture in Baroque England*. 1690 - 1730. Stroud: Sutton, 2000

Anbau von Gewächshausgemüse (Lebensministerium Freistaat Sachsen), www.smul.sachsen.de/lfl/publikationen/download/796_1. pd

Basic Horticultural Statistics 2010 + dataset (Defra), http://archive. defra.gov.uk/evidence/statistics/foodfarm/landuselivestock/bhs/documents/bhs.pdf

Family Food, A report on the 2009 Family Food Module of the Living Costs and Food Survey + dataset (Defra), *http://www.defra.gov.uk/sta-tistics/foodfarm/food/familyfood/*

Food and drink purchases by UK households in 2009 with derived energy and nutrient intakes, *www.defra.gov.uk/statistics/files/defra-stats-foodfarm-food-familyfood-2009-110525.pdf*

Food Statistics Pocketbook 2011 + dataset (Defra), http://www.defra. gov.uk/statistics/files/defra-stats-foodfarm-food-pocketbook-2011.pdf

GB Animal Feed Statistical Notice + dataset, 2011, *www.defra.gov. uk/statistics/files/defra-stats-foodfarm-food-animalfeed-statsno- tice-110609.pdf*

Household Food and Drink Waste linked to Food and Drink Purchases + dataset, 2010, www.defra.gov.uk/statistics/files/defra-stats-food-farm-food-foodwastepurchases-100727.pdf

Living planet report 2010 (WWF), http://wwf.panda.org/about_our_ earth/all_publications/living_planet_report/2010_lpr/

London Bridge Investment Framework (London Council 2009), http:// www.southwark.gov.uk/info/200189/frameworks_strategies_and_programmes_of_work/1234/london_bridge_investment_framework/1

Non-Food Crop Areas United Kingdom + dataset, 2009, *archive.defra. gov.uk/evidence/statistics/foodfarm/landuselivestock/nonfoodcrops/ documents/nonfoodcrops.pdf*

Substrates and their analysis (M. Raviv, R Wallach, A. Siber, a. Bar-Tal, 2002), http://www.fao.org/hortivar/scis/doc/publ/8.pdf

Web resources

Understanding substrate design (Grodan), http://www.horticom.com/pd/imagenes/75/118/75118.pdf

K.K. Vua, J.Y. Richard Liewa, Krishnapillai Anandasivamb: "*Deploy-able tension-strut structures: from concept to implementation*", in: Journal of Constructional Steel Research 62 (2006), p195–209

Tran Chi Trung: *Novel Deployable Membrane Structures: Design and Implementation*, B.Eng. National University of Civil Engineering, Vietnam: PhD Thesis 2007

http://en.wikipedia.org/wiki/Vertical_farming

http://www.verticalfarm.com/more?essay1

http://www.southwark.gov.uk/info/200023/design_conservation_and_ archaeology

www.pottersfields.co.uk/park-history

en.wikipedia.org/Thames

http://www.guardian.co.uk/environment/picture/2011/jan/13/londonsuper-sewer-map

http://maps.environment-agency.gov.uk/

http://www.fao.org/fishery/statistics/software/en

http://en.wikipedia.org/wiki/Guy_Debord

http://www.savvygardener.com/Features/veg_garden_calendar.html

http://www.pfalzmarkt.de/index.php?option=com_content&view=artic le&id=61<emid=70

http://www.franks-garten.de/garten/g006f.html

http://www.metoffice.gov.uk/climate/uk/so/

http://faostat.fao.org/site/342/default.aspx

http://www.nasa.gov/vision/earth/technologies/aeroponic_plants.html

http://www.pfaf.org/user/cmspage.aspx?pageid=80

http://stats.uis.unesco.org/unesco/TableViewer/document. aspx?ReportId=136&IF_Language=eng&BR_Topic=0

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