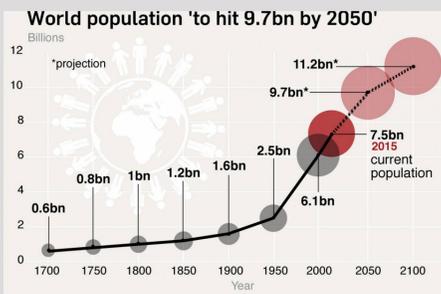


ABSTRACT

London is going to transit into a mega city population scale within the next few decades. The more crowded living environment has made the undeveloped land in the city become even more vital and has brought great challenges to the living quality of the area. The city needs more space and a smart method for accommodating the growth, not only for this generation, but also for the upcoming ones. Comparing with the Inner London area, the Outer London area contains less attractive working opportunities but more and cheaper development space. It is the home for majority central London employees.

The study looked into the current Green Belt area to re-examine their quality. The release and the reuse of the low-quality greenfields would contribute to the relief of housing crisis in London. For the development method, the study investigated into the recent highly acclaimed Garden City concept. The concept has shown great relevance in creating sustainable neighbourhoods. Its experience in solving the urban growth problem and providing high-quality living environment can be used for reference today's urban issues. However, the limitations of it cannot be ignored. The review of its primary tools and objectives could help identify its feasibility and deficiency when being applied to today's urban context. By redeveloping the existing concept based on the reference to the similar approaches, the study is expected to demonstrate a transferable framework for the neighbourhood creation that fits into the Outer London's intensification development. The development will contain efficient land use, higher quality of living and more sustainable way of production and consumption, which could be fitted into the Outer London's Green Belt development.



PROJECT PROBLEM IDENTIFICATION

Central City: too Expensive to Live

The central area of London has provided attractive job opportunities, while not containing enough affordable living space to these workers. The overheated housing market and the high cost of living have driven lots of people to live farther away from where they work. Results from the study of Trades Union Congress, London workers face the longest average commuting time in the UK, 75-minute daily, when comparing to 52.8 minutes of the national average (TUC, 2011). For housing, from the recent research, the annual housing supply is far from the actual demand, and the shortfall in annual house building against the annual housing target is enlarging each year. Central area is just too crowded.

Outer London: the Place in Need of Real Concern and Contains More Development Potential

Over the past seventy years, the outer London has seen distinctive population growth. However, the development within this area cannot follow the pace of its population growth, both physically and socially. Only forty percent of the overall jobs are provided here, and the congestion, quality of public transport and services, and the health of the local High Streets have been the common issues across the outer London area (Outer London Commission, 2016). Though the government has the great intention to promote the sustainable low-carbon travel mode widely within the city to convenient citizen's everyday life, the cost for daily travel by public transport is increasing each year, and the accessibility to these public transport infrastructure is quite limited, especially on the city edge, due to the lower density of development. Shown from the recent research by Newcastle University, the journeys by private car are still the most cost-saving mode choice in Outer London (Ford, Barr, Dawson and James, 2015). Hence, real concerns should be raised to the cost of travel since it has already deeply affected the quality of life of thousands of Outer London resident (Bell, 2016).

Main Concerns

Apparently, compared with the development intense in the inner London areas, the outer London area has greater potential for future de-

velopment. London needs more space for accommodating its future growth, and Outer London is significant to the future success of the wider city; hence, why not switch the development focus from the crowded central London to the outer areas that accommodating majority of the city's workers. Moreover, why not introduce the local employment opportunities to let residents avoid long commuting time every day and have more time for enjoying their life. Outer London area is urgently in need of space and a smart way for accommodating its growth. The questions are, can Green Belt be the place? And can Garden City concept be a solution?

Research Question

Under this perspective, the problem of the research will contain: Where in Green Belt could be used for development? Can the decentralisation of the large scale of high-quality small settlements housing development mode be fitted appropriately into the current Outer London's context? Will it meet the requirement of Outer London's intensification development? If not, what are the limitations and can the redevelopment of it help to achieve the goal? In short, the question will be:

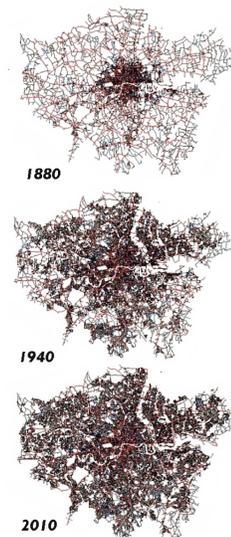
Can the traditional Garden City concept be applied to the high-quality new neighbourhood creation in Outer London's Green Belt area and help with its intensification development?

Design Objectives

O1. Demonstrate a flexible weighting matrix to encourage the re-examination and releasing of the low-quality land in London's Green Belt area for better use to respond to city's growing demand.

O2. Introduce a transferable design framework for new Garden City development in modern time, as a method for accommodating city's growth and intensification.

O3. Alleviate the urban sprawl and avoid its negative environmental impacts on the existing natural environment.



METHODOLOGY

Research Analysis

Step1: Context Understanding

Understanding the stress that London is facing with from its growth.
Find out possible location for construction
Refer to the recent popular method

Step2: Research Problem Identification

How to accommodate city's growth in Outer London Area's insufficiently used Green Belt. Can the Garden City Concept work?

Step 3: Literature Review and Board Strategy Building

Traditional Garden City concept objectives and tools
Similar urban theories and movements inspired by Garden City concept

Step 4: Case Studies and Toolkit Establishment

Demonstrate detailed strategies by referring to and comparing specific case studies from different theories.

Step 5: Site Selection

Assess the site's strength and limitations
Find out the development opportunities
Identify the place for strategy application

Design Proposal

Step 6: Masterplan

Strategy application on the site
More detailed interventions

Critical Review

Step7: Conclusion

Summarise the research
List the limitations of the research
Address the future study

LITERATURE REVIEW

Summary and Review of Ebenezer Howard's Objectives and Tools

ENVIRONMENTAL OBJECTIVE: HARMONY WITH NATURE

"Beautiful of Nature, Fields and Parks of Easy Access; Pure Air and Water"

1. Generous Construction of Green Infrastructure

Limit the concept of Green Infrastructure only on public and private aspects, did not mention the concept for community green infrastructure, which plays a quite important role in current neighbourhoods. Additionally, the green infrastructure should also incorporate with blue infrastructure (The Scottish Government, 2011).

ECONOMIC OBJECTIVE: FOSTER LOCAL EMPLOYMENT, COMMERCE AND TRADES

"Low Rates, Plenty to do; High Wages, No Sweating; Low Prices; Fields for Enterprise, Flow of Capital. Freedom"

2. Community Land Ownership

An efficient tool for making sure the homes are affordable based on the consideration of local people's actual income level. The house building is on behalf of a community and the surplus from the house sell or rent will be used as a reinvestment in local regeneration (National CLT Network, 2012).

3. Local Job Provision within Easy Commuting Distance

The tool provides a method to accelerate the local economy. However, the continuous application of Howard's separation of work and live principle is to some extent, becoming the source of the current housing crisis, due to the huge amount of building stock waste (Barham, 2014). Additionally, the quality of jobs really matters. The designed self-sufficient city has the risk turning into the 'dormitory suburbs' (Jones, 2016).

4. Opportunities for Residents to Grow and Consume Local Food

Provides opportunities for growing and consuming organic products locally, and consumers have the ability to know exactly where their food come from. The plants also provide colourful edible landscapes for the neighbourhood (Benedict and McMahon, 2006). However, if the tool applies without relevant technological guidance, it will bring the problem of food security.

5. Integrated and Accessible Public Transportation System

The integration of public transport is essential to the customer's satisfaction, and ultimately lead to the float of the ridership of public transport. It benefits not only the customers, but also the operators, authorities and other public (European Commission, 2009)

SOCIAL OBJECTIVE: FOSTER SOCIAL EQUITY

"Low Rents; Bright Homes & Gardens; No Smoke and No Slums"

6. Population Density Control

Too low density is widely recognised as wastes of land, and the goal of self-contained was hard to achieve without reaching a particular density requirement. Garden City turned out to be a car-dependent city due to the failure of constructing a compact city (Edwards, 1914).

7. Mixed-tenure Homes and Mixed Housing Types

The mix of housing tenure and the provision of affordable housing are deployed as a method for solving the urban deprivation and stimulating the social equality (Arbaci and Rae, 2013).

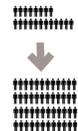
8. Encouraging High Quality and Innovative Designs

The high-quality housing design could essentially improve the living quality of the residents, however, to fit into the current context, sustainable design strategies should be integrated into the housing design.

THEORETICAL FRAMEWORK

1.

MEDIUM-HIGH DENSITY: Large-scale development is not suitable for too low-density development. More compact urban form will be suggested to help reduce the travel time to destination, and help promote walking and cycling. The development should meet the London housing density requirement to help accommodate the population.



2.

PERMEABLE STREET PATTERN: Direct and alternative routes should be provided within the area. Cul-de-sacs and enclaves should be avoided to ensure the permeability of the area.



3.

MIXED LAND USE: Horizontal land use is not enough for intensification development. Compact mixed-use layout with the combination of vertical and horizontal mixed-use <https://thenounproject.com/term/mortgage/197164> is more preferred if trying to achieve walkable environment. The main functional destinations should be within 400 metres walk.



4.

CONVENIENT CONNECTIVITY WITH INTEGRATED TRANSPORTATION SYSTEM: Wider area connection should be noticed as well as the inner ones



during the planning process. It is necessary to provide convenient and accessible links to other transport modes within a reasonable distance, especially for public transportation and walking.

5.

COMMUNITY LAND OWNERSHIP: The community could largely reduce the building cost by purchasing the land (CLTs), and makes the homes more affordable to rent or buy. It will provide great convenience, efficiency and also innovations during the planning process later. This will also ensure the housing affordability to some extent.



6.

QUANTITATIVE AND QUALITATIVE LOCAL JOB CREATION: Provide accessible jobs within the neighbourhood will largely help reduce the traffic pressure and air pollution. Apart from the improvement in local job quantity, community training for job skills should also be included.



7.

AFFORDABLE HOUSING PROVISION AND TENURE MIX: Generously provide affordable housing and encourage mix housing tenure types within the new neighbourhood. It will help meet the needs of people with different income and family size, which will ensure social equity.



8.

VARIED ARCHITECTURAL TYPOLOGIES AND HIGH QUALITY DESIGN: The variation in housing typologies will increase the visual interest for the users, and also meet the different housing requirements by different users. Encourage innovative and high-quality design. Include sustainable elements and LOCAL IDENTITY within the design will improve the living quality and attractiveness of the place.



9.

WALKING AND CYCLING FRIENDLY: Generously set pedestrian-friendly infrastructures, and set compact urban form. Clear separation between the pedestrians, cyclist and vehicles. Limit the use of cars will help create a safe walking environment to a large extent.

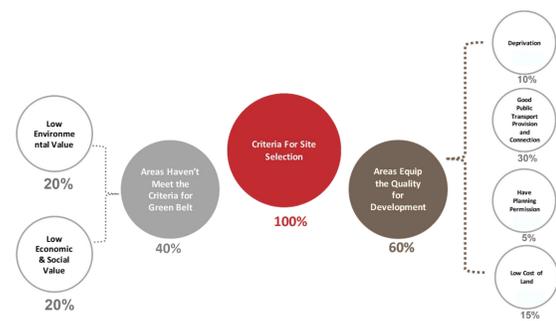


10.

ENOUGH, VARIED AND HIGH QUALITY OPEN SPACE WITH LOCAL FOOD PRODUCTION: Different size, ownership, and types of open space should be set within the neighbourhood, in both good quality and quantity. These open space should be easy to reach (within 400 meters). There should be lands allocated for food production or, by individual, community and public.



SITE SELECTION



SITE SELECTION METHODOLOGY

To narrow down the selection from boroughs with Green Belt, the study is going through a weighting method to make more a balanced decision. For this research, affordability will be a primary challenge for the development. Therefore, the selection of the site will focus more on how to achieve the housing affordability from the preparatory stage: where contains the cheapest land, where will cost less for infrastructure construction.

The selection stage contains two parts. One is going to identify the current qualities of those Green Belt that do not meet the quality of being as Green Belt, socially, economically or environmentally. The other part is to investigate the qualities that are vital for new affordable neighbourhood development within the Green Belt.

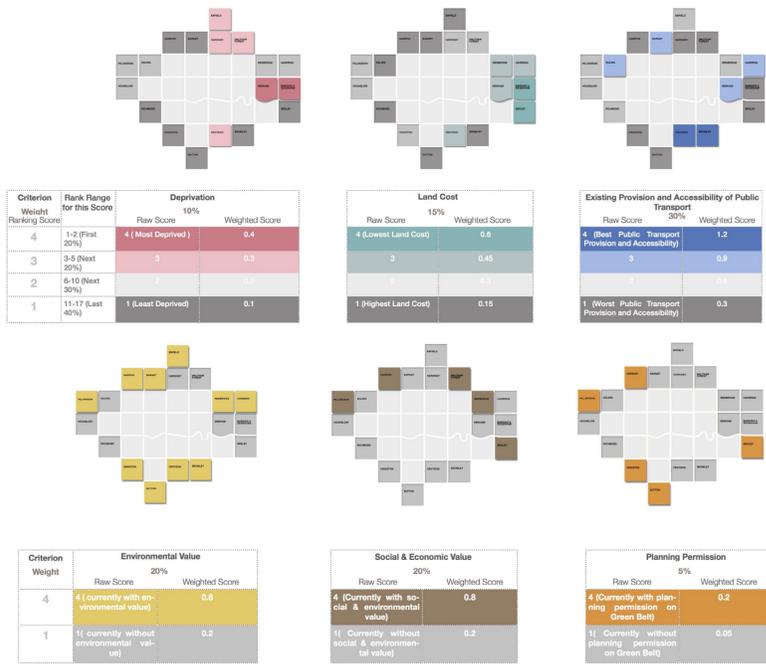
The criterions could be chosen and weighted based on different needs of the new developments. The weights for each criterion is quite flexible and could be adjusted within a reasonable range. Different selection results might occur under the situation of same criteria but attached with different weights.

Can the Traditional Garden City Concept be Applied to the High-Quality Neighbourhood Creation in Outer London's Green Belt, and Help with Outer London's Intensification Development?

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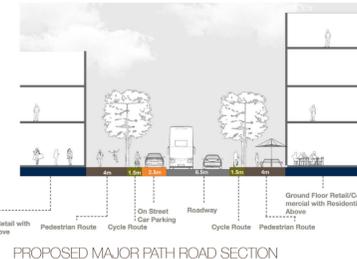
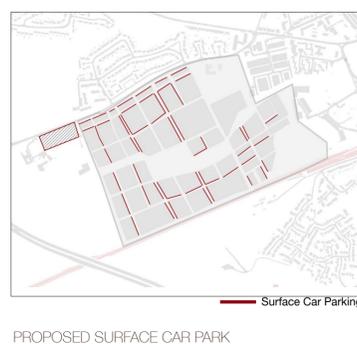
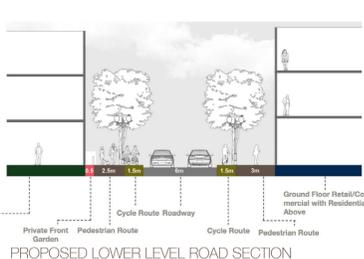
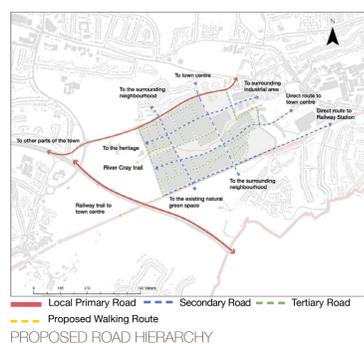
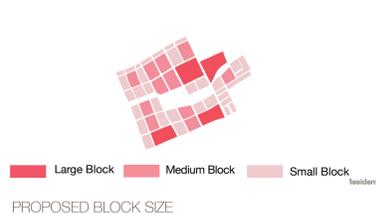
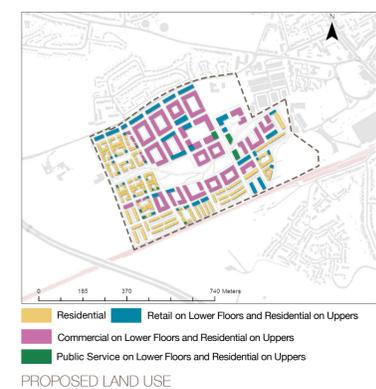
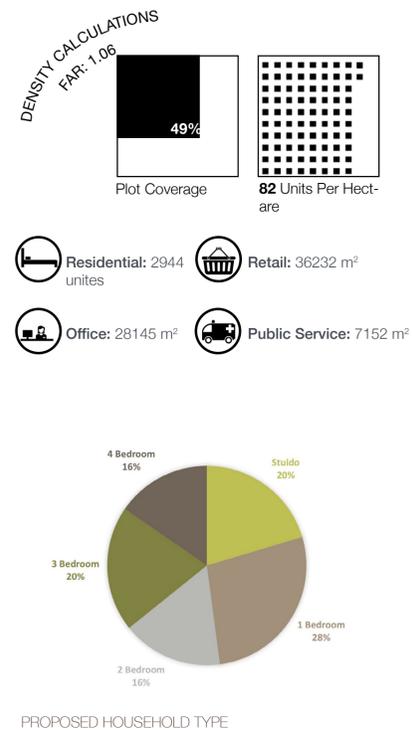


SITE SELECTION



RESULTS OF DIFFERENT WEIGHTING CRITERIA

MASTERPLAN



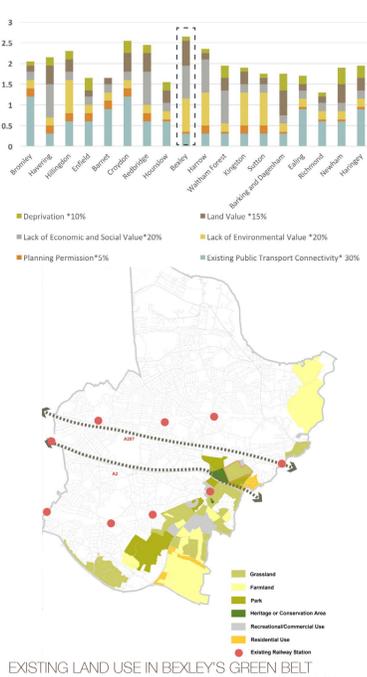
CONCLUSION

The research looks into the accommodation issue of the London's current and future growth in Outer London Area. It investigated into one of the most highly acclaimed methods that supported by the UK's government, the Garden City concept, to see whether it can meet Outer London area's intensification development requirement. The answer to the research question is 'NO'. However, the research has formulated an innovative way for accommodating the current and future growth of London in London's undeveloped Green Belt area, with more efficient land use, higher quality of living and more sustainable way of production and consumption. The method was developed based on the redevelopment of the traditional Garden City Concept.

The research has chosen London's undeveloped Green Belt area as the development site based on the argument that the re-examination and the redevelopment of the ineffectively used land within the Green Belt have its necessity and feasibility for accommodating city's growth. The reuse of the undeveloped land in Green Belt does not equal to the loss of the existing natural open space. The primary cause is that some parts of the historic definitions of the green belt area have been poor quality or declined, or have been changed of uses over time, which should not be qualified as Green Belt areas today, and should leave these space for new development. The replacement of the current lower quality open space will be compensated with much higher quality useable open spaces during the new development, as demonstrated in the masterplan before.

The proposed strategies would help Bexley accommodate 2944 households, and offers 36,232 sqm for retail, 28,145 sqm for commercial and 7,152 sqm for public service on 36 hectares' land, which will far exceed the annual housing target set in Bexley Core Strategy, 335 homes and 200 jobs per year by 2031. The research would provide useful experience for other boroughs and other UK cities with Green Belt as well. Re-examine the existing Green Belt, instead of just focusing on the

SITE ANALYSIS



SITE ANALYSIS

The London Borough of Bexley has shown a prime performance in the overall comparison of the six indexes. Looking into the existing land use and major roads connections in and around Bexley's Green Belt, the site is chosen on a piece of Greenfield land. It is greenfield at present. On its western side is a Grade II listed building Hall Place Garden Heritage, and the surface car park. On its south is the Braeburn Wildlife Park, and they are separated by the railway line. There is a neighbourhood allotment and a light industrial park on its east. The site contains a part of the River Cray, which is a tributary of the River Darent.

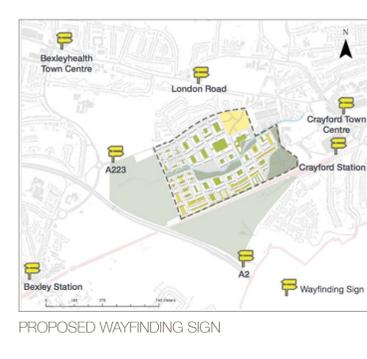
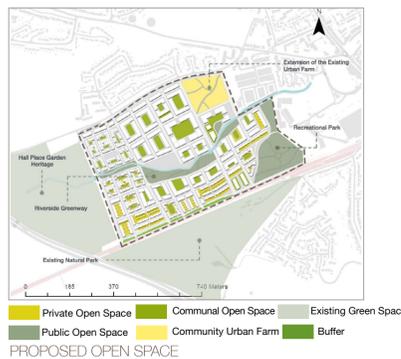


Strength & Opportunities

- Good and Convenient connection with other parts of the city. Close to the existing transport infrastructure. Close to the major roads
- Close to the existing town centres
- High quality public green space within walking distance
- Contains the potential for local identity development, River Cray development.
- Contains the potential for Green Network or River Corridor creation by enhancing the quality of existing green infrastructure and improving the accessibility of them

Weakness & Threats

- Uneven topography surrounding
- Poor permeability both inside and around the site. Moreover, too many inactive frontages around the Light Industrial Park and the Heritage.
- Car-dependent area. Lacks of pedestrian and cycling-friendly infrastructure.
- Poor legibility of the existing heritage
- Lack of accessible local employment opportunities and town centres decline.
- Loss of some parts of River Cray
- Lack of accessible retails and public services within 400m walking distance



undeveloped greenfields, the investigation should include the existing quality of farmland and golf courses in Green Belt area as well, and then analyse their development potential based on different weighting elements, after that, more lands could be released and be better used. Taking housing, for instance, the current gap of annual housing target against the actual supply is about 24,000 to 29,000 households each year, which equals to around 10 similar sizes of housing development as the research this time, which means release another ten pieces of 36 hectares in Green Belt for more intensified housing development. During the analysis of the existing land use in Bexley's Green Belt, it is easy to find out that there are several other hectares of undeveloped Green Belt within the borough of similar size.

The framework that demonstrated within the study is open-ended, which could be adjusted according to the different local condition and characteristics, especially when coming to the housing typologies, land use and urban form. The possible difficulties for the further study could include the:

1. Funding resources, from public or private sectors to ensure affordability.
2. The possible time limitations due to the policy constraint on the release of greenfields in Green Belt
3. The proposed Community Land Ownership is not that universal in the UK context, and is to some extent against the current planning system, the delivery of the strategy will meet foreseeable difficulties.

For the further study:
The development will focus more on detailed interventions in the creation of transition from new development to the existing Green Belt, for better prevention of the possible damage to the natural environment.

