

The Olympics – Going for gold and what else?

Can London 2012 urban regeneration legacy be considered as sustainable development?

James Cunningham

Master Thesis Series in Environmental Studies and Sustainability Science,
No 2014:033

A thesis submitted in partial fulfillment of the requirements of Lund University
International Master's Programme in Environmental Studies and Sustainability Science
(30hp/credits)



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Lund University Centre for
Sustainability Studies



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Science

Submitted May 15, 2014

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Abstract:

Olympic legacy was previously seen as a potential burden on the host city, however an evolutionary shift has occurred whereby it can now be regarded as an instrument in wider urban policy planning. Sustainable development is a requirement set by some governments, and London 2012 aimed to use the Olympic legacy for sustainable development in the form of urban regeneration. This paper is a case study of the London 2012 Olympics, using mixed methods involving interview, documents and personal observations. The focus is on the potential for mega sporting events such as the Olympics to contribute to sustainable urban development, and the London case, is used as an example of how this potential can be realised, and what problems it can occur. Within this, I analyse the concept of legacy itself, before using that definition to understand the sustainability of the London Olympics via the three pillars of sustainable development (Environment, Social and Economic).

Each pillar was critically analysed highlighting the strengths and weaknesses of the London Olympics towards sustainable development. Environmentally the focus was directed towards construction and renewable energy. Emphasis regarding social aspects was concentrated on issues such as gentrification and sports participation and the effect of using temporary venues. Economic legacy is the most researched aspect and therefore this paper does not just regurgitate monetary values. Instead it analyses the employment legacy, which is vital when investigating local economic impacts.

This paper takes steps towards understanding Olympic regeneration and concludes that the desired goal of sustainable development within this is still a utopian prospect, and that more analysis is needed before it can be considered as a utilitarian practice. It has however, underlined a variety of the different strengths and weaknesses of current approaches, which if adapted can enhance sustainable regeneration further.

Keywords:

Olympics; Sustainable Development; Mega Events; Urban Regeneration; Legacy; London 2012; Urban Renewal; Sustainability

Word Count: 14,200

Acknowledgements

I would like to say thanks to my supervisor, Chad Boda, and my mother, Liz Cunningham, for their continued support and help throughout the thesis process.

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1 Introduction

Over half the world population now live in cities and urbanisation has developed into one of the most important social-economic topics of the 21st century (Levy, 2009). In this century the last stage of the inexorable and irreversible transformation of human society to an urbanised world is predicted to occur (Allen & Atkinson, 2002). It has become apparent that in order to solve environmental, social and economic problems associated within urban areas, major reconfiguration and reconstruction is needed (Harvey, 2008). There is no panacea solution that can create a pathway to a sustainable city. Mega events such as the Olympics provide the opportunity for development of the host city's infrastructure and an opportunity for transformation. Throughout the modern Olympic era a variety of different approaches have been used to try and harness maximum benefits for the host city, resulting in mixed outcomes. Urban regeneration is one aspect that is becoming increasingly popular among governments and urban planners as a form of sustainable development, and this is the latest approach used by Olympic host cities.

This paper seeks to challenge the common conception that the Olympic legacy creates positive legacies that enhance prosperity and improve the global standing of the host city (Fredline, 2006; Shipway, 2007). The contested nature of the term 'legacy' and the use of different evaluation frameworks make comparison of legacies between Olympics difficult. For this case study of the London 2012 Olympics, the focus will be on all aspects of the legacy cube framework – positive/negative, tangible/intangible and planned or unplanned, in order to take steps to establish whether the Olympics can be considered a form of sustainable development. This involves analysing the claims of Olympic legacy organisers regarding the environment, society and economy, and determining what effects have occurred. The vast international publicity the Olympics offers give it the perfect platform to show sustainable development ingenuities to a wide audience and further expand the sustainability movement. Previously the Olympic Games has not been involved within the sustainability debate, because of the vast difference between itself and that paradigm. After all, the Olympic Games result in a huge investment in space (host city), in time (two week event) and in investment (Infrastructure etc.) (Furrer, 2002). It therefore potentially contradicts sustainable development concepts involving a careful balance between environmental, social and economic notions across time whilst being broadly beneficial to society (Furrer, 2002). A strong impetus for sustainability science is derived from the concept of sustainable development. Within sustainability science research, two aspects have formed, the descriptive analytical mode, which seeks to analyse problems, and the transformational mode, which tries to create practical solutions. The transformational mode suffers with difficulties generating

knowledgeable actions from theory, incorporating knowledge from sources outside academia, and dealing with different political interests (Weik et al, 2012). It is an area where sustainability science needs to progress, in particular in creating practical solutions for larger impacts (Weik et al, 2012). The Olympics could provide the chance to create a large and practical sustainable impact.

The rhetoric approach of host cities is that an urban regeneration legacy created from the Olympics can be considered as sustainable development (Walker et al, 2012). Despite these claims, there is currently a shortfall in research scrutinizing the association between mega sporting events, urban regeneration legacies and sustainable development (Davies, 2012). This research gap extends to the wider issues involving the social and environmental legacies impacting host communities, which are still currently inconsistent and misunderstood, despite it becoming a question of increasing importance. This will be a topic addressed within this paper. The multidimensional basis makes it an interesting field for research on the sustainable development debate within the urban milieu of post-modern cities (Furrer, 2002). The research from this thesis is aimed at contributing to sustainability science, through improving the understanding of Olympic legacy urban regeneration as sustainable development, in terms of environmental, social and economic effects on the host city. In the next section, I am going to provide a definition of sustainable development and urban regeneration used in the context of Olympic legacy, before highlighting some issues associated with it.

1.1 Sustainable Development

The term sustainable development first came to the forefront in the United Nations Brundtland report. From this the most universal and recognised definition was generated

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987, p. 15)

The sustainable development concept is commonly broken down into three key domains, environmental, economic and social sustainability. For sustainable development to be effective it needs to carefully balance the demands of each sphere, a task that is easier said than done due to the shortfall in our understanding of the interrelationships between the three pillars, as well as practical challenges in the implementation of sustainable development. The Olympics has claimed to have adopted the sustainable development idea into its core and become synonymous within the Olympic

legacy. When the IOC, in 2002 held a congress on *The legacy of the Olympic Games: 1984-2000*, the participants of this congress found issue with using the term 'legacy'

...There are several meanings of the concept, and some of the contributions have highlighted the convenience of using other expressions and concepts that can mean different things in different languages and cultures. (Moragas et al., 2003, p. 491)

This highlights the problematic nature of using the term legacy, and the likelihood of successfully embedding sustainable development into it. Therefore this next section will explain the attempts made to define legacy within an Olympic context.

1.2 Defining Legacy

Legacy as a concept is widely contested and debated, with multiple definitions and interpretations. Despite the elusive nature of a universal understanding, it has become a synonymous buzzword associated with hosting major sporting events since the late 1980s, and is assumed to incorporate economic, physical, social and sporting legacies (Davies, 2012). The increase in the use of the term legacy has largely resulted from the expansion of the Olympic movement, in particular the increased broadcasting coverage. Research involving legacy resulting from a sporting context only recently began, but literature can be found from a variety of different academic viewpoints ranging from sociology to history (Dickson et al, 2011; Leopkey & Parent, 2012).

Legacy within the English language can mean different things. For example, etymologically, legacy can be considered a gift or property inherited after death (Harper, 2001), but it can have a more general meaning in terms of things left from an event or period (Cashman, 2006). Legacy's lack of universal conceptualisation thus makes it a problematic word to use (Dickson et al, 2011). An additional difficulty regarding the use of the term 'legacy,' is that it is often mistakenly assumed to always be positive, whilst overlooking the negatives (Leopkey & Parent, 2012). Positive impacts can range from urban planning and sports infrastructure, to less obvious legacies such as renewed community spirit, business opportunities, improved public welfare and volunteering training (Preuss, 2007; Leopkey & Parent, 2012). According to Mangan (2008), the association with positive results occurs due to three reasons 1) a positive legacy is an indicator of a successful games 2) it justifies the cost to the public (taxpayers) 3) it provides motivation for other host cities to bid in the future. However, it is important to be aware and understand that negative legacies can also be created, for example, increased national debt due to construction, unused infrastructure (White Elephants), forced relocation of

inhabitants and strain on local resources (Gold & Gold, 2008; Leopkey & Parent, 2012). When legacy is mentioned it is thus hard to understand exactly what is meant, however some have tried to address this problem.

Cashman (2005) has tried to form a collective understanding about legacy, and classified it into six categories (Sport, Economics, Infrastructure, Information/Education, Public life, Politics & Culture and Memory & History). Using a similar classification idea Chappelet (2006) has created five topics (Sporting legacy, Economic legacy, infrastructural legacy, Urban legacy and social legacy). However, Preuss (2007) argues that these two qualitative definitions need to encompass a broader perspective and therefore suggested the following five dimensions, shown in Table 1.

Table 1, Five dimensions of legacy.

<p>1. The degree of planned/unplanned structure. For example, planned tourism structure is the extension of tourism attractions (museums, etc) while a bomb attack is unplanned but can spoil the tourism image of a location</p>
<p>2. The degree of positive/negative structure. This dimension is highly ambivalent. For example, a positive legacy for the tourism industry may be a negative legacy for the environment. The classification of a legacy is a valuation that may address the stakeholders in a negative or positive way.</p>
<p>3. The degree of tangible/intangible structure. For example, the increased number of inbound tourists is tangible, while the image of an attractive tourist destination is intangible.</p>
<p>4. The duration and time of a changed structure. Some structures and effects of an event can occur in the years before the event (what Weed, 2008, calls the 'pregnancy' effect). For example, a pre-Games increase of congress and business tourism. The duration of legacy can be very long (e.g. the infrastructure) or rather short (e.g. the cultural festivals initiated around the sport event).</p>
<p>5. The space affected by changed structure. For example, the city centre of the Olympic Games host city often benefits more from image and re-urbanisation than other locations in the city, state or country.</p>

Source: Adapted from Preuss, 2007

From these points, a definition of legacy is proposed (Preuss, 2007):

Irrespective of the time of production and space, legacy is all planned and unplanned, positive and negative, tangible and intangible structures created for and by a sport event that remain longer than the event itself.

There is a notable inclusion of negative legacies, from which the idea of the multi dimensional cube known as the 'legacy cube' is based, as seen in figure 1 (Preuss, 2007). Most pre event research and committees associated with staging mega events have focused on one section of the cube, the positive, planned and tangible impacts (Baade & Matheson, 2002; Szymanski, 2002; Kasimati, 2003; Cashman, 2005; Preuss, 2007).

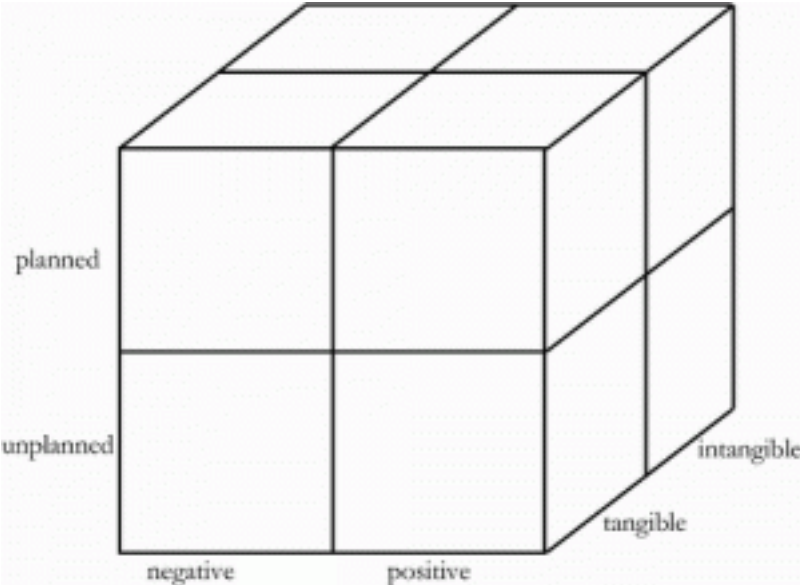


Figure 1, Legacy Cube. Source: Preuss, 2007

The legacy cube offers a visual representation of legacy, however it still remains a conceptual framework and lacks the ability to compare legacies between events, or provide any aid on the metric of how to position the legacy within the cube (Dickson et al, 2011). Further limitations of the legacy cube are discussed in detail by Preuss (2007). Within this research, all aspects of the cube will be analysed. A key aspect of London’s legacy and this case study is the focus on regeneration, it is therefore essential to understand what this actually means in terms of Olympic legacy.

1.3 Defining Regeneration

Regeneration is an important aspect that has become associated with legacy, and is a much less contested term. A holistic definition of regeneration is provided by Roberts (2000, p. 17)

...Comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change."

The idea of regeneration and major sporting events is not new, and has been used throughout the post war period, however focus was based on urban infrastructure and physical legacies. Most recently, regeneration has changed to a new discourse in which less tangible objectives are set, incorporating economic, environmental and social outcomes (Davies, 2012). The concerns of urban regeneration schemes can be seen in Table 2.

Table 2, Key concerns of urban regeneration

Dimension	Concerns
Economic	Job creation; income; employment; skills and workforce development; employability, business growth; inward investment, house prices and affordability; gross value added (GVA); land value
Social/cultural	Quality of life; health; education; crime; housing; provision and quality of public and community services (including sport, leisure, culture, etc.); social inclusion and cohesion
Physical/environmental	Infrastructure, quality and development of built and natural environment; transport and communications; remediation of land
Governance	Nature of local decision-making; engagement of local community; involvement of other groups; style of leadership; partnerships

Source: Adapted from Davies, 2012

2 Aims, Questions and Methodology

2.1 Aim and Research Questions

The purpose of this thesis is to improve the understanding of Olympic Games legacies and their potential role in contributing to sustainable development. This study analyses the most recent summer games London 2012, and also uses information from past Olympic host cities, highlighting how the Olympics has grown to become synonymous with urban planning and design. This paper is an interrogation of the widespread perception created by the media and legacy as a form of sustainable development. It is therefore important to understand if the two seemingly vastly different concepts, mega events (Olympics) and sustainability can be included under one paradigm. The multidisciplinary nature of this topic and the research field of sustainability science allows for a variety of different aspects to be covered.

The central research question is as followed:

- Is London 2012 an example of sustainable development?

Within this question, several sub questions exist:

- Can the Olympics be used as part of a wider sustainable regeneration scheme?
- Has the Olympics benefited London's local boroughs environment, economy and society?
- Can processes used in London help develop the sustainability of future Olympics?

Due to the complexity of the research questions, mixed methods will be used, as discussed further in the next section.

2.2 Methodology

This research project uses a case study approach to analyse a contemporary phenomenon within its real-life context (Yin, 1984), namely the influence of the 2012 Olympic Games on sustainable urban regeneration in London. Case studies pose a useful approach for a wide variety of studies; in fact, most knowledge that has been learnt about the empirical world was obtained from case study research

(Flyvbjerg, 2011). The main strength of the case study method is its in depth detail, richness and completeness (Flyvbjerg, 2011). Along with these merits of the case study, I furthermore employ a mixed method approach. Mixed methods are said to provide deeper understanding and enhanced validation of findings compared to mono-method research (Olson, 2010). A combination of document analysis, interviews and personal observation are used, as discussed in more detail below. For limitations of this research project see appendix A.

2.2.1 Documents

Document analysis is the technique used to categorise, investigate, interpret and identify the limitations of physical documents within the private or public sphere (Payne & Payne, 2004). The concept of document analysis is not new and is popular within mainstream social science research, and has been extensively used by classical theorists such as Karl Marx and Emile Durkheim (Gaborone, 2006). For this research project, documents from a variety of different sources will be analysed, ranging from UK governmental archives, Olympic archives, scientific journals, books, Non Governmental Organisation reports to media newspapers e.g. BBC (British Broadcasting Company) and the Guardian. The documents used were validated under Scott's (1990) quality control guidelines for documentary sources, which are: 1) authenticity – whether the information is reliable and from genuine origin 2) credibility – whether it is free from error and bias 3) Representative - whether the documents were representative of the relative documents 4) Meaning – whether the information is clear and concise. The complex nature of the questions proposed and the subjective nature of documents analysed meant that interviews were conducted in order to understand the issues further.

2.2.2 Interviews

Interviews are a common research method within social sciences, therefore the methodology associated with them is well known and conceptualised in a variety of papers (Brinkmann & Kvale, 2009; Silverman, 2013). For this research, interviews were used to expand on information examined from the document analysis, in order to establish more meanings and perceptions allowing enriched understanding. A semi structured interview approach was used in order to keep the conversation open and allow for discussion, which can raise issues that had previously not been conceived (Patton, 2002). According to Silverman (2011), interviews provide the chance to gain authentic understanding of peoples experiences and the use of open-ended questions are the most effective method of achieving this. Unintentional investigator effects are a weakness of incorporating interviews into the study, so in

combination with document analysis and interviews, personal observation was also incorporated (Teddlie & Tashakkori, 2009).

2.2.3 Personal Observation

Personal observation involves the systematic collection of data from experiences within a variety of different contexts (Teddlie & Tashakkori, 2009). Observation is often used to help validate and expand other findings from different research methods. Unstructured and unobtrusive observation was used in order to provide further exploratory and descriptive information to material gained from document analysis and interviews (Teddlie & Tashakkori, 2009). Two trips were arranged to the London Olympic Park, the first trip was at the beginning of the research project in order to establish background information about the area, and highlight any potential legacy impacts that had previously not been envisaged. The second trip was to conduct interviews and also document personal observations through photographic images.

3 Background of the Olympics

In this chapter I will present a background of the Olympic Games, firstly by discussing the change from the Ancient Games to the Modern revival and then the expansion of the Olympic Charter. Subsequently I will discuss the potential for social movements and the effect of globalisation and increased media, before reviewing the evolution of sustainability within the Olympic movement, and the changing focus of urban policies associated with hosting the Olympics from single stadiums to sustainable urban regeneration.

3.1 Ancient Games

The Olympics were the oldest and most famous of the four Panhellenic Games (Swaddling, 1999). Evidence suggests they were held as early as 776 BC (Golden, 1998). Their importance was high within ancient civilisation and the Games were used to spread Hellenistic culture through the region and celebrate peace and harmony (Instone, 2010). In 394 AD as a means to impose Christianity on the area, under the rule of Theodosius I, the Olympics were stopped (Perrottet, 2004). 1502 years passed until the modern revival of the Olympics and the ideals we associate with it now in the 21st century.

3.2 Modern Revival

The development of sport on an international level provided a strong impetus for the beginning of the Modern Olympic Games. Pierre de Coubertin, a French pedagogue is often referred to as the founding father of the Olympic Movement. He was inspired to try and use the importance of the Games as a means to promote cultural awareness and advocate his political ideals for athletic competitions (Hill, 1996). In 1890 Baron Pierre de Coubertin founded the International Olympic Committee (IOC). Under the auspices of the IOC, the first Olympics were held in Athens in 1896 and would be rotated internationally every four years. The Olympics has become the pinnacle sporting event in the world today. Its revival has created an international forum for competition, sharing and culture. The most recent Olympic Games was in London 2012. 204 nations competed, involving 5892 men and 4676 women in over 302 events from 26 different sports. The Olympics in modern times has become a central point for social and environmental issues and therefore has important implications within the sustainability science field.

3.3 Olympic Charter

The Olympic Charter is the constitutional basis of the Olympics and defines the obligations that members have to abide by. The recent inclusion of sustainable development and positive legacies highlight the awareness that the Olympic Games in recent times can incorporate sustainability, and therefore can become a platform for sustainability initiatives during the games and in the years after, thus helping to promote sustainable development.

3.4 Social Movements

As with any global event there are always multiple agendas. The Olympics has often been seen as a way to promote or challenge political ideologies. For example, under leadership of Hitler, the National Socialist Party used the 1936 Berlin Games to promote Aryan qualities and ideology, by excluding citizens of Jewish or mixed blood descent (Tomlinson & Young, 2006). The 1986 Games held in Mexico City, became famous for the black power salute by two African-Americans during the 200m medal ceremony, see Figure 2. It was a protest used to symbolise black power, unity and the regaining of black dignity (Hartmann, 2004). It has become one of the most poignant images created from an international event.



Figure 2, John Carlos (on right), Tommie Smith (centre) and Peter Norman, 1968 black power salute at the men's 200m medal ceremony. Source: Younge, 2012

As well as being used as a tool to highlight racial inequalities the Olympics has also been involved with sex discrimination. Women were allowed to compete in the Olympics since 1900, however there were fewer events and participants were often blocked from competing by their country. In 1900 just 2.2% of participants were female (IOC, 2013a). Awareness of women's inequality had increased by the end of the 20th century, and for the first time, in London 2012, all teams contained women, including Brunei, Qatar and Saudi Arabia, which could result in considerable empowerment for other women within these normally restrictive cultures. Female participants represented a record high of 44.2% of athletes. (IOC, 2013a). The increase in globalisation has meant that the Olympics can now provide the perfect platform for social movements due to the large audiences and high media attention. The next section discusses the consequences that have resulted from globalisation.

3.5 Mass Media and Globalisation

The modern Olympics has developed vastly since Athens in 1896. This change is directly linked to the advancement in technology and increased globalisation. The power of the media and their influence on society has had an equally important impact on how the games are perceived. Since the invention of television, the Olympics have become accessible to a wider audience. For the London Olympics, there was an estimated worldwide audience of 4.8bn people in over 200 countries (IOC, 2011). In contrast to this, the last time London hosted the Olympics in 1948, the broadcasting range was 50 miles from London (IOC, 2011). The impingement of the media has meant that globalisation of the Olympics has led to vast benefits, but also some negative consequences. One example of a positive benefit resulting from commercialisation is the increased amount of funding for venues, athletes, and implementation of other Olympic ideals. The revenue achieved from broadcastings in Rome 1960 was equal to \$1.2m, whereas the revenue from Beijing 2008 was \$1739m (IOC, 2011). On the other hand an example of perceived negative consequences is the pressure of external television companies to alter the schedule of events in order to maximise potential viewers. The increased global reach also means there is added potential for political/social ideological protests that can divert attention away from the main goals of the Olympic Movement. Conversely there is also potential for the Olympic Games to expand their influence and spread their ideologies to a wider audience. The increased emphasis on sustainability within the Olympic movement coincides successfully with the increased globalisation and can provide a platform for sustainable development initiatives to be recognised in a wider scope. The conversion of the Olympics to include and involve greater sustainability is discussed in the section below.

3.6 Greening of the Games

In 1999 the IOC agreed to the addition of *Agenda 21 Sport for Sustainable Development* to the Olympic movement and thus the environment became the third Olympic pillar, alongside culture and sport (Furrer, 2002; Vigor et al, 2004). This addition means that the Olympic movement plays an increasing role in the promotion of sustainable development. Therefore an important task for the IOC is the implementation of sustainable initiatives, whereby diverse ranges of economic, social and environmental issues have to be addressed. This is a particularly important aspect in order to achieve sustainable development, where a balance needs to be achieved between these factors. The Olympics have often been associated with negative consequences whereby equilibrium has not been accomplished. For example, past Olympics have been known to cause widespread environmental issues, been too expensive or cause a variety of different social issues such as forced removal of people from their homes in order to build Olympic infrastructure. Since incorporating the environmental movement, which has emerged together with the notion of sustainability and sustainable development in terms of legacies, all games have included it. The following section will showcase the potential for the Olympics as an urban development tool, and how emphasis has changed throughout history to a period where now the Olympics are being promoted to potential host cities as a method for implementing urban regeneration that can be considered as sustainable development.

3.7 Olympics and Urban Development/ Regeneration

The impetus of promoting urban development through hosting major sporting events has become increasingly popular in recent years, and is strongly associated with Post-Fordism and the transition from an industrial to a post industrial society, and from modernism towards post modernism (Esser & Hirsch, 1989; Graham, 1992; Tickell and Peck, 1995). It can provide host cities with the opportunity to fast track urban regeneration schemes, stimulate the economy, develop transport infrastructure and improve the prestige of the city. Since the revival of the modern Olympic movement, urban development associated with the Olympics has evolved, from the mono-stadium model to an Olympic quarter model. This growth in urbanisation has been in complexity, scale and content. (Liao & Pitts, 2006) The Olympics provides both urban opportunities and urban liabilities (Hiller, 1989). It is ultimately down to the host cities organisers as to whether they can harness the one off boost to make the changes and improvements required (Furrer, 2002).

3.7.1 Four phases of Olympic urbanisation

I am now going to present a historical overview of urban impacts from previous Games. This exposes the main patterns and changes associated with the Olympic movement. However this is a simplified reflection, and some Olympics during each period can deviate from the norm. The urban development aspect of the Olympic movement consists of four main stages.

- Phase One - Beginning of Olympic Urbanisation (1896 – 1904)

The first stage includes the first three modern Olympics. A lack of funds kept expenditure to a minimum. No new structures were built and events were all held in pre existing venues e.g. Paris 1900 swimming events were held in the River Seine and in St Louis 1904 they were held in an artificial pond at a fairground (Chalkey & Essex, 1999)

- Phase Two - The ascendancy of the Olympic Stadium concept (1908-32)

A milestone was crossed with the 1908 London Olympic Games, when the first purpose built Olympic stadium was constructed, the 'White City Stadium' (BOA, 1908). The multi function design was less than ideal, as it had to incorporate many events. Stockholm 1912 Games continued with building a stadium concept, which accounted for 87% of the budget, but also used other venues (SOC, 1912). This became the precedent for subsequent Olympics until the late 1920s, whereby host cities would build an Olympic Stadium that covered the majority of events, and also utilise rented halls and adapted water areas (Liao & Pitts, 2006). The 1932 Los Angeles Games is significant as the beginning of the end of this phase of Olympic urbanisation. What was special about these is that they were the first to include an Olympic Village. This expanded the Olympic concept of urbanisation from a focus on solely sports venues to now include housing aspects (Liao & Pitts, 2006).

- Phase Three - The progression to an Olympic Quarter (1936-56)

In 1936, the Olympics took place under Hitler's Third Reich in Berlin. These were the first to incorporate an Olympic Quarter, an 120 ha site in Western Berlin, as an area dedicated to sport and culture (Liao & Pitts, 2006). The site contained a new 100,000 seater stadium, 194 bungalows and a variety of supporting buildings (Liao & Pitts, 2006). The Berlin games were controversial due to the political dimension imposed by the Nazi regime. However it was also the first Olympics to have an impact on the city's urban infrastructure, and moved the Olympics from a sports spectacle to one of

multiple dimensions. A hiatus of the Games occurred due to the Second World War until London 1948, known as the austerity games due to the high war costs, leading to little impact on the urban infrastructure and reversion back to using existing structures. The following two Olympics in Helsinki and Melbourne continued the trend of moderate urban infrastructure change, with both incorporating social housing schemes into the Olympic Village as a means to alleviate affordable housing problems affecting the cities.

- Phase Four - The era of urban transformation (1960-2012)

The Rome Olympics of 1960 can be considered as the inauguration of a new era of urban development. Rome demonstrated the potential of the Olympics to act as a catalyst for major urban development, and caused a shift in the Olympic paradigm. The Olympic venues were focused on two separate areas: The North Olympic Centre and the South Olympic Centre (Chalkey & Essex, 1999). However investment was not just concentrated on sporting infrastructure and the Olympic Village, Rome also used the opportunity to develop a new modern municipal water supply system, new airport facilities, new street lighting and better transport systems (Liao & Pitts, 2006). The sheer size of investment and urban infrastructural change had led to calls for the next Olympics to be cancelled (Chalkey & Essex, 1999). However, the 1964 Tokyo Games took it even further, using it as an impetus for a wider 10 year development plan including improving its harbour, roads, water and sewage lines. (Essex & Chalkey, 1998). Three subsequent Olympics were overshadowed by civil unrest in Mexico City 1968, terrorism in Munich 1972, and overspending at Montreal 1980 (Chalkey & Essex, 1999). This concept of Olympic urban development has continued throughout the following Olympics, with small fluctuations in levels of investment and change due to certain issues, e.g. state of the world economy. London 2012 and the next Olympics in Rio 2016 have continued this trend but with a greater focus edging towards regeneration, sustainability and legacy. I am now going to highlight the urban regeneration from the Barcelona 1992 Games, which is often cited as the most successful implementation of urban renewal from the Olympics.

3.8 Barcelona – An Example of Urban Regeneration

The Barcelona Games in 1992 were considered an example of successful urban redevelopment and showcased the potential for the Olympics to act as a catalyst for urban change. The economy of Barcelona had been struggling leading up to the Olympics in the 1970s and 80s. The city's industry was traditionally engineering and manufacturing based, but was suffering from the worldwide recession and increased global competition (Essex & Chalkey, 1998). The Olympics provided an opportunity to improve the urban landscape and change the public perception of the city and assert its importance as the capital of Catalonia. A variety of urban aspects of the city were redeveloped. The Olympic site was previously an area associated with the declining industries. Investment was made in the rail network and sewage systems as well as construction of a new marina and regeneration of the coastline (Essex & Chalkey, 1998). To meet the demands of the considerable media presence improvements were made to the cities urban technology and telecommunications networks. Investment for the Olympics thus helped Barcelona become the leading global city that it is today, transforming it from a city with a decaying industrial port into a popular tourist destination (Liao & Pitts, 2006). It has shown many major cities that are faced with similar problems of declining industries and infrastructural deficiencies, that urban initiatives included within hosting the Olympics can dramatically improve the fortunes of the city.

4 London Case Study

This paper will now focus upon the London 2012 Games as a case study, scrutinising the urban regeneration legacy that is associated with the Olympics and establishing whether this can be considered sustainable development in terms of environmental, economic and social factors.

4.1 London - Introduction

London is a global city and has a strong influence on the United Kingdom and other countries around the world. It is also the largest urban agglomeration in the European Union and had previously hosted the Olympics in 1908 and 1948. London had been working on their Olympic bid since 1997. In June 2005 during the 117th IOC Session in Singapore, London was awarded the games of the XXX Olympiad. This made it the first city to host three Olympics and beat bids from Moscow (RUS), New York (USA) Madrid (ESP) and Paris (FRA) (IOC, 2010). The fundamental basis of the bid and a key reason for London being selected was its commitment towards sustainability from the onset, and the proposed regeneration of East London. The London Olympic Committee claim that their legacy planning has been the most intensive in comparison to other host cities, with development plans for the legacy initiated before the Games were held (CMS Committee, 2007).

4.2 London Borough Background

Five Olympic host boroughs in East London that surround the Olympic park were selected; Hackney, Newham, Tower Hamlets, Waltham Forest and Greenwich. These boroughs are in urgent need of development and change according to the British Government. Figure 3 illustrates the deprivation levels of the boroughs. The areas suffer from a series of socio-economic problems that have become deeply set within East London society. The Olympic boroughs have high diversity in terms of nationality and religions, and an expanding population, that contains a high percentage of youths. There is urgent need for affordable housing within the boroughs as at current levels the area is suffering from overcrowding (MacRury & Poynter, 2009). There is a shortage of skills adequate to gain employment, which results in high unemployment levels. Unemployment has also increased due to mechanisation and reducing labour needs in the docklands, particularly from the 1960s to the 1980s (MacRury & Poynter, 2009). This combined with decline of manufacturing industries during the 1990s has further reduced availability of jobs, which communities have previously depended on. One reason

for the social problems existing is the large gap between the most and least prosperous members of the community in comparison to other areas in London resulting in high crime rates.

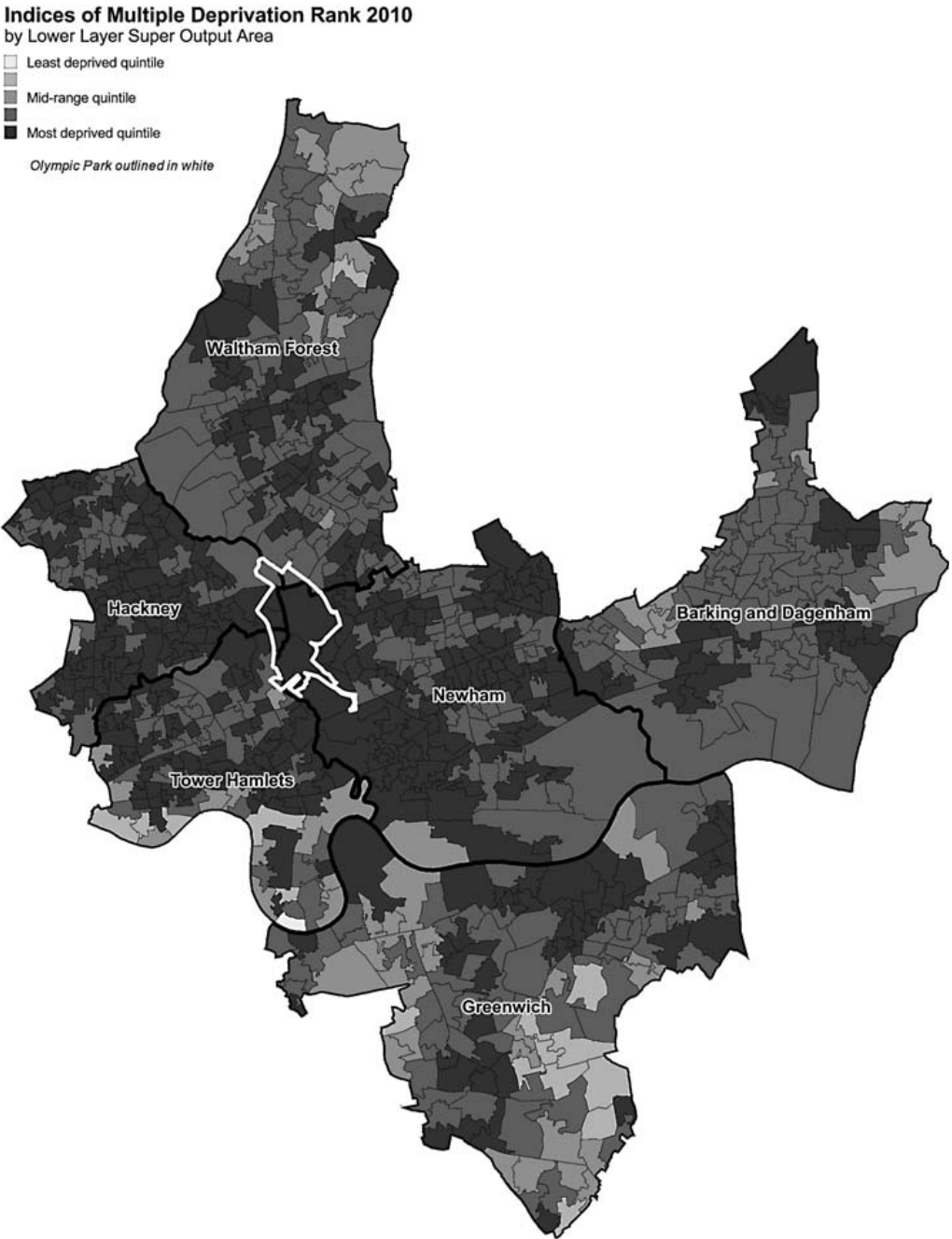


Figure 3, Deprivation of London host boroughs. Deprivation is based on index covering seven main topic areas- income, employment, health, education and skills, housing, crime and living environment. Source: Davies, 2012

4.3 London Olympic Area

The London Olympic Park was the main area designated for the Olympics. The Park occupies 256 ha within four different London Boroughs: Newham, Tower Hamlets, Hackney and Waltham Forest. Its location was previously a mixture of greenfield (undeveloped land) and brownfield (former industrial or commercial land) sites that encompassed many derelict industrial buildings. The local landmark used to be “ Hackney Fridge Mountain,” a 20ft high mound of broken appliances, (Atkins, 2014). The site was chosen in order to bring about regeneration to the area, which like many other areas in East London had fallen into disrepair, with deteriorating conditions both in terms of infrastructure and social aspects. The Olympic Park, see Figure 4 & 5, is where the majority of the permanent venues and infrastructure investment were concentrated, with the Olympic Stadium, Copper Box, Velopark, and Aquatic Centre all situated there. Temporary venues were also constructed on the Olympic Park such as the Riverside Stadium, Basketball Arena, and Water Polo Arena. Despite a key focus of the Olympics in the Olympic Park area, events were also held in temporary venues in different iconic areas of London in the Riverside Zone and Central Zone. Outside London a small selection of events occurred, with football using stadiums throughout the country, sailing occurring in Dorset, mountain biking in Essex and canoeing in Buckinghamshire.



Figure 4. Ariel image of London Olympic Park. Source: Richter, 2014

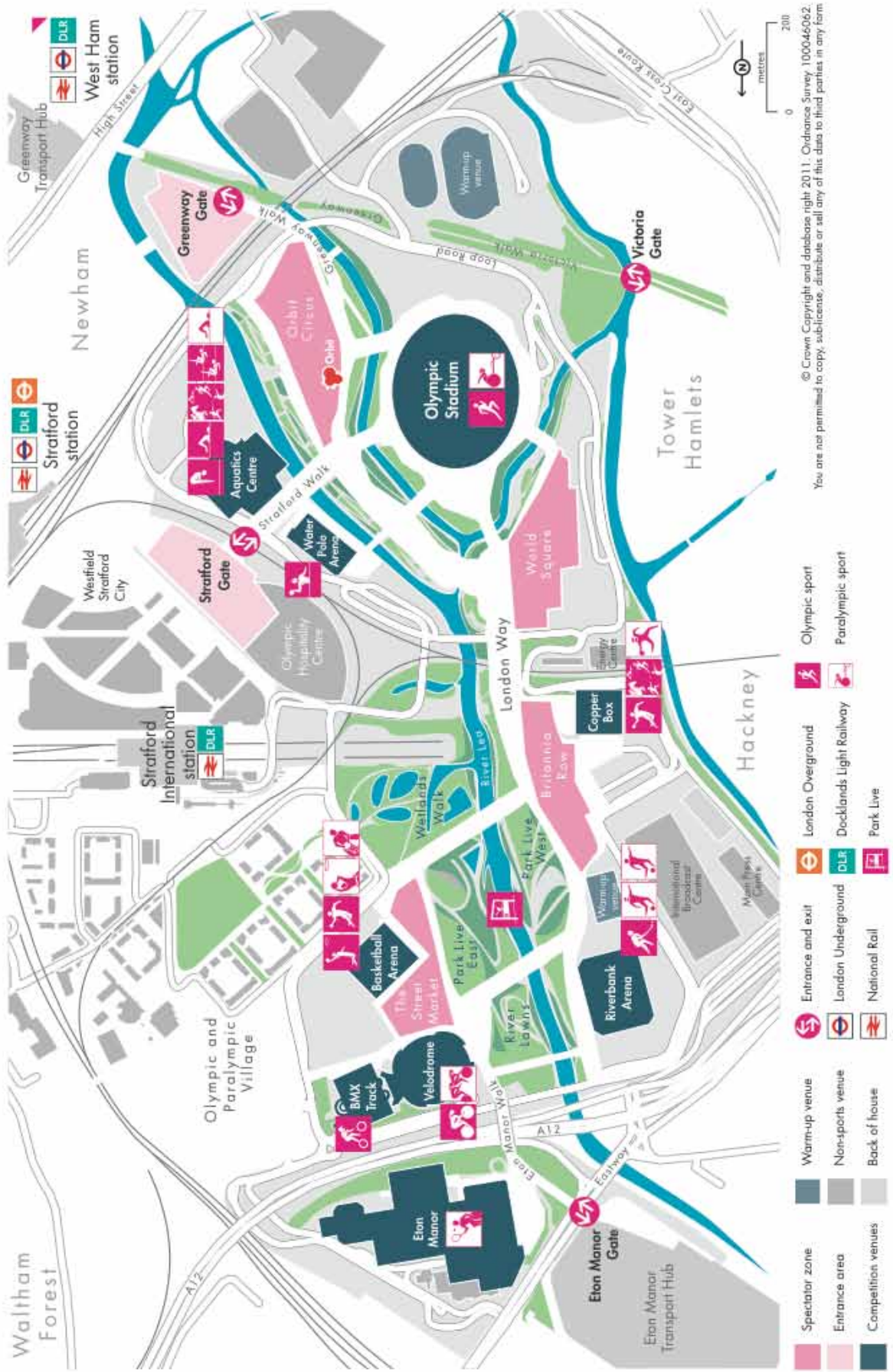


Figure 5. Map of London 2012 Olympic Park. Source: Mapping London, 2014

5 London Urban Regeneration

Urban renewal plays an important role in achieving sustainable development within cities (Gbadegesin & Aluko, 2010) The Olympics are seen as a way to improve the beset local conditions impacting on the host boroughs, and in combination with other projects, provide a crucial and strategic transformation of East London (Hayes & Horne, 2011). British Prime Minister David Cameron (2010) said:

Let's make sure the Olympic legacy lifts East London from being one of the poorest parts of the country to one that shares fully in the capital's growth and prosperity

Since the 1980s initiatives have ensued to regenerate East London in response to deindustrialisation, for example Canary Wharf (offices) and London Gateway (shipping/port) (Davies, 2012). It was expected that the Olympics would act as augmented catalysts to the development and accelerate the plans for economic, social and environmental regeneration. Figure 6 illustrates the urban transformation of the Olympic Park. Next, details on the key projects associated with the urban regeneration are discussed.



Figure 6. Showing before the Olympics (top) and after the Olympics (bottom) at the Olympic park.
Source: Aecom, 2014

5.1 Housing

Housing is a key aspect of the urban regeneration. The London Olympics will produce 11,000 new homes in five new neighbourhoods and through conversion of the Olympic Village, shown in Figure 7.

Table 3 shows the key information regarding the new housing.

Table 3. Showing planned housing for the Olympic Park area.

Housing	Borough	Number of Homes	Housing Type
East Village (Olympic Village)	Newham	2800	Mixed
East Wick	Hackney	870	Mixed
Sweetwater	Tower Hamlets	650	Mixed
Chobham Manor	Newham	828	Town and mews houses, maisonettes, single flats
Pudding Mill	Newham	1650	Mixed
Marshgate wharf	Newham	2500	Mixed

Source: Adapted from IOC (2014)



Figure 7. Olympic village. Source: Personal photograph

5.2 Parklands

The Olympic park incorporates plenty of green spaces and wetlands, with over 4000 trees and 300,000 wetland plants introduced to the area, as illustrated in Figure 8. It is expected that the green infrastructure safeguards 5000 homes from flooding and damage from future climate change (Natural England, N.D). The waterways surrounding the park have been refurbished (see Figure 9). Previously they were contaminated and suffering from high levels of invasive species, and could not be used by boats.



Figure 8. Photograph showing Parkland on Olympic Park. Source: Personal Observation



Figure 9. Photograph of Lea Navigation Canal regeneration near Hackney Wick. Source: Personal Picture

5.3 Transport

Transport is a major aspect of regeneration, as good connections are essential in order to promote business and attract people to the area. A total of £6.5 billion was spent improving London's existing public transport network (UK Government, 2013). Stratford Station was upgraded considerably and acted as the gateway to the Olympics. An extension of the Docklands Light Railway (DLR) from Canning Town to Stratford Regional Station was built, involving the construction of new DLR stations at Stratford International, Star Lane, Abbey Road, and Stratford High Street (Richter, 2012). Another extension of the DLR was completed from King George V to Woolwich Arsenal Station. The significance of this is that it provides a north-south link to the Olympic area. In combination with this an addition of 55 new carriages boosted capacity significantly (Richter, 2012). The East London Line has been incorporated into the London Overground system and now links 21 stations from Dalston (East London) to West Croydon and Crystal Palace in the south (Richter, 2012). The north London overground line had refurbishments to the track and platforms allowing an expansion of the trains from three carriages to four. In terms of the London Underground, the Jubilee Line, which serves the Olympic Park, increased capacity by 50% by the addition of seven car trains and improved signalling systems, allowing faster and more frequent trains (UK Government, 2013). These improvements are expected to result in £10bn in economic regeneration for the area due to greater connectivity (Hackney Council, 2013).

5.4 Education

With an increase in population expected due to the urban regeneration and a particular emphasis on housing, providing education is key, since in this area education levels are very low in comparison to other parts of London and the UK. Chobham Academy was purposely built into East Village (Olympic Village) and provides education for 1800 students and has a specialisation in performing arts. Chobham Academy also has an adult learning facility meaning the focus isn't only on youth education. Four further schools are due to be built.

5.5 Here East

Here East is a new digital quarter developed as a legacy from the former press and broadcast centre (See Figure 10). It is located near Hackney Wick, which is famous for its creativity and arts and is expected to bring further entrepreneurial heritage to the area whilst also providing over 7500 jobs (QEOP, 2014). The development is expected to be fully operational by 2018, with BT sport already using the site from August 2013 for broadcasts in their state of the art 80,000 square foot studio and production hub (Hackney Council, 2013). It will also contain a 300,000 sq ft. innovation centre, a 1045 person capacity auditorium, a state of the art data centre as well educational and office space (icity, 2014).

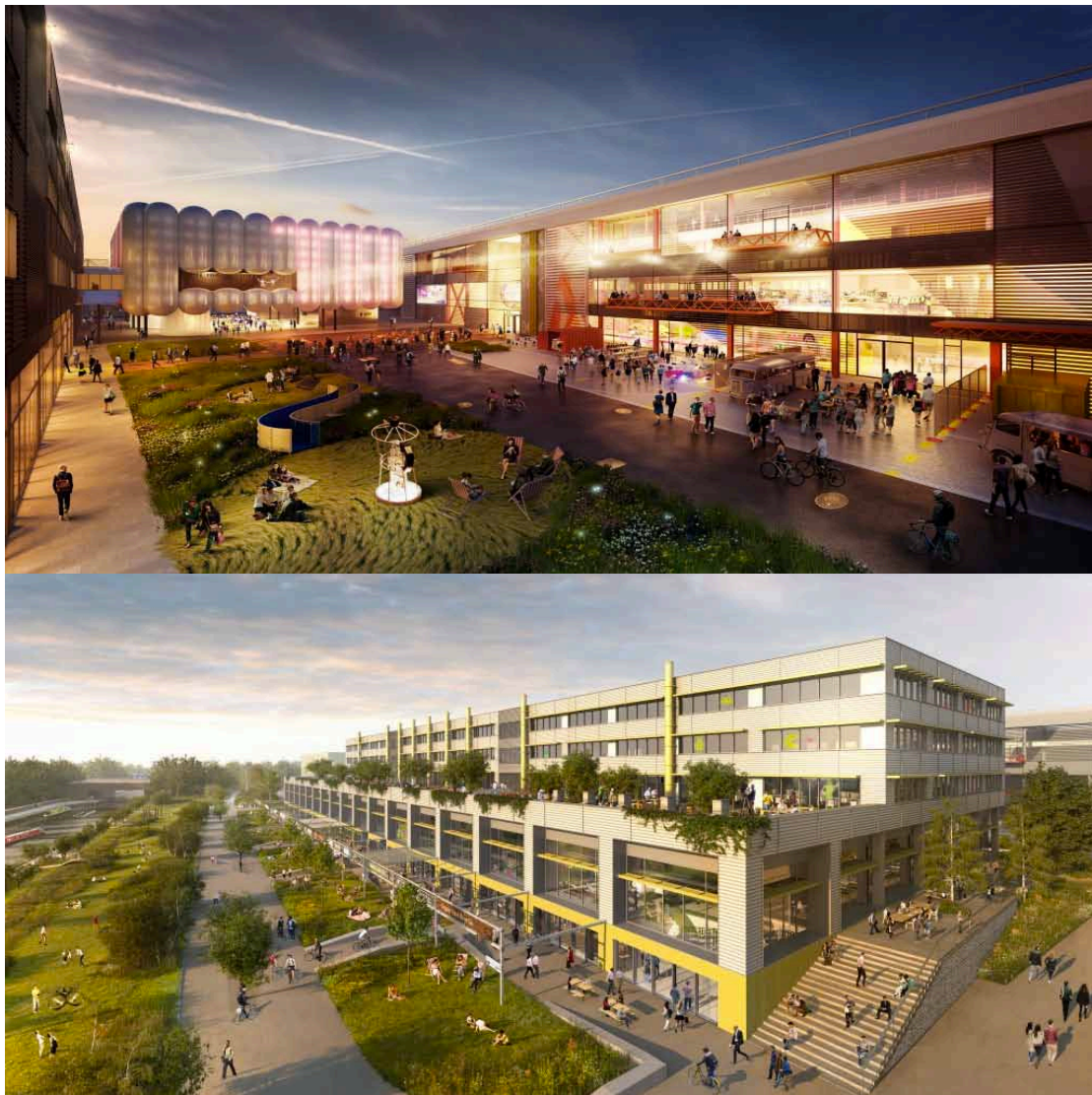


Figure 10. Artist visualisation of Here East digital quarter. Source: icity, 2014

5.6 Westfield Stratford

Westfield Stratford Shopping Centre, shown in Figure 11, opened in September 2011. It is one of the largest urban shopping malls in Europe and the third largest shopping centre in the UK in terms of retail space. It contains 300 different stores, 70 restaurants, a 17-screen cinema, a casino and two hotels. It attracted 50 million visitors in its first year (UK Government, 2013). The site was previously used by Stratford Works as a locomotive building works for the Great Eastern Railway until the 1990s. It was already a proposed development before the Olympic bid was won, but the Olympics resulted in the project being commissioned and its development fast-tracked by incorporating it into the Olympic legacy.



Figure 11. Visual image of Westfield Stratford Centre. Source : London town, 2014

London has tried to include urban regeneration within the Olympic legacy to provide sustainable development, which is a key goal for urban planners. I am now going to discuss the environmental, social and economic legacies that have resulted from the Olympics, using the legacy cube concept to establish whether London 2012 can be considered as an example of sustainable development.

6 Environmental Legacy

The environment is one part of the sustainable development model, and is an area that has been a key part of the London Olympics. The focus of this section of the case study will be upon the sustainability initiatives used in the construction of Olympic venues, their sustainable legacy after the games and the levels of renewable energy available. The construction industry is one that is vital in increasing sustainable development and is an area where vast improvements can be achieved. However, it can also be resistant to changes in practice, including increasing sustainability, it is thus important to analyse.

6.1 London's approach to Environmental Legacy

London had seven years to prepare for the Games, with a focus being placed on successfully incorporating sustainability and leaving a positive legacy. The unique nature of hosting an international sporting event of this precedent places pressure on urban foundations and offers the opportunity to construct new venues and improve infrastructure. London's focus on sustainability led to it developing a host of new frameworks. One framework developed was a unique attempt at modifying BREEAM (Building Research Establishment Environmental Assessment Methodology) for sports stadia. This system is usually used to assess sustainability of new buildings but needed to be adapted for stadia. This approach provides a comprehensive assessment of the initial design and includes the transformation after the games, as certain venues are modified e.g. reduced capacity (Paterson et al, 2012). Using a modified BREEAM assessment allowed venues to be evaluated in line with the sustainable development strategy and placed conditions on venue construction. Any permanent structure had to achieve or be inline to achieve an excellent rating (Epstein, 2011). If they were failing targets, the Olympic Development Authority ODA would have to use reasonable endeavours to enhance the rating (Paterson et al, 2012). The benefit of using a BREEAM assessment is that it allows a wide scope for achieving sustainability targets. This encourages innovative solutions for designers who are engaging in projects that have unusual demands (Paterson et al, 2012).

6.2 Olympic Park

The prior usage of the site beforehand as a glue factory, chemical works and oil refinery had caused the underlying soil and groundwater to be contaminated. The remediation process occurred in situ, eliminating the carbon footprint that would be associated with using a large number of trucks to

transport the soil. To date it is the UK's biggest soil washing operation. In excess of 1.7 million cubic metres was cleansed, resulting in over 80% of the soil reused, way above the 50% that is usually considered a success for soil remediation (Atkins, 2014). The soil process linked up with nearby construction processes reducing the amount of material sent to landfill, and lessons learnt were incorporated into forty follow on projects (Atkins, 2014).

Before construction could occur on the Olympic Park over 200 derelict buildings needed demolishing (Atkins, 2014). Construction and demolition is a vital area for London 2012 to meet its sustainability targets and improve sustainability not just for future Olympics but also for the industry as a whole. Currently construction and demolition is the largest waste producer in the UK, annually generating 120 million tonnes (UKGBC, 2014). There is considerable scope for this industry to improve and help the UK reach its European targets. For example reusing steel has a 25% lower environmental impact than new steel, which normally has a recycled content of 60% (BRE, 2006). The ODA set up a hierarchy of waste management Figure 12 that was incorporated into their sustainable development strategy. The target for construction and demolition contractors working on Olympic venues was to achieve a reuse and recycling rate of 90% during demolition (Bio Regional, 2011), and to divert 90% of construction waste destined for landfill via reuse, recycling and recovery (CSL, 2011). These targets were exceeded.

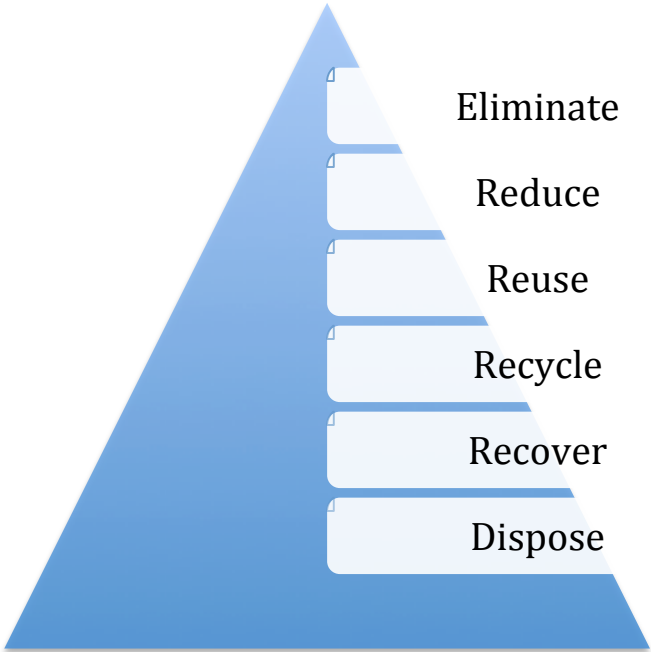


Figure 12. ODA hierarchy of waste. Source: ODA, 2007

One problem with the targets was the use of a joint goal for reuse and recycling. Reuse is a more complicated and time consuming process than recycling. This encouraged contractors to recycle rather than reuse materials. The lack of incentives for reuse thus leads to the waste hierarchy not being followed and an inversion of the waste pyramid (Bio Regional, 2011). Contractors can achieve the 90% target whilst actually reusing very little material. The perspective of this being considered a success is not shared by everyone equally. One interviewee commented:

Its hardly surprising, the companies just want to make a profit and the organisers just want to say they have met their targets and how amazing everything is. By the looks of this both have benefited, whereas the general public has lost (personal interview, Hackney resident, 26th March, 2014).

Nevertheless, lessons can be learnt for future event organisers. For the demolition process, setting separate objectives for reuse and recycling could eliminate this problem and encourage greater sustainability on behalf of the contractors.

6.3 Permanent Infrastructure

The construction of permanent infrastructure is not a new concept for Olympic hosts. For London, four new permanent venues were created which had to meet certain sustainability requirements. A positive part of London Olympics towards sustainability has been the development of an adapted BREEAM assessment for environmental sustainability of its infrastructure. All venues achieved the desired rating of “excellent”. This indicates that sustainability levels have been acceptable, and numerous advantages for venue construction sustainability have resulted from it. However if you are critical, there are some areas where improvements can be made, and lessons learnt via London’s experience which can benefit other mega events sustainability implementation, as described below.

6.3.1 Methods of analysing cost

Firstly, at the start of the construction and design process choices were based on capital costs, therefore many sustainable solutions were disregarded due to having higher initial costs than similar alternatives (Carris et al, 2011). Considerable pressure from organisers and the public is placed on contractors and architects to keep costs low. Overall price of venue is always scrutinized in comparison to similar venues. In terms of life cycle cost, products with higher initial costs can overall be lower in their lifecycle cost due to reduced maintenance requirements, being less labour intensive, lower

transportation cost etc. (Carris et al, 2011). Therefore a product that generates increased sustainability and reduced costs in the long term should be prioritised over a lower capital cost product. This would create an economic-environment win-win situation.

6.3.2 Risk

Risk is known to prevent development of pioneering solutions provided by clients, designers and contractors. The construction sector is recognised as being tremendously conservative in innovation performance (Nesta, 2007). Those working on Olympic projects are reluctant to risk their liability and professional reputation on using new innovative products when their performance is unknown (Carris et al, 2011). The size and nature of the Olympics amplifies the damages to a wide audience if projects fail or are delayed, especially considering the short time frame and immovable deadlines for completion, leading to a focus more on delivering on time, rather than best possible designs and solution. A way to improve this situation according to those involved in the projects would be to increase shared risks between the clients, contractors and designers (Carris et al, 2011). This would increase the share of information, improve efficiency of those working on the projects and enhance the cooperation of different sectors i.e. architects and engineers to come up with innovative solutions. The British government estimates, that the adoption of fully integrated teams and increased transparency could save the public sector £2.6 billion annually (National Audit Office, 2005). Therefore the adoption of shared risk that allows more communication in comparison to traditional arrangements between those involved, can lead to greater innovative solutions and lowers costs.

The practises developed and lessons learnt from London 2012 now provide a benchmark for future sporting venues and can support major events e.g. 2016 Rio de Janeiro Olympics, to build upon sustainable ideas from London and improve sustainability levels further. Table 4 provides a description of each venue, its BREEAM assessment rating and other sustainability concepts that were used.

Table 4. London Olympic permanent venues sustainability information

Venue	Facts	Sustainability	BREEAM Rating	Legacy
Olympic Stadium	<ul style="list-style-type: none"> • Cost = £428m • Capacity 80,000 will be reduced to 50,000 	<ul style="list-style-type: none"> • Lightest Olympic Stadium built to date – used 10,000 tones of steel, 50% less than Beijing • 40% of concrete aggregate used was recycled • 60% less water usage than similar structures 	Excellent	<ul style="list-style-type: none"> • UEFA Category 4 Stadium • Occupied by West Ham Football Club • Used for major athletic events
Aquatic Centre	<ul style="list-style-type: none"> • Cost = £251m • Capacity = 17,000 reduced to 2, 500 	<ul style="list-style-type: none"> • High levels of concrete used – 150,000 tones • 3200 tonnes of steel used (Very High) • Used phthalate-free PVC wrap to reduce health effects associated with PVC • Temporary stand did not meet 30% recycled commitment • Used ammonia-based coolers instead of typical hydroflorocarbons, CO₂ savings were marginal, but cost £500,000 	Excellent	<ul style="list-style-type: none"> • Public swimming pool • 2016 European aquatic championship host venue
Copper Box	<ul style="list-style-type: none"> • Cost = £4.1m • Capacity = 7000 reduced to 6000 	<ul style="list-style-type: none"> • 3000 sq. m of copper cladding used was made up of 60% recycled material • 88 light pipes into the roof – increases natural light and reduces energy consumption by up to 40% • 60% less water usage 	Excellent	<ul style="list-style-type: none"> • Multiuse venue
Velodrome	<ul style="list-style-type: none"> • Cost = £87m • Capacity = 6000 	<ul style="list-style-type: none"> • Cable roof – halved the weight, only used 100 tonnes of steel • 56km of wood was sustainably sourced Siberian pine for racing track • The 5,000sq m red cedar pine cladding was sustainably sourced • natural ventilation provided through the perforations of the timber cladding that surrounds the building, rapidly reduces the energy costs associated, especially during warm summer months • Uses 75% less water • Quarter of all material used was recycled e.g. recyclable seats 	Excellent	<ul style="list-style-type: none"> • Velodrome • BMX Track

Sources: Olympic Stadium: CSL,2014. Aquatic Centre: Henson, 2012; CSL, 2014. Copper Box; CSL, 2014; Connolly et al, 2011,; make 2014. Velodrome: Mathews, 2012; Ingenia ,2012; CSL, 2014

London’s commitment towards a strong positive legacy meant that temporary venues were used when permanent ones were considered unnecessary. No previous Olympics or mega event has used temporary venues on such a grand scale. Therefore I am now going to focus on sustainability initiatives implemented on these temporary structures in order to establish if they can be considered as contributing to sustainable development, particularly for future Olympic host cities.

6.4 Temporary Venues

For London, 25 venues were temporary, eliminating the risk of “white elephant” venues as much as possible and hopefully improving sustainability. However less research has been carried out involving sustainability issues associated with temporary venues, meaning much of what happened for London 2012 was setting a benchmark for other mega events in the future. The ODA was responsible for building the temporary venues but worked very closely with the London Olympic Committee for the Olympic Games (LOCOG), who had the responsibility of designing, building, operating, decommissioning venues and also reinstating when existing building were used (Aukett, 2012). These venues had to translate typical building concepts into a temporary structure whilst minimising waste when they are removed (Aukett, 2012). A challenge for LOCOG was that a lack of precedent currently exists for sustainability involving temporary venues on such a grand and complex scale. LOCOG set an internal sustainability strategy guide (Figure 13) for its venue operations that fitted with the ODA’s sustainable policy framework in order to make an important contribution to sustainability commitments of the London and future Olympics.

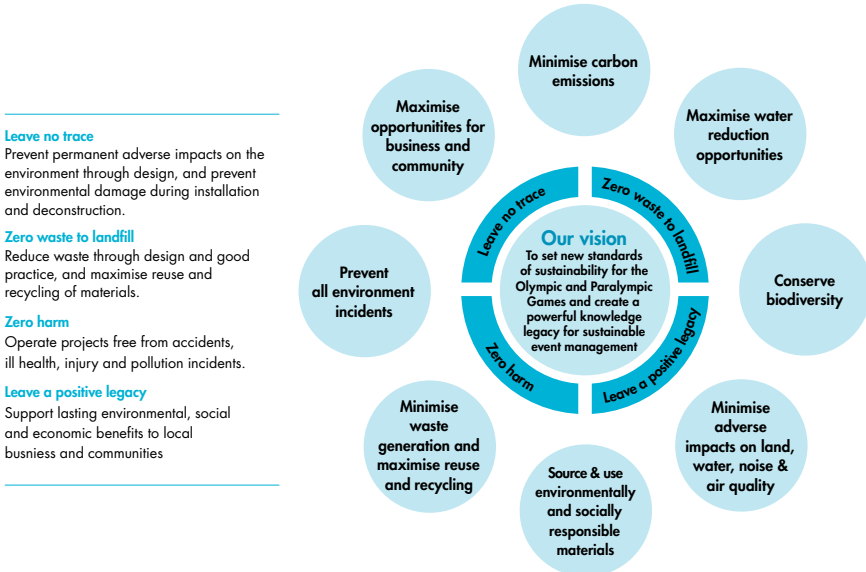


Figure 13. Showing LOCOG strategy vision, aims and objectives. Source: Aukett, 2012

A major sustainability aspect with the temporary venues was material wastage. The challenge involved incorporating the design, construction and dismantling of the materials in the most sustainable and cost effective way. Figure 14 shows the material hierarchy system proposed by LOCOG during design, installation and removing phases.

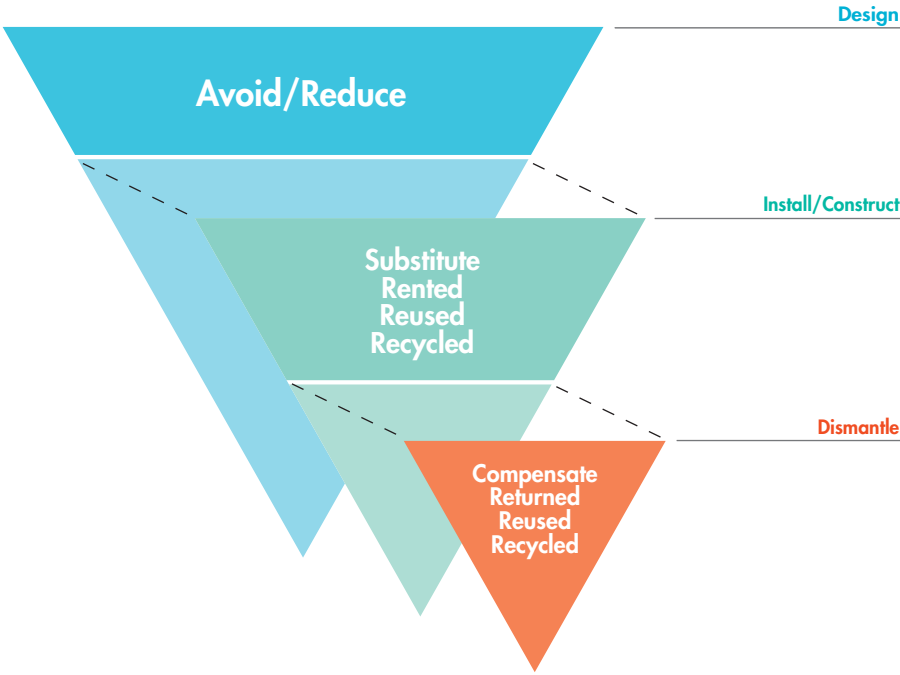


Figure 14. LOCOG temporary venue material hierarch system for design, installation and removing phases. Source: Auckett, 2012

Unlike with permanent venues where the life cycle ends after a long period of time, temporary structures need to have a clear strategy for dismantling to avoid high amounts ending up in landfill potentially making the concept of temporary venues unsustainable. The life cycle of a temporary venue can be seen in Figure 15. Having a clear guideline and effective planning can considerably affect the sustainability of temporary venues, where mismanagement can be very detrimental. One interviewee summed up the potential of temporary venues

The successfulness of using temporary venues, in particular from an environmental perspective is the legacy of materials used. Poor management in their legacy can drastically reduce the point of using them in terms of environmental and economic benefits (personal interview, construction manager, March 27th).

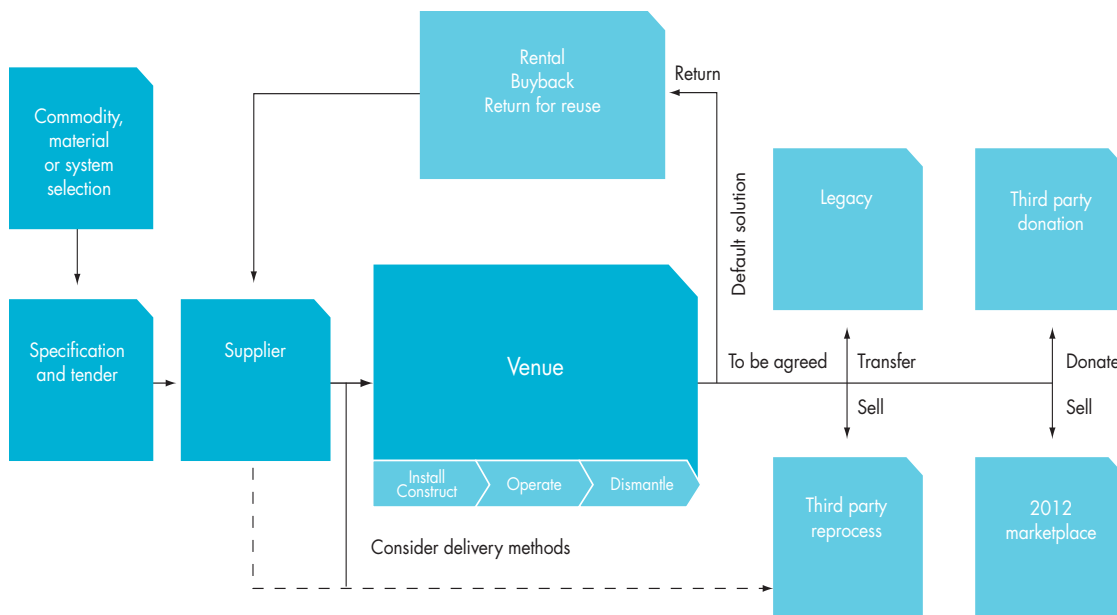


Figure 15. LOCOG life cycle of temporary venues. Source: Auckett, 2012

It is therefore evident knowledge obtained about temporary structures from London 2012, such as the importance of understanding the whole life cycle and the need for a clear sustainability plan can be transferred to other mega events. I will know address the renewable energy aspect of the infrastructure

6.5 Renewable energy

Reducing energy demand is a key part of improving the sustainability of urban development and the Olympics as a whole. Currently, few regeneration schemes attempt to improve renewable energy levels (Walker et al, 2012). However, London did attempt it and originally set out a target for renewable energy as described below:

At Games time, 20 per cent of Olympic Park electricity requirements will be met by new local renewable energy sources: e.g. advanced waste-to-energy technologies, photovoltaic panels, small scale wind turbines, bio-diesel generators and micro-co-generation for public lighting, venues, accommodation, and electric vehicle power. All additional site electricity demand will be imported from off-site renewables, e.g. wind farms and marine current turbines (CSL, 2014b)

This commitment of 20% energy was also incorporated into objectives of the legacy after the games, whereby 20% of energy must come from onsite renewable sources (CSL, 2014). However issues have

arisen which have lead to the target being missed. A strategy was in place to build a 120m 2MW wind turbine that could power some venues and at least 1000 homes afterwards, thus contributing a large amount of the required renewable energy (CSI, 2011). However the wind turbine was cancelled due to commercial and safety reasons. To meet the renewable energy target after the cancellation was difficult, because in a dense urban area, few renewable electricity options are available. Another problem in achieving this was that biomass boilers were used for heating the energy centre, but other renewable options could not be used due to the contract for the energy centre requiring the owners to have exclusive rights for heating the Olympic Park (CSL, 2011). These problems led to Solar Panels being used on the media centre as the only viable option for increasing renewable energy. In total 9% renewable energy was achieved, coming from a combination of renewable energy methods and the combined cooling, heating and power (CCHP) system that was developed. In the long term the CCHP system improves the efficiency of energy generation for the surrounding area however it is powered by natural gas, which is a fossil fuel (CSL, 2011). Arrangements have also been added to reduce energy consumption in the surrounding boroughs through RE:NEW and RE:FIT schemes (CSL, 2014b).

6.6 Summary

To briefly summarise, the environmental legacy has resulted in considerable sustainability improvements within the construction industry, and has highlighted the effectiveness of using a mixture of permanent and temporary venues. However a clear lesson learnt is to separate goals and provide individual targets. Regarding renewable energy, few regeneration projects attempt to initiate renewable energy technologies and the main experience gained was the risk associated with relying on one source, as opposed to multiple small-scale solutions. In the following section I am going to analyse the social legacy resulting from the Games.

7 Social Legacy

In this chapter the focus will be on social legacy. The Olympics have a strong impact on the local community and can influence a variety of different social aspects. The perspectives of the Olympics can often be considerably different when presented from a local population viewpoint compared to the organisers. Literature generally states that less affluent members of the host city tend to suffer most economically and socially (Short, 2013). The gentrification and the inevitable association of displacement of low-income sectors of the communities is a well-known effect of the Olympics and other major sporting events (COHRE, 2007; Porter et al, 2009; Kennelly and Watt, 2012). Despite this London 2012 attempted to improve the well being of the local boroughs by improving there:

- Health & physical wellbeing (physical activity, diet, disease & illness/ wellness)
- Lived environment (and standard of living; housing, parks)
- Sociality and inclusion (skills, self-esteem; relationships with others; participation rates) (Smith, 2008)

I will now critically discuss the successfulness of the social legacy associated with hosting the London Olympics on the local communities. I will focus on the following key topics: housing, gentrification, sports participation and the temporary vs. permanent structure debate.

7.1 Housing

Despite the derelict nature of the Olympic Park site prior to the Games, the location did still maintain a few residents and compulsory purchase orders were made (Smith, 2008). Loss of 425 residential dwellings, a traveller community and allotment holders resulted in up to 1000 people being displaced (Hayes & Horne, 2011). The rehousing was considered a success by those moved, because they moved higher up the social housing list. However, there were some issues associated with breaking up the group society in terms of the dispersal of the local community, and implications on other residents on the housing list who had to wait longer for suitable housing (Smith, 2008).

A major part of the social legacy created is the increase in housing in East London helping to address the housing shortage problem. The conversion of the Olympic Village into 2800 flats, and the construction of a further 11,000 residences in five new neighbourhoods surrounding the Olympic Park, will have a considerable impact on the area. New residents will support the local economy by

providing new business, the diversity of the area will increase and local facilities will expand increasing services available to local residents, thus increasing their “well being” according to the organisers. However it can also have negative effects by alienating locals opposed to change, as discussed in more detail in the subsequent section.

The current conditions within the local boroughs in terms of poverty, education and deprivation means that in order for London 2012 to have a real social legacy, the most in need members of society need to feel the benefits. The new housing development will consist of a third of homes set aside for social housing in the form of affordable rented housing. Within the UK affordable rented housing is a new method being used by the government to increase financing of social housing. Properties are allocated in the same way as social housing and rent can only be offered at a maximum 80% of the market rate. It is vital to improve the poor housing conditions within the Olympic host boroughs because research shows the low quality housing has adverse effects on the local community.

Firstly it is known that housing conditions are a key determinant of health inequalities within Britain (Wilkinson, 1999). Research suggests cold, damp and mouldy conditions can affect respiratory systems of all ages in society. Cold conditions especially during winter have been linked to increased deaths, particularly impacting old and vulnerable members of society. It can also lead to detrimental mental health from overcrowded and poorly conditioned flats (Oxford Economics, 2012). Secondly low quality housing is associated with higher crime rates, due to lower housing security. Thirdly it is associated with lower education levels (Friedman, 2010). The increase in available houses to rent and the 35% level of affordable housing, seems like it will improve the standard of living for the local community due to the salubrious benefits. However the change of the UK government’s policy on social housing towards ‘affordable housing’, lack of rent caps and use of austerity economics is impacting the success of the Olympic legacy to address social issues (Abbott, 2013). The affordable rent model used for Olympic legacy housing will not address the housing problem, because it has been calculated that these houses will only be affordable to members of society with an annual income over £30,000, which excludes the majority of local residents and creates a socio-economic enclave (Abbott, 2013). Therefore the traditional view of affordable homes being for low income and working class residents is now being replaced with the view that they are for graduates and young professionals. This issue is raised in several interviews from local residents.

People who need housing the most wont be the ones getting the new housing (personal interview, Newham resident, 27th March, 2014)

And

A lot of the houses are only in the price range of the middle class, very few of us will be the ones who benefit from these new housing developments (personal interview, Hackney resident, 26th March, 2014)

So despite the improvements in facilities and housing quality, the social problems are likely to be shifted elsewhere due to the lack of adequate solutions for the majority of the local population.

7.2 Gentrification

With London 2012 and many other Olympic and mega events, a concern is often raised about the impact created on the local communities. This is a particular apprehension for London with the focus of the legacy based on urban regeneration and vast transformation. A potential social corollary effect of hosting the Olympics is gentrification. Gentrification can be defined as a shift in urban communities towards wealthier residents and increased property values, and is often caused by increased investment (Lees et al, 2013). Whether gentrification should be restricted, controlled or prevented is a topical debate because of the mixed outcomes associated with it (Bernt & Holm, 2009). The obvious benefits of gentrification are the lower crime rates, new businesses, economic stimulus as well as improved greater visual aesthetics of the area (Atkinson & Bridge, 2004). On the other hand there are also negative effects, such as social exclusion of the poorest households leading to resentment, displacement and population migration (Atkinson & Bridge, 2004). This occurs as a direct result of increased living costs and a change of local conditions that is focused more on services towards the new wealthy citizens. Gentrification thus does not solve social issues of the area, it merely transfers it to another location.

An unpopular consequence among local residents with gentrification is the displacement. Any mobilisation against this displacement is not based on political ideology by those affected, but more a concern and desire to defend their right to the place (Davidson, 2009). Therefore there is concern from the organisers for further aggravating the antagonistic class relations and social unjust, from the local society towards what they perceive as corporate powers and wealth (Harvey, 2008b). Previous Olympic hosts have reported that regeneration had lead to gentrification of the local area (Hiller, 1998;

Kavetsos, 2011). For instance, Barcelona Olympics 1992, are argued to have been the trigger for increased property prices within the city (Mckay & Plumb, 2001), however a large inflow of investment from the European Commission also occurred at the same time, which augmented the rise (Holt, 2005). London 2012 promoters have claimed this will not be the case and that these Olympics will be different in terms of inclusion to the social legacy (Watt, 2013).

Within 20 years, the communities which host the 2012 Olympic and Paralympic Games will enjoy the same social and economic chances as their neighbours across London. (Wales, 2012)

The urban redevelopment in Olympic boroughs within London has obviously boosted the area. Since London was announced as the winning bid in 2005, property price growth has increased 45% by March 2013 in areas near to the Olympic site. This is much higher than the average price growth of 29% experienced throughout the rest of England (Christie, 2013). This price rise for owners located near to the Olympic area has resulted in them experiencing an increased value of £1000 per month on their house. The first year after the Olympics had finished, in the 14 areas closest to the park, prices increased by 10% compared to a nationwide average of 4%. These price rises are a good indication of gentrification processes starting to occur within the Olympic area and East London. Local citizens interviewed raised similar issues, despite a majority of them not using the term “gentrification,” the underlining tones of what they were mentioning related to gentrification. One interviewee stated:

The prices of average things have increased, places where you can get cheap food are being replaced by posh dining spots (personal interview, Newham resident 27th March, 2014)

This indicates a trend whereby a shift is occurring in the urban dynamics of the area that can ultimately lead to social exclusion through neighbourhood resource displacement, as described by Davidson (2008), where residents start feeling out of place in their own communities. This sense of losing a community is also evident in the construction of Westfield Stratford Shopping Centre. This shopping mall contains many high-end retailers e.g. Hugo Boss, Prada and Hollister. These previously would seem out of place in East London, and are more attributed to West London. This association with the feeling of an invasion of West London into East London can be highlighted from another interviewee

Why would you name a shopping mall in East London, Westfield, this is East London, if you want West London go to West London! (personal interview, Hackney resident, 26th March, 2014)

Westfield Group had previously opened up a new shopping mall in Shepherds Bush, West London in 2008 called Westfield London, leaving the Westfield Stratford Centre to be considered the other mall. It also demonstrates a clear sign of the rebranding and gentrification that East London is experiencing, with the budget stores typically associated with the east, being replaced by shops designed for more affluent members of society. The concerns raised here by interviews and personal observations are also backed up by other research articles that have discovered similar results (Kennelly & Watt, 2012). Therefore the effectiveness of the inclusion of all aspects of society to benefit from the Olympic legacy as planned is in considerable doubt. Figures 16 & 17 are personal observations of evidence of the gentrification process, following on from this I will discuss the next social legacy scrutinised, sports participation.



Figure 16. Showing the creative side of the East London and the run down nature of some buildings. Source: Personal Photograph, 2014



Figure 17. Photograph showing evidence of gentrification in the form of new stylish apartment. Source: Personal photograph, 2014

7.3 Sports Participation

The Olympics aim was to “inspire a generation” to take up sports and become more physically active, with a focus on younger generations (Smith, 2008). This is important because a lack of physical activity and poor diets are causes of chronic diseases e.g obesity. Obesity is known to reduce life expectancy, and there is strong connection between life expectancy and social deprivation within a community (Doran & Whitehead 2003). Low socio-economic members of society are less likely to carry out exercise and participate in sports due to the income/leisure trade off concept (Gratton & Taylor,

2004). Some health inequalities in East London can therefore be addressed by altering peoples diet and amount of physical activity, under the basis that sports participation lowers health inequalities and thus improves standards of living (Gratton & Henry, 2002). However in the case of the Olympics, research so far finds no basis that it leads to a positive and prolonged sports participation legacy (Hamlyn & Hudson, 2005; Cashman 2006; Downward & Ralston, 2006), with some noting a sports fatigue effect afterwards whereby participation declined (Veal, 2003; Coalter, 2004). For the London boroughs it was hoped that participation would increase, due to increased interest and facilities. However the latest report published, looking at sports participation nationwide between April 2012 and April 2013 indicate that for young people, levels have dropped by 53,000 to 3.74 million (Gibson, 2013). However participation levels as a whole have slightly increased, with Olympic borough host Newham increasing by 3.4% (Amako, 2013). It is still early on in sport participation legacy evaluation, because a lot of sporting facilities have only just reopened since the Olympics and a vast majority of residents who will benefit from the new facilities, will move in when the new housing is completed. With sports participation it is not just about providing the facilities and infrastructure, behavioural change needs to occur, and for that more time is needed in order to evaluate the sport participation legacy fully. The importance of this is evident in one interview when asked about the sporting legacy

I believe that the Olympics will change the perception of sport for young women who previously would not of been interested in it, because of the common perception with beauty ideals not coinciding with athletic ideals. The strong British female role models like Jessica Ennis presented during the Olympics, highlights that sport is for everyone and raised awareness towards healthy benefits associated with sports activities. I am hopeful it will cause a change (personal interview, Waltham Forest resident, 28th March, 2014)

However, the current indicators are suggesting more efforts are needed in order for this to be considered a positive and successful legacy.

7.4 Temporary Vs. permanent

A key aspect of sustainable development is the balance between economic, environmental and social impacts of the proposed development. For the Olympics, the tight timeframe and international pressure placed on host cities can lead to rushed analysis of the infrastructure and projects which might not be appropriate in the long term. This has been evident throughout the history of mega events and the Olympics, with many white elephants created. One potential solution that has already gained popular appeal and has started being implemented is the use of temporary venues. For London,

a vast number of temporary structures were used to host and support the games. Figure 18 shows how London has taken advantage of temporary seating in comparison to other Olympic events, with nearly the same amount of temporary seats as the previous three hosts combined (Sydney 2000, Athens 2004 and Beijing 2008).

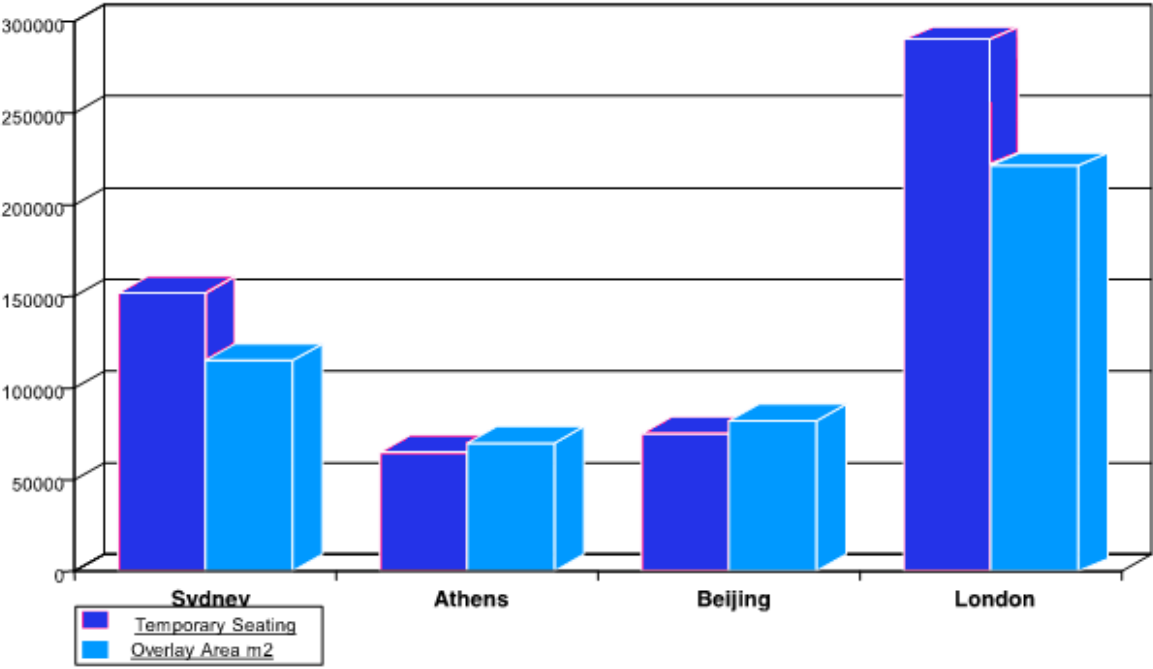


Figure 18. Temporary seating/overlay area at the Sydney 2000, Athens 2004, Beijing 2008 and London 2012 Olympics. Source: UK Green Building Council, 2012

Using temporary structures has a host of benefits ranging from reduced environmental impacts to economic effects of the lower costs in construction and maintenance (Farrer, 2002). The social impacts are also particularly important, so host communities don't get left with investments that are not 100% appropriate for the area. Money saved from construction and maintenance of permanent stadiums can be better spent on other local issues, thus helping spread the benefits to a larger proportion of the host population, rather than just supporting the select few who make use of the stadium e.g. elite athletes. One interviewee said:

The temporary seating I feel was a very good aspect of the London games, it reduced the risk of wasted stadiums that is common with the Olympics, and really engaged the games with iconic landmarks around the city (personal interview, Waltham Forest resident 28th March, 2014)

The high number of temporary structures such as the Basketball Arena, which can be transferred between host cities, can open up the Olympics to countries who previously felt the cost and complexity was too high. It is clear that London has been an example of combining temporary structures and permanent venues to provide the best chance of generating a positive legacy, whilst also offering a successful and iconic Olympics. However from the viewpoint of local society the lack of permanent infrastructure can reduce their perception of legacy and value for money.

If there was a bit more temporary seating I would feel short-changed on the price the nation has paid for the Olympics, a physical and evident legacy is important, otherwise we have just paid the cost for 2 weeks of sporting events for a select few people around the world (personal interview, Hackney resident, 26th March)

7.5 Summary

To briefly summarise, it is evident that the rapid transformation of the area is starting to lead to gentrification, and more needs to be done to limit this if socio-economic conditions associated within these boroughs are going to be reduced and not just transferred. In particular an area of concern is the affordability of the social housing offered to local citizens, which appears to be a cause of social exclusion from the area. Sports participation legacy requires more time to understand its true impact, but the slight increase in participation within the boroughs indicates greater effort is needed to promote involvement in sport. The use of temporary structures has been a considerable success and shown that temporary venues provide a cost effective method for hosting the games and reduce the risk associated with permanent venue legacies. London has provided invaluable lessons regarding social aspects for future Olympics. In the next section I am going to analysis the economic legacy.

8 Economic Legacy

The last aspect of sustainable development and legacy of the Olympics I will focus on is the economic legacy. The increased scale of the Olympics since its first modern conception means that the economic legacy has been extensively researched in order to prevent the build up of national debt. Economic legacy is particularly difficult to assess, especially in the long run. Many research papers and government departments have attempted to quantify the impacts and assign monetary values (Short, 2004). Table 5 shows the three sections of economic impact often analysed.

Table 5. Different types of economic impacts associated with the Olympics

Economic Impact	Cause
Direct Impacts	This results from expenditure directly related to the Olympic games, for example construction of Olympic venues, athlete villages and development projects associated with the legacy.
Indirect Impacts	This results from the supply chain of the procurement of goods for the Olympic games. For example the supply chain of construction materials for venue construction
Induced Impacts	The economic activity caused as a result of those employed by the Olympic games through spending of wages

Source: Adapted from Oxford Economics, 2012

However due to the large amount of research carried out on these, the focus of this paper will be based on employment legacy whereby the impact is more directed towards the host boroughs, than general economic legacies for the whole of London. I will first give a brief overview of the monetary values of the Olympic economic legacy so far before critically analysing the employment aspects.

8.1 Monetary Values

The Olympics is a huge financial investment, and the British Government and citizens expect a return on the £8.921 billion cost (Gibson, 2012). The overall Government target is to receive £11 billion in economic benefits via trade and investment before Rio 2016 (UKTI, 2014). Current figures from July 2013 indicate that £9.9 billion has already been achieved, with £5.9 billion pending from sales of Olympic related activity e.g. British Business Embassy (UKTI, 2014). £2.5 billion resulting from

increased inward investment within Britain and £1.5 billion as a consequence of British companies winning contracts abroad (UKTI, 2014). Some monetary values on the benefits of the local boroughs economy have already been calculated. For instance, the parklands created are expected to cause £500 million in capital value added to the area in current monetary terms. This is due to the improved environment, increasing amenity, aesthetics and house prices (Oxford Economics, 2012). Another monetary value calculated is the savings in the National Health Service (NHS). Less crime and lost working days combined with general health improvements are estimated to result in NHS savings of £50-130 million per annum (Oxford Economics, 2012). This summarises the economic impacts by associating figures with the legacy, however I will now analysis the employment legacy, which is a less tangible aspect of economic legacy.

8.2 Employment Legacy

Unemployment within the London boroughs is high, with many people lacking the essential skills needed in order to gain employment. It has been a social problem that the London Olympics have focused on addressing. It is believed that the training of the work force, largely in construction work, will leave a positive legacy due to increasing living standards and productivity of citizens in London. According to statistics, construction of Olympic venues involved 3000 workers who had previously been unemployed, and 70% of these were from the London host boroughs (Oxford Economics, 2012). Sustained unemployment can dramatically reduce the likelihood of gaining subsequent employment. Therefore the training and skills learnt from the construction of Olympic infrastructure can result in long lasting benefits for the local workforce.

The Olympic Park and Olympic Village provided a vast majority of the jobs, over 46,000 workers were associated with their construction (IOC, 2013b). This provided an opportunity to hire local workers to give the area a boost. Before the Olympics, the commitment was set that 20,000 local citizens from host boroughs would be contracted for employment (Abbott, 2013). However, the end result was under half, with only 9,700 people receiving jobs (Abbott, 2013). Since the Olympics, it is expected that 17,900 additional jobs will be created each year as part of its legacy, whether this has been achieved is still yet to be seen. The employment opportunities issues were raised in several interviews, one interviewee stated:

There were lots of chances to volunteer at the games, and this was good as few people would have considered volunteering before, however it felt as if there was a lack of jobs that offered money and also that offers a long term future (personal interview, Hackney resident, 26th March, 2014)

However large failures involving the legacy regarding the employment aspects are already being seen. Two schemes were set up, the 2012 Employment Legacy programme and the 5-borough Employment and Skills Project, both have been considered failures (Vanderhoven, 2012). Firstly the 2012 Employment Legacy Programme suffered from delays meaning the project only started in 2011. By this point most Olympic contract workers had already been arranged by recruiters (Abbott, 2013). This was not the only issue and further problems have been identified as a cause for the limited success of this scheme. Another issue was that the results by payment model used by the London Development Agency (LDA) have been suggested to negatively effect chances of employment. For instance, the contractor Seetec (employment, training and job search company) receives a payment for every individual placed, however the largest amount of the fee, 40%, is only paid if the person stays in the work for over one year (Donovan, 2012). The short-term nature of the work required for a lot of Olympic jobs has made sustained long-term employment difficult to accomplish. Providing unrealistic targets reduces incentive to focus on long-term employment because of the difficulties in achieving the one-year goal and receiving the 40% payment (Vanderhoven, 2012). Perhaps, lower and more attainable targets could increase incentives and boost the amount of people securing longterm employment.

The 5 borough work project which was initially expected to help 5000 people enter employment, has also suffered problems. It was initially planned to run from April 2010 until March 2013, thus taking advantage of the Olympic boom. However it was also delayed and didn't start until early 2011 (Abbott, 2013). The overall budget of the scheme is £15 million but this has been reduced by £2 million due to missed targets and the economic recession. Some improvements have been made to improve the fortunes of the project, with payment systems adapted, allowing payments for keeping a person in a job for 6 months instead of one year, and also allowing for changes of jobs. The scheme has so far managed to get 3600 people employed (Donovan, 2012). Despite the failures of this scheme, London 2012 was the first host of the Olympics to set targets involving employment legacy, and information gained here can substantially help other hosts to incorporate long term employment into their legacy plans.

The Westfield Stratford Shopping Centre development that was incorporated into the Olympic legacy was intended to provide a direct benefit to the local population. In terms of employment, 10,500 jobs were created in the shopping centre, with a vast majority of these being low skilled within the service industry e.g. retail. This provided the opportunity to raise employment within the host boroughs, yet of these 10,500 jobs, only 2000 went to unemployed local citizens, accounting for fewer than 20% (Oxford Economics, 2012). Under closer examination however, deeper lying issues can be considered to have affected the amount of local citizens successfully being recruited. According to Westfield's recruiters, some applicants who applied lacked basic reading and writing skills. Therefore it is apparent that employment legacy should not be fixated solely on the short-term impacts, but also on how it influences longer-term trends.

In terms of the long-term impact, the London Olympics has the potential to positively influence the local boroughs. The high levels of volunteer participants and the increased jobs prosperity created by new investments directly (Olympic investments) and indirectly (Investment that has resulted from the increased Olympic investment in the area) can help tackle the issues surrounding East London boroughs, which suffer from 'worklessness'. This term refers to a culture of not working being passed down through the generations. By improving business employer engagements with the local workforce, improving education and increasing job availability provided by new investments, this issue of 'worklessness' could be reduced (Meadows, 2006).

9 Discussion

It is hoped this paper can progress understanding of the potential for the Olympics to act as a form of sustainable development, by highlighting London 2012's strengths, weaknesses and opportunities. I am now going to critically discuss each section of sustainable development (environment, society and economic), using all aspects of the legacy cube for London 2012 legacy and take steps to answering my research questions.

Environmentally the focus was placed on the construction of sporting venues. London provided stylish buildings that contained a variety of innovative sustainability solutions. Sustainability groups have praised this. Each permanent venue had to pass an adapted BREEAM analysis, the first of its kind for sporting venues that encouraged less rigid sustainable solutions and focused on long-term legacy. Despite this, the age long debate between sustainability and economic viability hindered some aspects. Sustainable solutions might be higher in terms of capital cost, but often last longer and thus provide a better life cycle value. The focus towards capital costs rather than life cycle costs led to sustainable solutions being disregarded for expense reasons. The holistic view of contractors did change when flexible budgets were allocated, but one improvement, which could be made, would be for more long-term cost thinking to be incorporated earlier on. Attention was focused on recycling and the diminishing impacts of construction. Targets in these areas were achieved and indicate successful policies and implementation, which were considerably more extensive than any previous Olympics and the construction industry as a whole. However there are concerns about the initial goals. For example, improvements are necessary in the creation of solo objectives rather than combined ones. Evidence of this is provided by the 90% recycling and reused target. Contractors vastly favoured 'recycling,' instead of the more environmental 'reuse' method, due to it being cheaper and more convenient. This occurred despite it being lower down on the waste hierarchy pyramid and therefore should have been a secondary option not the first choice. Overall governance of the environmental aspects was praised, in particular the planning and cross party political support for the regeneration legacies.

The social aspect of sustainable development from the Olympics and the urban regeneration of the area are harder to predict, analyse and understand. The London Olympics aimed to address several key issues within the area such as housing and wellbeing. The 11,000 new homes improve the living conditions associated with the area. One concern is that more progress is needed to prevent the alienation of less well off members of the local society. The scarcity of affordable housing that is

actually affordable had meant regeneration has already started to lead to gentrification. More needs to be done to retain the local communities and to engage them with the developments, in order for the typical East London atmosphere not to completely disappear and the area lose its uniqueness and charm. The research project occurring within two years of the Olympics finishing, means a lot of social trends are yet to be established, and vast amounts of regeneration, particularly housing structures are still being constructed, and therefore there is still a chance to alter and improve the social legacy. The monitoring and evaluation is an area of concern whereby the short-term nature of organisations involved in the regeneration legacy can threaten the successfulness of the project.

The economic legacy was not a key focus of this paper due to it being the most topical research area for legacy studies, either by academics or governmental departments. The main emphasis for this paper on economic legacy was on the employment of local people and whether the local population have benefited as well as British GDP. The employment of local workers has not been as successful as hoped, with less than half getting jobs before/during the Olympics, and there have been considerable problems in improving long-term job prospects afterwards for the local society. This aspect of economic legacy requires the most research, in order to understand how improvements can be made to increase the employment opportunities of local communities, in line with benefits made in other sectors of society and the environment. Sustainable development regeneration associated with the Olympics is still a utopian prospect, and more analysis of future games is needed before it can be considered a utilitarian practice associated with all mega events.

The integration of Olympic buildings into development plans and the incorporation of projects to also become part of the Olympic legacy, e.g. Westfield Shopping Centre, are considered a success. The transportation network improvements indicate the immense potential there is for the Olympics to combine with other regeneration schemes to speed up their development and in some cases justify the investment. The last aspect this paper addressed, was to understand the potential that sustainability themes used during London 2012 can be replicated. From this study it appears that much of the experience gained from London 2012 can become a blue print for future sport regeneration projects. For example incorporating the insistence for transparency of sustainable aspects, providing the frameworks for construction and effective governance of the legacy from the beginning, whilst also trying to combat threats such as gentrification and political conflict. More analysis is needed in the understanding of it's effectiveness on deeper social consequences, but the signs are encouraging so far that a vast amount of knowledge can be passed onto Rio 2016, to further improve sustainability for the next host city, and help use the Olympic Games for sustainable development of key urban areas.

9.1 Future Research

This paper has started to analyse the potential of the Olympics to contribute towards sustainable development. Future research needs to continue to analyse the legacy of mega events such as the Olympics, in order to gain further understanding of the complex interactions that occur, and how to best combine the competing objectives of different organiser's ambitions. By improving our understanding of these mega events, we can establish a greater chance of successful sustainable development associated with them for future generations to benefit from.

10 Conclusion

The information gained from this research project contributes to the growing and developing multidisciplinary interest and literature on mega event management and the emergent emphasis on the legacy it creates. This study has explored the potential of urban regeneration legacy as a form of sustainable development resulting from hosting the Olympics. London 2012 has shown that sustainability associated with the Olympics has increased over the years, and greater thought is being placed upon it. London has provided plenty of positives supporting the idea of sustainable development regeneration from hosting the Olympics, such as the strategic planning of regeneration and legacy from the beginning, and incorporating different local and regional regeneration initiatives. It has also offered an insight into potential weaknesses threatening its success, such as the lack of long-term evaluation of regeneration due to limited life span of organisations and the effect of gentrification and displacement. Currently, the view taken from this paper is that sustainable development associated with regeneration plans are still idealistic and more research needs to be done in order to maximise effectiveness in order to enhance sustainable regeneration further. It is hoped that this paper has contributed to the understanding of the environmental, social and economic legacies and taken steps to answering whether the Games can ultimately be considered to be a form of sustainable development.

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Appendix

Appendix A - Limitations of Research

The multiple aspects of legacy and the lack of a ubiquitous definition makes it extremely difficult to measure. The complex relationships associated with legacies mean it is often difficult to decide if the impact has a positive or negative effect, this is because the impact can be positive and negative at the same time (Preuss, 2007). According to Gratton & Preuss (2008), research carried out to calculate legacies are often to focused on economic aspects. This is due to monetary values being easier to measure and quantify and thus making the focus of this paper towards environmental and social aspects challenging

A major limitation with this study was the short-term nature of organising companies involved in London 2012. Most of the governmental departments and organisations were set up specifically for the Games and therefore close down within two years of hosting them. This makes contacting those involved hard to track down, information difficult to access, and people are unwilling to be interviewed due taking up different roles. Those organisations still left or specifically tasked with handling the legacy were inundated with request for interviews resulting in them instead only giving information out in a series of lectures which were open to the public, however these did not occur within the time scope of this project. Additionally those conducting the research can often be biased, because the commissioners involved in organising the legacy study want to present the event in good light, as often they are under pressure to justify the large sums of public money spent (Kesenne, 2005; Gratton & Preuss, 2008). Another problem is raised in finding research that can support findings here, due to the low commitment of countries to find out about legacies and after the event itself interest declines, and researchers move onto the next big event.

The focus of this paper towards regeneration also causes some methodological issues due to the lack of a unified methodological approach and several key challenges, as described below (Davies, 2012)

1. Hard to calculate what regeneration would have occurred anyway, without hosting the games
2. Identifying the regeneration impacts associated with the games from other regeneration activities in the area that are not associated
3. Accounting for regeneration displacement that would have occurred elsewhere had the focus not been on a particular area
4. Capturing the intangible impacts such as community and social aspects that are hard to measure