

Costs of large city parks and open spaces Robert Holden for CABE Space

This paper has been written at the request of CABE Space in connection with the 2012 Olympics legacy park in the Lea Valley. It surveys the question of capital costs, by comparing the costs of large parks projects from the past three decades in the UK, continental Europe and elsewhere and thereby inform the process of developing guideline costs.

Comparative costs

Costs in the majority of cases have generally been determined by asking the designers or parks development authority; otherwise contemporary reputable secondary (published) sources have been used. Usually the costs are contemporary with the completion of the project, i.e. the questions were posed shortly (within a year or so) after completion. A range of parks has been compared; mainly these are larger parks so as to be directly comparable with the Olympics parks (85ha for the Olympics and 110ha for the post 2012 legacy park). However, smaller parks are included as well. Costs do not include the large remedial or later capital development works which can take place in large park projects following completion and opening. For example, at both Parc de la Villette and Parc Citroën Cévennes, in Paris, there have been large scale remedial works to deal with structural damage due to subsidence (such as rebuilding the cascades and waterworks at Citroën Cévennes) during the late 1990s, a decade after completion (A1). Such large scale works after completion are not unusual.

Costs in the case of the majority of projects are known to exclude VAT and design costs (i.e. in those figures sourced from articles by Holden and in those from *Topos*). Area cost rates have been expressed in rates/m² (rather than rates/hectare) because square metre rates are more generally understood in terms of building construction costs. A caveat, however, should be added: the author is a landscape architect not an economist and it is advised these are rough and ready calculations.

Rates have been updated using national inflation rates for each country based on reputable sources of information for inflation which are listed in the footnote (A2). The 2007 rate in the national currency has then been converted into pounds sterling at current rates. Note post 2003 euro establishment rates are still available for old euro area national currencies.

When forecasting costs for the period 2007- 2012, allowance will have to be made for inflation during the construction period and the additional costs consequent on the shortage of skilled labour and materials of such a large project as the £9.25 billion Olympics and there may be scope for phasing the post 2012 legacy park works so as to benefit from the contrary tendency of a fall in construction costs after recent Olympics such as Athens and Sydney.

What is the cost of a city park?

Asking the question what is the rate for a large city park such as the Olympics legacy park begs the question what is a city park? The projects surveyed have been grouped as follows:

A >£200/m²,

high cost intensive use urban parks with a high proportion of paving, structures and water features, numbers of buildings and high levels of intensive horticulture requiring high quality management e.g. Paris parks or the two Chicago examples, usually on redevelopment land.

B £100-200m² medium cost parks

involving high intensively used spaces and high level maintenance but tending to be smaller than A.

C £50-200/m² low cost developments

of various types, including ruderal (spontaneous plant regeneration), forestry and parkland developments, often on semi-greenfield sites

D <£50

very low cost parks. with forestry and simple designs, phased developments, some involving volunteer or low cost labour and ruderal developments.

E British garden festivals:

these are included because they were intensively used projects built on derelict land and may share some of the characteristics of an Olympic legacy park proposal. They range from £68.17 /m² at Liverpool to £307.08/m² at Glasgow.

Tables of comparative parks costs (ranked in descending order of cost by category)

A >£200/m²,

These are high cost, intensively used urban parks with a high proportion of paving, structures and water features. They have numbers of buildings and high levels of intensive horticulture requiring high quality management e.g. the Paris parks or the two Chicago examples. The Millennium Park in Chicago is extraordinarily expensive and that may be due to cost overruns and the costs of expensive artworks by international artists such as Anish Kapoor. One of the projects is not urban, the Eden Project in Cornwall, but is included because it is very successful and it is a reclamation project. Two of the projects are Garden Festivals, the Dutch *Floriaden* at Zoetermeer and Haarlemmermeer and built on a greenfield sites, but within Randstad. The other projects are inner city and much smaller than the Olympic Legacy Park.

A >£200/m², High cost, intensity use parks							
Park (sources of information in brackets)	Park Authority / Developer	Area	Construction Period	Capital Costs (base info) figures)	Base Info. /m ² (date)	Capital Costs /m ² (2007)	Capital Costs £/m ² (2007)
Millennium Park Chicago (33)	City of Chicago	10ha	2004	US \$ 475 million	\$ 4 750/ m ² (2004)	\$5 192/ m ² (2007)/	£2635/ m² (2007)
Eden Project (7)	Eden Project Ltd.	15 ha	2001 first phase,	£86 million	£573.33 m ² (2001)	–	£670.41/m² (2007)
Lakeshore East Chicago (34)	Magellan Development Group LLC	2.43 ha	2004	\$15 million	\$ 617.28/ m ² (2004)	\$674.6/ m ² (2007)	£342.30/m² (2007)
Zoetermeer Floriade 1992, The Netherlands (29)	Den Haag Zoetermeer Floriade 1992	33ha	1988-92	£66 million (source in sterling)	£200/ m ² (1992)	n/a	£290.07/m² (2007)
Parc Citroën Cévennes (4)	Direction des Parcs, Jardins et Espaces Publics de la Ville de Paris	15.0 ha	1985-90	FF 340 million	FF2962.00 /m ² (1990)	€609.78/m ² (2007)	£250.55/m² (2007)
Jardins Tage Kellerman Paris (26)	Direction des Parcs, Jardins et Espaces Publics de la Ville de Paris	7720 m ²	1989-91 (phase 1)	FF 13.3 million	FF 1722.79/ m ² (1991)	€343.53/m ² (2007)	£232.12/m² (2007)
Floriade 2002 Haarlemmermeer (35)	Dutch Horticultural Council	64.7 5ha	-2002	£70,5 million (source in sterling)	£188.46/ m ² (2002)	n/a	£209.07/ m ² (2007)

B £100-200m2

Medium cost parks involving a high proportion of paving, structures and water features, numbers of buildings and high levels of intensive horticulture requiring high quality management. All tending to be significantly smaller than the Olympic legacy park.

B £100-200m2 Medium cost, high intensity use urban parks							
Park (sources of information in brackets)	Park authority / developer	Area	Construction Period	Capital Costs (base info) figures)	Base Info. /m ² (date)	Capital Costs /m ² (2007)	Capital Costs £/m ² (2007)
Jardin Botanique, Bordeaux (24)	City of Bordeaux	4.6ha	2001-5	€9.2 million	€200/ m2 (2005)	€207.88/ m2 (2007)	£140.46/m² (2007)
Thames Barrier Park (9)	LDDC then English Partnerships	9.3ha	1997-2000	£10.3 million (£2.3 m for remediation and river bank works: new park £8million)	£111 /m ² (2000)	–	£132.10 /m² (2007 rates)
Cendon di Silea Riverside (22)	Municipality of Silea, Italy.	0.8ha	2002-4	€1.2 million	€150/m2 (2004)	€159.96/m2 (2007)	£108.13/m² (2007)

C £50-100/m,

Lower cost, but relatively small developments of various types. Including parkland (i.e. extensive grassland) developments and one contract projects such as Rotten Row Gardens.

C £50-100/m,2 Low cost developments of various types							
park (sources of information in brackets)	park authority / developer	Area	Construction Period	Capital Costs (base info) figures)	Base Info. /m ² (date)	Capital Costs /m ² (2007)	Capital Costs £/m ² (2007)
Westpark Bochum (32)	City of Bochum & LEG Stadtentwicklung GmbH & Co. KG (developer)	35 ha	1997-2006	€44.2 million (2006)	€126.28/m2 (2006)	€128.42/ m2 (2007)	£86.74/m² (2007)
Rotten Row Gardens, Glasgow (6)	University of Strathclyde	9,800 m2	2003-4	£720,000	£73.5/ m2 (2004)	–	£79.78/ m² (2007)
Cultuurpark Westergasfabriek Amsterdam (5)	Westergasfabriek BV for Stadsdeel Westerpark (Urban District) / MAB (a private sector developer)	1.5ha	1996-2003	total:34.5 million guilders (fl) (remediation 27.5 million fl, park development 12 million fl)	237.93 guilders per m ² (2003 prices)	€115.18/m ² (2007)	£78.83 /m² (2007 rates)
Parc Diagonal Mar, Barcelona (17)	Diagonal Mar / HINES	14ha	1997-2000	\$US 10 million/ 1430.39 mill. pesetas (17)	10 217 pesetas/ m2 (2000)	12 798.72 pesetas/m2 €76.92/m2 (2007)	£76.92/m² (2007)

D <£50

Low cost parks involving forestry techniques or ruderal (natural regeneration) techniques or volunteer labour. They are of a range of sizes with some of the scale or bigger than the Olympics legacy site. Projects promoting ruderal natural regeneration include Duisburg Nord or Nordstern Landscape Park. Some, such as the Riem Park in Munich or the Spreebogen in Berlin, use extensive grassland. The Earth Centre cost is just phase 1 including the Tropical and Mediterranean “biomes” or greenhouses.

D <£50 very low cost parks involving volunteer labour or forestry techniques							
Park (sources of information in brackets)	Park Authority / Developer	Area	Construction Period	Capital Costs (base info) figures)	Base Info. /m² (date)	Capital Costs /m² (2007)	Capital Costs £/m² (2007)
Torrent d'en Farré, Esplugues de Llobregat, (23)	Municipality of Esplugues de Llobregat, Spain	12ha	2001-4	€7 121 520	€59.35/m ² (2004)	€65.55/m ² (2007)/m ²	£44.31/m² (2007)
Seepark Lunen Lunin-Horstner (31)	City of Lünen/ Landesarbeitsgemeinschaft Gartenbau und Landespflege cV Nordrhein.	63ha	1993-97	DM65 million (1997)	DM103.17/ m ² (1997)	€60.33/ m ² (2007)	£ 40.79/m² (2007)
Parque de Catalunya Barcelona (28)	Municipality of Sabadell	40ha	1990-92	2 000 million pesetas	5 000 pesetas/ m ² (1992)	7699.72pes etas/m ² €46.28/m ² (2007)	£31.28/m² (2007)
Earth Centre (14)	Earth Centre, (charity on land owned by Doncaster Council)	170ha	phase 1 1997-2000	£42 million	£24.71 / m ² (2000)	–	£30.42/m² (2007)
Spreebogen open spaces, Berlin (25)	Federal State of Berlin	28ha	1998-2004	€12 million	€42.86/ m ² (2005)	€44.51/m ² (2007)	£30.07/m² (2007)
Nordstern Landscape Park, Gelsenkirchen (30)	Bundesgartenschau Gelsenkirchen 1997 & Nordsteinpark GmbH & City of Gelsenkirchen	100ha	1993-1997	DM65 million (1997) : excludes BUGA DM70mill.	DM65/ m ² (1997)	€38.03/ m ² (2007)	£25.71 /m² (2007)
Centre for Alternative Technology/ Canolfan Y Dechnoleg Amgen, Machynlleth (19)	Centre for Alternative Technology plc.	2.8 ha	1975-2001	£630 000 (2001 estimate)	22.5/ m ² (2001)	n/a	£26.29/m² (2007)
Duisburg Nord Landschaftspark (15)	Landesentwicklung s Gesellschaft Nordrhein-Westfalen	200ha	1989-2005	DM 100 million (1999)	DM50/m ² (1999)	€28.80/m ² (2007)	£19.47/m² (2007)
Stiftung Schloss Dyck - Gartenkunst und Landschaftskultur (20)	Stifting Schloss Dyck (a foundation)	30ha	2001-2	€7.5 million (2002)	€25/ m ² (2002)	€28.13/ m ² (2007)	£19.01/m² (2007)

D <£50 cont. Park (sources of information in brackets)	Park Authority / Developer	Area	Construction Period	Base Capital Costs	Base Info. /m² (date)	Capital Costs /m² (2007)	Capital Costs £/m² (2007)
Riemer Park München (2)	Maßnahmeträger München-Riem (City of Munich)	210ha	1997-2005	€37 million (2005)	€17.62 / m ² (2005)	€21.388/ m ² (2007)	£14.45/m² (2007)
Waldpark Potsdam (21)	BUGA Foundation	16ha	2001	€3 million	€18.75/m ² (2001)	€20.66/m ² (2007)	£13.20/m² (2007)
Parque del Migdia Barcelona (27)	Municipality of Barcelona	52ha	1990-92	840 million pesetas	1 615.38 pesetas / m ² (1992)	2 604.52 pes/m ² €15.69/m ² (2007)	£10.78/m² (2007)

E British Garden Festivals

Separately listed are the British Garden Festivals which were on derelict land and where the total costs given include reclamation. All were high intensity use and all except Ebbw Vale were inner city.

D British Garden Festivals							
Park (sources of information in brackets)	Park Authority / Developer	Area	Construction Period	Capital Costs (base info) figures)	Base Info. /m² (date)	Capital Costs /m² (2007)	Capital Costs £/m² (2007)
Glasgow National Garden Festival 1988 (11)	Glasgow Garden Festival 1988 Ltd for Scottish Development Agency	48ha	1984-88	£77.75 million	£161.98 / m ² (1988)	–	£307.08/m² (2007)
Ebbw Vale Garden Festival 1992 (13)	The 1992 National Garden Festival Ltd. for Blaenau Gwent Council and Gwent County Council.	80ha	1992	£60 million	£75/ m ² (1992)	–	£109.84/m² (2007)
Gateshead Garden Festival 1990 (12)	NGF 90 Ltd (company set up by Gateshead Metropolitan Borough Council + DOE)	82ha	1984-90	£52 million	£63.41 / m ² (1990)	–	£102.00/m² (2007)
Stoke National Garden Festival 1986 (10)	NGF '86 for Stoke-on-Trent City Council + Staffordshire County Council	73ha	1981-86	£30 million	£41.10/ m ² (1986)	–	£84.12/m² (2007)
Liverpool International Garden Festival 1984 (10)	Merseyside Development Corporation	100ha	1981-84	£30 million	£30/m ² (1984)	–	£68.17/m² (2007)

Discussion

Four inter-related questions should be asked at the inception of any large park: these are in no particular order:

- what is the capital cost?
- what is the maintenance cost?
- how are the capital and maintenance costs to be funded?
- what is the park for?

This paper has been requested to inform decisions about capital costs for the Olympics legacy park (A3), but these should not be divorced from decisions about the other three questions.

Capital costs and revenue costs.

There is no point in embarking on large capital park investment without considering future management and its finance. One way to fund maintenance and support a park is to tap the increase in value of adjacent land consequent on the added value engendered by a high quality park. This is a historically successful model illustrated in London best by Regent's Park, which is part of the Crown Estate and is a part of the Regent Street development by John Nash. Compare Victoria Park, (which also began as a Royal Park) but where finding adequate funding for maintenance is a chronic challenge. The highest standards of estate management in the former LDDC Docklands area are in the private sector, most notably Canary Wharf.

Parks equate with good environment, but should be integrated into transport improvements and real estate development. Transport + parks + long term management = successful long term real estate value. Enhanced land value can be equated with good community development and good ecological development as fundamental *desiderata* of most forms of urban development, including parks and related development areas.

Failure by the London Docklands Development Corporation to adequately address long-term funding of public realm maintenance and management led to the arguments about the handover of the Thames Barrier Park on its completion in 2002. London Borough of Newham refused to accept it and the situation was saved by the GLA's London Development Authority adopting the park and accepting the burden of funding it. Meanwhile private sector developers of adjacent residential sites have profited from the environment and transport benefits of public expenditure and the consequent rise in land and property values. Bonds and covenants linked to land sales are just two ways for a freeholder ensure a contribution from developers while section 106 agreements may be set by a planning authority.

The Earth Centre, near Doncaster is included in the comparative table of costs because it had financial problems and closed in 2004. The Centre for Alternative Technology (CAT) is interesting as a low cost incremental project developed with some voluntary labour over thirty years. The Eden Project is a successful example because of active marketing. Note the Earth Centre, the Centre for Alternative Technology and the Earth Centre are all rural projects on derelict land, but may be interesting models for a large urban park on derelict land.

The private sector benefits consequent on transport and environmental improvements should be tapped in order to fund the public park. Alternatively the park developer (in this case the Olympic Development Authority) should keep the freehold of development land

around the Olympic Park so profits and service charges go to the public purse and fund the park. This is not a new concept, it is common practice in business park development. It also is the practice of Disneyland developments where the real profits are made from the related hotel and housing development, which Disney purchases prior to development of the theme park. The challenges to local authorities of this mechanism have been attempted in Amsterdam at the Westergasfabriek Park, but have only be partially successful, because of the remediation costs and doubt about the viability of some of the uses.

Basically, the financial decision depends on what sort of park is desired. If an intensive Paris style park then that is over £300/m². If a parkland effect such as the Riemer Park in Munich or Thames Barrier Park or the Westergasfabriek then c. £100-200/m² (including remediation to a certain standard) alternatively a cheaper approach is to use natural regeneration or forestry techniques with limited areas of intensive use like Duisburg Nord or CAT so one could develop a park for far less than £100/m².

But then what is the remediation standard and cost? That depends on the extent of the works already done on the Olympics site, but also on changing views about the safety of the remediation method, the Westergasfabriek Park in Amsterdam was dogged by the different and mutually exclusive concerns of cost and remediation safety concerns.

Park use

Parks require functions which attract users. This was one reason for the success of Parc de la Villette in Paris where the national science museum ensures c.5 million visitors per annum to the park and its buildings. Lack of a sufficient attraction led to the failure of the Earth Centre (which went bankrupt in 2004) because the main proposed attraction, the Ark, was not built. Parc de Bercy in Paris works well because it is in the centre of a redevelopment area, a ZAC (*Zone d'Aménagement Concerté*). This has ensured it has a local residential population and furthermore there is an up-market shopping and café street and related entertainment centre which ensures it attracts wider range of Parisians, it also has good community and school relations. A park is not automatically an attraction *per se*, many suburban parks in the UK are under-utilized because of lack of investment and indeed a successful park can become unsuccessful due to poor management.

Conclusions:

One firm conclusion is that successful and effective parks can vary greatly in finance and cost. Generally the French and US examples cost more than recent British practice. For example, the Thames Barrier Park including remediation (9.3ha) at £132 per m² is just above one third the cost of Paris parks such as the slightly bigger (15ha) Citroën Cévennes at £370.58 / m². Both are former industrial sites, and this difference in cost is reflected in the intensity of use, even when, as in these examples, the same designer, Allain Provost, is involved.

Lower cost parks are possible, but either offer less intensity of use and/or require an approach to remediation which aims to control toxicity on site by treating run-off rather than by capping or by toxic material removal. The German practice is to allow vegetation to develop over time naturally and this may require exclusion of the public for periods of some decades; it also requires an acceptance of low intensity use once the park is open linked with active management as at Duisburg Nord and the other large German post-industrial parks.

FOOTNOTES

Footnotes references are in two series, A series for text footnotes and number series for project refs.

Text references

(A1) The running costs for Parc de la Villette in 1999 were FF195.8million (= Euro 29.85 million in 1998 or 34.09 million in 2006) and the cost of major repairs and improvements for were FF 65.8million (= Euro 8.05 million in 1998 values or euro 11.46million in 2006) according to Tate, A. *City Parks* London, Spon Press: 2001, p.63. Also compare Bryant Park New where in 2000 the Bryant Park Restoration Corporation has an annual budget of \$3.7million of which \$1million was for day to day maintenance and \$600 000 for repairs and \$500 000 for management. (Tate p.31) or Duisburg Nord where the annual maintenance cost in 1999 was DM 3.5million

(<http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1922&context=cad/places>).

(A2) International price and Inflation comparisons:

Inflation over the years has been calculated on a national basis of the state where the project is located. National inflation tables are from:

<http://www.theodora.com/wfb/#CURRENT>

and the linked

<http://www.photius.com/countries/germany/economy/index.html>

based on annual consumer price inflation and in turn based on the annual (US) *Central Intelligence Agency World Factbook* and the invaluable US Census chart of OECD countries' consumer prices inflation (itself based on OECD data) from 1970-1998 which is on

http://www.allcountries.org/uscensus/772_annual_percent_changes_from_prior_year.html.

Alternatively International Monetary Fund International Financial Statistics Browser information has been used ref. <http://ifs.apdi.net/imf/about.asp>

Rates from the 2007 rate /m2 have then been converted to pound sterling using the Reuters conversion calculator on

http://investing.reuters.co.uk/Investing/Currencies.aspx?WT.mc_id=ext_SEM_Google_sterling%20euro%20exchange%20rate&WT.srch=1

Old national currency to euro exchange rates for the euro area countries have been compiled by using by the University of Sussex calculator on:

<http://www.sussex.ac.uk/Units/currency/>

Historic French franc (FF) to euro rates have been compiled using:

<http://inflation.free.fr/>

Historic German Deutschmark (DM) to euro rates have been compiled using:

www.altersvorsorge-und-inflation.de/euro-rechner.php

Sterling inflation rates have been compiled using:

<http://inflation.findless.co.uk/> which Simon Dickson has compiled based on UK National Statistics and House of Commons Research papers.

(A3) Once the answers to these questions have been determined a name should be chosen, this is common practice in business park master planning at an early stage, a name helps determine image e.g. Regent's Park and Victoria Park indicate their ambition.

Table references:

(1) Holden, R. Parc de la Villette "New Parks for Paris, Landscape Art and the State" *Architects' Journal* 12 July 1989, pp 57-67

(2) LAE Foundation (Diedrich Lisa, Holden R. Luiten Eric (eds.)) "Landschaftspark Riem" *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 196-2001.
Inflation calculated as 2% in 2006 and 1.7% in 2007 compound so £37million (2005) is €38.38 million. German inflation source <http://www.photius.com/countries/germany/economy/index.html> (nb ultimate source USA CIA World Factbooks, the United Nations Statistical Office, The Library of Congress Country Studies and other sources).

(3) Holden, R. "Where landscape comes first" (re Parc de Bercy, Paris) *The Architects' Journal* vol.207, no.22, 4 June 1998, pp.37-39 gives the 400 million FF cost, note 1996 tour notes *Promenade dans quelques grands jardins de Paris* issued by Réseau Aménagement Ecologie Environnement, Ministère de l'Environnement gives a rate of 2962 FF/m² which equates with 39 987 000FF. Alan Tate *Great City Parks* Spon: 2001 (p. p46) reports a development cost of FF 388million.

(4) Holden, R. "New Parks for Paris, Landscape Art and the State" (re Parc Citroën Cévennes) *Architects' Journal* 12 July 1989, pp 57-67. Nb 1996 tour notes *Promenade dans quelques grands jardins de Paris* issued by Réseau Aménagement Ecologie Environnement, Ministère de l'Environnement give a 1990 rate of FF 2771/ m² which equates with FF 387 940 000. Alan Tate *Great City Parks* Spon: 2001 (p. p46) reports a development cost of FF 388 million

(5) US Environmental Protection Agency *International Brownfields Case Study: Westergasfabriek, Amsterdam, Netherlands*

<http://www.epa.gov/swerosps/bf/partners/westergas.html>

Note the private developer could not obtain private sector finance and finance came from the state sector through the National Restoration Fund which in turn sought a guarantee from Westerpark urban district, see Olof Koekebakker *Westergasfabriek Culture Park* Rotterdam NAI Publishers : 2003 p.66

(6) LAE Foundation (L. Diedrich, R, Holden, E Luiten eds.) "Rotten Row Gardens" *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 136-139

(7) Holden, R. "Ecological Theater" (re Eden Project), *Landscape Architecture* January 2002, pp 56-63

(8) n/a

(9) Holden, R. *Thames Barrier Park: Park and pride. Architects' Journal* 12 July 2001 pp. 25-31 (with detailed breakdown of costs for phase 2, the park development). The CABA Space profile reports £12.5million for capital costs:

<http://www.cabe.org.uk/default.aspx?contentitemid=263&aspectid=9> (A%) Important to note is that it is inadvisable on the grounds of both establishing soil structure and of cost to import high cost clay topsoil common in the Thames basin as at Thames Barrier Park because 1) it had soil structure problems 2) it was too high a fertility for the meadow planting they wanted: better by far to make topsoil as Bradshaw used to promote and as they did at the Eden Project 3) made up soils using geological material such as Greensand can have better soil structure than the heavy clay common to the Thames Basin, the cost in 2000 was high at £9/m³. Source of topsoil rate: verbal advice from Patel Taylor project landscape architect on SE Branch Landscape Institute guided tour, 2002

(10) Holden, R. "British Garden Festivals : the first eight years", *Landscape and Urban Planning* no.18 1989, pp.17-35

(11) Holden, R. "Long on grass short on results" *Architects Journal*, 27 March 1991, p 14; PA Cambridge Consultants and Gillespies *An evaluation of Garden Festivals* DOE:1990

(12) Holden. R. "Garden Funfair for Gateshead" *Architects Journal* 23 May 1990, pp. 14- 15

(13) Holden, R. "The germ of an idea" (Ebbw Vale and Zoetermeer Garden Festivals) *Architects Journal*, 19 February 1992 pp 22-25

(14) Holden R. "Planning for the Planet" (re Earth Centre) *Architects' Journal* pp.43-47, 17 February 2000 also "About £41.5 million were spent on Phase I and another £22 million are expected to be spent on Phase II. Phase III is estimated to coast about another £30 million." Source <http://www.eaue.de/winuwd/196.htm> European Academy of the Urban Environment, SURBAN, the database on Sustainable urban development in Europe, website Updated 13.9.2001.

(15) Holden, R. *International Landscape Design* London: Lawrence King: 1996 p.13 gives £28 million; *Topos* no.26, March 1999 special issue Internationale Bauausstellung Emscher Park .p26 gives DM100 million for development costs also ref. Duisburg Nord Landschaftspark article <http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1922&context=ced/places>

(16) Holden, R. *New Landscape Design* London: Lawrence King: 1996 p.102

(17) unpublished information from Ms Paula Garvey, EDAW 17 May 2007 nb costs given in US dollars and so converted to pesetas at the 1 January 2000 rate of 143.30 pesetas per \$US then national Spanish inflation rates applied since, then converted into euro then converted into pound sterling at 17 June 2007 rate.

(18) n/a

- (19) <http://www.eaue.de/winuwd/188.htm> European Academy of the Urban Environment, SURBAN, the database on Sustainable urban development in Europe, website Updated 13.9.2001. Note the CAT used a great deal of low cost voluntary labour.
- (20) LAE Foundation (L. Diedrich, R, Holden, E Luiten eds.) "The New Gardens in the Dyck Field" *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 136-139
- (21) LAE Foundation (L. Diedrich, R, Holden, E Luiten eds.) "Waldpark Potsdam" *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 210-213
- (22) LAE Foundation (L. Diedrich, R, Holden, E Luiten eds.) "Cendon di Silea Riverside" *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 230-233
- (23) LAE Foundation (L. Diedrich, R, Holden, E Luiten eds.) "Torrent d'en Farré public park" *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 128-131
- (24) LAE Foundation (L. Diedrich, R, Holden, E Luiten eds.) "Jardin Botanique" (re Bordeaux Botanic Garden) *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 106-112
- (25) LAE Foundation (L. Diedrich, R, Holden, E Luiten eds.) "Open spaces in the Spreebogen District" (re the federal government district in Berlin) *Fieldwork Landscape Architecture Europe*, Basel, Birkhäuser: 2006 pp. 96-101
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- (27) Isotti, Cortesi, "Parque del Migdia Barcelone, Espagne 1990-92" pp.90-95 & 276
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