Review of London Oxford Airport Proposal

December 2003

Halcrow Group Ltd

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Contents

1 Introduction

1.1 Introduction

This report reviews the London Oxford Airport proposal made by Pleiade Associates. It is based on information contained in a Summary Report *The Best Practicable Environmental Option for an Integrated transport hub in South East England?…London Oxford Airport,* Pleiade Associates and Gardiner & Theobald, 2003 and accompanying documents: Appendix Figures; Report Figures – which gives cost estimates; and, on CDROM, a series of figures including airport layout, surface access connections, and the airport layout in relation to relevant facilities and features.

These documents can be accessed from www.pleiade.org.

The report also draws on comments made by Pleiade Associates in response to a draft version of this report issued in September 2003.

The report is structured as follows:

- Chapter 2 deals with issues relating to the airport layout and capital costs
- Chapter 3 deals with issues relating to surface access
- Chapter 4 deals with the forecasting of potential traffic and with the economic appraisal of the proposal

2 Airport Layout and Capital Costs

2.1 Airport Layout

The LOx proposal is promoted as the 'best practicable environmental option' for a new airport in the South East, with the promoters claiming that its environmental impacts would be lower than all the alternative airports advanced for consultation. The proposal is for a four-runway airport sited to the west of Abingdon in Oxfordshire, in the Vale of White Horse, with Abingdon and Didcot to the east, Wantage and Grove to the south west.

The site lies just to the north of the Great Western Main Line west of Didcot. A 230 ha Development Zone is proposed between the railway and the airport. The A34(T) runs north-south to the east of the site and the A338, which would need to be re-aligned, to the west.

The ultimate configuration is as two pairs of close parallel runways, each 4000m in length, and aligned east-west. It is claimed the airport would have capacity for 120 mppa and 4 million tonnes of cargo on completion.

The airport facilities are set between the two pairs of runways, with a main terminal building and three satellites. The plan shows parallel taxiways between the runway pairs and dual parallel taxiways to each pair.

The planned airport facilities include:

- Four 4000m runways
- 12800m of passenger aircraft stands
- 171 frontal passenger aircraft stands
- 40 remote passenger aircraft stands
- 15 frontal cargo aircraft stands
- an Air Cargo Centre
- an Aircraft Maintenance Centre

LOx is planning to provide 211 stands in total, dependent on the mix of sizes up to ICAO Code E aircraft. The SERAS standard stand provision is 2.1 times the sustainable average hourly runway capacity. With four runways operating at capacity this would convert to a requirement for 256 stands, substantially in excess of the LOx provision.

With a fourth satellite, which with some rearrangement of the space allocated in the airport layout to cargo, aircraft maintenance and an ancillary zone could probably be accommodated within the proposed site boundary, the airport could accommodate 250 passenger aircraft stands, at an additional cost of £600 million for the extra satellite. Providing four satellites and 250 passenger aircraft stands would be sufficiently close to the standard SERAS provision.

The Air Cargo Centre is to have a capacity of 4 million tonnes and 44,000 ATMs per annum. The cargo terminal has 1200m for aircraft stands, and a size of approximately 250,000 sq m. Heathrow currently handles 1.3 million tonnes of cargo per annum through a 94,000 sq m facility.

The Aircraft Maintenance Centre is to the west of the Air Cargo Centre, with 18 parking spaces (modules). The area of the facility is roughly 630,000 sq m, with what appears to be 208,000 sq m of hangar area within the facility.

Timing and Construction

The LOx proposal envisages phased construction, commencing with either one or two runways: two runways would provide 60 mppa of capacity by 2015. 2015 is the programmed opening date. Capacity would be further increased to 90 mppa by 2021 and 120 mppa by 2024.

LOx envisage two terminals, each capable of serving 30 mppa, and two runways from the opening date, but claim the design allows for construction of a single terminal and runway if that would better suit demand. LOx claim there are no front-end costs in the development of the airport, and that the low front-end costs and the ability to tailor expenditure to demand would significantly reduce the risk of the project requiring financial support.

The LOx proposal forecasts are as set out in Table 2.1

Table 2.1: LOx Forecasts

Year	Runways		Passengers, mppa	PATMs, 000
2015	2	Capacity	60	513
	2	Demand	35	238
2020	2	Capacity	60	513
	2	Demand	50	320
2030	4	Capacity	120	756
	4	Demand	98	573
2040	4	Capacity	120	756
	4	Demand	120	675

The passenger forecasts envisage 35 mppa by 2015 (at 147 p/patm), 50 mppa by 2020 and 98 mppa by 2030 (at 171 p/patm). LOX refer to the DfT's Air Traffic Forecasts for the United Kingdom 2000, but do not specify how their forecasts have been derived. The LOx Appendix Figures indicate the excess of South East demand over the capacity available at existing airports: this may have influenced the forecasts.

Terminal Space

The planned terminal area encompasses one terminal with pier, and three satellite terminals. The area of the terminal and numbers of gates are not declared but there are 12,800 metres available for stands.

From Report Figure 2, it is estimated that the Terminal area (on three levels) and Pier area amount to 800,000 square metres. Each of the three satellites is 60,000 square metres.

The SERAS standard for determining core terminal area is 6,600 sq m/mppa. Thus, to serve a capacity of 120 mppa, a core terminal area (terminal and pier area) of around 792,000 square metres, as provided, would be required.

Car Parking

Areas for short-term, long-term and employee parking are shown on the LOx layout drawing. Assuming ground level long-term parking and four-level short-term parking, the passenger parking area may be around 1.4 square kilometres. The proposed airport operating at capacity is likely to require of the order of 3.6 square kilometres of passenger parking capacity, suggesting that more parking area or a greater intensity of use of the areas shown may be required. Some multi-level long-term parking may be provided.

2.2 Capital Costs

Cost estimates have been provided by Gardiner & Theobald – International Project & Cost Management. The estimated cost (at 1st quarter 2002 prices) for the full four-runway, 120 mppa airport is £11.2 billion, with further landside road and rail costs of £1.4 billion and £2.2 billion costs for the 230 ha Development Zone

Cost comparison

In Table 2.2, the LOx undiscounted cost estimates are compared with the SERAS cost estimates for a four-runway Cliffe. The cost categories are those of the LOx proposal and there may be some mis-match between the LOx and Cliffe allocations. Both layouts have two pairs of close parallel runways and similar terminal capacities – 120 mppa at LOx, 113 mppa at Cliffe. For the main airport facilities – terminals and satellites, runways and taxiways, etc - the LOx estimate exceeds that for Cliffe. The Cliffe 'other' costs include large sums for site clearance and earthworks.

The LOx airport development costs, excluding the costs of surface access infrastructure, of £11.2 billion equates to £93 million per mppa of capacity, which compares with a Cliffe estimate of £102 million per mppa, or £69 million per mppa excluding site clearance and earthworks costs. This comparison suggests the LOx airport development costs are reasonable for the proposed capacity and may be on the high side, notwithstanding that the provision of aircraft

stands, terminal space and parking provision may be less than required to serve the proposed capacity.

Surface access costs are addressed in Section 3 of this report.

Table 2.2: Outline Cost Comparison: LOx and Cliffe Costs (£M)

Cost Category	LOx estimate	Cliffe
Terminals & Satellites, Rail Station, Car Parking, Landside Roads	6143	4411
Runways, Taxiways, Aprons, Airside Roads	2900	1355
Ancillary features, including ATC	1108	1141
Cargo & Maintenance	780	645
Other costs	258	3736
Land	Included in other costs	190
Airport Development Costs	**11189**	**11480**
Surface Access		
Landside roads	1130	581
Landside rail infrastructure	253	1211
Rail rolling stock	41	
Total	**12613**	**13270**

2.3 LOx Assessment of Impacts

The LOx documentation indicates the likely impacts of the LOx proposal. These are reported below under the headings of Operational Issues and Noise. Other principal impacts are then summarised.

Operational Issues

LOx refer to several physical features which are infringements of the Obstacle Limitation Surfaces. The most significant seems to be the Main Chimney of Didcot A Power Station which would penetrate the Outer Horizontal Surface and Approach Surface to runway 27L, the fourth runway, by some 169 feet. LOx suggest a reduction in the height of the chimney of some 60 metres (197 feet) would be required before this runway could be provided. They suggest the loss of the 4th runway would reduce the capacity of the airport to 638,000 ATMs and 112 mppa.

Alternatively, a combination of moving the runways, to the north or to the west, reducing the height of the chimney or moving the chimney may be possible.

LOx suggest the proximity of RAF Brize Norton would require joint management of the operations from the airbase and LOx as would the occasional use of Fairford by US forces.

LOx refer to a Prohibited Area around Harwell constraining some operations without suggesting this would be a particular restriction and suggest the LTMA (London Terminal Manoevring Area) should be extended to accommodate the new site. Prohibited Area P106 at Harwell prevents any flight within this area below 2500 ft. This would impact on any missed approaches, as aircraft could not re-circulate to the south of the airport below 2500 ft. LOx does not regard this as a significant constraint on airport operations. While we note that procedure design for a 4-runway airport would be complex, and that this constraint would add to that complexity, we accept the LOx view in principle.

LOx suggest there are no particular problems with regard to runway usability or birdstrike hazard, the latter view reinforced by a plan showing the location of major rivers, reservoirs, lakes and ponds within 8 miles of the proposed airport.

Noise

LOx report noise contours for 2040 with areas and populations affected as set out alongside four runway Cliffe 2030 equivalent numbers in Table 2.3. In 2040, LOx envisage four runways, 120 mppa and 719,000 ATMs including cargo ATMs.

Table 2.3: LOx and Cliffe Estimated Noise Impacts

Noise level	LOx 2040		Cliffe 2030	
Leq (dBA)	Area sq km	People '000	Area sq km[1]	People '000
>54	370	45	290	32
>57	209	22	173	14
>60	122	13	109	9
>63	74	6	71	5
>66	43	3	44	3
>69	26	>1	23	0.4
>72	15	0	13	<0.1

[1] The area shown is the total area, including the area of sea

The LOx estimated contour areas are larger than those estimated for Cliffe, particularly at the lower noise levels. The numbers affected by LOx are higher than those affected by Cliffe, but lower than those affected by comparable high-capacity options at Stansted (28,000 within 57 dB contour of four runway airport in 2030) or Gatwick (31,000 within 57 dB contour of three runway airport in 2030).

Other Impacts

The other principal impacts are summarised in Table 2.4.

Table 2.4: LOx Assessment of Principal Impacts

Impact	LOX Comment
Land take	33 sq km airport site including 230 ha of Development Zone and just over 600 ha of Wildlife Reserves, so 24 – 25 sq km of operational airport site. 188 residential properties taken 3093 ha of ALC Grade 3 –4 agricultural land taken
Heritage	23 Grade II Listed Buildings to be taken down and re-sited Just over 20 ha of East Hanney and Steventon Conservation Areas taken Encroachment into 182 ha of the Thames Valley and Buscot-Fyfield Ridge Area of High Landscape Value
Ecology	No impacts assessed as significant. No SSSIs or other areas given statutory protection are within the site The site area is drained by the River Ock and smaller watercourses which support a valuable riparian ecosystem. These habitats would be relocated and extended within the proposed Wildlife Reserves (bordering the airport site, principally to the north and east) and replacement floodplains
Water	Part of the site is designated as a Functional Floodplain by the Environment Agency. A replacement floodplain, on-airport temporary ponds and a holding pond would be provided Extensive and significant diversions of watercourses and short sections of culverting would be required Meeting the demand for water could be difficult – as at all proposed major South East airport options.
Air Quality	Less than 300 people exposed to excessive levels of NO_2 with four runway airport in 2030. These effects could probably be prevented
Safety Risk	No impacts within 1:100,000 risk contours
Regional Planning	Airport-related employment (direct on- and off-site and indirect) estimated at 27,000 in 2015 and 77,000 in 2030 Levels of urbanisation are in excess of the provision of Regional Planning Guidance. 41,000 new dwellings could be required by 2030, envisaged as settlement expansions to Swindon, Grove andDidcot and in the Development Zone to the south of the airport

3 Surface Access

3.1 Road Access Proposals

LOx propose that the airport be accessed principally via the M4 (Junction 13) and the M40 (Junction 8) and via the A34, A415 and A338.

On the M4, Junction 13 is proposed to be modified and the A34 (T), which runs along the east side of the airport site, is proposed to be widened to dual-four motorway standard between Junction 13 of the M4 and Abingdon, a distance of approximately 30 km.

Another section of D4 motorway is proposed from the A34 at Didcot to the M40 (Junction 8), a distance of some 20 km.

The A338 from Grove to the A420 (some 15 km) would be diverted around the west end of the airport site and upgraded to dual-carriageway standard. A new dual carriageway is proposed from the A419 at Swindon to the A34 (some 20 km) following the line of the Great Western Main Line.

The proposals therefore are for some 50 km of new dual four motorway and some 35 km of new or upgraded dual carriageway road, to give access to the airport along all principal road corridors. Some £1,130 million have been allowed for in the LOx proposals for new motorways, trunk roads and local roads.

3.2 Rail Access Proposals

The LOx rail access proposals are less specific than the road proposals. The Summary Report refers to:

- An 8 platform passenger station adjoining the passenger terminals – to the eastof the airport site
- A 2 platform cargo station
- Enhanced capacity to the Great Western Main Line
- Additional London terminal capacity – presumably at Paddington
- The extension of Crossrail to the airport
- An orbital shuttle service connecting the airport to Bletchley (West Coast Main Line), Bedord (Midland Main Line) and possibly Sandy (East Coast Main Line)

The Summary Report also suggests that LOx assume the SWARMMS proposals of a Didcot east grade-separated junction and new stations serving Grove and the proposed urban expansion at Swindon are in place.

No direct reference is made in the documents reviewed to any bus or coach services to the airport, but it is assumed that there will be facilities for both long-distance coaches and local bus services at the terminals.

For rail a spur is proposed from a grade separated junction with the Great Western Main Line at Steventon (91km from Paddington) to a terminus station within the airport terminal complex with 8*450m platforms. There would also be a west-facing connection to the Great Western, but no indication that this would be grade separated.

No direct reference is made in the documents reviewed to the rail services that will serve this station, but Figure 3 in the LOx Report Figures shows a "Projected strategic rail network". From this, it appears that LOx is expected to be served by:

- Intercity trains from South Wales (via Bristol Parkway), the South West (via Bristol Temple Meads), Birmingham and the north via Oxford, and London (Paddington) via Reading;
- Crossrail services via Paddington, extended from Reading to LOx;
- A potential "LOx Shuttle" between the airport and Sandy, with upgrading of lines currently only used by local passenger and freight between Oxford and Bedford, and re-instatement of the line between Bedford and Sandy – this service is targeted at interchange with the West Coast Main Line (WCML) at Bletchley, Midland Main Line at Bedford and East Coast Main Line (ECML) at Sandy; and
- A projected LOx-Heathrow service, using a new alignment (detailed in Figure 4 of the Report Figures) between the Great Western Main Line at Langley and the Heathrow rail system at T5.

A projected "Great Western-CTRL link" is also shown in Figure 3, but no details of this link, or of the services that would use it, are given elsewhere.

In the NAAM modelling of LOx, it is understood that the airport station was treated as being on the Great Western Main Line, allowing all 6 services per hour on that line to call (serving Weston, Bristol, Swansea, Cardiff, Newport, Bath, Cheltenham, Gloucester and Swindon to the west, Didcot, Oxford, Reading and Paddington to the east).

The 4tph Brentwood-Reading Crossrail service incorporated in some NAAM scenarios was extended to LOx, with a further 3tph between LOx and Heathrow. The LOx shuttle was modelled as a 3tph service, with matching 3tph WCML services calling at Bletchley and 3tph ECML services calling at Sandy.

No indication of expected journey times from main urban centres is given in the summary report, nor of the PT mode share these services are expected to capture.

3.3 Feasibility

Significant infrastructure enhancement will be required to allow the proposed rail services to operate. The summary report acknowledges this, and appears to assume that the full infrastructure enhancement to the Great Western Main Line recommended for the London to Bristol corridor by the London to South West and South Wales Multi-modal Study (SWARMMS) and Thames Valley Multi-modal Study (TVMMS) will have been implemented before the airport opens, together with Crossrail (as planned in 1994) and the outer-orbital rail route (Oxford-Bicester-Bedford-Sandy-Cambridge) considered by ORBIT.

With these schemes in place, the only rail infrastructure that would be required by LOx is the spur from the Great Western to the airport itself. However, many of these infrastructure schemes are unlikely to be implemented without additional funding for the railways, or have since been scaled down from the level envisaged by Pleiade. The Oxford-Cambridge line, in particular, is unlikely to be built (to the standard required for the LOx shuttle service) within the timescale required for LOx airport development.

It is also far from certain that Crossrail will now run as far as Reading, even if Line 1 is built, while a Western Connection to Heathrow T5 may only be justified with a third runway and 6th terminal at that airport, a scenario which may not be compatible with plans for a 4-runway LOx.

In addition to the probable lack of infrastructure for the new services envisaged for LOx, adding an airport station call to existing services that currently pass the airport site will also be problematic. Diversion to the airport station, where trains would need to reverse, would add around 10 minutes to, for example, the London-Bristol journey time in a corridor where the level of road-rail competition is such that the SRA have considered schemes to allow some expresses to omit a station call at Reading in order to shave 4-6 minutes from the inter-city time.

Some (or all) LOx services from Cardiff, Bristol and London may thus need to be additional trains, rather than diversion of existing services, adding to the number of trains to be accommodated on the network, particularly to the east of the airport. With 4 (headline) London expresses, 4 Crossrail, 3 LOx-Heathrow, 3 LOx shuttle and 2 direct services from Birmingham per hour, 16tph would be added to the 5km section between Foxhall Jn. (Didcot power station) and Steventon, 11tph between Foxhall Jn. and Reading Station, 7tph between Reading and the Heathrow Western Connection and 4tph between Langley and Paddington, with all sections considered to be at or close to capacity at peak periods without significant upgrades such as those put forward by SWARMMS and TVMMS. A mix of high-speed passenger and heavy freight traffic also means that there are looming capacity constraints between Didcot, Oxford and Banbury.

The easiest section to upgrade may be that immediately adjacent to the airport, where lengths of 3- and 4-track alignment still exist between Didcot and Challow (10km west of the airport) – SWARMMS recommended re-instating 4 tracks throughout between Didcot and Swindon. Specific mention is made in the summary report of grade separation at Didcot East Jn., but grade separation of Reading West Jn. may be of more use to LOx, removing conflict between London-Reading-Didcot express passenger traffic and Southampton-Birmingham freight.

It is noted that 8*450m platforms are proposed for the airport station. With a maximum trainlength of 200-235m (10*20m cars for Crossrail, up to 10*23.4m for Great Western and Cross Country inter-city services) for train likely to serve the station, this means that a London-LOx-Bristol service could reverse in a platform already occupied by a (terminating) LOx shuttle, Crossrail or Heathrow service. The planned station would thus have adequate capacity for any level of service that could be accommodated on the rail network in the vicinity of the airport.

3.4 Additional Infrastructure Requirements

The cost estimate accompanying the LOx summary report allows just £253m for rail links and £41m for additional rolling stock (no details of the nature of this rolling stock are given, it is assumed that it is for the LOx-Heathrow and LOx shuttle services).

As noted above, it is highly unlikely that the rail infrastructure upgrades and additions assumed by the summary report to already be in place (at Network Rail / SRA expense) will be justified or affordable without additional funding for the railways.

Re-appraisal of the rail services that LOx actually requires, the infrastructure needed to facilitate these services, and the contribution that the airport promoters would need to make to the wider network upgrade costs to ensure these works and services were prioritised by the railway industry would therefore appear to be needed, to ensure that they are in place in time for the opening of the airport.

Cost estimates by SWARMMS for a selection of the works which might be needed include:

Didcot-Swindon 4-tracking	£100m
Didcot-Oxford 4-tracking	£100m
Reading Station / Reading West Jn. re-modelling	£500m
Acton-Airport Jn. 6-tracking	£600m

These prices are in 2002 prices and could be subject to the same degree of cost escalation recently applied to rail infrastructure upgrade costs elsewhere to take account of safe working practices and compensation to TOCs for disruption to normal services while works are carried out.

In summary, from the material submitted, it is not clear how the airport could best be served by rail. The operational feasibility and implications of diverting existing services via the airport or of operating additional services have not been established. It is apparent, however, that the costs of new or enhanced infrastructure to accommodate required services are likely to exceed substantially the £253 million allowed for by LOx.

4 Forecasts and Economic Appraisal

4.1 Passenger Forecasts

Two sets of forecasts have been prepared for the LOx proposal. In both cases LOx was added to Maximum Use of the existing South East airports. The first set, summarised in Table 4.2, seeded LOx with the same service frequencies that have been assumed at Cliffe for the options that feature in the Consultation Document. That is, 40% of Heathrow's 1998 scheduled services, 23% of Gatwick's 1998 charter services and 11% of Stansted's 2000 low cost services. No seeding was applied in the second set of forecasts, summarised in Table 4.3.

The capacity assumed at LOx was the same in each case. It assumed, for modelling purposes that the first two runways come on stream in 2011, the third in 2021 and the fourth in 2024. The assumed capacities are set out in Table 4.1.

Table 4.1: LOx Capacities for Modelling Purposes

	Passenger capacity, mppa	Runway capacity, ATM, '000
2011	60	513
2021	90	635
2024	120	756

With seeding, forecast use of LOx reaches 58 mppa in 2015 and 118 mppa in 2030. The 2020 forecasts, prior to the introduction of the third runway and additional terminal capacity in 2021, are capacity-constrained as are the 2030 forecasts.

Seeding acts to increase the number of scheduled passengers allocated to LOx and, particularly the number of International to International interliners. Few domestic or low cost passengers are attracted.

Without seeding the number of scheduled passengers at LOx develops more slowly – to 17 mppa in 2015 and 55 mppa in 2030, as opposed to 28 mppa in 2015 and 69 mppa in 2030 with seeding. There are many fewer I to I interliners without seeding, but more charter passengers. Total passengers reach 88 mppa in 2030compared with the seeded total of 118 mppa.

Passengers per ATM (P/PATM) are slightly lower in the unseeded run increasing on average from 133 in 2015 to 143 in 2030, compared with 141 in 2015 to 157 in 2030 in the seeded run.

The passenger mix at LOx becomes increasingly business orientated as it fills up, with around 30% of passengers on scheduled services being business passengers in 2015 increasing to 45% by 2030.

Table 4.2: LOx Passenger Forecasts –seeded

	2000	2005	2010	2015	2020	2025	2030
Passengers, mppa							
Scheduled				28.1	34.7	55.4	68.9
I to I interlining				10.4	10.3	26.8	22.0
Charter				17.6	14.9	23.0	24.7
Domestic				0.6	0.7	0.9	1.0
Low cost				1.2	1.0	1.7	1.7
Total				57.9	**61.7**	107.7	**118.3**
ATMs, '000							
Scheduled				290	338	557	601
Charter				96	82	120	123
Domestic				14	13	14	14
Low cost				11	11	14	14
Total				411	**445**	704	**753**
Passengers/PATM							
Scheduled				131	133	147	151
Charter				184	181	192	200
Domestic				74	73	92	101
Low cost				100	92	123	119
Total				141	139	153	157

bold forecasts are capacity-constrained

Table 4.3: LOx Passenger Forecasts –unseeded

	2000	2005	2010	2015	2020	2025	2030
Passengers, mppa							
Scheduled				16.8	30.6	41.4	55.0
I to I interlining				1.2	1.6	2.5	3.7
Charter				19.3	23.4	25.5	28.9
Domestic				0	0	0	0
Low cost				0	0	0	0
Total				37.3	55.6	69.4	87.6
ATMs, '000							
Scheduled				177	297	375	470
Charter				104	123	131	142
Domestic				0	0	0	0
Low cost				0	0	0	0
Total				282	421	506	612
Passengers/PATM							
Scheduled				102	108	117	125
Charter				185	189	184	204
Domestic							
Low cost							
Total				133	132	137	143

bold forecasts are capacity-constrained

Figure 1 shows the demand for air travel by district, and the four quadrants of London (North West, North East, South West and South East) plus Central London represented by bars, and the percentage of this demand from each zone that is forecast to use LOx in 2030 represented by graduated shading.

The height of the bars for the London area show that it is the prime area from which airport demand originates. London Oxford's core catchment area is mainly to the North, West and South West of the airport, with the London airports forecast to maintain the core of the London and South East demand.

4.2 Economic Appraisal

The results of the economic appraisal of the LOx airport proposal are presented in Table 4.5 below for the unseeded run. They are based on a discount rate of 6% as used in the economic appraisal of the options that feature in the Consultation Document.

The reason the unseeded run has been taken forward to economic appraisal, and not the seeded run, is because it was felt that London Oxford's location is in close proximity to a sufficiently strong catchment so as not to require the stimulus of demand that seeding would give in the year of opening.

The cost of £2.2bn that the LOx proposal included for a Development Zone adjacent to the airport has not been included in the appraisal.

The present value of benefits is estimated at £11.5 billion and the present value of costs at £5.1 billion, giving net benefits of £6.4 billion and a benefit:cost ratio of 2.25:1.

Table 4.5: Economic Appraisal of LOx, Present Value, 6% discount rate, £m

	LOX
Benefits	
Generated users– UK	5,422
Generated users – Foreign	1,902
Existing users – UK	73
Existing users – foreign	-204
Freight users	233
Producers	3,465
Government revenue	570
Total Benefits	**11,462**
Costs	**5,097**
Net Benefits	**6,365**
Net benefits to UK users only	4,667
Benefit:cost ratio	2.25:1
NPV per mppa of additional capacity	53

Table 4.6 compares the headline results of the economic appraisal for LOx with those for the four runway Cliffe option at a 6% discount rate. For the sake of comparison both airports are unseeded. Total benefits at LOx are higher than at Cliffe due to its proximity to a greater passenger catchment.

Table 4.6: Comparison of LOx with Cliffe Economic Appraisal, Present Value, 6% discount rate, £billion

	LOx (unseeded)	Cliffe (unseeded)
Total Benefits	11.5	10.9
Costs	5.1	6.4
Net Benefits	6.4	4.5

With the assumptions specified in the Green Book published in January 2003, of a discount rate of 3.5% rather than 6%, a 44% increase to costs and a three year delay in the receipt of benefits to represent a delay in construction, benefits would increase to £28.1 billion, costs would increase to £11.3 billion, therefore net benefits to £16.8 billion, and the benefit:cost ratio to 2.48:1.

Table 4.7 presents the results for LOx in the context of other multi runway airport development packages in the South East with a 3.5% discount rate, 44% increase in costs and three year delay in benefits.

Table 4.7: Comparison of LOx with Other Multi Runway Packages of Development, Present Value, 3.5% Discount Rate, Cost Increase and Benefit Delay, £billion

Runway Development Package	Net Benefits
LOx (4 runways)	16.8
1 new runway at each of Heathrow, Gatwick & Stansted (P15)	23.8
2 new runways at Gatwick, 1 new runway at Stansted (P19)	28.2
1 new runway at Heathrow, 2 new runways at Gatwick (P18)	29.0

Demand for Air Travel By District

2030

54,000,000 (Central London)

% District Demand to Oxford Airport

>40%		(73)	
30	to 40%	(59)	
20	to 30%	(71)	(Number of districts in percentage band)
10	to 20%	(56)	
Up to 10%		(243)	

Notes:

Data is presented at district level except for the boroughs of London which are divided into a central area (City of Westminster, City of London, Kensington & Chelsea and Camden) and into four quadrants.

Each bar represents the total air travel demand from passengers whose ultimate origin or destination is within that particular district.

Demand consists of international scheduled, international low cost, charter domestic scheduled and domestic low cost.

Shading represents the percentage of a district's air travel demand that fly from Oxford Airport

Figure 1 - Demand For Air Travel By District At London Oxford Airport

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