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Gatwick Airport rail services and infrastructure development

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A series of research papers on a second Gatwick runway

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Introduction

A large airport is located at Gatwick in part because it lies on the main railway line connecting the County of Sussex to the south with London to the north. When flying began in 1936 a station (south of the present station) was opened to serve air travellers, and when Gatwick was selected as the location for London's second airport in 1952 it was envisaged that it would be provided with a new station on the site of the former racecourse station. This duly opened in 1958.

The Brighton Main Line was the core route of the London, Brighton & South Coast Railway, which was absorbed into the Southern Railway in 1923 and became part of the Southern Region of British Railways in 1948. The present pattern of off-peak services for Gatwick Airport comprises:

◗ ◗	**Eastbourne via Lewes + Littlehampton via Worthing <> London Victoria**
◗ ◗	**Southampton or Portsmouth + Bognor Regis via Horsham <> London Victoria**
◣ ◣ ◣ ◣	**Brighton <> London Victoria (Gatwick only) alternating with Airport <> London Victoria**
●	**Brighton <> London Victoria (5 stops)**
◗ ◗	**Brighton <> London Bridge**
◗ ◗	**Horsham <> London Bridge**
◗ ◗	**Brighton <> London St. Pancras <> Bedford**
◗ ◗	**Three Bridges <> London St.Pancras <> Bedford**
●	**Gatwick Airport <> Reading via Guildford**

◗ ◗ *half-hourly* ◣ ◣ ◣ ◣ *quarter-hourly, combined* ● *hourly*

This is a busy complex of routes that is intensified in the peak hours. Between 07:30 and 08:30 ten northbound trains call, three services start from Gatwick and nine pass through. North of Gatwick the route also carries a dense London suburban service. And operations are complicated by the fact that economical operation and efficient use of paths requires two of the services to run as two portions (except in the high peak), with the timekeeping hazard of joining and splitting trains.

The Airport station now has seven platforms following an extensive rebuilding completed in 2014. Platforms 4 and 7 serve the Up (northbound) and Down Fast Lines respectively, and 5 and 6 the Gatwick Express service (which runs every 15 minutes, alternating between the Brighton trains and the Gatwick <> Victoria trains). Platforms 1, 2 and 3 are on the Slow Lines and also accommodate the Reading trains. The purpose of the new platform 7 was to avoid the terminating Express services having to cross the layout to the Slow Lines in order to turn round.

Gatwick Airport is the 23rd busiest station on the national railway network. The number of people using it has grown from 7.5 million in 1997/98 to 17.5 million in 2014/15,[1] an increase by a factor of 2.3 and a mean annual increase of 5.1%. Since 2000 rail traffic has grown nearly three times faster than airport traffic, presumably as a combination of non-airport traffic attracted by the speed and frequency of the train service, growth in the number of people employed at the airport and more of them using rail, and capture of a larger market-share among air travellers.[2]

The Airport's Perspective

The operator of Gatwick Airport (a consortium led by Global Infrastructure Partners) adopts a bullish approach to its development and to its claim to be the best location for an additional runway in south-east England. A strong element in this is its surface-access strategy, in which rail plays a major role. It is undoubtedly true that its facilities are attractive in this respect and superior to those of many other airports. However it is necessary to approach its promotional documents with some caution.

To start with there is the manner in which sustainability is presented. The most recent Surface Access Strategy covers the period 2012 to 2030.[3] It states that "sustainability is a fundamental theme of aviation policy" but goes on to discuss this only in terms of the government policy to encourage reduction of the carbon footprint of airports

while not addressing air traffic itself. The Airport does not recognise the fallacy in that position, namely that continuing growth of air traffic is fundamentally incompatible with serious and essential policies to reduce total outputs of carbon: reducing land-side carbon outputs per passenger is a worthy objective but, short of an unforeseeable breakthrough in aircraft technology, is likely to be offset by a continuing rise in the number of people flying.

Not unconnected with this perception of the future is the glossy picture the brochure presents of travel in 2030. For an imaginary journey from Russia to the Lake District a 'foreign backpacker' is offered the concept that "rail companies know the exact number of arrivals at the airport and can adjust train schedules according to real-time demand" [p.10]. That is fantasy. On a very busy railway the multiplicity of requirements and the complexity of layouts mean that solutions take a long time and many resources to be determined, and once settled must be agreed for at least many months, if not longer, in order to optimise the use of staff, tracks, stations and rolling stock. In any case, regular travellers expect stability: to be told that their train home may be adjusted every evening to satisfy the needs of (mostly) holiday-makers is unlikely to be acceptable.

According to the Access Strategy document 35% of air passengers used the rail services in 2012. Not unreasonably therefore the Airport expects much of the rail industry: the problem is doing this compatibly with the non-airport business of the railway. A key example of the tension is the history of Gatwick Express. From its introduction it operated as a self-contained service, on the basis that to be attractive to air travellers it required superior rolling-stock, separate pricing, its own terminal at Victoria and a train always standing waiting at the Airport station.

However, as both types of traffic grew and capacity was increasingly at a premium, this arrangement became untenable, partly because the Expresses were significantly less well-loaded than commuter services and partly because occupying platforms at Gatwick to turn trains round is not ideal operating practice. At present the compromise is to use common train-sets and to run every other Gatwick Express as a fast Brighton train. While making their continuing case for a dedicated service the Airport does accept that it may not be feasible; a partial solution would be that a train-set awaits incoming air passengers and is then attached to a train arriving from Brighton.

The Airport's strategic priorities emphasise a call for "higher quality" Thameslink trains (which may not be appropriate for the generality of Thameslink services), "sufficient capacity for air passengers … in the peak hours" (which has its costs), "integrated smart ticketing" (which may not be easy to manage in a situation where premium fares apply for selected trains, especially since it also calls for removal of the ticket gates), and new routes to improve links with Kent, Surrey and the Thames Valley (which would raise considerable infrastructure issues). In regard to infrastructure development the Airport calls for "a substantial step change" in the station's facilities, the building of Crossrail 2 through Victoria, and mitigation of constraints at East Croydon and Victoria.

In one of its 'Gatwick obviously' documents[4] the Airport updated its forecasts and aspirations. With the start of the full Thameslink service in 2018 it looks forward to new through services connecting it with Cambridge and Peterborough, facilitated by "tube-style digital technology". However, experienced railway staff are noting the timetabling conundrum of planning for interactions between operations at Brighton and at places as far afield as Aberdeen (connected via the East Coast Main Line), together with the real-time challenge of running 24 trains/hour to and from disparate origins through the central tunnels between Blackfriars, Farringdon and King's Cross St. Pancras. By 2025 it hopes that "a package of improvements [will] increase capacity and performance". By 2030 there will be direct connections with Crossrail2 and HS2 (since neither is planned in a way that would permit through trains and the latter will involve awkward interchanges the basis of this claim is unclear). And by 2035 the Airport wants capacity for 40,000 passengers each way in the peak hour and 50 departures per hour.

Despite this enthusiasm (and perhaps being politic) a press release in January 2016 on the occasion of the extension of Oyster to Gatwick[5] claimed that "Network Rail has confirmed that with already committed and planned improvements there will be enough rail capacity for airport passengers – even with a second runway – because Gatwick will continue to contribute only a small percentage of passengers during peak hours". It also suggested that the improvements to the station which are planned to start in 2017 will allow it "to comfortably manage the projected growth in rail passengers, including meeting Gatwick's target of 50% of air passengers travelling to and from the airport by rail by 2040".

Quite apart from the presumption of dramatic growth, regardless of the carbon consequences, this confidence merits scrutiny from the railway perspective, which the next section addresses.

The Railway Perspective

As a first step in the process of preparing the Route Study for Sussex, Network Rail [NR] published a report for the Department for Transport entitled Brighton Main Line : Emerging Capacity Strategy for CP6[6] (CP6 is the Control Period that provides the framework for NR's planning and will run from 2019 to 2024). It was surprisingly blunt about the issues.

It pointed out

- the problems caused by "the uneven spacing of services … driven by the complexity of the origin and destination of services[7] plus the flat [ie. not grade-separated and thus the cause of conflicts] junctions and platform availability";
- the fact that "future signalling technology advances such as ERTMS [the European Railway Traffic Management System] are likely to provide marginal capacity benefits on plain line sections, but will not remove the key constraints of flat junctions and available fast line platforms";
- the fact that "the most heavily utilised flat junctions, platform faces and plain line sections are in the inner area of the route" and that while these sections and bottlenecks will be the main focus of CP6 they will "see increased usage … when the Thameslink programme is completed"; and
- that because the congestion is in the London area the idea of a second Brighton route (probably by reopening the Lewes … Uckfield line) is only relevant in the long term.

It did nonetheless note that much of the Brighton Main Line signalling is due for replacement and that this presents opportunities for enhancing the infrastructure and hence capacity.

The critical constraints are

- too few platforms on the Fast Lines at Gatwick, Redhill, East Croydon, Clapham Junction and London Victoria;
- a peak-period density of 17 or more trains/hour on the Fast Lines between Stoats Nest Junction (north of Redhill where the main and Quarry bypass lines converge) and Victoria;
- numerous flat junctions with regular conflicting movements (it is pointed out that the Southern Railway chose to concentrate the construction of flyovers for grade-separation on the South Western network); and
- a maximum capacity of no more than 20 trains/hour on the Fast Lines at Clapham Junction with the current signalling and platform-reoccupation rules – and acute difficulties in improving on this for reasons to do with the volume of passenger movements, the length of trains and safety requirements[8].

The outcome is a railway that is extremely difficult to operate reliably. It is effectively full. Moreover, because of the sheer number of trains and people in the system a relatively minor failure can quickly morph into a serious degradation of service[9].

Network Rail published the South East Route: Sussex Area Route Study in September 2015[10]. It develops the issues raised in the preparatory report into a series of recommended interventions for stakeholders and funders to consider for implementation in CP6. In order to cope with an expected increase in demand by between 38% and 53% over the 30 years from 2011 it identifies the following priorities (not entirely clearly) for the Brighton Main Line:

- remodelling of track at some or all of Gatwick Airport, Reigate and Redhill to improve operational flexibility;
- grade-separation by means of a flyover at Stoats Nest Junction;
- grade-separation at Windmill Bridge Junction (between the London Bridge and Victoria lines) and extra platforms at East Croydon, and possibly further grade-separation at Coulsdon or Selhurst;
- advanced signalling technology in the Clapham Junction area or some rebuilding (one senses that the planners are unsure about when or even whether such signalling can deliver the needed extra capacity, and it may be delayed to CP7); and
- track alterations at London Victoria to secure greater operational flexibility.

It is thought that these measures – at a cost of anywhere between £375 and £1,975 million, depending on the chosen package, but with modest benefit/cost ratios[11] – could yield six extra paths in the high-peak hour. This would be sufficient to cover the growth in demand expected by 2043. A number of schemes south of Gatwick are also reviewed, but it is stressed that they would afford little benefit in terms of paths without the projects between there and Victoria.

A surprising feature of the document is the limited attention it pays to the airport traffic. One of the Conditional Outputs [CO19] is specified as "To provide *adequate connectivity* for passengers travelling to and from Gatwick Airport". However the phrasing is much stronger for the five groups of London commuter services: "To provide *sufficient capacity* for passengers travelling into central London during peak hours, taking into account anticipated growth over the period to 2043" [CO1-CO5, our italics].

A section on airports [§3.5.5] merely notes that a government decision on expansion is awaited. As for Gatwick it emphasises that in the draft Thameslink timetable for 2018 Gatwick Airport will have 24 trains to London in the high-peak hour (10 to London Bridge, 14 to Victoria). It then states categorically that "This already exceptional level of connectivity leads the Route Study to conclude that on the Brighton Main Line there is no specific connectivity gap to/from London at Gatwick Airport. Gatwick Airport passengers travelling to London should not have issues boarding most trains at Gatwick Airport during the peak hours at end CP5. However without general interventions on the BML after CP5 [post-2019], passengers at Gatwick Airport, with or without expansion, are likely to experience some significant congestion and standing in the high-peak hour".

This implies that the airport traffic represents only a part of the overall demand, the totality of which requires the package of measures outlined above. It is also relaxed about the impact on demand of a second runway, but whether this is because research suggests it is unlikely to be a problem or whether Network Rail is simply waiting on the government decision is uncertain.

The section concludes with the scheme to increase the service on the North Downs Line from 1 to 2 trains/hour (which seems likely to materialise – including the possibility of extending it from Reading to Oxford) and with a brief reference to the possible connection with HS2 at Old Oak Common (which is not very helpful since Gatwick passengers would have to change at East Croydon as well as at Old Oak or at Farringdon[12]).

The Study returns to the subject later in a section entitled "Potential Gatwick Airport Expansion" [§6.2.2]. However this focusses on the scheme presently being prepared to expand the concourse of the station, improve 'vertical separation' and adjust the points of access to platforms in order to spread passengers more evenly so that dwell times are minimised. It concludes that "no other specific enabling works have been identified [as] required to meet airport passenger growth as opposed to the large set of works required anyway to meet wider BML growth. It should be noted however that, as demand would be slightly higher overall should a second runway option be taken forward, there would in turn be slightly higher high peak hour crowding". No detail is given to explain this somewhat surprising conclusion.

Finally, the Study reports [Chapter 4] on schemes put forward in the consultation. It is fairly dismissive. The Wealden Line Campaign proposal for 'Brighton Main Line 2' would not only involve extensive reopening and civil engineering but is flawed by not yielding any extra paths inwards from Lewisham. Its response to this criticism was to propose a tunnel from Lewisham via Canary Wharf and Stratford to Tottenham Hale and thence to Stansted Airport – which would seem to evade the point, as well as creating an exceptionally costly inter-airport link whose justification is difficult to fathom.

Another campaign envisaged double-decking the railway from Gatwick to Clapham Junction, a fantasy based on a vision of spiralling employment in London. Other proposals were for an extra track between Purley and East Croydon, a section which includes high embankments and deep cuttings that would make the engineering difficult and expensive. The conclusion is that the need for such projects lies beyond the time-horizon of 2043, and the only action that should be taken now is to safeguard the Lewes … Uckfield alignment.

The Long Term

There are several difficulties in discussing long-term developments. The first is that reports from consultants tend to be so technical as to be virtually impenetrable for ordinary concerned citizens and to be complex even for those with some knowledge of the methodologies. Next is a credibility gap: is it really likely that what are already mass experiences of commuting will simply get even more massive without some reaction against them? And third, is it sensible to forecast very high rates of growth in flying from Heathrow or Gatwick when a fragile global economy, threats to security and stability and above all the likelihood of a rapidly-worsening climate with innumerable disruptive consequences should be putting all manner of question marks against gross optimism?

The argument about far-horizon impacts on the rail network is therefore problematic. The study that modelled surface access for the Airports Commission[13] concluded that "even with the Second Runway in place, there are no significant crowding issues on National Rail services to and from the airport in the AM peak" [¶4.6.13]. On the most crowded route, namely Thameslink into London Bridge, standing would be at an acceptable level while there would be none on Victoria services, assuming the completion of the schemes proposed by Network Rail for CP6.

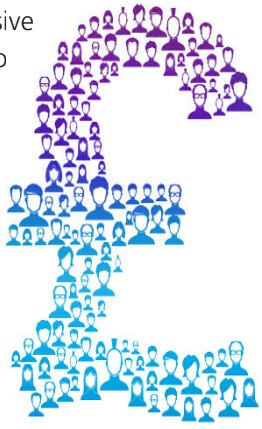
The Commission accepted this analysis:[14] "the challenges are primarily driven by background demand growth which the government will need to tackle whether expansion takes place or not." [p.25]. It also noted that at Gatwick "the enhanced rail offering is expected to enable a significant shift in the airport's public transport mode share by 2030, shifting it from 44% today to around 54%, which would be similar to the levels achieved today by leading comparable European airports" [¶8.26].

This conclusion has however been challenged by critics of the expansion of Gatwick. The calculations were based on a total number accessing and egressing rising from 42.1 to 53.2 million/year, although that incorporated an unlikely increase in interlining from 3.7% to 26.2%, ie. a quarter of air passengers never leaving the airport.[15] What the Airports Commission did not do was to consider the consequences of the airport continuing to grow to its target of 95 million, about 2.5 times its current throughput, with a lower proportion inter-lining.[16]

The study also took inadequate account of the growth in travel associated with the increased number of airport jobs and the general increase in employment in the area that airport expansion is expected to stimulate; it is however fair to say that this is the lesser problem for rail since most of the trips concerned would be by road and relatively few would be joining the principal London-bound services in the morning peak.

As it stands the forecast represents an extra 3,800 passengers [¶4.5.4] to/from Gatwick Airport station in the morning peak by 2030. Since some of those will be alighting from northbound trains, some joining southbound trains and some using the Reading service it is possible to see why the study concluded that there would be only a containable impact (perhaps of the order of 30-40 extra passengers per London train) – and why Network Rail has little to say on the subject.

The key point is therefore what happens if the airport really does expand up to its so-called maximum capacity of 95 million. In that event there plainly would be a serious problem, which explains the proposition that it would be necessary to construct a 22-km tunnel from the Purley area to central London or to double-deck the railway. These were mentioned in the consultation document in November 2014,[17] but not in the report published by the Airports Commission in May 2015[18] nor by the Commission in its final report. As noted above, double-decking is technically a virtual impossibility for engineering and gauge reasons and/or inconceivably costly. The tunnel would also be hugely expensive – at least £1.5 billion[19] – and would require in addition either extensive expansion of an existing surface terminal or a problematic underground terminal or to be part of a vast project for 'Crossrail 3'.



A scheme on this scale is only likely to receive any justification from an increase in non-airport journeys in the event of a quite improbable growth in employment in central London. It must therefore be conceived as primarily driven by airport requirements. And there's the rub. If these did materialise the cost could hardly be justified as legitimate expenditure from the public purse and would thus fall, via the airport company, on air passengers – which, if statements from the principal airlines are accurate, they would not be able or willing to bear.[20]

This paradox of expanding demand running up against escalating infrastructure costs is not exclusive to Gatwick Airport – it is appearing all over the railway network – but it is particularly pointed here because it casts considerable doubt on the stance taken by the Airport company regarding the true cost of expansion. As Sir John Stanley, the then Member of Parliament for Tonbridge and Malling, put it in 2014 "On the grounds that Gatwick Airport Ltd has totally failed to be transparent about its financial evaluation, and has concealed the public expenditure implications of the infrastructure needed for a second runway, its proposal should be rejected by the Airports Commission". [21] And when Robert Goodwill, the Minister with responsibility for aviation, stated that "the Government has been clear that it expects the scheme promoter to meet the costs of any surface access proposals that are required as a direct result of airport expansion and from which they will directly benefit",[22] it is not obvious that he was aware of the situation that could arise in the longer term.

Conclusion

It is probably the case that steady growth in airport-associated demand for rail services at Gatwick Airport will add to but not be a primary factor in the necessity of some substantial expansion of capacity on the Brighton Main Line in the next decade – that is, after the major overhaul of services when Thameslink is fully open in 2018 during the years 2019 to 2024 and possibly beyond to 2029 (CPs 6 and 7). After that it is almost impossible to forecast with any confidence. However, if (and it is a large 'if') commuting to London were to continue to grow AND the number of air travellers was greatly stimulated by the offer of flights made possible by the building of a second runway (in the absence of carbon-related constraints), then conventional rail capacity would be likely to be exhausted by 2040 and possibly sooner.

Yet the engineering cost of relief would then be so high that it would be impossible for the state or for (mostly leisure) travellers to bear. Demand would then have to be managed by significantly raising air fares, and perhaps rail fares as well if non-airport demand were still increasing. Some might say that that should happen sooner, since the many subsidies hidden in the 'predict and provide' model are difficult to justify in economic and social terms even now.

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Jonathan Tyler has a first-class degree in History from the University of Cambridge. He has worked in the railway industry for over fifty years, as Traffic Apprentice, operations manager, developer of the first passenger demand model (the precursor of MOIRA), British Rail-sponsored University Lecturer and latterly as an independent consultant trading as Passenger Transport Networks. Since 1999 he has specialised in strategic approaches to timetabling, reflecting Swiss practice and using Swiss software. This has included work for Network Rail, Train Operating Companies, HS1 Ltd and two franchise bids and involvement in industry debates. As a survivor from the British Rail era (though lacking rose-tinted spectacles) he supports solutions to the railway's problems based on unitary organisations acting in the public interest and developing the best available data and methodologies.

Press cuttings

http://www.theguardian.com/uk-news/2016/may/05/cheaper-heathrow-expansion-plan-willie-walsh-third-runway

http://www.standard.co.uk/news/politics/sadiq-khans-election-will-not-sway-decision-on-heathrow-a3243291.html

http://www.telegraph.co.uk/business/2016/05/09/sadiq-khans-victory-gives-heathrow-a-surprise-boost

References

[1] Office of Rail and Road. Station usage 2014-15 time series. *http://orr.gov.uk/statistics/published-stats/station-usage-estimates.*

[2] *https://www.gatwickairport.com/globalassets/publicationfiles/business_and_community/all_public_publications/2012/lgw_asas_2012_web.pdf.* Chart at page 37.

[3] Op.cit.

[4] Gatwick's Rail Transformation: *http://www.gatwickairport.com/globalassets/publicationfiles/business_and_community/all_public_publications/2016/gatwick-rail-revolution.pdf.*

[5] *http://www.mediacentre.gatwickairport.com/press-releases/2016/gatwick-rail-transformation-continues-as-airport-joins-oyster-and-contactless-network.aspx*.

[6] *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/306997/brighton-main-line-interim-report.pdf.*

[7] Transport for London has proposed a simplification of the suburban network to reduce the number of terminal permutations but increase frequencies on the continuing services. Withdrawn through trains would be replaced by efficient interchanges at key hubs. This is akin to the Underground model and could bring considerable benefits both for passengers and for more reliable utilisation of capacity. Network Rail sees it as a CP7 project. *See reference at endnote 10, §6.4.2.*

[8] In the light of ongoing enthusiasm for the capacity increases that the 'Digital Railway' might deliver this footnote is rather revealing: "Depending on its application ERTMS is likely to reduce slightly the actual technical headways on plain line sections. It is not yet clear whether this will be sufficient to reduce planned headways to the extent necessary to release additional through train paths on this particular route. Initial assessment of key sections suggests possibly not, but this conclusion needs to remain under review". *See endnote 6, p.13.*

[9] The Airport Commission noted in a consultation document in November 2014 that "South of East Croydon, disruptive incidents (for example power supply failures, signalling failures and suicides) can lead to total suspension of services between London and the airport. In the last three years an all lines closure on the line occurred 22 times (*an average of seven or eight times a year).* Network Rail typically aims to alleviate such closures within 90 minutes". However, new equipment and technical innovations in monitoring hold the prospect of failures becoming less frequent, while measures are being taken to reduce the number of suicides.

[10] *https://www.networkrail.co.uk/long-term-planning-process/south-east-route-sussex-area-route-study/.*

[11] See Appendix A: Economic Appraisals.

[12] The possibility of running peak-hour trains from further south to the West London Line is dismissed [§6.6.1], and it is pointed out that Old Oak will also be reachable via Thameslink and the Elizabeth Line at Farringdon.

[13] *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/437279/surface-access-dynamic-modelling-report-gatwick-airport-second-runway.pdf.*

[14] Airports Commission Final report [July 2015]. *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/440316/airports-commission-final-report.pdf*

[15] This presumably makes various – and possibly challengeable – assumptions about both passenger and airline behaviour in the event of a second runway becoming available at Gatwick.

[16] See the reference at endnote 13, ¶2.2.1 and Table2.2. The document did make a passing reference to the issue [at ¶8.24], but only in a comparison with Heathrow: *"Gatwick's advantage in terms of capacity is expected to diminish relatively quickly after 2030 as background and airport demand are both forecast to continue to grow strongly past that point".*

[17] *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/371822/4-surface-access—lgw-2r.pdf.*

[18] See endnote 13.

[19] HS2 Ltd have published a study of tunnelling costs. For a relatively simple twin-bore tunnel in a rural area the estimate is £70 million/km [70 x 22 = £1540 million]. See *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/434516/HS2_Guide_to_Tunnelling_Costs.pdf.*

[20] The Chief Executive of easyJet was reported to have said in 2014 that "We make £8 profit per seat and our average price is just £60. If Gatwick's charges doubled to an average of £15 to £18 as predicted by an independent commission examining the case for expansion, that is quite worrying in terms of our economic case" *[Financial Times, 18 November 2014].*

[21] House of Commons, 18 December 2014. See http://www.theyworkforyou.com/debates/?id=2014-12-18a.1621.0. Sir John pointed out that the Airport Commission appeared to accept the case for government funding of surface access, quoting from *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/374662/evidence-base-gatwick-airport-second-runway.pdf, ¶3.36.*

[22] Hansard, 14 October 2015.

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