



**Review of the economic
impact analysis of the
expansion of London City
Airport**



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Review of the economic impact analysis of the expansion of London City Airport

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Summary

London City Airport has recently published a Draft Master Plan in which it puts forward a way to accommodate 11 million passengers by 2035. The Draft Master Plan proposes to lift the annual cap from 111,000 to 151,000 flights; to lift the weekend break; and to allow more flights early in the morning and late in the evening. The socio-economic impacts of this proposed Draft Master Plan have been presented in a Socio-Economic Assessment Report. It estimates that the economic impact of the Draft Master Plan on the UK economy would be £ 586 million in 2035.

This report conducts a methodological review of the Draft Master Plan on the basis of the official UK transport analysis guidance. It also reviews of results and recalculates the estimated economic impact based on the results of the methodological review and the review of results.

Methodological review

The methodology of the Socio-Economic Assessment Report has been compared with the UK's best practices for transport analysis (WebTAG). This analysis revealed that the Socio-Economic Assessment Report follows the WebTAG guidance relatively well. However, there are five occasions where there appears to be a disparity between WebTAG best practices and the methodology used in the Socio-Economic Assessment Report. These are:

1. The analysis conducted does not involve a social cost-benefit analysis.
2. The environmental impacts of the Draft Master Plan are not quantified or monetised.
3. There are additional effects taken into account that are not mentioned in WebTAG.
4. There is possible double counting of effects as certain impacts are merely shifts between regions, even though they are presented as impacts on the UK economy as a whole.
5. The costs and benefits of the Draft Master Plan are not identified and reported separately for UK and non-UK passengers.

The fact that the environmental impacts are not quantified or monetised is particularly significant. Although there are other reports dedicated to air quality, noise levels and greenhouse gases, the *causal* effect of the Draft Master Plan on air quality, noise and greenhouse gas emissions is not presented anywhere. The impact of the Draft Master Plan on all three is likely to be negative because of the increase in aircraft movements, and hence they have a negative effect on the UK economy.

The issue of local versus national effects is also quite significant. Certain effects may be additional at the local level, but may not be additional at the national level. For example, employment that is generated by a project will often result in a reduction in employment elsewhere. The report acknowledges that current UK Government appraisal guidelines (WebTAG) assume no net additionality of jobs at the national level but adds all the impacts together in the executive summary anyway.

In diverging from WebTAG guidelines, and as a result of the aforementioned five points, it is probable that the Socio-Economic Assessment Report likely overestimates the economic impact.



Review of results

Each item monetised in the Socio-Economic Assessment Report has been reviewed, leading to the following conclusions.

Firstly, the scope of the analysis of the different impact is not internally consistent. In some cases impacts are calculated for the local level, whereas other impacts are calculated for the national level. However, in the summary of the Socio-Economic Assessment Report and in the Draft Master Plan, components of the total estimated economic impact are added together, whilst they are not additional at the national level.

Secondly, the Assessment assumes that each person newly employed at LCY did not have an income before, so it counts their total Value Added as an impact. In fact, many or all-new employees will have had an income before taking on a job at LCY. Therefore, the Assessment should only take into account the *change* in income (and therefore change in GVA).

Thirdly, the Socio-Economic Assessment Report assumes there are trade impacts from the airport expansion plan. However, there is no proof of a causal relation between growth in aviation and economic development. Also, the Socio-Economic Assessment Report acknowledges that it is unlikely that the Draft Master Plan will lead to a net increase in business passengers at the national level. Therefore, even if one were to include the trade impacts in the estimated economic impact of the Draft Master Plan, the effect should be zero.

Lastly, the Assessment finds significant positive impacts from journey time saving and the associated effects on productivity and economic growth. However, the way these are calculated is not clear and it appears that relatively high values of time have been used to arrive at the results.

Recalculation of economic impact

Based on the reviews of the methodology and the results, the estimated economic impact of the Draft Master Plan on the UK economy have been recalculated (see Table 1). Instead of a positive impact of £ 586 million in 2035, this report finds that the impacts cannot be larger than £ 353 million ± PM (some positive and negative impacts could not be quantified)¹.

Table 1 - Estimated economic impact of the Draft Master Plan on the UK economy

Impact (£ million, 2019 prices)	Annual benefit in 2035 (central scenario), undiscounted According to (ARUP, 2019)	Recalculated annual benefit in 2035 (central scenario), undiscounted According to CE Delft
User benefits - Journey time savings	58	Possibly smaller than 58
User benefits - Surface access benefits	10	10
Total user benefits	68	Possibly smaller than 68
GVA from direct employment	105	+ PM (not additional at national level)
GVA from indirect employment	28	+ PM (not additional at national level)
GVA from induced employment	28	+ PM (not additional at national level)

¹ PM (Pro Memori) costs or benefits are effects that could not be estimated with enough confidence, but that could exist. They are usually of a smaller magnitude compared to the monetised effect.



Impact (£ million, 2019 prices)	Annual benefit in 2035 (central scenario), undiscounted According to (ARUP, 2019)	Recalculated annual benefit in 2035 (central scenario), undiscounted According to CE Delft
Total local impacts	160	+ PM (not additional at national level)
Trade impacts (high)	73	0 according to WebTAG
Productivity and economic growth	190	190
Move to more productive jobs	95	95
Total wider economic impacts	358	285
Air pollution	0	- PM
Noise	0	- PM
Climate	0	- PM
Total environmental impacts	0	- PM
Total	586	353 ± PM

1 Introduction

1.1 Background

London City Airport (LCY) is one of London's six major airports and is situated in the London Docklands. Compared to the other five airports LCY is relatively small and is traditionally known for being a business airport due to its geographical proximity to Canary Wharf, the City and to other destinations in East-London. In 2018, LCY had 4.8 million passengers, of which 50% travelled for business purposes and 50% travelled for leisure purposes (London City Airport, 2019). The airport currently serves 45 destinations in the UK, Europe and beyond (London City Airport, 2019).

Due to the airport's proximity to residential areas it also affects a relatively large number of people. In order to limit the noise hindrance experienced from aviation, a suite of measures has been taken. These include relatively steep flightpaths, a cap on the number of flights per year, a ban on night flights and a weekend break from 12:30 on Saturday until 12:30 on Sunday during which no flights arrive or depart.

Currently, LCY is implementing the City Airport Development Programme (CADP), which aims to transform the airport by delivering new infrastructure and passenger facilities. The CADP will extend the terminal buildings, deliver additional aircraft parking stands for quieter, cleaner, new generation aircraft and provide a parallel taxiway to make better use of the single runway (London City Airport, 2019).

LCY's current planning permission allows up to 6.5 million passengers and 111,000 air traffic movements. These limits are expected to be reached in 2022. If these limits remain unchanged, the airport would not be able to accommodate the demand it projects from both business and leisure passengers (London City Airport, 2019).

Therefore, LCY's management has recently published a Draft Master Plan outlining proposals until 2035, which includes, amongst others:

- a proposal to lift the annual cap from 111,000 to 151,000 flights to accommodate 11 million passengers;
- a proposal to abolish the weekend break; and
- a proposal to allow more flights early in the morning and late in the evening.

The management has also published several documents supporting the Draft Master Plan, including a Socio-Economic Assessment Report (ARUP, 2019) that claims that the expansion of the airport would result in a creation of 2,500 new jobs (FTE), of which almost 2,000 would be local, as well as an impulse to the local economy resulting in £ 210 million of gross value added.² Furthermore, journey time savings and surface access benefits will amount to £ 68 million in user benefits. An additional £ 358 million is expected in wider economic benefits. In total, the proposed growth of LCY is projected to generate £ 586 million additional to the UK economy as a whole.

² Compared to today, the local employment benefits amount to £ 210 million. If a scenario in 2035 with growth and without growth is compared the benefit is £ 160 million.



HACAN East, a campaign group made up of concerned residents from east and southeast London, is concerned that these developments will result in an increase in noise hindrance. It has asked CE Delft to review the economic arguments for the expansion.

1.2 Objective & outline

The objective of the study is to review the results mentioned and methodology used in the Socio-Economic Assessment Report. Will the Draft Master Plan lead to the economic benefits mentioned in the paragraph above?

To do be able to answer that question, we carry out both a methodological review as well as a review of the results. In Chapter 2 we first compare the Socio-Economic Assessment Report to current UK best practices for transport analysis (WebTAG) recommended by the UK Department for Transport (DfT). We then review the results of the Socio-Economic Assessment Report in light of economic science and available statistical data in Chapter 3. Based on the findings of Chapter 2 and Chapter 3 we recalculate the economic impact of the Draft Master plan in Chapter 4. Chapter 5 presents the conclusions.

2 Methodological review

This chapter compares the Draft Master Plan and the Socio-Economic Assessment Report with the transport analysis guidelines as set out by WebTAG. In this chapter, we focus on a methodological comparison: what steps should be carried out in the analysis according to WebTAG, and are these steps actually carried out in the Socio-Economic Assessment Report? We will not delve into concrete results yet. This will be addressed in Chapter 3.

2.1 WebTAG

2.1.1 What is WebTAG?

WebTAG is the UK DfT's multimodal guidance on appraising transport projects and proposals. For projects that require UK government approval, it is expected that the WebTAG guidance is used in a manner appropriate for that project or study. For other projects that do not require government approval WebTAG should be considered a best practice guide.

Within WebTAG, there is a specific TAG unit dedicated to aviation appraisal (Tag Unit A5.2) detailing how general webtag guidance should be used in the aviation context (Department for Transport, 2018a). However, the Airports Commission has published a series of documents that have further adapted WebTAG's guidance to the context of aviation. The Socio-Economic Assessment Report appears to have used two of those documents from the Airports Commission, in particular the report on *Transport Economic Efficiency Impacts* and *Wider Economic Impacts Assessment* (Airports Commission, 2015a; 2015b). These two documents from the Airports Commission predate the latest version of TAG Unit A5.2 dedicated to Aviation Appraisal (2015 as opposed to 2018).

It is important to keep in mind that there are slight differences between WebTAG and the documents published by the Airports Commission. However, in this chapter we specifically focus on the comparison of the Socio-Economic Assessment Report with the WebTAG guidelines, as this is considered the UK's best practices for transport analysis.

2.1.2 CE Delft's view on WebTAG

CE Delft has previously compared the UK's WebTAG guidelines to two other guidelines for cost-benefit analysis that are frequently used abroad for aviation investment projects (CE Delft, 2013). Although each of these guidelines have been updated since this study, a number of the conclusions drawn then are still relevant. CE Delft concluded that WebTAG is an adequate guideline to analyse costs and benefits of aviation investment projects. It compares well with other CBA tools in some aspects, but could still be improved further, for instance by including:

- impacts on other markets, such as the costs and benefits to businesses in the supply chain (backward linkages);
- impacts on other transport modalities (effect on rail and road transport);
- strategic effects (locational advantages); impacts on regional inequality.

2.2 Comparison of report to WebTAG

We have carried out a global analysis of WebTAG and compared it to the Socio-Economic Assessment Report. In general the report follows the WebTAG guidance well, for instance in:

- a the calculation of tax revenue impacts as a result of the redistribution of employment; and
- b measuring output change in imperfectly competitive markets.

However, there are five occasions where there appears to be a disparity between WebTAG best practices and the methodology used in the Socio-Economic Assessment Report.

1. Lack of a social cost-benefit analysis.
2. Environmental impacts not quantified or monetised.
3. Additional effects taken into account.
4. Possible double counting of effects.
5. Treatment of UK and non-UK passengers.

Each of these will be described below.

2.2.1 Lack of a social cost-benefit analysis

One of the main pillars of WebTAG is the social cost-benefit analysis (TAG Unit A1.1). WebTAG mentions: “Costs are as crucial to the assessment and appraisal process as benefits” (Department for Transport, 2018b). A social cost-benefit analysis is a useful tool to structure and weigh the different impacts of project and express them in a common denominator (money). A social cost-benefit analysis takes the costs and benefits to society as a whole into account. This does not only include the implementation, operating, maintenance and enforcement costs of the planned investment, but also refers to monetising several environmental impacts (e.g. air quality, noise and greenhouse gas emissions).

The Socio-Economic Assessment Report mentions benefits (e.g. in terms of FTE jobs, added value of the project etc.), however, no costs are mentioned at all. There is no indication of the size of the planned investment to facilitate the Draft Master Plan, nor are other costs monetised. Without a social cost-benefit analysis it is impossible to evaluate whether the planned expansion project increases welfare or not.

2.2.2 Environmental impacts not quantified or monetised

Building on the point mentioned above, many transport investment projects require the monetisation of numerous impacts that are not readily available in a financial unit. Focusing specifically on airport expansion plans, classic examples are environmental impacts such as noise nuisance, air pollution and greenhouse gas emissions. There are seven background reports accompanying the Draft Master Plan³, of which three discuss local air quality, noise levels and greenhouse gas emissions, respectively. However, the reports on air quality and noise do not identify the *causal effect* of the airport expansion plan on local air quality and noise levels. The report on carbon and greenhouse gas emissions identifies the effect of the City Airport Development Plan (CADP - which is already in place and concerns the period up

³ The Socio-Economic Assessment Report is one of the background reports published with the Draft Master Plan. Six other reports were also published, on air quality, demand forecasts, noise, surface access, carbon and greenhouse gas emissions and an environmental appraisal of other environmental issues.



to 2025), rather than the Draft Master Plan, and furthermore only takes into account the LTO CO₂ emission and does not take into account non-CO₂ greenhouse gas emissions from aviation⁴.

Although it is beyond the scope of this study to delve into the results of those other reports in detail, there are a few things that stand out in terms of the magnitude of the expected effects. For instance:

- The report on air quality argues that growth to 151,000 air traffic movements by 2035 is predicted to *coincide* with lower concentrations of NO₂, PM₁₀ and PM_{2.5}, and that pollutant concentrations would therefore remain below the UK's air quality objectives (ARUP, 2019). However, the *causal* effect of the Draft Master Plan on local air quality is not actually identified in any of the reports. The report argues that 'the decrease in concentrations is due to the predicted decrease in road traffic emissions due to tighter emissions regulations and in background concentrations'. The Draft Master Plan itself therefore does not *cause* lower air pollution levels. It doesn't lead to a reduction in pollutants. Rather, the growth in pollutant emissions from aviation will merely take up the emission space freed up by cleaner road transport. In absence of the Draft Master Plan, air pollution levels would be lowered further than the levels reported in (ARUP, 2019). This is particularly relevant as Newham is known to have one of the highest mortality rates from air pollution in the UK (Newham Recorder, 2019). NO₂ pollution levels in some areas in Newham currently exceed air quality objectives (London Borough of Newham, 2019). Furthermore, even if national air quality objectives are met, the World Health Organisation (WHO) guidelines on ambient air pollution are much stricter (WHO, 2018). Achieving the WHO guideline values would significantly reduce the burden of disease from stroke, heart disease, lung cancer and both chronic and acute respiratory diseases. Therefore, air quality is still a concern, even if the national guidelines are met.
- The report on noise claims the 'increase in the number of movements up to 2035 will not have a significant impact on the local community due to the increase in the proportion of movements by quieter new generation aircraft' (Bickerdike Allen Partners, 2019). However, it is only fair to make this claim if airlines invest in newer, quieter aircraft *as a result of* the Draft Master Plan. Otherwise, the Draft Master Plan is merely profiting from an autonomous trend towards quieter aircraft and the reduction of noise would have been larger in the reference scenario, i.e. without the master plan.
- The technical note on carbon and greenhouse gas emissions is brief and focuses on City Airport Development Plan (CADP, already in place, concerns the period up to 2025), not on the Draft Master Plan (not yet in place, concerns the period up to 2035). Most importantly, the note only focuses only LTO emissions of aircraft arriving or departing from LCY airport, and fails to also take into account the cruise emissions of flights arriving or departing LCY airport. LTO emissions are mainly relevant for local air quality (see above) but most greenhouse gas emissions are generated at cruise. Globally only 13% of fuel burned for aviation is used in the LTO phase (FAST 2015). Hence, a significant part of the CO₂ emissions are missing and thus large part of the environmental impact of the flights is neglected. However, it is important to note that it is currently uncommon for airports to take into account the emissions from the cruise stage of flights arriving and departing. It would be a good development if airports started taking into account cruise emissions, as these have recently shown to be significant for local air quality and nitrogen deposition.⁵ However, one should take care

⁴ Studies have shown that 50-60% of aviation's total climate impact is caused by non-CO₂ effects (Lee, 2018).

⁵ A study in The Netherlands showed that the total contribution of aviation to nitrogen deposition (including the contribution of cruise emissions) is two to four times as high as the contribution of LTO emissions only



not to double count the cruise emissions. If all airports in the world were to take into account the cruise emissions of arriving and departing flights, the cruise emissions would be overestimated by a factor of 2 (as each flight that departs an airport arrives at another one). Secondly, the note expresses the environmental impact of the airport mainly in terms of the GHG emissions per passenger, rather than the absolute total. As the City Airport Development Plan leads to increases in passenger numbers, the greenhouse gas emissions per passenger decrease in the future. However, the total greenhouse gas emissions of the airport increase from 70,630 tonne CO₂ equivalents⁶ in 2014, to 92,665 tonne CO₂ equivalents in 2025 (without the CADP) or 113,841 tonne CO₂ equivalents in 2025 (with the CADP), even when ignoring cruise emissions. This is because although technological developments in aircraft in terms of efficiency improvements are still predicted for the future (aircraft fuel burn per seat has been falling by roughly 1% per year (ICCT, 2015) the demand for aviation is growing by much more (according to ICAO the demand for air transport will increase by an average of 4.3% per year (ICAO, sd). One can hence imagine that with further expansion beyond the City Airport Development Plan, as intended in the Draft Master Plan, the greenhouse gas emissions from the airport would increase even further.

Accurately measuring the impact of the Draft Master Plan on environmental indicators such as air quality, noise and greenhouse gas emissions is key to presenting a fair overview of the different impacts associated. The causal effect of the Draft Master plan on air pollution, noise levels and greenhouse gas emissions should therefore be monetised.

2.2.3 Additional effects taken into account

The Socio-Economic Assessment Report overestimates the benefits of the Draft Master Plan by also including some additional effects that are not mentioned in WebTAG.

The Airports Commission documents acknowledge the WebTAG reports and aim to adapt the WebTAG reports (further) to the aviation context. However, there is one instance where the viewpoints of the Airports Commission and WebTAG do not match. The Airports Commission also considers increased international trade an effect of airport expansion plans, whereas WebTAG does not. The Socio-Economic Assessment Report diverges from the WebTAG guidelines in this instance, and follows the Airports Commission's recommendation to also include the effects on international trade.

The reasoning the Airport Commission provides for including the effects on international trade is that expanding an airport provides increased connectivity, better access to foreign markets and hence facilitates trade between the country in question and the rest of the world. However, the scientific literature on this effect is not robust. The question remains if more aviation leads to economic growth, or does economic growth lead to more aviation.

It is widely acknowledged that there is a *correlation* between economic development and aviation but *causality* (does more aviation *cause* economic growth) has not been universally proven (Tretheway, 2010; CE Delft, 2013; CE Delft & SEO, 2019). To our knowledge, only

(Adviescollege Stikstofproblematiek, 2020, Advies luchtvaartsector, Soest: Adviescollege Stikstofproblematiek). It is likely that the contribution of aviation to the concentration of NO_x is also 2 to 4 times higher if cruise emissions are taken into account.

⁶ Aircraft emit a number of other emissions, besides CO₂, that also contribute to global warming. The term CO₂ equivalents is used to quantify the amount of CO₂ that would have the same global warming potential as the other emissions, when measured over a specified timescale (typically 100 years).

one study reports causality between aviation and economic growth.⁷ The study, by Ramboll & Oxford economics claims a 10% increase in business connectivity leads to an increase of 0.5% in total factor productivity (Ramboll & Oxford Economics, 2017). However, this effect is only valid for business connectivity, which implies the destinations served by the airport are crucial to achieving potential economic growth. No causal effect was found for leisure passengers.

By including the (potential) effect of the Draft Master Plan on international trade the Socio-Economic Assessment Report deviates from WebTAG and includes an effect that is not scientifically proven. Furthermore, the draft master plan does not project a net increase in business passengers, therefore, even if there was widespread scientific agreement around the causality of aviation and economic growth, it would not apply to this context.

2.2.4 Possible double counting of effects

The Draft Master Plan possibly double counts certain effects. According to the report's executive summary the total impact of the Draft Master Plan will be £ 586 million, although it acknowledges in a footnote in the main text that 'it is possible that adding all the benefits may lead to double counting'. The report does not provide an estimate of the size of the double-counting or mention which of the effects should be excluded to correct for this.

There is one main reason why adding all the impacts together results in double counting: certain impacts are calculated locally⁸, whereas others are calculated for the UK as a whole. Certain effects may be additional at the local level, but may not be additional at the national level. Therefore, these two different scopes result in possible double counting.

A prime example of this is in the calculation of GVA from employment. The report acknowledges that current UK Government appraisal guidelines (WebTAG) assume no net additionality of jobs at the national level. Any employment that is generated by a project therefore results in a reduction in employment elsewhere. According to economic theory this is plausible if the country's economy is solid and not suffering from a recession (or high unemployment rates caused by other factors). The UK's economy is currently not in a recession, and unemployment rates are low. According to the Office for National Statistics (ONS) the UK's unemployment rate was 4.1% in 2018, the lowest it's been since 1975 (ONS, 2019).

Therefore, the claim that the proposed growth of LCY is projected to generate £ 586 million additional to the UK economy includes effects that are not additional at the national level.

2.2.5 Treatment of UK and non-UK passengers

WebTAG unit A5.2 clearly states that: 'Where possible and practical to do so, the costs and benefits of interventions to UK and non-UK residents should be identified and reported separately. If it is possible to identify all impacts to non-UK residents, then impacts on these residents should be excluded from the central case' (Department for Transport, 2018a). This is particularly relevant in the case of aviation, as aviation crosses borders,

⁷ There are a few studies that show a causal relation between air access of remote regions and economic development, e.g. in Northern Scandinavia and part of Africa, which we do not consider to be relevant for a well-connected large agglomeration like London.

⁸ LCY's Draft Master Plan and the Socio-Economic Assessment Report define the local area as the following boroughs: Newham, Tower Hamlets, Greenwich, Bexley, Lewisham, Southwark, Barking and Dagenham, Havering, Redbridge, Waltham Forest and Hackney, as well as the local authority of Epping Forest.



transports individuals of all nationalities and connects passengers to different parts of the world.

Non-UK residents can be transfer passengers with a layover in the UK, or those with a (short) stay in the UK. When identifying the different impacts of the Draft Master Plan, it is important to separate UK residents and non-UK residents, because the former will be impacted more directly by the Draft Master Plan than the latter. For instance, non-UK residents will not be affected by the air pollution and noise impacts from the Draft Master Plan, nor will they benefit from the higher welfare in the UK, as they do not reside there. However, UK residents will be directly impacted by changes in air pollution and noise and will benefit from the higher welfare. In addition, the Draft Master Plan, if financed (in part) by government spending, will imply higher taxes to fund the investment, or diverge investments from elsewhere (e.g. from education or the NHS) to the airport. This impact is only felt by residents.

WebTAG recommends carrying out a social cost-benefit analysis (see Section 2.2.1). Key to carrying out a successful social cost-benefit analysis is a clear definition of the society in question. Usually, the scope of social cost-benefit analyses is the individual country as the projects in question are normally funded by government spending. It therefore makes sense to separate UK and non-UK residents and to only consider the effects of the Draft Master Plan on UK-residents. However, the Socio-Economic Assessment Report does not make the distinction between UK and non-UK passengers.

Lastly, it is important to note that WebTAG is relatively lenient when it comes to the treatment of UK and non-UK passengers, stating it is only necessary ‘whenever possible and practical to do so’. In doing so, it deviates from other countries, e.g. the Netherlands, where the national guidelines prescribe the separation of effects for residents and non-residents. This separation was applied in recent studies looking at a national aviation tax (CE Delft & Significance, 2018; CE Delft & Significance, 2019).

3 Review of results

In this chapter, we review the results mentioned in Socio-Economic Assessment Report. Table 2 summarises the estimated economic impact of the Draft Master Plan on the UK economy according to the Socio-Economic Assessment Report. We review the results in this chapter by looking at each of the individual impacts separately.

Table 2 - Estimated economic impact of the Draft Master Plan on the UK economy

Impact (£ million, 2019 prices)	Annual benefit in 2035 (central scenario), undiscounted
User benefits - Journey time savings	58
User benefits - Surface access benefits	10
Total user benefits	68
GVA from direct employment	105
GVA from indirect employment	28
GVA from induced employment	28
Total local impacts	160
Trade impacts (high)	73
Productivity and economic growth	190
Move to more productive jobs	95
Total wider economic impacts	358
Total	586

Source: (ARUP, 2019).

3.1 Adding all components of the estimated economic impacts

In the summary of the Socio-Economic Assessment Report Table 2 is presented as an overview of all the individual components of the total estimated economic impacts. In the summary, it is argued that the proposed Draft Master Plan is projected to generate £ 586 million additional to the UK economy in total. This is the sum of all individual components. However, in the report's chapters and annexes, a disclaimer is mentioned for some of the impacts, stating that some effects may be additional at the local level, but not at the national level. In the summary, this disclaimer is ignored and all impacts are added together.

If one were to follow the advice as mentioned in the main text of the report (i.e. not all impacts are additional at the national level) then the total estimated economic impact of the expansions plans would be lower than £ 586 million. In the next sections we delve deeper into how much lower the total estimated economic impact would be.

3.2 User benefits

The Socio-Economic Assessment Report claims the total user benefits from the Draft Master Plan will be £ 68 million in total. This is split into £ 58 million from journey time savings and £ 10 million in surface access benefits. These benefits have been calculated by updating an analysis previously provided by York Aviation to 2019.



3.2.1 Journey time savings

Data from the CAA Passenger Survey have been used to estimate the journey time savings. By examining journey patterns within the LCY catchment area and the relative popularity of alternative options, the amount of time saved on ground transport by flying from or to LCY rather than the next best alternative airport can be calculated. In calculating this effect, it is important to realise that journey time savings only exist for those passengers that fly from another airport in the reference scenario (e.g. that originally fly to/from Heathrow, but now fly to/from London City Airport because of the expansion detailed in the Draft Master Plan). For new passengers who would not have not travelled by airplane in the reference scenario no journey time savings should be calculated. Based on the Socio-Economic Assessment Report it is unclear if this important distinction was made or if journey time savings have been calculated for all passengers.

The Socio-Economic Assessment Report does not provide the data used to calculate the annual journey time savings, but it does mention that the travel time saved is monetised using the value of time from the Airports Commission. Unfortunately, detailed analysis of the Airports Commission reports did not reveal which values of time the Airports Commission used. However, Gatwick Airport published a response to the Airports Commission Consultation in which Oxera calculated the values of time used by the Airports Commission for Heathrow and Gatwick Airport (Oxera, 2015). For UK business travellers the value of time used was £ 45.12 for Gatwick and £ 54.98 for Heathrow. For foreign business travellers the value of time was £ 40.06 and £ 51.71 respectively.

Although it is unclear which of these values of time were used in the Socio-Economic Assessment Report, the values for both of these airports are significantly higher than the values provided in the TAG data book (DfT, 2019). The TAG Data Book provides different values of working time depending on the transport mode used. In this case, the journey time savings arise from shorter (road) travel times to/from LCY compared to other airports. For instance, the value of working time for a taxi passenger and an underground passenger are £ 22.87 and £ 12.96 respectively (2019 prices). This is significantly lower than the values recommended by the Airports Commission.

Furthermore, the Draft Master Plan is anticipated to lead to a decline in the share of business passengers and a corresponding increase in the share of leisure passengers, from 50% business/50% leisure to 36% business/64% leisure. The Draft Master Plan would cater for 11 million passengers in 2035, compared to 5 million in 2019. This implies an increase of 6 million passengers, of which only 1.6 million are anticipated to be business passengers. The bulk of the passenger increase will therefore be caused by leisure passengers. The value of time for leisure passengers should be valued differently from business passengers, the value of time for leisure is generally lower. However, it is currently unclear whether or not the Socio-Economic Assessment Report has done this or not. According to the TAG data book, the value of non-working time that is not spent commuting should be £ 5.87, significantly lower than the different business value of time (per transport mode) mentioned earlier on in this section.

As a part of the data is missing, we are unable to calculate the journey time saving, and therefore unable to replicate the £ 58 million mentioned in the Socio-Economic Assessment Report. However, it is possible that the value of time used in the calculations in the Socio-Economic Assessment Report is higher than recommended by WebTAG guidance.



3.2.2 Surface access benefits

Surface access benefits may exist as the result of the Draft Master Plan because passengers may travel shorter distances by using LCY rather than their next best alternative airport. The Socio-Economic Assessment Report calculates these benefits based on the CAA Passenger survey, but does not provide the data detailing how these benefits are calculated, therefore we are unable to provide judgement on how realistic the £ 10 million in surface access benefits is.

3.3 Local impacts

As mentioned in section 2.2.4, the Socio-Economic Assessment Report states that the Draft Master Plan is projected to generate £ 586 million additional to the UK economy. This number includes effects that may be additional at the local level, but are not additional at the national level. The local impacts mentioned in the Socio-Economic Assessment Report consist of the gross value added (GVA) impacts for direct (£ 105 million), indirect (£ 28 million) and induced employment (£ 28 million), amounting to £ 160 million in total.⁹

3.3.1 GVA from direct employment

According to the Socio-Economic Assessment Report, in which an analysis by York Aviation was carried out, the Draft Master Plan is expected to add 1,318 direct jobs to the airport by 2035. The report acknowledges that these jobs are expected to be mostly additional at the local level, but not additional at the national level due to a diversion of jobs from existing employment. However, when the final estimated economic impact of the Draft Master Plan is presented, the local values are added to achieve the national total. This is not in line with UK government appraisal guidelines (WebTAG), which consider no net additionality of jobs at the national level.

The employment catchment area of LCY mainly concerns the Borough of Newham. On average over 25% of on-site employees live in Newham, whereas in 2018 42% of new employees were from Newham (London City Airport, 2019). The Draft Master Plan aims to secure 40% of new jobs for Newham residents (London City Airport, 2019).

According to the most recent Annual Population Survey, carried out by the ONS, which covers the period October 2017 to September 2018, the unemployment rate in London as a whole was 5.1%, whereas the unemployment rate in the Borough of Newham was lower than that at 4.7%. With Newham having a lower unemployment rate than the London average, it seems unlikely that jobs generated by the Draft Master Plan will therefore lead to net additional employment, and would rather involve the movement from other jobs to jobs at LCY. It is possible that this movement of jobs within the Borough of Newham could involve a switch in lower quality jobs to higher quality jobs. However, unfortunately we do not have information on the quality of employment in Newham.

Therefore, the Draft Master Plan's strict target of securing 40% of new jobs for Newham residents combined with the Borough's low unemployment rate may even lead to questions regarding whether or not these jobs can be filled at the local level, hence raising questions regarding the additionality of these jobs (and the corresponding GVA) even at the local level.

⁹ Numbers may not add up completely due to rounding.



Although the amount of jobs may not be additional at the national level (or maybe even at the local level), it is likely that new employees at LCY would receive higher wages in their new jobs than in their previous ones. If this weren't the case, then it is likely that they wouldn't switch jobs. Therefore, the change in the wages (and GVA) that new employees experience should be taken into account, rather than the full wage (and GVA) per job. It appears that the Socio-Economic Assessment Report uses the full GVA per job, rather than the difference between the old job and the new job.

3.3.2 GVA from indirect & induced employment

Apart from the direct employment generated by the Draft Master Plan, the report also claims indirect and induced employment effects. *Indirect employment* is generated in the sectors supplying the airport. The size of the indirect employment is an indicator of the connectivity of the sector with other economic sectors. *Induced employment* is employment generated as a result of the spending of LCY employees, e.g. on rent, mortgage, groceries etc. This spending stimulates the rest of the UK economy. Note that the effect of induced employment presupposes that the new employees would have no income in the reference situation.

Adding direct, indirect and induced effects together leads to double-counting and the overestimation of the economic impact of the airport expansion (CE Delft, 2013). If all sectors would claim the direct, indirect and induced effects as their own, the country's Gross Domestic Product (GDP) would be significantly overestimated, seeing as most sectors are either a supplier or customer of another sector. Therefore, the most transparent methodology would be to only take into account the direct employment impacts into account. Note that WebTAG assumes that no indirect and induced employment at the national level.

If indirect and induced employment effects (and the corresponding GVA) are taken into account it is common to use multipliers to calculate this effect. The Socio-Economic Assessment Report carries out a brief literature review of aviation employment multipliers for a number of UK airports: Ayrshire, Glasgow, Edinburgh, Belfast, Luton and Gatwick. The overview of multipliers for those airports is shown in Table 3. In particular, the combined indirect + induced multiplier for Luton is projected to be particularly high (2.9), compared to the other multipliers. Based on this overview, the Socio-Economic Assessment Report uses a central multiplier of 1.2 for both indirect and induced employment, and a central multiplier of 1.42 for the combined employment effect of indirect and induced jobs.

However, one notable airport and its corresponding multiplier is missing from the list in the Socio-Economic Assessment Report, but is added in italics in Table 3. Employment multipliers for Heathrow are projected to be 0.62 for indirect employment and 1.10 for induced employment in 2030 (Airports Commission, 2014). Heathrow's indirect multiplier in particular is significantly lower than the proposed employment multipliers used. It is unclear why the Socio-Economic Assessment Report does not mention Heathrow's multiplier in their overview, especially with Heathrow arguably being the most important airport in the UK. If one were to include Heathrow's multiplier, the overall multiplier used in the Socio-Economic Assessment Report would decrease, reducing the size of the GVA from indirect and induced employment.

Table 3 - Estimates of aviation employment multipliers

Location / Airport	Multiplier type	Multiplier
Ayrshire	Indirect + induced (regional/national)	1.2/1.7
Glasgow	Indirect + induced	1.95
Edinburgh	Indirect / induced	1.4/1.6
Belfast	Indirect + induced	1.1
Luton	Indirect + induced	2.9
Gatwick	Indirect / induced	1.07/1.08
Heathrow	Indirect / induced	0.62/ 1.10

Source: (ARUP, 2019).

Lastly, when one chooses to include the GVA from indirect and induced employment, regardless of which aviation employment multiplier is used, it is important to take into account the fact that those new employees are likely to have had previous income, and hence GVA. Therefore, it is unfair to allocate the entirety of the GVA associated with the new jobs at LCY. One should therefore only take into account the *additional* gross value added of the jobs at LCY compared to the previous jobs. It is unclear whether or not the Socio-Economic Assessment Report uses the full GVA per job, rather than the difference between the old job and the new job

Overall, it does not make sense to claim the GVA of indirect and induced employment to LCY's Draft Master Plan. If every sector were to do this, a country's GDP would be significantly overestimated. If one were to add the indirect and induced employment effects, it is important to keep in mind that this effect is only additional at the local level, not at the national level, that the multipliers used in the Socio-Economic Assessment Report may be somewhat high, and that one should only use the difference in GVA between the old and new jobs, rather than the full GVA associated with a job at LCY.

3.4 Wider economic impacts

The Socio-Economic Assessment Report claims the total wider economic impacts amount to £ 358 million. This consists of £ 73 million in trade impacts, £ 190 million in productivity and economic growth impacts and £ 95 million in impacts from the move to more productive jobs.

3.4.1 Trade impacts

A number of interesting things happen in the calculation and presentation of the trade impacts of the Draft Master Plan.

Firstly, the Socio-Economic Assessment Report includes the trade impacts in its estimated economic impact of the Draft Master Plan. This is not in line with WebTAG guidelines as argued in Section 2.2.3.

Secondly, if one were to follow the Airports Commission's approach and include the trade impacts in the total economic impact of the Draft Master Plan, one should strictly follow it. The Airports Commission's method states that the productivity and trade impacts are driven solely by a net increase in business passengers (Airports Commission, 2015b). However, the Socio-Economic Assessment Report acknowledges that it is unlikely that the master plan will



lead to a net increase in business passengers at the national level, so this effect should be neutral.

Thirdly, if one chooses to ignore the first two reasons for not including trade impacts in the total economic impact of the Draft Master Plan, it would be good to present them correctly. The trade impacts mentioned in the overall table¹⁰ and in the executive summary of the Socio-Economic Assessment Report are £ 73 million in annual benefits in 2035. However, in the corresponding section in the Socio-Economic Assessment Report (Section 6.3.1), the text mentions that the productivity impacts are 'estimated to be in the range of £ 12 million to £ 71 million'. Therefore, there is a clear discrepancy in the overall table (£ 73 million) versus Section 6.3.1 in the Socio-Economic Assessment Report (maximum £ 71 million). This is particularly striking considering the overall table is presented as the central scenario. For each of the other components, the values presented in the table are the central estimates. Although the report does not state the value of the central estimate for the trade impacts, it is likely that the central value would be an average of the low (£ 12 million) and high (£ 71 million). A fair estimate could be £ 41.5 million, £ 31.5 million lower than the current estimate provided.

Lastly, the Socio-Economic Assessment Report acknowledges that the trade impacts may not be considered additional at a national level, yet in presenting the total economic impact of the Draft Master Plan, it does it anyways.

Overall, when strictly following the WebTAG guidelines, trade impacts should not be included in the total economic impacts of the Draft Master Plan. If it is taken into account, the effect should not be considered additional at the national level. If one still chooses to include the trade impacts, despite the aforementioned reasons, it would be fair to present the trade impacts in the central scenario if all other impacts are also presented for the central scenario. It is unfair to pick and choose a higher scenario for certain impacts when looking at the central scenario as a whole.

3.4.2 Productivity and economic growth

The productivity and economic growth impacts are estimated at £ 190 million. Impacts that are included under this umbrella term are agglomeration effects and the impact on economic growth as a result of imperfect competition. Agglomeration effects are the bulk (£ 181 million) of this category. These occur when firms move closer to the catchment area of the airport as a result of increased passenger capacity. This special clustering of businesses leads to higher productivity. According to WebTAG, both of these impacts can be considered additional at the national level.

The total productivity and economic growth impacts are calculated as follows:

$$\begin{aligned} \text{Productivity \& growth} &= \text{agglomeration effect} + 10\% * \text{user benefits} \\ &= £ 181 + 10\% * £ 68 \\ &= 181 + 6.8 = 187.8 \end{aligned}$$

The report claims £ 190 million, whereas a brief calculation reveals the benefits should be £ 188 million. However, it is possible this error occurs due to rounding.

¹⁰ Reproduced as Table 2 in this report.



Agglomeration effects are the bulk of the productivity and economic growth effects and contribute to 30% of total estimated economic impact of the Draft Master Plan. It is unclear how the Socio-Economic Assessment Report reaches £ 181 million, and whether or not it follows the WebTAG guidance.

In general, not enough information is provided in the Socio-Economic Assessment Report to check the complete calculations, therefore we are unable to provide judgement on how realistic the £ 190 million in surface access benefits is.

3.4.3 Move to more productive jobs

This impact follows from the agglomeration effects mentioned in Section 3.4.2. More productive firms are likely to pay higher wages, which in turn is likely to have a positive impact on tax revenues. The Socio-Economic Assessment Report appears to follow WebTAG guidance for this impact, however, not enough information is provided for us to check the calculations. Therefore we are unable to provide judgement on the how realistic the £ 95 million in tax impacts from more productive jobs is.

3.5 Environmental impacts

As briefly touched on in Section 2.2.2, there are a number of impacts that are not quantified or monetised in the Socio-Economic Assessment Report. These include, amongst others, effects on air pollution levels, noise and greenhouse gas emissions.

Neither the Socio-Economic Assessment Report, nor the background reports on air pollution, noise and greenhouse gases provide enough information on the size of the effect of the Draft Master Plan on pollution and noise levels. If the true effect of the Draft Master Plan on noise, air pollution and greenhouse gas emissions can be identified (correcting for changes in road transport emissions and fleet renewal) this should be monetised. To do so, environmental prices exist. The next three sections delve deeper into the UK's prescribed environmental prices for air pollution, noise and climate.

3.5.1 Air pollution

The UK Department for Environment, Food & Rural Affairs (Defra) provides national guidance on how the effects of air quality should be valued. According to Defra, the effects of air quality should be reflected in decision-making wherever possible (Defra, 2019). Table 4 presents the damage costs against which the changes in air pollutants should be valued. Specific values exist for aircraft NO_x and aircraft PM_{2.5}. For the other pollutants only general, national figures are provided.

Table 4 - Air pollution damage costs according to Defra

Pollutant	£/tonne, central scenario (2017 prices)	£/tonne, central scenario (2019 prices) ¹¹
NO _x from aviation	11,672	12,129
PM _{2.5} from aviation	194,269	201,877
SO ₂ general	6,273	6,519
NH ₃ general	6,046	6,283
VOC general	102	106

¹¹ Prices have been updated to 2019 levels using the GDP Deflators mentioned in the WebTAG Data Book (October 2019). For 2017 this value is 112.36. For 2019 this value is 116.76.



If the causal effect of the Draft Master Plan on air pollution causes x tonnes extra air pollution (e.g. NO_x, PM_{2.5}, etc.), this x should be multiplied with the damage costs from Table 4.

3.5.2 Noise

Defra also provides national guidance on how changes in noise should be incorporated into a cost-benefit analysis. The impacts from noise consist of health impacts (e.g. direct AMI, strokes and dementia) and annoyance (Defra, 2014). As noise is highly non-linear the impacts of noise are quantified in marginal terms, rather than average terms. Table 5 presents the noise costs to be used for aviation noise according to Defra. Note that this table is a shortened version of the full table in (Defra, 2014).

If the Draft Master Plan leads to an increase in noise levels experienced during the day from 65 dB LA_{eq, 16h} to 66 dB LA_{eq, 16h} for 100 households, then the noise nuisance should be monetised by multiplying 100 * 86.90. This results in total noise costs of £ 8,690 per year.

Table 5 - Noise costs from aviation according to DEFRA

Change in noise metric by dB	Total costs £ per household per dB (LA _{eq,16h}) 2014 prices	Total costs £ per household per dB (LA _{eq,16h}) 2019 prices ¹²	Total costs £ per household per dB (L _{night}) 2014 prices	Total costs £ per household per dB (L _{night}) 2019 prices ¹³
45-46	15.61	16.99	37.93	41.29
...				
55-56	49.01	53.36	66.56	72.46
...				
65-66	79.82	86.90	95.19	103.63
...				
75-76	114.75	124.93	95.19	103.63
...				
>80	124.71	135.77	95.16	103.63

Note: Certain values are missing from this table to aid in clarity (e.g. the marginal costs from moving from 57 to 58 dB). For a full overview of all marginal noise costs we refer to (Defra, 2014).

3.5.3 Climate

The UK government has also agreed on a set of carbon values to be used in policy appraisal and evaluation. These values are provided by the Department for Business, Energy & Industrial Strategy (BEIS, 2019). Table 6 presents the costs per tonne of CO₂ equivalent in 2018 prices.

¹² Prices have been updated to 2019 levels using the GDP Deflators mentioned in the WebTAG Data Book (October 2019). For 2014 this value is 107.25. For 2019 this value is 116.76.

¹³ See footnote 12.



Table 6 - Carbon prices for policy appraisal in £ per tonne CO₂ equivalents (real 2019 prices)¹⁴

Year	Low	Central	High
2018	2.38	13.01	26.02
2019	0.00	13.41	26.82
2020	0.00	14.11	28.24
2021	4.12	20.95	37.77
2022	8.24	27.78	47.32
2023	12.36	34.61	56.86
2024	16.49	41.45	66.40
2025	20.61	48.27	75.94
2026	24.73	55.10	85.48
2027	28.85	61.93	95.02
2028	32.97	68.77	104.56
2029	37.09	75.63	114.10
2030	41.21	82.43	123.64

If the Draft Master Plan leads to y extra tons of CO₂ in 2025, one could calculate the extra climate costs by multiplying y by the damage costs per tonne in that year (£ 48.27).

¹⁴ Prices have been updated to 2019 levels using the GDP Deflators mentioned in the WebTAG Data Book (October 2019). For 2018 this value is 114.49. For 2019 this value is 116.76.



4 Recalculation of economic impacts

In this chapter we recalculate the results mentioned in Socio-Economic Assessment Report based on the review conducted in Chapters 2 and 3.

4.1 Overview: national level

Table 7 summarises the estimated economic impact of the Draft Master Plan on the UK economy as a whole according to the Socio-Economic Assessment Report (middle column), and according to our recalculations based on Chapters 2 and 3 (right column).

Table 7 - Estimated economic impact of the Draft Master Plan on the UK economy

Impact (£ million, 2019 prices)	Annual benefit in 2035 (central scenario), undiscounted According to (ARUP, 2019)	Recalculated annual benefit in 2035 (central scenario), undiscounted According to CE Delft
User benefits - Journey time savings	58	Possibly smaller than 58
User benefits - Surface access benefits	10	10
Total user benefits	68	Possibly smaller than 68
GVA from direct employment	105	+ PM (not additional at national level)
GVA from indirect employment	28	+ PM (not additional at national level)
GVA from induced employment	28	+ PM (not additional at national level)
Total local impacts	160	+ PM (not additional at national level)
Trade impacts (high)	73	0 according to WebTAG
Productivity and economic growth	190	190
Move to more productive jobs	95	95
Total wider economic impacts	358	285
Air pollution	0	- PM
Noise	0	- PM
Climate	0	- PM
Total environmental impacts	0	- PM
Total	586	353 ± PM¹⁵

¹⁵ PM (Pro Memori) costs or benefits are effects that could not be estimated with enough confidence, but that could exist. They are usually of a smaller magnitude compared to the monetised effect.



4.1.1 User benefits

According to the Socio-Economic Assessment Report, the user benefits amount to £ 68 million in total, split into £ 58 million in journey time savings and £ 10 million in surface access benefits. Section 3.2 revealed that it we unable to deduce the value of time used in the calculation of the journey time savings. It is possible that the Socio-Economic Assessment Report used a value of time that is higher than recommended by WebTAG, although we were not able to verify that due to a lack of data.

Not enough information was provided on the surface access benefits to verify the £ 10 million mentioned in the Socio-Economic Assessment report. Therefore, we estimate the total user benefits to be £ 68 million or possibly smaller.

4.1.2 Local impacts

The local impacts, which is the sum of the gross value added of direct, indirect and induced employment were estimated to be £ 160 million according to the Socio-Economic Assessment Report. These effects are not additional at the national level according to WebTAG guidelines (see Section 3.3.1).

With unemployment rates being lower than the London average in Newham, it is unlikely that the new jobs triggered by the Draft Master Plan would lead to new employment. Rather, individuals who are previously employed will switch jobs to the airport. This switch, however, is only likely to be made if the new job pays more than the previous job. Therefore, at the local level, it could be possible that the GVA of employment is a positive PM post. To calculate the GVA, only the change in wages (as a proxy for GVA) should be taken into account, rather than the full wage per job.

To conclude, the local impact of GVA from employment should not be considered as an additional benefit to the UK economy as a whole, as it involves merely a displacement of jobs. When considering the impact of the Draft Master Plan at the local level, it is possible that the GVA from employment is a positive PM post, albeit smaller than reported by (ARUP, 2019).

4.1.3 Wider economic impacts

The total wider economic impacts are the sum of the trade impacts, productivity and economic growth impacts and the move to more productive jobs. In the case of the latter two, not enough information is provided in the Socio-Economic Assessment Report to be able to check Arup's result. However, the trade impacts of airport expansion should not be taken into account when strictly following WebTAG guidance.

Therefore, we estimate the total wider economic impacts to be £ 285 million, rather than £ 358 million.

4.1.4 Environmental impacts

The environmental impacts are not mentioned or monetised in the Socio-Economic Assessment Report. Although we don't have enough information to carry out calculations to estimate the environmental impacts, it is fair to say that the *causal* effect of expanding LCY airport will be negative for air pollution, noise levels and climate change. This is regardless of whether levels stay within national limits and boundaries and regardless of what happens to other transport modes (e.g. large-scale deployment of electric passenger cars). Any



deterioration in air quality levels, noise levels of climate change emissions can be valued using the prices mentioned in Section 3.5.

As we know that the *causal* effect of the Draft Master Plan will have a negative impact on noise, air pollution and climate change emissions, the total environmental impacts will be negative.

4.1.5 Total

The total estimated economic impact of the Draft Master Plan on the UK economy is therefore likely to be smaller than £ 353 million + PM, rather than the £ 586 million estimated by Arup in the Socio-Economic Assessment Report.



5 Conclusions

This report has conducted a methodological review, a review of results and has attempted to recalculate the economic impact of the proposed Draft Master Plan for expanding capacity at London City Airport up to 11 million passengers by 2035. The socio-economic impacts of this proposed Draft Master Plan were presented in a Socio-Economic Assessment Report conducted by ARUP (ARUP, 2019). According to ARUP, the estimated economic impact of the Draft Master Plan on the UK economy would be £ 586 million in 2035.

In general, our study has concluded that the £ 586 million in economic impact in 2035 is an overestimate. Our study suggests the impact will be lower, the economic impact of the Draft Master Plan is likely to be smaller than £ 353 million + PM. This disparity in estimates can be explained.

Firstly, the local impacts are not additional at the national level, according to the UK's transport analysis guidance WebTAG. This implies that £ 160 million in benefits reported by the Socio-Economic Assessment Report are significantly overestimated. In this study it is replaced by a (small) PM post.

Secondly, when following WebTAG guidelines, the trade impacts of the Draft Master Plan should not be taken into account. However, Arup, in their Socio-Economic Assessment Report reports £ 73 million in trade benefits. In this study, we follow WebTAG guidelines and replace the £ 73 million by 0.

Lastly, the *causal* effect of air pollution, noise and greenhouse gas emissions of the Draft Master Plan is not taken into account in the Socio-Economic Assessment Report. Although it is outside the scope of this project to identify the size of the *causal* effect, we can say with certainty that the effects will be negative, as more flights will lead to more air pollution, more noise and more greenhouse gases. The effect should therefore be monetised and incorporated as a negative economic impact into the total economic impact.

For a number of the impacts identified, the calculations and background data were not made publically available with the publication of the Socio-Economic Assessment Report. Therefore, we were unable to verify whether or not the figures mentioned in the report are realistic. It is therefore possible that those impacts (e.g. surface access benefits, productivity and economic growth, move to more productive jobs) may change in magnitude.

Overall, we can conclude that our estimate of the total economic impact of LCY's Draft Master Plan on the UK economy is lower than presented by Arup in their Socio-Economic Assessment Report.

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