The costs and benefits of runway extension

Report for the States of Guernsey

13 March 2020

Confidential

Provisional Analysis: findings will be reviewed in light of the impact of the Covid-19 pandemic on air travel

Note about confidential information contained in this report

The analysis in this report has been prepared using a variety of information and data sources, including publicly available data prepared by the States of Guernsey and other sources, industry data, and research commissioned by the States of Guernsey. Commercially sensitive business data have been redacted from this version of the report, and this is indicated by the label [C.I.C]. Information with potentially sensitive financial implications for individuals and businesses has also been redacted. Regarding the list of stakeholder consultations, information on stakeholders responding on behalf of the states has been included. All other information on stakeholders has been redacted.

Contents

Frontier were appointed to undertake an analysis of the benefits and costs of specific proposals for extending the runway.

The States of Guernsey commissioned Frontier Economics Ltd to undertake an economic analysis of a proposed extension to Guernsey Airport's runway. The proposal is to increase runway length to between 1,700 and 1,799 metres. The scope of this analysis focuses on the decision to invest in a runway extension or to refrain from doing so. It does not explicitly consider whether the resources ear-marked for the extension could be allocated to other uses. The analysis compares the outcomes under the runway extension scenario(s) to outcomes in scenarios in which this extension does not take place.

The States commissioned Frontier to undertake two separate streams of work: the cost-benefit analysis and a high-level analysis of social and environmental costs. The two are related, since the latter analysis informs the cost-benefit analysis. A third workstream to quantify the construction and associated engineering costs of extending the runway was undertaken separately by independent experts (RPS) and used as an input to this work.

In principle, the economic benefits of a runway extension can arise through several inter-related channels:

- The effects of the extension on connectivity, and through this on visitor numbers for leisure and business purposes. Increased visitor numbers may generate economic impacts through spending decisions on goods and services. These spending effects are captured in national accounts, and thus represent a benefit to Guernsey as a whole.
- The effects of improved connectivity on the climate for doing business. This includes the possibility of lowering costs for businesses to acquire inputs (skills, capital). It could also reduce the transactions costs associated with business operations. These effects in turn could facilitate, relative to the baseline, the expansion of existing businesses and the establishment of new ones. These effects may also be picked up in the national accounts. Connectivity may also induce activities (such as cultural and social ones) that generate public benefits that are not captured in national accounts
- Improved connectivity could also generate benefits for Guernsey residents by improving travel opportunities, and the ability to access services off-Island. Some of these services, such as health care, have high social rates of return.

Against these potential benefits it is necessary to offset the best understanding of economic costs to a runway extension. These include:

- The "resource costs" of the runway extension: the capital and operational expenditure needed to extend the runway.
- The social and environmental costs associated with the runway extension, including noise, pollution, and changes in land-use
- The social and environmental costs of increased connectivity and increased visitor numbers.

For both costs and benefits the analysis must consider which elements represent displacement from other parts of the economy (e.g. visitors by sea switching to planes and so not adding new visitors, jobs created in one part of the economy representing a shift from another and so not being new jobs, costs of runway operations for safety or other reasons that would necessitate spending regardless of an extension).

The length and condition of the runway have been under constant review for over a decade.

The consideration of when would be the right time to extend Guernsey's runway has been ongoing since at least 2009.

The States of Guernsey decided in October 2009 to rehabilitate but not lengthen Guernsey's runway. This followed a report, presented by the then Public Services Department, supported by the findings of an independent study by York Aviation, that a runway extension was not, at that time, necessary. Guernsey Airport's pavement areas (runway, taxiways and apron) were then upgraded in 2010. This work included, inter alia, realignment and strengthening of the runway and enhancement to Runway End Safety Area (RESA) provision.

Since then the potential to extend Guernsey's airport runway has continued to be a source of discussion. Guernsey's 2016 Island Development Plan recognised the potential need for a runway extension in the future and therefore designated an area of land to the eastern boundary of the airport as a Safeguard Area which could be used to facilitate an extension.

During the June 2017 Capital Prioritisation process, the Assembly decided that a strategic review of Guernsey's air and sea links infrastructure should be undertaken to ensure that all external transport links were considered as part of a strategy. The review was commissioned in May 2018 covering Guernsey's Air and Sea Links. It was undertaken by PwC for the Policy and Resources Committee, with the final report being presented in September that year.

While the strategic review was in progress the late Deputy Jan Kuttlewascher successfully led a Requête that directed the States Trading Supervisory Board to consult with the Director of Civil Aviation to determine the acceptability of an 'undershoot' and an 'overrun' provision. The Assembly provided majority support to the proposal on 26 October 2018 which, if feasible, would have allowed a runway extension of 107m providing an overall length of 1,570m.

Following the receipt of the strategic review report in September 2018, the Committee for Economic Development, adopted the *States of Guernsey Air and Sea Route Policy Development and Investment Objectives* in November 2018, which were subsequently approved by the States of Deliberation in December 2018. These objectives specifically commit to developing air links that, amongst others:

- Encourage development of regional (UK and Europe) connectivity through an open skies policy approach
- Attract carriers with proven international connectivity
- Broaden UK and European connectivity
- Access for Bailiwick residents to specialist healthcare and emergency evacuation services

More recently this culminated in the consideration of three options.

The Policy and Resources Committee subsequently prepared a **Policy Letter** focussed on air link infrastructure, (dated 08 March 2019), that was considered by the States Assembly on 26 April 2019. The strategic review considered three options:

- Option 1. A runway extension to 1,570m – within the airport boundary
- Option 2. A runway extension to 1,700m-1,800m – beyond the airport boundary
- Option 3. A runway extension to 2,000m and over – beyond the airport boundary.

Option 1 was identified as a potentially short term, low cost and high benefit solution, subject to further work to establish its feasibility from both a commercial and operational perspective. Option 2 was deemed to be one that should be subjected to a detailed cost-benefit analysis. Option 3 was immediately discounted as it was considered that the additional benefits of a 2,000m runway over a 1,700-1,800m runway could not justify the extra cost and time required.

After consideration of the Policy and Resources Committee's Policy Letter, the Assembly resolved on 26 April 2019:-

- Not to support the Policy and Resources Committee's proposition that: "*.. further work is (to be) carried out to assess the business case for extending the airport runway outside its current boundaries given the other options available for meeting Guernsey's air links objectives including the work of the States' Trading Supervisory Board investigation to examine the possibility of commissioning 107 metres of starter strip/paved runway end safety area ("RESA") to increase the current available runway length from 1463 metres to 1570 for take-off and landing*.." .
- Not to support the Policy and resources Committee's proposition: "*..to direct the Policy & Resources Committee to open a capital vote of up to £700,000 for the Committee for Economic Development to commission further work on the technical, regulatory, environmental and economic business case for the extension of the airport runway beyond the current boundaries to 1,700-1,800m,.. .*"

Following formal advice from Guernsey's Director of Civil Aviation about the option approved in the Kuttleswascher-led Requête to extend the runway to 1,570m, that too was rejected. The States Trading Supervisory Board presented a Policy Letter, dated 06 August 2019, proposing, inter alia, that "*..no further work is (to be) carried out to assess the option to extend the airport useable runway within the current airport boundary by reducing the Runway End Safety Area, at the eastern end of the runway*..". On 26 September 2019 the Assembly, by a majority, agreed to support the States Trading Supervisory Board's proposition, the effect of which was to cease all research into extending Guernsey's airport runway.

And, most recently, the States approved new studies to examine the costs and benefits of runway extension.

Subsequently, on 06 October 2019 Deputy Jan Kuttlewascher laid a further Requête titled “Development of the Business Case and Cost Benefit Analysis for the Extension of the Runway at Guernsey Airport to create a 1,700 Metre Runway”, seeking the Assembly’s approval:

1. To direct the Committee for Economic Development to present a business case and cost benefit analysis for the extension of the runway at Guernsey Airport to achieve a length of at least 1,700m.

2. To agree that this work should be completed by May 2020.

3. To direct the Policy and Resources Committee to make available the necessary funds to carry out this work, should they be required, to not exceed £360,000.

On 28 November 2019 the States Assembly, by a majority, provided support for the Prayer to the Requête.

Given that extension to a runway length of 1,800m would carry significant additional regulatory and reclassification requirements, the case for extension is being considered against a maximum length of 1,799m.

The current study represents the culmination of that process.

The findings in this study should be interpreted against the core strategic and investment objectives of the States.

As observed, deliberations on the extension of the runway are part of a wider policy and strategic framework that addresses the question of air and sea link connectivity. Given Guernsey's position as a small island state, connectivity has vital economic and social implications.

The strategic and investment objectives are set out in the document *States of Guernsey Air and Sea Route Policy Development and Investment Objectives*, of 12 November 2018. They are as follows:

- As core objectives - air and sea links must:
  - Meet the majority, if not all, of the current and future requirements of the residents of the Bailiwick
  - Enable economic growth
  - Increase visitor numbers
- As Investment objectives – air and sea links must consider:
  - Affordability
  - Connectivity
  - Reliability

In relation to reliability, the objectives emphasised the importance of attracting carriers of proven reliability and resources. This issue has received particular attention in the context of FlyBe's recent cessation of operations. The modelling approach pursued in this analysis is based on the profitable operation of air routes, and the link between runway extension and the profitability of servicing Guernsey by carriers that optimise their decisions across their entire network.

In setting out these three objectives, the States recognised that tension that could exist between them across different categories of users. It recognised that solving this "trilemma" would go beyond the scope of any single intervention or investment, and would require a cross-cutting approach. Similarly, there is a recognition that the core objectives would also require a suite of supporting interventions.

The next slide considers some of the broader factors that have a bearing on the findings of the study.

The findings in this study should be interpreted against a number of other factors outside the scope of the study.

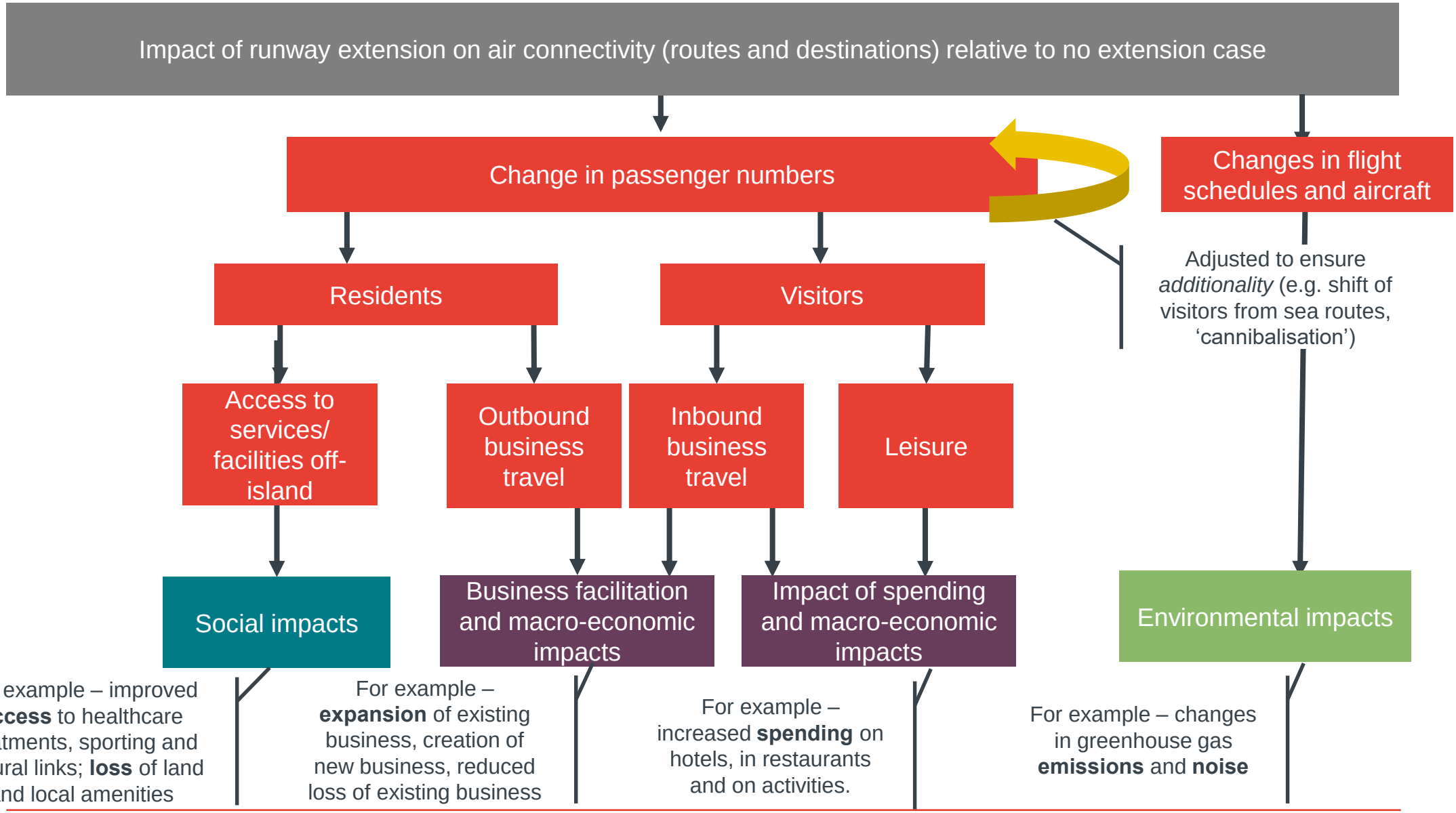
The economic impacts of a runway extension operate through various channels (e.g. through new visitor arrivals, business expansion, social, cultural and environmental impacts). The degree to which each channel results in more or less economic activity or value creation depends on a wider suite of policy interventions and settings beyond the one related directly to runway extension. This point was generally acknowledged in the consultations that formed part of this study.

Where relevant this study recognises wider factors that need to be in place to realise economic and social outcomes from the runway extension.. We provide qualitative assessments of wider impacts or constraints where appropriate in the report. However, the scope of this report is solely focussed on the impact of a runway extension, and the economic, social, and environmental impacts of a resulting change in air connectivity. The scope does not extend to considering alternative policies or ways of spending equivalent amounts of money and their economic impacts.

The following specific examples may be useful to keep our analysis in perspective:

1. **States policy towards air links** . We have not assumed any changes to policy towards air links These policy settings reflect, in part, attempts to manage a perceived “trilemma” in which considerations of affordability, reliability and improved connectivity are in tension with each other. We have assumed a continuation of the quasi-open skies policy as it currently stands: i.e. liberalised services on routes to and from Guernsey, with the exception of Gatwick, the rights to which remain with the States.
2. **Business**. Business expansion and attracting new businesses depends on many factors, of which runway length and the impact on connectivity is only one factor. The extent to which it is a factor will vary depending on the sector and structure of costs for businesses in that sector. We draw on evidence from our consultation, wider literature and our own modelling to understand how business decisions may be linked to the runway extension but these results should be interpreted in light of these other drivers of business decisions.
3. **Tourism**. Although our modelling is based on tourism forecasts, we do not analyse other factors that contribute to tourism. The effect of the runway extension on tourism will also depend on a number of other conditions. These include the marketing strategies of air and sea-link operators (and States bodies), hotel capacity and attractiveness, airline route decisions, wider trends in the tourism market and other factors. Our modelling is based on the evidence available and we have not modelled each of these factors. We note that the runway extension is unlikely to be the sole driver of tourism outcomes.
4. **Environment**. Different types of aircraft produce different total, per seat and per passenger greenhouse gas emission and noise. We provide evidence about these variations but do not model which type of aircraft might ultimately be used under scenarios for runway extension or business-as-usual

Our framework investigates the pathways through which increased visitor numbers & connectivity feed in to wider economic impacts.



We have drawn on a wide range of evidence, from many sources, to implement the framework.

Methodology for incorporating different kinds of evidence

Developing a cost-benefit analysis of the runway extension has required a framework capable of synthesising findings from the application of different methodologies. The methodologies we used were:

- A quantitative analysis of visitor spending impacts involving: drawing on and adapting research commissioned by the States into the effects of runway extension on visitor numbers; estimating the effects of changes to visitor numbers on spending; and estimating the impacts of these changes on Guernsey's economy using official data on national accounts. In particular we:
  - Developed alternative scenarios for visitor increases based on different assumptions about the effects of runway extension on routes
  - Explicitly controlled for the effects of substitution between sea and air routes ("Cannibalisation"). Our analysis suggests that these effects are not material. Nevertheless, in Annex 3 we model scenarios based on hypothetical rates of cannibalisation. The results show that our overall conclusions do not change if there are greater levels of cannibalisation than our analysis of the evidence would suggest.
- A quantitative analysis of business expansion effects using two different methodologies. The first of these draws on econometric models establishing the role of connectivity in affecting international trade flows, and the role of international trade in driving changes to productivity. The second examines the relationship between improved business connectivity and drivers of productivity in businesses. The approach we adopted in both cases includes a combination of bespoke modelling and synthesis of peer-reviewed empirical literature.
- A quantitative analysis to determine the extent to which emissions and noise impacts arise as a result of changes to aircraft movements that result from the runway extension.
- A qualitative analysis based on stakeholder consultations in Guernsey. The purpose of the stakeholder consultations was to:
  - Guide the quantitative modelling and enable us to make informed decisions about assumptions and parameters
  - Provide information where quantitative estimation was not possible or appropriate. These include some aspects of wider economic and social benefits (notably benefits to residents of access to healthcare, and cultural and sports activities) and some aspects of social costs (such as the possible disruptions created by the extension through road diversion and the effects on land use).

Cost Modelling

- The resource costs of the runway extension (capital and operational costs) were estimated as part of a separate exercise commissioned by the States. We describe these in more detail on page 14.
- In addition to those costs, our analysis includes the cost of incentives provided by the States to airlines to service Guernsey based on expert advice.

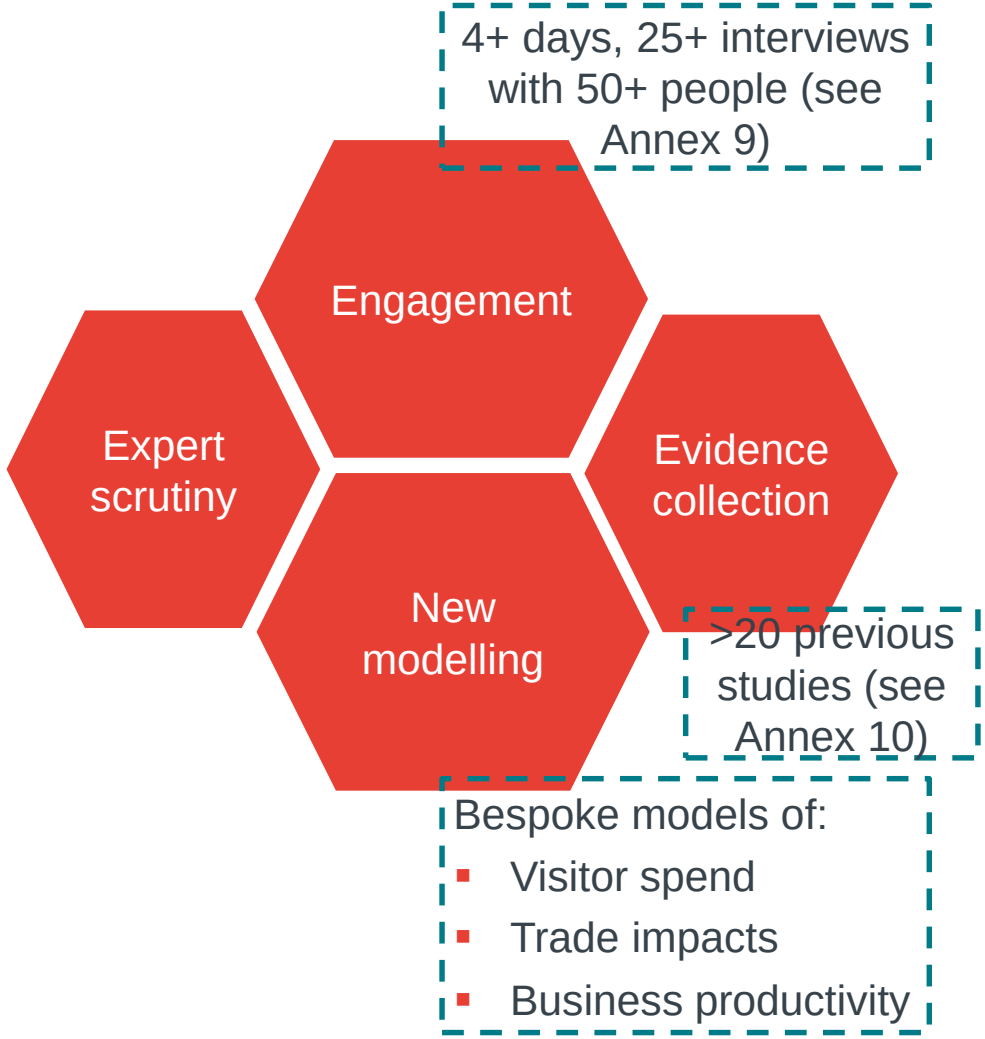
We have consulted widely. These consultations also highlighted other factors outside our analysis that needed to be taken into account.

Notwithstanding the evidence collection, a number of wider factors not included in the analysis could be important:

- Guernsey's economy has specific characteristics. It is necessary to exercise caution when applying methods and estimates developed for applications in other economies.
- There are many other factors that may limit the extent to which historical data from Guernsey will predict the future (e.g. future trading arrangements between Guernsey and the EU).
- Technological developments might affect how and by whom the runway is used and the impact of that use (e.g. possibilities for alternative fuel aircraft, role of remote working and meeting).

Given these and related uncertainties, we have consistently adopted an approach that biases our analysis towards increasing costs and reducing benefits (i.e. it is a conservative approach). These include:

- Using the upper end of cost estimates for the runway and incentives
- Using lower bound estimates for business growth impacts
- Assuming no real increase spend per visitor over time
- Plus other technical assumptions (e.g. choice of discount rate, break even analysis)



Our analysis is based on a proposal to extend the Runway to 1740 metres with traditional RESA. Three other options were costed.

In line with the PwC Strategic Review and the States' Investment Objectives, a variety of extension scenarios were considered and modelled by a specialist engineering consultancy appointed by CfED, RPS. The four main ones are summarised in the table below:

Option	Civil Works (on Island costs)	Valley Fill (Civil costs)	Fee Risk and Contingency	Misc.construc-tion costs, labour and insurance	Total
	Costs in £ Millions (numbers may not add up due to rounding)				
1700 with traditional RESA	23.2	12.6	22.8	9.9	69.5
1740 traditional RESA	**24.4**	**19.0**	**24.6**	**9.9**	**78.9**
1740 EMAS RESA	30.6	13.7	24.8	9.9	80.1
1799 EMAS RESA	31.2	25.7	27.9	9.9	95.3

The costs associated with runway extension works are primarily found in the civil works category. The costs quotes are acknowledged to be at the high end of the likely range. The actual construction process will follow a competitive tender. The costs of upgrading the Instrument Landing System, and of expanding the size of terminals, have been excluded from this cost base. They would be the subject of a separate analysis if and when decisions are taken on these aspects.

The option highlighted in bold is the one considered in this cost benefit analysis. The 1700 option is not deemed to be adequate to accommodate the type of aircraft required to ensure higher levels of connectivity.

A runway extension to 1,799m with traditional, land-based, RESA was discounted as it would require earthworks which would extend over both Les Blicqs Road and the parochial cemetery; it would also take the development well beyond the IDP Safeguarded area.

An extension to beyond 1,799m was not considered, as this is outside the scope of the options that were retained in the 2018 Strategic Options Review report; it would also require the Runway Code to change from 3C to 4C (or 4D).

The primary economic impacts are the result of visitor spending and business facilitation and expansion effects.

The business case analysis for the proposed runway extension against the no-extension case rests primarily on visitor spending impacts and business facilitation and expansion impacts

- **Visitor spending impacts** are measured as the macro-economic impacts of changes to the annual number of expected leisure and business visitor arrivals as a consequence of the runway extension. To obtain this impacts, we use our projections of visitor numbers and combine these with data on average spending. This information on spending is then converted into impacts on Gross Value Added (GVA) using national accounts data. We also use this approach to derive data on exchequer revenues based on indirect and direct taxation.
- **Business facilitation and expansion impacts** are based on estimates of the macro-economic impacts of runway extension via business facilitation and expansion effects. Given the uncertainty in these estimates we use two different approaches to provide the most likely range:
  1. *A top-down approach* that is based on international evidence about the relationships between business travel and trade and economic growth. We model the application of these relationships to Guernsey in the context of a runway expansion and forecast impacts on visitor numbers.
  2. *A bottom- up approach* that models the relationship between reliability, business visitor numbers, and productivity. On the basis of these relationships, we estimate the level of sectoral expansion linked to a runway extension.

  We use both approaches given the more uncertain nature of the magnitude and measurement of these business expansion effects. We interpret the findings in light of inputs made by stakeholders on their views of the likely magnitude and nature of these effects.

Alongside the impacts on GVA from changes to visitor spending and business, we also provide an analysis of other effects including:

- Effects on tax revenues estimated on the basis of GVA effects via the visitor spending channel and the business expansion channel
- Benefits in terms of access to health services and facilities, and in terms of access to sporting and cultural activities and events

We undertake an initial assessment of the social and environmental impacts of runway extension. This focuses on the:

- Impact of aircraft emissions of greenhouse gases and noise: drawing on the modelling of changes in visitor numbers and flights we provide initial estimates of the implications for greenhouse gas emissions and noise based on evidence about current and future airport operating performance.
- Impact of the runway extension itself: the environmental impacts of the process of runway extension, including greenhouse gas emissions associated with the new construction and with the loss of some natural environments.
- The social effects of changes in land-use as a result of the runway extension

Our assessment is of the impacts of extension against the baseline of no extension.

We assess the proposed extension of 1740 metres with traditional RESA against a 'business as usual' (or counterfactual) case in which the runway remains at its present length. We also model sensitivities around visitor trends in this counterfactual (see next page and Annex 2 for more detail).

- In the absence of the extension, the effects of connectivity that we have modelled on visitor spending channels and the business expansion channels do not materialise, and neither do the benefits that are attributable to these two channels
  - In the absence of an extension, annual visitor levels reaching Guernsey by air will remain stable, at around 180,000 per year, reflecting trends since 2016. This generates spending valued at around £2.4 billion in NPV terms over the duration of the project. This scenario is conservative in relation to the potential upside of a runway extension..
- The investment costs of extension are not incurred but there will be on-going costs reflecting the maintenance of the existing runway and the incentives provided to airlines by the States. These are not expected to lead to changes in connectivity trends, absent any other intervention.
  - Resurfacing is required every 10-15 years, and the estimated cost is around £10 million. Resurfacing is required regardless of the extension and therefore the costs do not feature in the net benefit analysis. We assume that in the no extension case the resurfacing costs are the same as in the extension case. Though in practice it may be higher in the no extension case if doing the resurfacing at the same time as runway extension generates economies of scope (synergies).
  - The incentives provided to carriers are valued at £1m per year for 10 years following the extension, or £8million in real present value (PV) terms.
- An assessment of a counterfactual case to the runway extension in which the States devote equivalent resources to support some other form of intervention is not within the scope of this study.
- We have not made any assumptions relating to the installation of ILS as part of the extension process, relative to the no-extension process. A decision to install enhanced ILS facilities, if made, would increase the cost base, but could also generate added benefits in terms of avoided cancellations and delays. This is borne out by the data presented in Annex 4, which contains preliminary analysis of the relationship between flight cancellations and the incidence and severity of fog.

We modelled sensitivities to the baseline no extension case reflecting scenarios in which visitor numbers continue to decline

Stakeholder input revealed concerns that in the absence of an extension, visitor numbers would continue to decline. This is because potential visitors might prefer destinations that have invested in connectivity in recent years, and compete with Guernsey for tourism and business opportunities.

We model two scenarios in which the number of visitors arriving by air could fall below the 180,000 level. We have investigated:

- A 1.7% annual decrease in visitors arriving by air, which has been the average visitor trend since 2012
- A 1% annual decrease in visitors (i.e. an intermediate scenario)

The detail of this modelling is presented in Annex 2. The table below reports the GVA increases associated with visitor spending under the standard no extension case (which is the basis of the net benefit analysis we have undertaken), and under the two sensitivities. We also report the impacts on GVA via visitor spending of the extension scenarios (high and intermediate) against these three alternative baselines

Present value visitor spend	Constant visitors	Moderate visitor decline	Historical visitor decline
No extension	£2.4b	£2.0b	£1.8b
Extension - intermediate impact	£2.6b	£2.2b	£1.9b
Extension - high impact	£3.1b	£2.6b	£2.4b

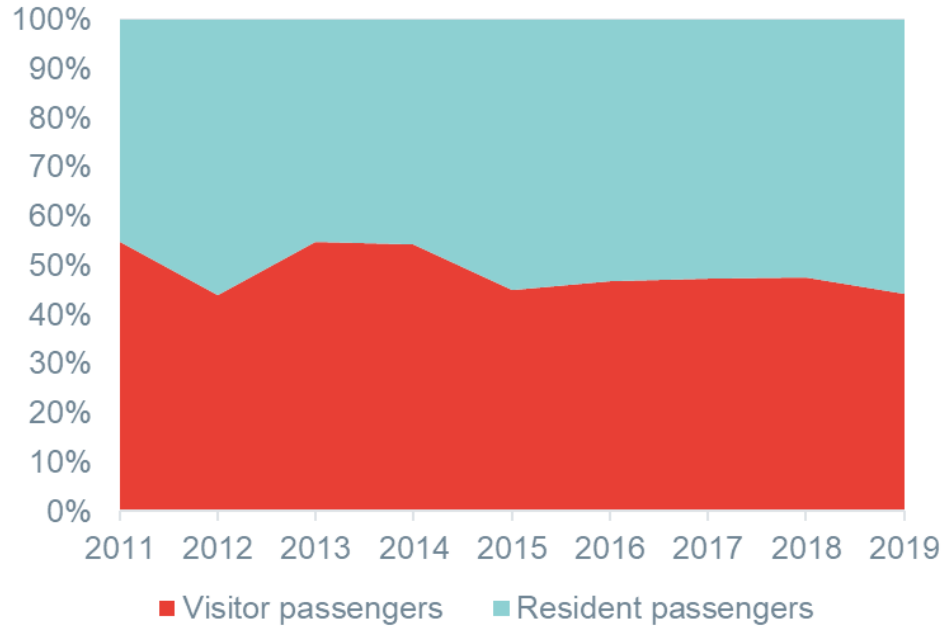
We observe that for the high impact extension scenario, the effect of *lowering* the baseline is to *increase* the relative impact of the extension (i.e. the percentage increases off the baseline are bigger). In the intermediate case, the relative impacts are smaller the lower the baseline. This reflects differences in underlying modelling approaches to the extension scenarios: in the high impact case we use fixed increases in arrivals numbers based on the modelling commissioned by the States. While in the intermediate case we model percentage increases off the baseline.

We also evaluate information stakeholders submitted to us about the value of lost business opportunities in the finance sector, and present this information as part of our discussion in chapter 4.

The mix of passenger and visitor types has been stable over the last five years

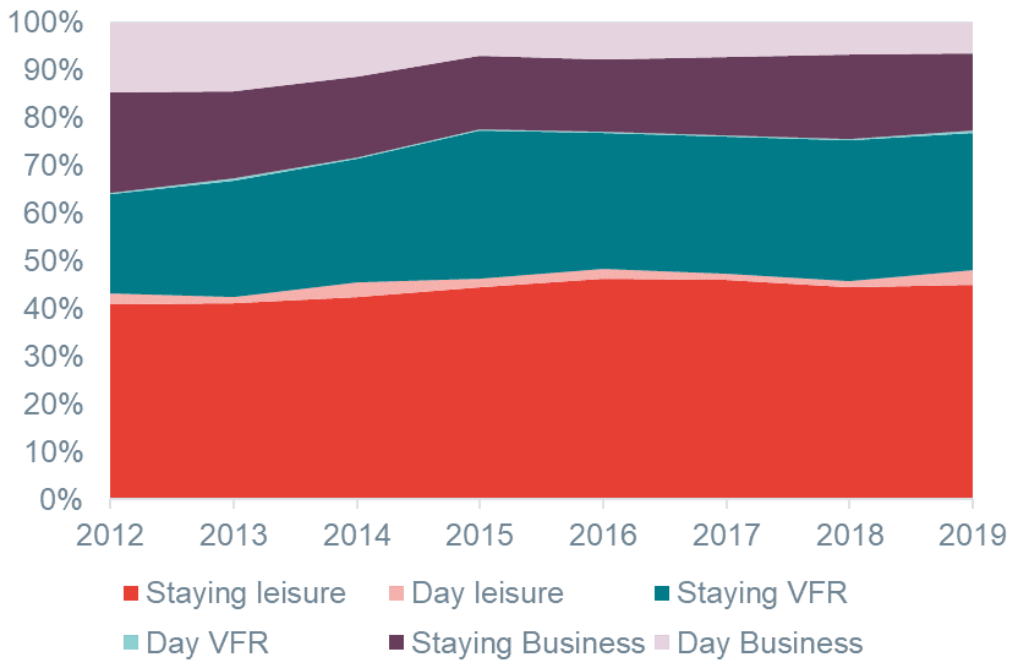
We estimate the economic impacts of spending by new visitors to Guernsey. We investigate this from two perspectives: scenarios for possible increases in new visitors and modelling the number of new visitors that would be required to justify the cost of the runway extension. Different types of visitors spend different amounts during their stay in Guernsey. Therefore, under both our approaches we need to understand the future split of visitors by visitor type.

Air passengers



Since 2015, split between visitors and residents among air passengers has been roughly constant. Therefore we use the 2019 split between visitors and residents in estimating future years.

Air visitors



The mix of visitor types has also remained broadly steady since 2015. We use the 2019 distribution of visitor types in estimating visitors and visitor spend in future years.

VFR – visiting friends and relatives.

To ensure only new visitors are counted in the analysis, any visitors that choose to switch from sea routes to air routes following the runway extension (so-called "cannibalisation") should be excluded.

Many external factors affect trends in sea and air passengers volumes

Over time, sea and air passenger volumes can be effected by changing passenger demographics. These can include age, rates of travelling with children, affluence, and region of origin.

Stakeholders have suggested that changes and air and sea services have affected their relative passenger volumes

In 2015, Condor replaced two smaller vessels operating from two south coast ports to a single port operation utilising a larger vessel. This reduced rotations and overall seat capacity on the Mainland line. The decreased frequency may have impacted passenger volumes, for instance reducing the feasibility of ferry travel for day-trippers.

Condor reported a drop in passenger volumes from the UK following the introduction of competition on the Southampton air route and more generally the implementation of the quasi-open skies policy.,.

The geography of air and sea links likely plays an important role in any competition between transport modes

Condor have informed us that a majority of their UK customers originate within a 2-hour drive time of the Poole or Portsmouth harbour. For example, over 30% of their UK bookings originate in what Condor refers to as the Meridian region (essentially, the South East), compared to fewer than 2% in Scotland. Therefore we would expect the location of an air route to play an important role in the impact of air connectivity on sea passengers to Guernsey.

To investigate the relationship between air and sea passenger volumes, we have analysed data from Jersey

VisitJersey provided us with monthly sea and air passenger volumes, split by route, for 2017 to 2019. Passenger volumes on a route are composed of:

Passenger volumes on a route = (seasonal effects on the route)

+ (trends common to all routes)

+ (trends specific to the route)

To understand competition between sea and air routes, we analysed trends specific to individual routes. We fit an econometric model to control for seasonality and common trends, that isolated trends specific to individual routes. A positive correlation between routes' trends would indicate that shared factors drive their passenger volumes. A negative correlation would indicate that there may be substitution between the routes. Although we do not find that sea cannibalisation will substantially effect long run net benefits, for reference we calculate net benefits under cannibalisation scenarios in **Annex 3.**

To investigate the relationship between sea and air passenger volumes, we have analysed historical Jersey data.

Condor informed us that their closest competition from air links is from Channel Island routes from Bournemouth, Exeter, and Southampton. As there are no direct flights between Bournemouth and Jersey, we have tested correlations between the other two airports and the sea links:

Correlation between route trends	Exeter	95% Confidence interval	Southampton	95% Confidence interval
Poole	-0.0009	(-0.31,0.31)	-0.10	(-0.40,0.22)
Portsmouth	0.13	(-0.19,0.42)	0.11	(-0.21,0.41)

Source: Visit Jersey

Positive correlations indicate that numbers move roughly in the same direction. If that is the case, we can rule out substitution. Negative numbers suggest the possibility of substitution. Scores of zero or close to it indicate no relationship.

These statistics do not provide evidence of air passenger volumes impacting sea passenger volumes; the correlations between Portsmouth and the two airports are positive, and Poole and Exeter have a correlation that is nearly 0. By contrast, the sea links have very high positive correlations with one another:

Correlation between route trends	Guernsey	Poole	Portsmouth
Guernsey			
Poole	0.46		
Portsmouth	0.09	0.34	
St Malo	0.48	0.69	0.39

These correlations are all positive, and largely much higher in magnitude. This suggests that other factors common to these routes, such as weather and quality of service are more significant drivers of ferry passenger volumes.

We conclude from this analysis that changes in air passenger volumes are not likely to substantially affect sea passenger volumes in the long run. This does not exclude the possibility of periodic switching between sea and air routes.

We estimate the effects of runway extension on GVA via changes to visitor numbers and their spending (relative to a no-extension case).

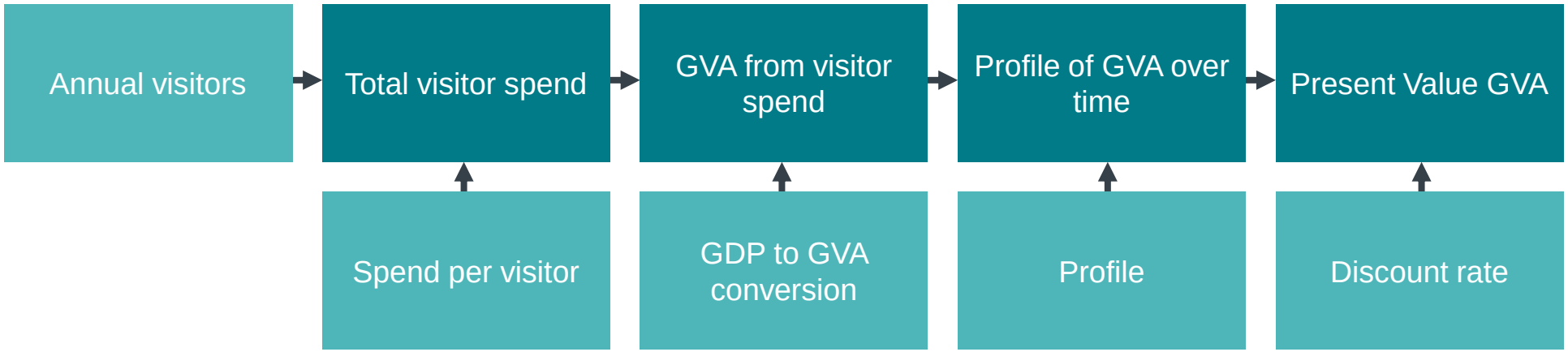
We have conducted a cost-benefit analysis that compares the benefits from visitor spend with the costs of installing the runway. As noted in our methodology, this provides one part of the overall estimate of benefits. The impacts through stimulating new and existing businesses provides the other main impact. It is discussed later.

We have analysed the impact on GVA of **3 scenarios** that vary in terms of the increase in visitors resulting from the runway extension:

- **High** This scenario uses the 'base case' forecast provided by the States, based on work by ASM, of the increase in visitors that would result from the runway extension. The Gatwick route is excluded from this calculation, in line with the assumption about the continuation of the quasi-open skies policy
- **Intermediate**. This scenario provides a revised projection based on the high scenario. We have independently estimated the potential increase in visitor volumes that would result from the runway extension. As with the High scenario, the Gatwick route has been excluded from the analysis. Details of this analysis are provided in the Annex 1.
- **Break even**. Unlike the other two scenarios, this is not a projection. Rather it can be viewed as a risk analysis in the sense that it estimates the smallest uplift in passengers required to exactly offset the costs of the extension through the effect on GVA of spending decisions

Note that the first two scenarios estimate the potential benefits from visitor spend resulting from a runway extension. By contrast, the break even scenario is *not a forecast*; it provides a point of reference against which to compare the passenger volumes estimated in the other two scenarios.

For each scenario, we calculate the benefits from visitor spend as follows:

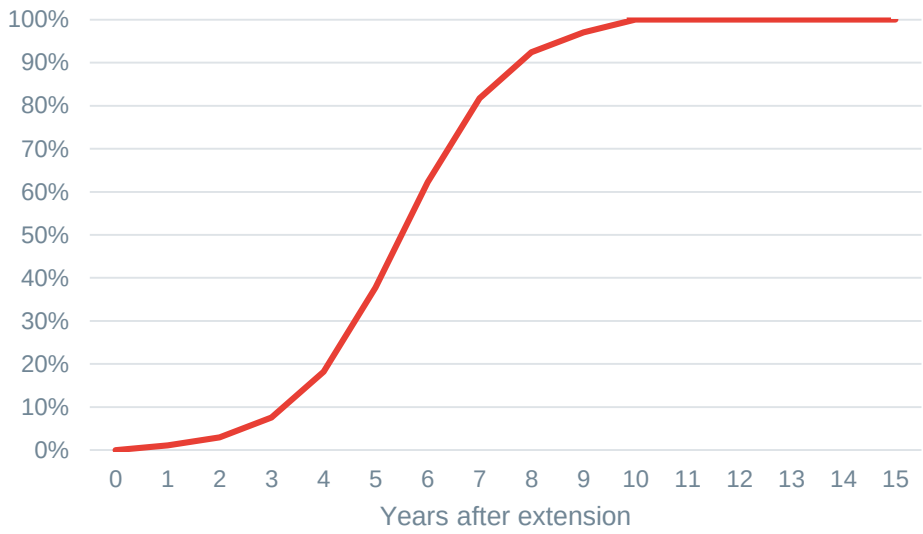


We use recent data to estimate visitor spend and to convert that spend into a present value estimate of total benefit.

Benefits

- **Spend per visitor**. We have used the 2019 spend per visitor (air travel) of £633. We have assumed that the average spend per visitor arriving by air remains constant over time in real terms. [2019 Visitor Spend Survey].
- **GVA calculation**. We convert total visitor spend to economic benefits, expressed as Gross Value Added. GVA measures GDP (turnover) less net taxes and subsidies. In the most recent year of data available (2018), 98% of GDP was GVA, and 2% was composed of net taxes and subsidies. We have assumed that net taxes and subsidies on the goods and services purchased by visitors is equal to the net taxes and subsidies in the entire Guernsey economy. So we have estimated that GVA will be 98% of total visitor spend. The calculation of GVA contribution per visitor is shown in the table on the right.
- **Profiling**. The visitor stimulation from the extension is likely to 'ramp up' over a period of years. This could be due to several factors: customers that make travel plans with long lead times, a delayed effect of marketing, or other lags in public awareness. We model this 'ramp up' over 10 years: in the year of the runway extension (year 0), there is no incremental benefit of the extension. This increases to year 10, when the full benefits of the extension are realised. Beginning in year 10, the benefits are constant. The rate of increase was modelled with a logistic function (S-shaped curve) and is illustrated on the right.
- **Discount rate**. We have used the HM Treasury Green Book discount rate of 3.5% over 40 years. We recognise the Green Book allows a lower 3% discount rate for periods over 30 years; our approach provides a conservative estimate.

Illustration of profile shape



Estimating GVA from visitor spend

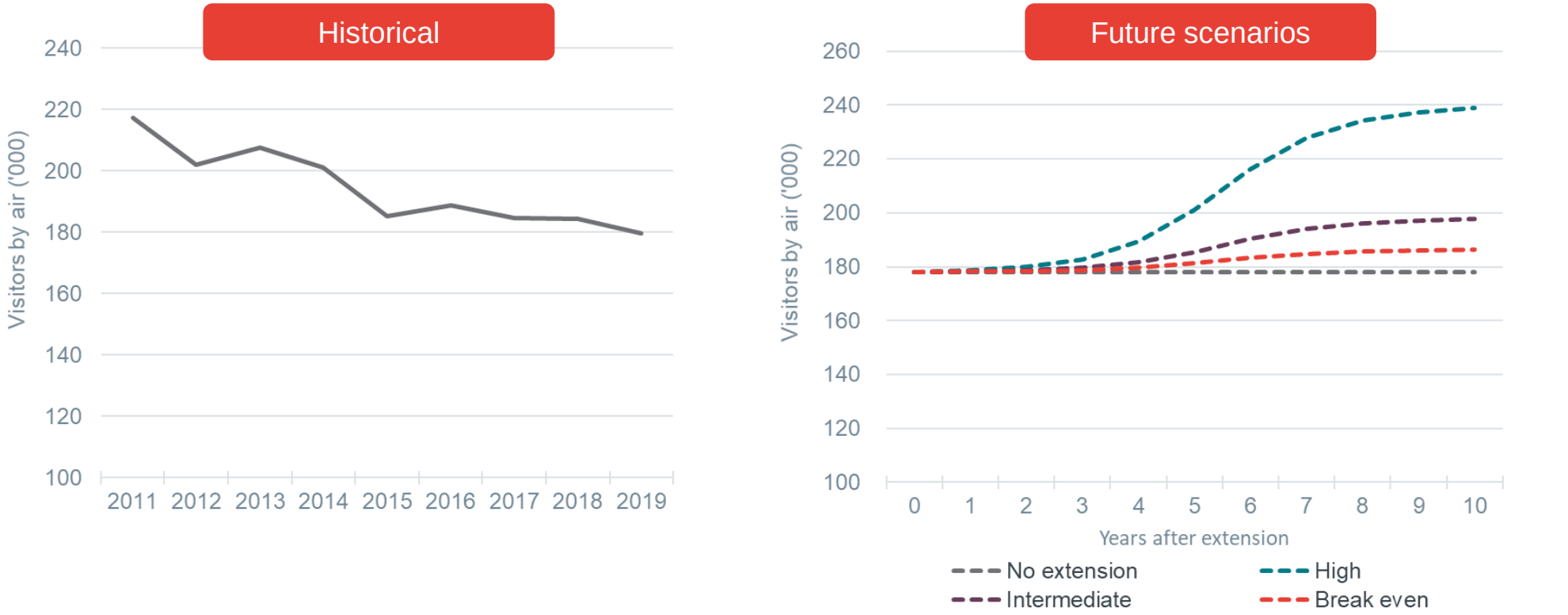
Spend per visitor	GVA / GDP conversion	GVA contribution per visitor
£633	98%	£620

We have received estimates of the engineering costs of the extension, and we estimate the environmental costs of incremental flights.

CfED commissioned a separate engineering study to estimate the costs of building the new runway extension. It was undertaken by RPS. We have used the output from analysis to estimate overall costs and benefits. The RPS analysis suggests:

- **BAU engineering costs** (not incurred in a runway extension scenario): the costs of a single resurfacing of the runway, that would last approximately 10-15 years. This is modelled as a single payment of £10m. In the absence of information about the particular timing of the no-extension resurfacing relative to the timing of the runway extension, we have evenly divided the £10m over the initial 12 years of the period being examined.
- **Runway extension costs.** RPS provided an estimate of £78.9m for a Traditional RESA 1740m runway extension. We have amortised these costs over 40 years, using an interest rate of 3.65% based on Government borrowing costs. Following expert discussions, we have also added a further annual cost of £1m for 10 years following the extension to account for incentives that may be needed to attract new airlines. This is normal practice but again we have used conservative (ie. high) estimates. Finally, in the no-extension scenario, there is a one-off cost of £10m to resurface the runway
- **Environmental costs**. We have estimated greenhouse gas emissions costs. We provide details of this calculation subsequently in this report.

The visitor increases resulting from the runway extension could reverse recent decreases in visitor levels.



- The differences between scenarios are driven by the long-run increase in visitors. All scenarios phase in visitor demand using the same profile such that10 years post extension the full impact on visitor volumes is realised.
- The High forecast provides the highest visitor estimate. Both the High and Intermediate scenarios estimate visitor increases substantially above the visitors required to break even (i.e. to ensure the costs of the extension are balanced by the benefits from visitor spend).
- The increase in visitors under the High scenario would roughly recoup recent declines in visitor numbers. Given that Guernsey recently accommodated higher visitor flows, this may suggest that wider constraints (e.g. available beds, airport capacity) would not limit visitor growth within a 10 year time horizon, with the potential to invest and plan over a longer time horizon.

The increase in visitors and spend can be divided amongst visitor types to produce an estimate of the value of the runway extension.

The tables below provide the analysis of visitor numbers (top table) and visitor spend (bottom table) split by the type of visitor. As discussed in the methodology section, analysis of historical trends suggest the split between different types of visitors is stable.

A large majority of the increase in visitors are likely to be leisure visitors, followed by those visiting friends or relatives (VFR). Although business visitors are likely to make up a small portion of visitor numbers, they are likely to spend more per visitor than other visitor types.

('000) visitors	% of visitors	High	Intermediate	Break even
All leisure visits	71%	43	14	5.8
All visits friends/relatives	16%	10	3	1.3
All business visits	9%	6	2	0.8
All other visits	4%	2	1	0.3
Total		**61**	**20**	**8.2**

Annual visitor spend	% of spend	High	Intermediate	Break even
All leisure visits	78%	£30.1m	£9.7m	£4.1m
All visits friends/relatives	12%	£4.6m	£1.5m	£0.6m
All business visits	7%	£2.7m	£0.9m	£0.4m
All other visits	3%	£1.2m	£0.4m	£0.2m
Total		**£38.5m**	**£12.4m**	**£5.2m**

Note: Figures are used to develop scenarios, they are not a forecast. See methodology section for details.

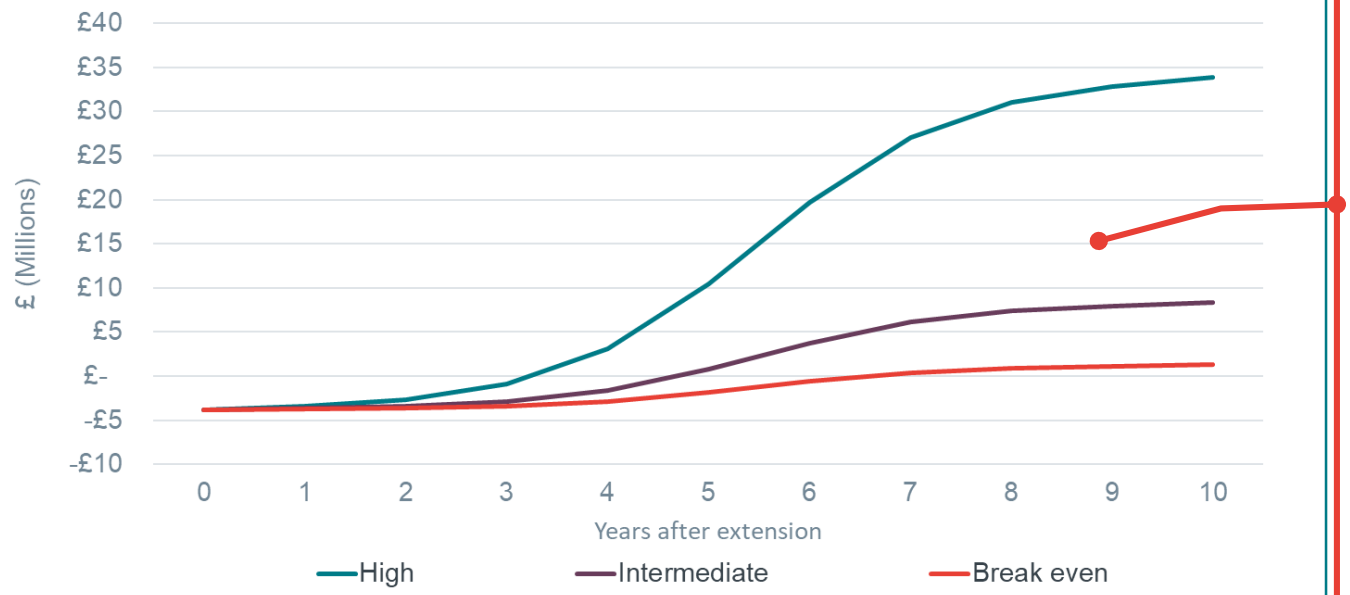
The net benefits from visitor spend will be in the range of £115m - £534m, considerably higher than the cost of the runway extension.

The table below provides the net present value of the costs and benefits from the runway extension. The "break even" column shows the result of calculating the number of additional visitors that would be needed to just offset the costs of the runway extension. This break-even value, of 7,700 additional annual visitors, is well below existing estimates of the actual number of additional visitors in scenarios developed by us and others.

Scenario (differences against base case)	High	Intermediate	Break even
Long-run increase in annual visitors	*61,000*	*20,000*	*8,200*
Benefit from visitor spend (PV over 40 years)	£627m	£201m	£85m
Resource and environmental costs (PV over 40 years)	-£93m	-£86m	-£85m
Net benefits (visitor spend impacts only, PV over 40 years)	£534m	£115m	0

In the years immediately following the extension, the annual costs are likely to outweigh the annual benefits from visitor spend. The year in which the annual net benefits from spend begin to exceed the annual costs depends on our assumptions about timing of costs and benefits.

Incremental net benefit from visitor spend (annual basis)



The year in which annual net benefits exceed zero depends on:

1. Any disruptions to visitor flows during the extension installation. (not modelled these.)
2. The rate at which in visitor increases phase in. This depends on various factors such as airline and States marketing campaigns, and consumer awareness (we have modelled a 10-year ramp-up).
3. The timing with which costs are incurred. There may be some upfront extension costs that are not smoothly amortised. (We have modelled smooth amortisation.)

Business facilitation and expansion – how do they come about?

The analysis of the visitor spending impacts suggests that the costs of a runway extension can be justified based on those alone. However, a complete cost-benefit analysis should also include benefits from business facilitation and expansion.

Existing businesses may expand their operations because of the opportunities provided by the runway extension. The size of the Guernsey economy means that individual decisions by individual businesses could have significant impacts on these estimates. In order to best capture the uncertainty created by the fact that individual decisions (which cannot be predicted) could have a significant impact on economic outcomes, we have evaluated the potential impact on businesses in two different ways:

1. A top-down approach based on the relationship between business facilitation and trade, and the effects of trade expansion on productivity and growth.
2. A bottom-up approach modelling the effects of runway extension on reliability, and through this on business productivity.

These elements are incorporated directly into our overall analysis of costs and benefits.

In addition, we received submissions from stakeholders regarding the likelihood of business-related benefits. These included:

- Statements on the effects low levels of connectivity could potentially have on lost finance sector activity and employment. Stakeholders submitted survey evidence in support of their claims. Investment funds found that the ability for potential customers to access Guernsey efficiently through known operators was an important factor in their competitive positioning vis a vis rivals in other jurisdictions.
- The Institute of Directors and Chambers of Commerce presented survey evidence about the effects of reliability and travel costs on businesses. They also submitted information on their assessment of lost business opportunities in the finance sector. A quantitative assessment and estimate of the economic impacts of lost finance sector activity based on this claim is presented in this section, but is not included in our overall analysis of costs and benefits.
- Statements pointing to feedback from tourism sector operators indicating that future investments in tourism infrastructure were on hold pending a decision on the runway extension. If the runway were to stimulate such investments, this would in turn generate wider benefits in terms of economic activity.

Business expansion benefits are valued at between £21 million and £153 million in PV terms (over 40 years), depending on business visitor increase scenarios

The analysis described in this section suggests additional benefits, in PV terms over 40 years, of £21 million to £153 million from business facilitation and expansion effects using the top down approach. The estimated benefits are lower using the bottom-up method: they range from £11 million to £87 million. The difference is not necessarily surprising: the bottom-up approach considers a narrower range of effects, as explained later in this report. We use the results from the first methodology for our overall calculus since the methods used in it have been applied to various situations and contexts globally.

Both sets of results tell a consistent story: greater connectivity can have significant effects on businesses, and through that on economic activity. They suggest that the benefits measured solely on the basis of visitor spending are likely to significantly understate the overall benefits of runway extension. And notwithstanding the uncertainty surrounding the estimates, the runway extension preserves the option that they may be realised.

The small size of the Guernsey business community means that individual decisions by individual businesses could make a significant difference to these estimates. Given the unpredictability of such individual decisions these estimates should be treated with caution.

The table below summarises the NPV effects for the different methodologies.

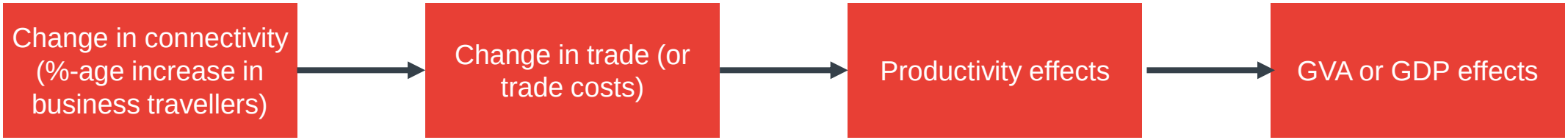
	Present value of GVA increases under the…		
	Break even scenario	Intermediate scenario	High scenario
Top down: connectivity, trade, productivity and growth	£21m	£86m	£153m
Bottom-up: connectivity, business efficiency and productivity, growth	£12m	£28m	£87m

In addition**, stakeholder inputs** raised the issue of costs to Guernsey if no extension were forthcoming and businesses relocated elsewhere. Based on a view that this would lead to lost opportunities equivalent to 30-45 finance sector jobs per year, we estimated annual GVA losses at between **£3.4 and £8.6 million per year.** We do not include these results in our analysis of net benefits. However, they can be viewed as sensitivities around these results, in particular as a guide to additional costs of a no-extension scenario

Our first approach was to estimate the effects of increased connectivity on business expansion “top down”.

A “top down” approach draws on the research connecting connectivity to the reduction of transactions costs, and the research connecting transactions costs to productivity

The key steps of the analysis are summarised in the schematic below.



One advantage of this approach is that the focus on productivity responds to concerns raised by stakeholders that lack of air connectivity was one of several factors that contributed to a “productivity trap” i.e. a situation in which lack of connectivity inhibited business expansion, which in turn inhibited productivity growth, with further consequences that Guernsey would forego opportunities for further investment and growth.

The framework also has the advantage of drawing on an established empirical findings, including

- Empirical research into the relationship between connectivity and trade and trade costs
- Empirical research into the relationship between trade and productivity

Both lines of research typically estimate measures of responsiveness (“elasticity”) of trade to changes in connectivity and productivity to trade. These measures are averages, and are estimated across countries. We therefore need to adapt these estimates to Guernsey.

To do this, we look at qualitative evidence as to which sectors are likely to benefit from a reduction in transactions costs brought about by the increased business travel. The evidence from our consultation with stakeholders suggests that the main sector in which these effects are detected is the financial sector. This is because of the importance of personalised, face-to-face contact in developing client relationships and managing clients’ businesses. .Stakeholders also pointed to the value of being able to accommodate a higher number of business and private jets. Specifically, we focus on financials services trade: the extent to which Guernsey is able to attract funds from outside the island. This counts as cross border trade by Guernsey based institutions and consumption abroad by clients based off-shore.

Note: See Annex 5 for all references and literature referred to in this “bottom-up” approach

The “top down” approach focuses on the impact of new trade in raising the productivity of Guernsey-based businesses.

How does increased business travel increase trade flows

We use a gravity model of trade to provide a proxy for the impact of the runway extension. Gravity models of trade represent trade between any pair of partners as proportional to their size and inversely proportional to the square of distances between them. In this context, distance can capture trade costs generated by transport. Frontier’s gravity model of international services trade flows augments the basic model with other policy variables measuring services trade restrictiveness. It suggests that a 1% reduction in distance boosts trade in services by around 0.6%.

An alternative methodology, used in other research, is to measure the change in trade resulting from business travel directly. This gives a responsiveness of around 0.3% to every percentage change in business travel.

We can treat the two estimates as lower and upper bounds. The first estimate might overstate the effects of business travel connectivity since there are other factors that may be captured in the model but are not related to the ease of business travel. The second estimate may understate the effects since it includes sectors that may be less “relationally-intensive” than financial services.

Responsiveness of productivity to trade .

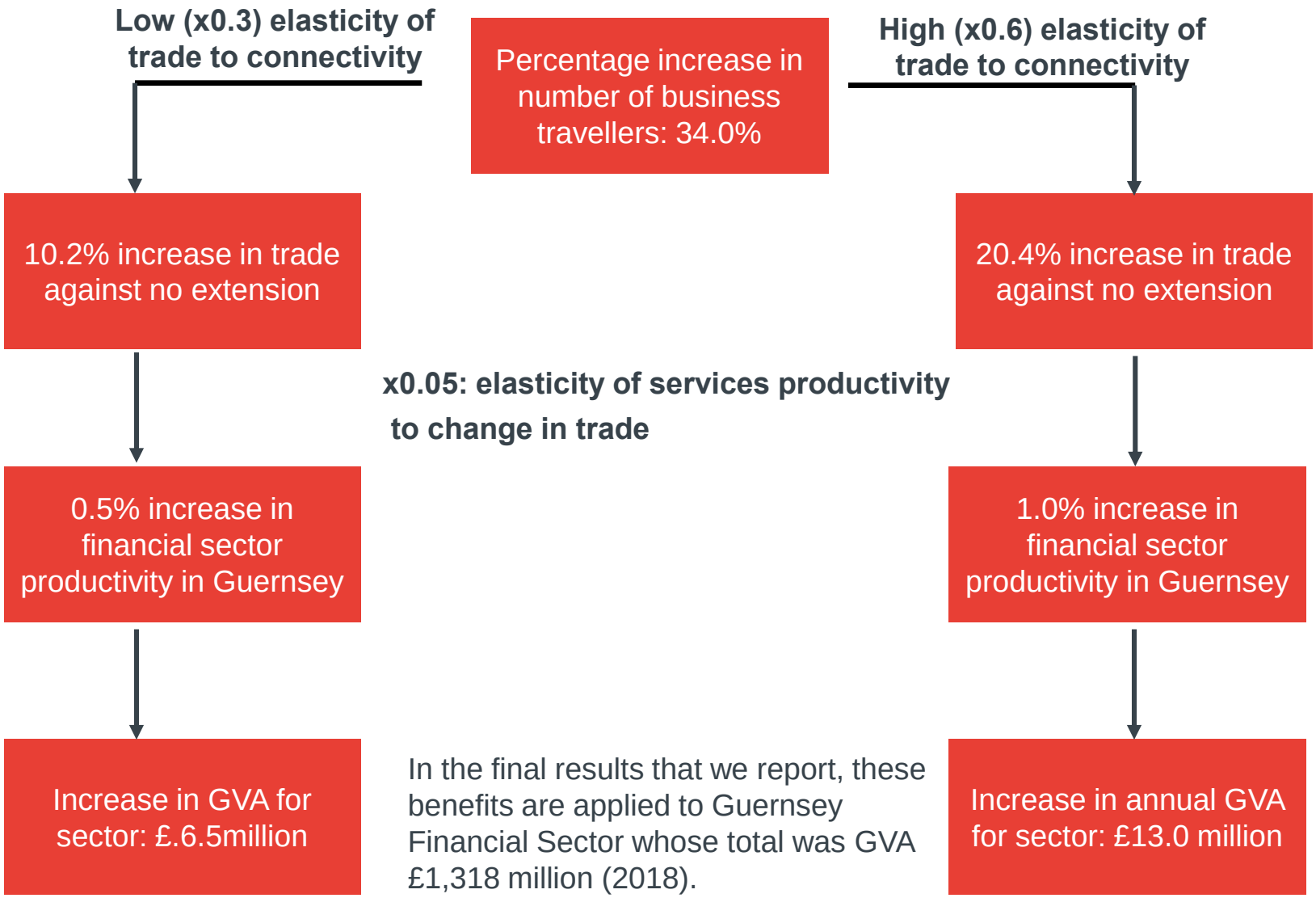
Empirical research provides estimates of the relationship between trade and productivity. The empirical evidence on this is vast and points to a fairly wide range of effects depending on the countries in question. The literature suggests an intermediate value of 0.4%. This figure may overstate the impact for financial services in Guernsey because: (1) the results capture economies of scale that are more prevalent in manufacturing than in services and (2) the results also capture the effects of global value chains and the gains from international specialisation in production, which is less relevant to Guernsey. Research into trade costs and productivity suggests that productivity gains in services might be around 12% of those measured overall. We use this as a conservative estimate and adapt the 0.4% figure downwards accordingly.

Applying these estimates to financial sector GVA

The schematic on the following page shows how the methodology is applied. We begin with the proposed uplift in connectivity, measured as the percentage change of business travellers. We then multiply these by a parameter that measures the responsiveness of trade to connectivity (0.3 in the low case on the left, 0.6 in the high case on the right). This gives a percentage change in trade, which we then multiply by a parameter measuring how productivity changes in response to trade. This percentage uplift is applied to sector GVA to yield an increase in GVA

Note: See Annex 5 for all references and literature referred to in this “bottom-up” approach

Depending on the responsiveness of trade to connectivity we get a range of benefits from £6.5m to £13.0 per year in GVA .



Note: see explanation of pathways in preceding slide

The “top-down” trade-based analysis suggests benefits to the finance sector of £2m to £13m.

Visitor increase scenario relative to baseline	Percentage change in business travellers	Percent change in trade as results of projected change to business travellers (scenario A – low, and scenario B – High)		Percentage change in productivity response to change in trade (scenario A – low, and scenario B – high)		Range of finance sector GVA effects (millions of pounds per annum)
		A	B	A	B	
High	34.0%	10.2%	20.4%	0.5%	1.0%	**£6.5 to £13.0**
Intermediate	11.0%	3.30%	6.6%	0.2%	0.3%	**£2.1 to £4.2**
Break even	4.5%	1.4%	2.7%	0.06%	0.1%	**£0.9 to £1.8**

The table summarises the results of the methodology depicted in the previous slide across all three visitor scenarios relative to a no-extension case for the finance sector. As discussed – we focus on the finance sector because evidence suggests they benefit the most from connectivity improvements. However, to the extent that other sectors also benefit this would only add to the total value of benefits.

The last column presents the annual impacts on finance sector GVA in millions of pounds, relative to the no extension case

The number reported are the result of cumulatively applying projected changes is business travellers to trade flows changes, and trade flows to productivity changes which are then applied to national accounts that present data on finance services sector GVA

The range reflects the differences between parameters used to compute the responsiveness of trade to changes in business numbers,

To the extent that the effects on passenger changes materialise progressively, the effects on GVA will also materialise progressively

The GVA effects are additional to the spending effects derived under the visitor spending effects analysis

The GVA effects are based on linear extrapolations from current values. They are conservative in the sense that they do not capture the possibility that increased connectivity could lead to step changes in business activity. (For example, as a result of the relocation of a large financial services business). Such step changes are inherently difficult to model. What could be said is that the extension, at the very least, preserves the option for such a step change to occur.

The "top down" approach to business expansion suggests benefits of £21 million to £153 million in PV terms.

We present the results in the previous table in present value terms over the 40 year life of the extension.

In order to do so, we use the same discount rate as used for the visitor spend analysis. Because the number of business travellers increases progressively, we assume that the business-related benefits calculated through this channel do not materialise immediately. As a conservative assumption, we assume that benefits only materialise after 7 years (reflecting the S-shaped profile of passenger increases).

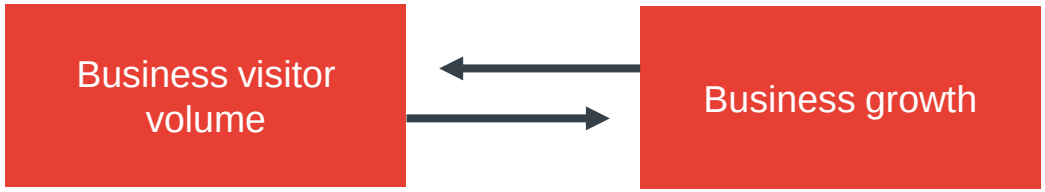
Using the mid-point of the ranges presented in the table in the preceding slide, the NPV of business facilitation and expansion benefits is:

- High scenario:£153 million
- Intermediate scenario: £86 million
- Break even scenario: £21 million

An alternative, bottom-up, approach focuses on the link between individual business decisions and connectivity.

The second approach to estimating business impacts is to investigate the decisions of individual businesses ("bottom-up"). We focus on finance sector for this bottom-up approach. Financial services forms a plurality of the Guernsey economy, and air connectivity is relatively important to the sector, as evidenced by the feedback in our stakeholder consultation. To the extent that other sectors would also benefit, the estimates provide a conservative view of total impact.

Many factors contribute to business growth, and improved connectivity may interact with these factors in complicated ways. A central challenge in estimating the relationship between business visitors and business growth is that they simultaneously impact one another: visitors affect business growth at the same time that growth affects visitors.



The principal features of air connectivity that affect business growth in finance are:

- Access to London routes
- Reliability of services
- Availability of a carrier with a global brand

In this analysis we focus on the first two points: the impact of reliability on London routes. The effect of carrier brand is difficult to measure, especially within the specific Guernsey context. To the extent that the effect of carrier branding would contribute to the impact of the runway extension on business stimulation, our estimates are conservative in omitting it.

We use a combination of Guernsey and Jersey data, in order to increase the data from which we draw inferences. One possible approach to this issue would be to estimate the effect of the introduction of easyJet in Jersey in 2008. However, this is complicated by the simultaneous structural discontinuity in the financial services industry during the financial crisis. As it is difficult to robustly remove this effect from the data, we have focussed on the period since 2012.

Our approach is based on the increase in finance sector activity from improved reliability arising from the runway extension.

In order to estimate the effect of an increase in business visitors on business growth, we focus on estimating the effect that an increase in London flight reliability would have on business visitor volumes, and how this feeds through to finance sector GVA. In focusing on Finance GVA, we avoid double-counting visitor spend, which falls within other subsectors.

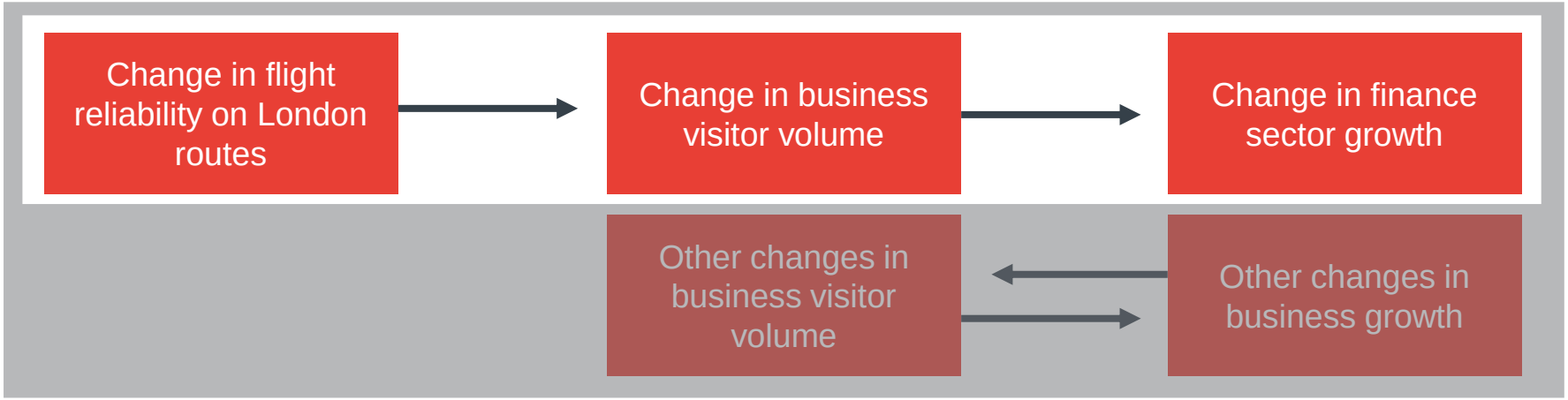
We estimate the effect of flight reliability for the following reasons:

- Stakeholder evidence suggests that the runway extension will likely improve reliability.
- Reliability is an important consideration to businesses making travel arrangements. Moreover, businesses have access to high quality reliability information online and from personal experience, and so should be responsive to changes in reliability
- Flight reliability is a result of weather conditions and carrier operations, and therefore reliability is likely to be unaffected by GVA. It is statistically useful as an exogenous source of variation in business visitor volumes.

We break the estimation down into the following components:

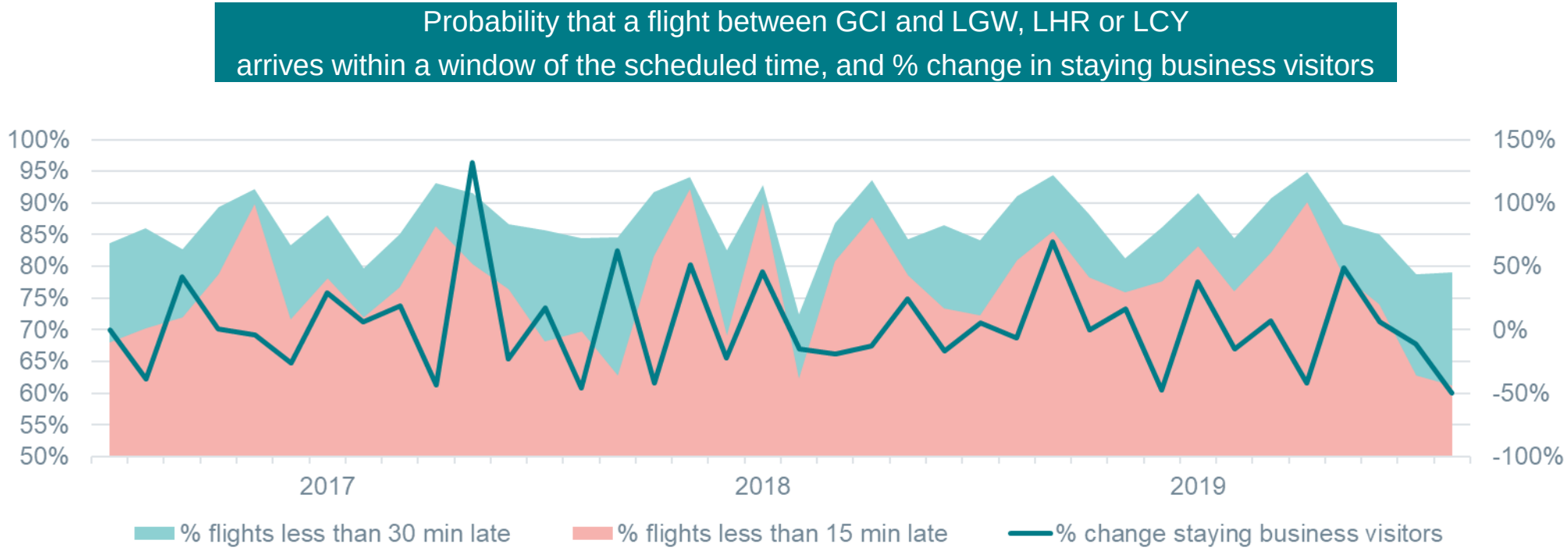
1. How does flight reliability on London routes affect business visitor volumes?
2. How do business visitor volumes comove with GVA?
3. Combining the previous steps: how do business visitors affect GVA?

Isolating the effect of increased reliability



In the first step we investigate the relationship between reliability and business visitors.

The charts below shows the probability of flights to London (Gatwick, Heathrow, London City) being on time (axis on the left) and staying business visitors volumes (axis on the right). We undertake a simple statistical test to understand whether these two factors are correlated.



Sources: Punctuality data from CAA. Business visitor data from States of Guernsey.

The statistical analysis of the relationship shows a small, positive link – albeit with important caveats.

We have regressed staying business visitors on flight reliability measured at the monthly level. Our main specification examines the relationship between a % increase in flight punctuality and a % increase in staying business visitors. As a sensitivity, we have also reported the relationship between a % increase in flight punctuality and the level of staying business visitor volume.

Window of scheduled time	A 1% increase in the probability of flight arriving within window corresponds with the following % increase in staying business visitors:	95% Confidence interval	A 1% increase in the probability of flight arriving within window corresponds with the following increase in number of staying business visitors:	95% Confidence interval
Less than 15 min late	1.0%	(-0.49%,2.49%)	0.35	(-1.41,2.11)
Less than 30 min late	1.39%	(-1.24%,4.02%)	0.98	(-1.62,3.58)

Sources: Frontier analysis of: Punctuality data from CAA and business visitor data from States of Guernsey.

Notes: Data spans July 2016 to August 2019. N=38. All regressions included a time trend. One outlier observation was excluded from this analysis and charts on previous slide (September 2019) due to anomalously high staying business visitor volumes.

We estimate a positive relationship between the reliability of a flight and the number of staying business visitors. We note that these results are not statistically significant, as we are estimating a small association with a limited sample size. As we can estimate the relationship between staying business visitors and the 15-minutes late reliability measure with more precision than the 30-min late measure (i.e. the confidence interval is narrower), we use this estimate in our calculations.

In the following calculations, we take the conservative estimate from these results, that staying business visitors increase 0.35% from a 1% increase in flights arriving less than 15 minutes late.

The second step is to understand how an increase in business visitors may be linked to increased business output.

There are many potential pathways through which business visitors can impact business growth. In order to provide a cross-check of our qualitative evidence on these pathways, we have looked at Jersey's Business Tendency Survey.

This quarterly survey reports various measures of business activity, business outlook, costs, prices, profitability, and employment. The units of the survey measures are:

(% respondents who answered that this area has improved in the last quarter) –

(% respondents that answered that this area has become worse in the last quarter)

We note that this scale does not easily translate into real or monetary units, and so this exercise is a qualitative cross-check of our other analyses.

We investigated correlations between quarterly business visitors to Jersey and each of the quarterly business tendency measures. We looked at each business tendency item measured across all sectors, only within finance, and only within non-finance sectors.

The only statistically significant relationships between business visitors and the business tendency measures were within finance. We have reported these below. This provides some further evidence of an effect of business visitor volumes on growth outlook in the financial sector.

Jersey business tendency survey

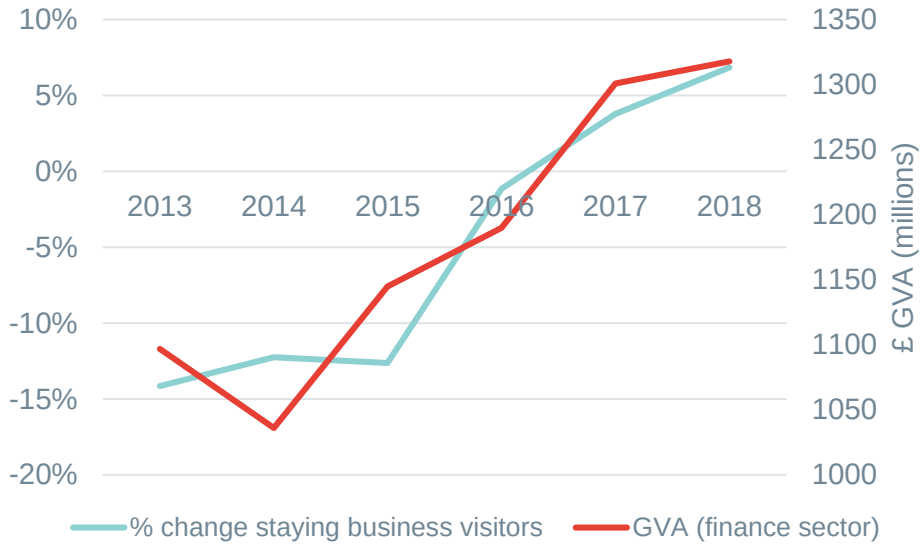
Sector	Measure	An increase of 1,000 business visitors in the quarter is associated with an increase in the measure:	P-value
Finance	New Business	2.5	0.05
Finance	Input Costs	1.8	0.08
Finance	Profitability	2.8	0.05
Finance	Business Optimism	3.2	0.007
Finance	Parent company perspective	3.6	0.05

Source: Jersey Business Tendency survey

Focusing on the finance sector suggests that more finance visitors increases GVA by measurable amounts.

We find evidence of a relationship in Guernsey between the annual change in business staying visitors and financial sector GVA.

Guernsey staying business visitors and finance GVA



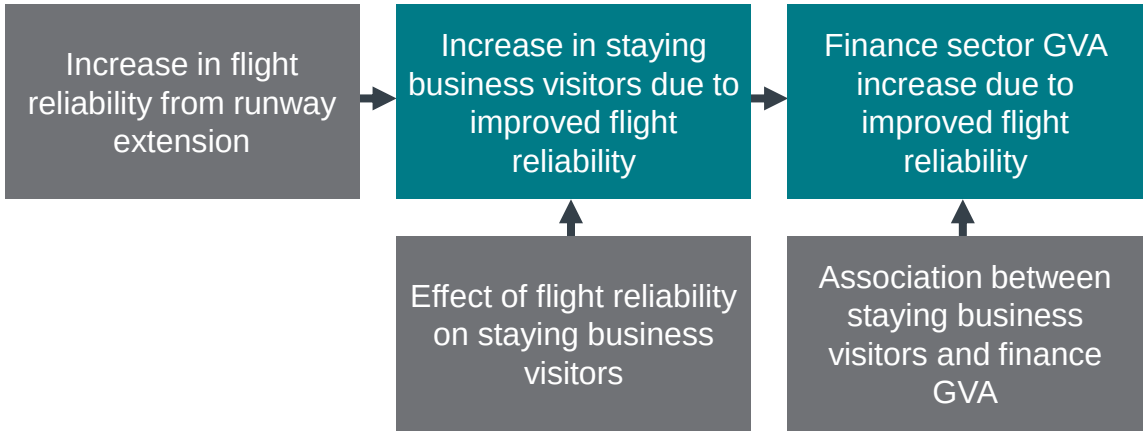
Model	A % increase in staying business visitors is associated with	95% Confidence interval
A % increase in Finance GVA of:	0.1%	(-0.69%,0.92%)
A level increase of	£5.8m	(£-13.26m, £24.93m)

Source: Frontier analysis of data from States of Guernsey and Guernsey GVA GDP Bulletin

We take the more conservative estimate, which is the model of percentage increases to GVA.

The analysis suggests that the runway extension could increase annual business GVA by up to around £5m.

We estimate the effect of the runway extension on GVA with the following steps:



In 2019, 76% of flights to and from Guernsey Airport arrived within 15 minutes of the scheduled time. We assume that under the runway extension, the percentage of flights arriving later than this 15-minute window will increase to 86%, which is the current percentage of flights arriving no later than 30 minutes late.

We then calculate the expected long-run annual increase in business visitors that is due specifically to increases in reliability. We then calculate the increase in finance sector GVA that we expect to result from this increase in business visitors.

We note a caveat to these results. The business visitors that cause GVA growth may not be the same kind of visitors who travel to Guernsey specifically due to improvements in flight reliability. We assume that GVA growth results equally from visitors who travel to Guernsey due to flight reliability, and visitors who travel to Guernsey for other reasons.

We find the long-run annual increase in Finance GVA that would be due to increased reliability under the High Scenario is £5.2 million. We have scaled this figure down to estimate the GVA increase under the Intermediate and Break Even scenarios by the relative numbers of visitors.

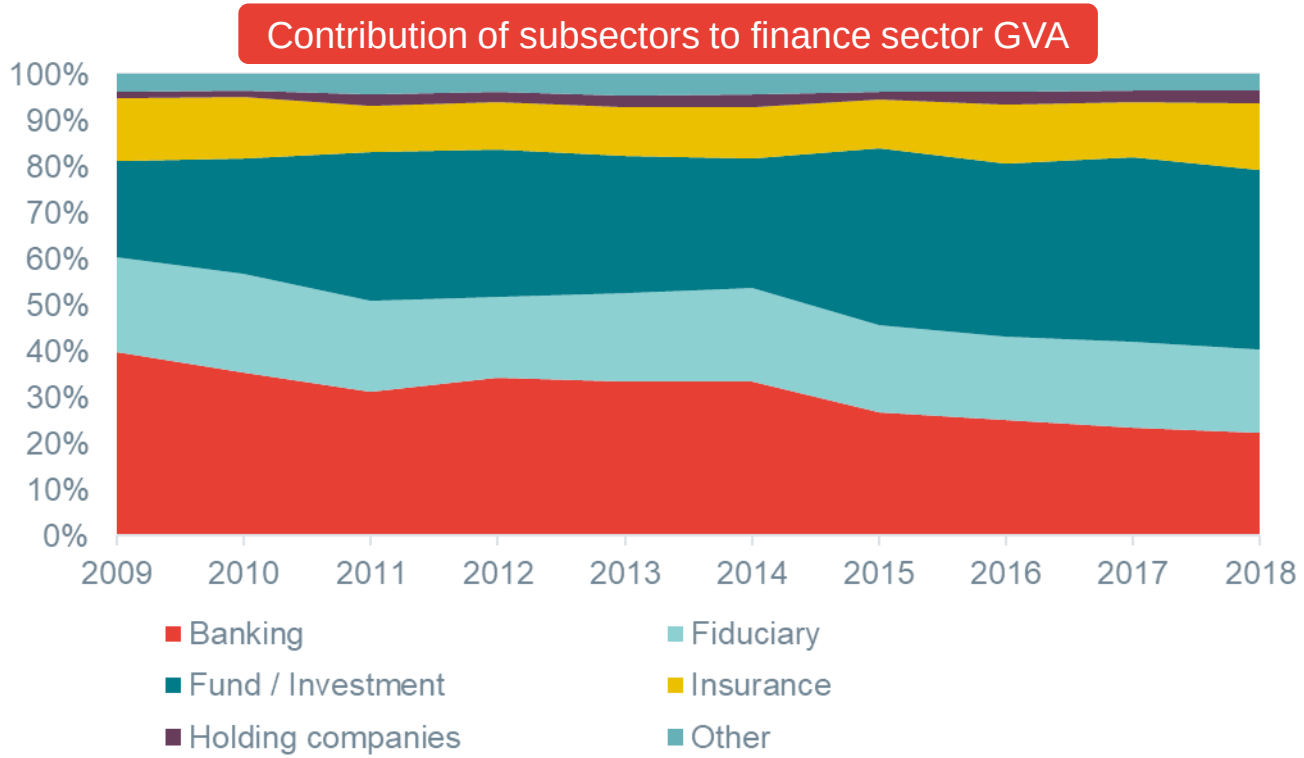
	High	Medium	Break even
Increase in Finance GVA from increase in staying business visitors	£5.2m	£1.7m	£704,000

The changing distribution of finance subsector GVA points to the importance of air connectivity for future growth.

Research evidence suggests that air connectivity reduces local investment bias, where local investment bias is the tendency to invest locally because the investors feel they have more knowledge about the conditions and factors that affect returns to investment (see notably Zhi Da, Umit G. Gurun, Bin Li, and Mitch Warachka (2019) “Investment in a Smaller World: The Implications of Air Travel for Investors and Firms”, Management Science, https://doi.org/10.1287/mnsc.2019.3452).

While that research focused on equity raisings by firms, a similar logic applies to investment fund management activities. This is because the decision to commit to a fund involves a screening process that is made easier by face-to-face communication, which in turn is facilitated by air travel. This view was corroborated by interviews with fund managers. They also pointed out that clients valued the ability to access destinations via airlines that had punctual air links and a strong brand reputation.

As investment funds are a growing share of Guernsey’s finance GVA, air connectivity is likely to be particularly important to future growth in the sector. While Funds / Investment composed 21% of Finance GVA in 2009, by 2018 it grew to 39%.



Evidence from stakeholders largely supported the view that connectivity is important – particularly in financial services.

Connectivity can affect the ease of doing business through a variety of channels.

In principle, the effects of improved connectivity can improve the ease of doing business through various channels, notably: (1) by reducing the costs of acquiring inputs to running businesses (whether physical inputs or labour) and of getting goods to market (2) by reducing wider business transactions costs, notably those associated with establishing buyer-seller relationships (whether on a B2B or B2C basis).

These channels can in turn contribute to the expansion of existing businesses, and also the establishment of new businesses.

Connectivity appears more important for sectors in which the quality of personal relationships is important, notably finance

Various submissions pointed to the detrimental effects of poor connectivity on business prospects. These submissions are dominated by businesses in which relationships through personal contact are important. Finance sector activities, are the prominent example, The reason such contact is important is that it helps to deal with informational asymmetries: i.e. to build reputation for service quality.

Data collected by the Institute of Directors/ Chamber of Commerce, reported that in 2018, of 477 respondents, close to 90% indicated that the evolution of air links in the previous 5 years had contributed negatively to their business. Frequent criticisms related to the cost of travel for business and clients. The latter effect, combined with the relative lack of connectivity in Guernsey relative to Jersey, had, in the opinion of respondents, contributed to lost business opportunities. (e.g. funds being placed in Jersey and not Guernsey).

By contrast the initiation of the open-skies policy post 2018 has contributed to an improved perception of the effects of air connectivity on business operations. A survey of business attitudes in 2019 revealed that of 270 respondents, around 40% had thought changes to air links had made a positive contribution to their businesses, with 40% neutral and 20% seeing a negative contribution.

The effects of improved connectivity may be less about business expansion and more about avoided losses

This data and the tenor of comments – notably about the threat of lost businesses – suggest that the appropriate focus, in the short-to-medium term at least, of connectivity is on loss-reduction. That is also in line with other considerations (full employment, restraints on population growth) that make analyses projecting a step change in investment and business expansion, less relevant to Guernsey's situation

Data submitted by the IOD, based on a survey of businesses, estimated that 30-45 financial sector jobs per year were at risk from a finance sector institution choosing to close or relocate.

Submissions made as part of the evaluation provide a third view of potential business impacts.

Survey data provided for the finance sector suggests indicative GVA losses between 0.11% and 0.27% per year depending on assumptions. These results could be used in discussing sensitivities around the core modelling results

To ascertain the overall impact of losses/ foregone opportunities, we need to take into account that workers move between sectors. A worker losing a job in the finance sector may be reemployed elsewhere; similarly, in the presence of full employment and restraints on inflows of workers, an expansion of employment would require reallocation for other sectors. Hence any contracting (expansion) effect in finance would need to be set against an expansion (contraction) effect in other sectors. The net effect on GVA will depend on the relative productivity of workers in each sector.

GVA per employee in the finance sector is around £190,200 per year, compared to around £76,500 for other sectors. If all 30-45 workers that were lost from the finance sector were redeployed in other sectors, the lost GVA would be between £3.4 million and £5.1 million, or between 0.11 and 0.16 percent of GVA per year. If none of the lost workers were deployed (for example, if they left Guernsey), GVA losses would be between £5.7 million and £8.6 million per year, or between 0.18% and 0.27% total GVA per year.

The figures provide illustrative evidence of how foregone opportunities could translate into wider economic impacts. As they are based on survey evidence, they form an input into the overall evidence base. We do not include they in the formal modelling analysis, but treat them as a factor to take into account when considering sensitivities around the core modelling results.

Although it is important to note that some stakeholders were sceptical about the extent to which air connectivity was the main binding constrain on business

In Guernsey's specific context, various submissions, notably by the CGI, alluded to the existence of multiple constraints affecting business establishment and expansion in Guernsey, including constraints on skills and demographic factors. These, rather than connectivity to and from Guernsey, were deemed to be the binding constraints. Some businesses averred that air connectivity had little or no bearing on their operations. Other submissions pointed to the growing value of remote technologies in conduct of business. This was notably the case for tech-sector start-ups.

Summary of business facilitation and expansion effects

We have estimated two different mechanisms through which the runway extension can generate business facilitation and expansion effects, and through this stimulate economic growth.

- A top down approach based on the effects of runway extension in stimulating cross-border trade in financial services. We draw on evidence suggesting that financial services are particularly dependent on connectivity, given the highly relational nature of the business and the importance of facilitating contacts between service providers and clients. Increases in cross-border trade stimulate productivity increases, which in turn facilitates the expansion of economic activity
  - The gains through this channel are estimated at between £21 million and £153 million on a PV basis. The upper end of this range would more than cover the costs of the runway extension. The lower end of this range would mean that there are net gains under a scenario in which visitor spending effects (measured in the previous chapter) are just sufficient to cover the costs of the extension.
- A bottom up approach based on estimating effects of improved reliability on finance sector productivity. We draw on a bespoke analysis of reliability trends and their relationship to productivity in Guernsey, on the grounds that improvements in reliability increase the propensity for business visits, which stimulates financial sector productivity by facilitating transactions.
  - The gains through this channel are estimated at £11 million and £87million in PV terms. The results are lower than the impacts estimated through the first method, which is comprehensible given the differences in focus. Nevertheless, they tell a consistent story.

Stakeholder input corroborates the analysis reported above, and also sheds light on potential costs under a no-extension scenario

- The current situation is associated, in the view of stakeholders, with multiple constraints on businesses operating in the finance sector. These costs could divert business away from Guernsey. The lost GVA effects associated with such diversion are valued at between £3.4 million and £8.6 million per year. We do not include these figures in the overall net benefit calculus. But they could be interpreted as a sensitivity around these, particularly in relation to the cost of no extension.

In addition to economic growth effects, the runway extension could generate a range of other benefits.

The economic effects of runway expansion on GVA are likely to generate increased government revenues. If the current tax regime remains unchanged then increased visitor spending and increased financial sector output would increase tax revenue for the States. We present high-level estimates of the size of the potential increase.

We have also been provided with some evidence that the runway extension project has the potential to generate benefits to Guernsey residents through the following channels:

- Improved access to residents to healthcare facilities and services off-Island
- Improved access to cultural and sporting activities, whether through the organisation of these on-island or access to these off-Island.

The runway extension project also has the potential to generate environmental and social impacts through:

- Effects on aircraft emissions and noise
- Effects of the execution of the extension project itself on the environment, and on social goods that might be affected by changes in land use.

:

First, growth in GVA leads to higher tax receipts.

Increases in tax revenue as a result of direct spending GVA effects and business expansion GVA impacts

The runway extension is projected to generate GVA increases through the effects of increased visitor spending, and through business expansion effects. This means that the overall resource base for the economy has increased, which in turn increases the resource base from which the States raises tax revenue.

It is common practice world-wide to develop fiscal policy by projecting growth in the taxable resource base for governments by projecting growth scenarios (see references below). In estimating fiscal impacts of the uplift in growth projected by the extension scenario, we need to take into account the specificities of Guernsey's tax system, including:

- Corporate tax rates of zero on non-financial sector activity, and 10% on the finance sector
- A 20% income tax rate on net income after the application of allowances

In order to work out the effects of increased growth rates on tax, we used the following methodology:

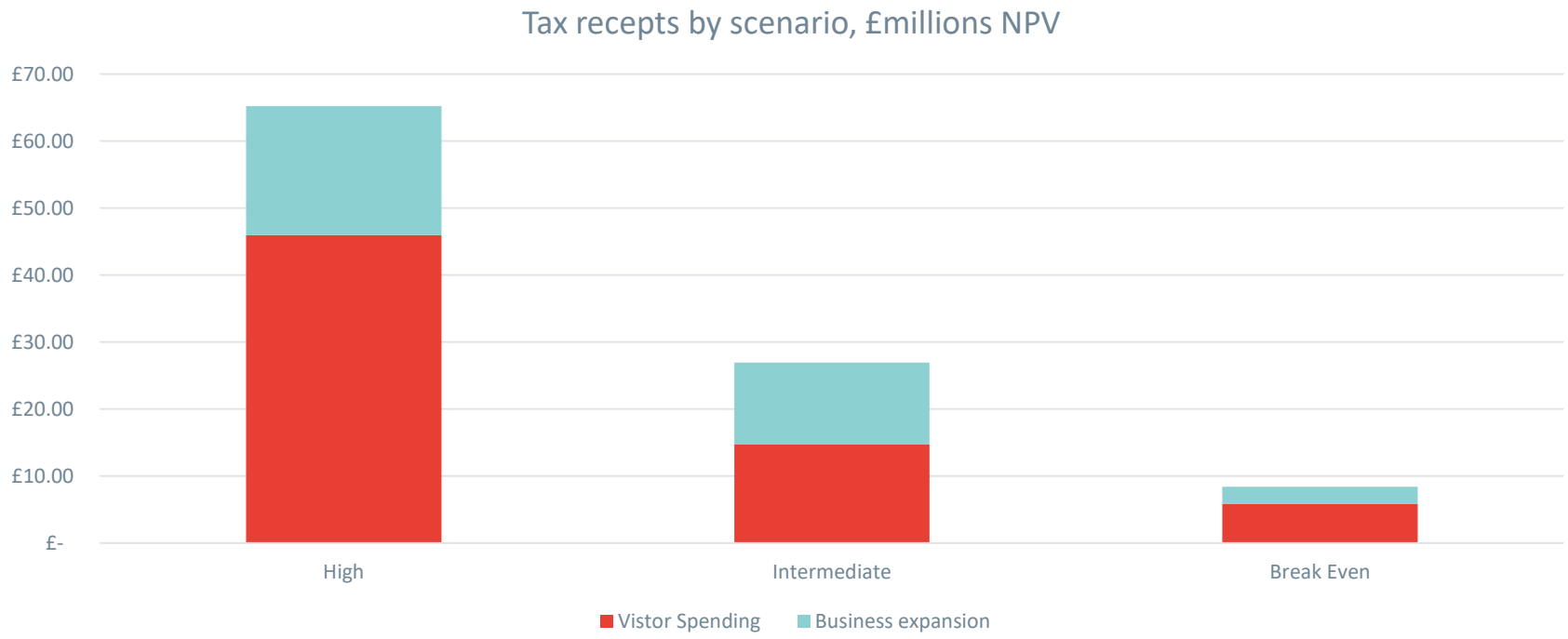
- For increased GVA generated by visitor spending, we estimated the share of increased GVA accounted for by earnings, on the basis of existing data which shows that employment accounts for around 42% of total GVA. We used data from the States schedule of benefit payments and contribution rates to subtract that portion of the 42% was attributable to pension and social security contributions made by employers and employees (controlling for different rates of contribution for employed and self-employed by looking at the relative shares of these two classes of workers in 2019). We then computed the tax receipts from this share based on a rate of 20%. The approach is conservative since it assumed that all visitor spending is directed to sectors that face a zero tax rate on profits
- For increased GVA generated by business expansion in the finance sector, we separated out shares attributable to profits and shares to employment earnings. We used a split of 65% v 35% based on trend in recent years. The profits share was assumed to be taxed at 10%. The employment earnings were taxed according to the methodology described in the previous bullet point

References: see notably Gerrit Koster, Christoph Priesmeier (2017), Revenue Elasticities in Euro Area Countries, ECB Working Paper No.1989; Paulo Dudine and Joao Tovar Jalles (2017) "How buoyant is the tax system: New evidence from a large heterogeneous panel", IMF Working Paper WP/17/4

In PV terms, tax receipts increase by between £8.5 million and £65 million over the 40 year period.

The tax increases assume no change to tax structure and constant shares of GVA by sector, and within sectors for employment earning and profits

The chart reports the results by scenario, and reports the break down by visitor spend impact and business expansion impact



We have also received evidence that improved connectivity could lead to better and more affordable access to healthcare for residents.

Gaps in specialist medical skills in Guernsey sometimes require that residents need to travel off Island to access treatments. In 2019, the authorities report that 11,622 movements (outbound and inbound) took place. The vast majority of these are to the UK, with Southampton as the preferred destination on account of its proximity.

Data on referrals suggest that around 54% of referrals are for patients that are outside the age range of 18-60. Patients in this range are more likely to require assistance via another accompanying adult.

Potential cost-savings from increased connectivity can be categorised as follows:

- Lower air fares for a patient, which would be a saving directly accruing to the exchequer given that the state bears the cost of patient travel
- Lower air fares for accompanying adults, which would accrue to them in most cases, unless means-tested state support is provided
- A higher frequency of flights could increase the possibility of making day returns, saving costs related to accommodation and also the opportunity cost of time for patients and for carers
- If the runway extension and associated works leads to fewer flight disruptions, this would reduce costs associated with rescheduling treatments and prolonged stays.

Our modelling of the intermediate scenario suggest a reduction in fares of around 39% for routes to Gatwick and Southampton. By way of illustration, the States has a set return rate for Southampton at around £172. There were around 4000 bookings for the Southampton route for health referrals in 2019. Assuming travel for health referrals is not sensitive to price, that would imply a savings of around £270,000 to the States in 2019 on that route alone.

Note: data and evidence above provided by the Health and Social Care and Employment and Social Services Committee.

Improved connectivity is important for cultural and sports activities, some stakeholders have suggested.

Stakeholder consultations emphasised the importance to Guernsey of sporting and cultural events. Both are dependent on connectivity because:

- Guernsey's small size means that sportspeople and performers need to access competitions and events off-Island, mainly in the UK. For example, Guernsey Football Club participates in regional football competitions in South-East England. The prospects for participating in larger-scale competitions and events held off-Island is important in terms of progression pathways in both sports and artistic contexts.
- More generally, consultations pointed to the benefits to residents of engaging in cultural events off-Island.
- Affordable travel options to Guernsey are an important factor in the ability to organise events on-Island, in terms of attracting participants (artists, performers, sports people), as well as visitors. Consultations pointed to a growing "events culture" in Guernsey.

There are various spillover benefits of facilitating access to sports and cultural events:

- Visitors to Guernsey generate revenue to businesses, including hoteliers and restaurateurs. Stakeholders consulted suggested around 3,000 to 3,500 bednights sold to participants in arts and cultural events.
- Hosting events, and facilitating access to participants can enhance the attractiveness of Guernsey. Aside from the direct benefits to residents, this can facilitate the attraction and retention of workers.

We also address the three categories of environmental and social impacts of extension.

CO2 Emissions	**Our approach is to model the additional CO2 emissions impacts** for incremental flights that are set up as a result of a net increase in passengers from runway extension. The incremental flights on routes from the following are used: 1. **Frontier Intermediate Case Modelling Results** 2. **High Case Modelling Results** **These impacts are measured** in terms of **total additional CO2 produced**, which is converted into a **£ value for social cost**. **Two different methods are used to model the additional CO2 and social cost** for a given flight: a. **Emissions per representative aircraft**: use an estimate of fuel burn for a particular type of aircraft (e.g. A319) on a given route length, and convert it to CO2 produced. b. **Emissions per passenger-km**: use a direct estimate of emissions per passenger-km from a public source The social cost of CO2 per flight is scaled up to total annual social cost for each of the Intermediate and High results.
Noise	**Our approach is to use publicly available data on aircraft noise** at the standard three certification points (Lateral, Flyover, Approach) **to measure the total additional noise generated by a single flight by different aircraft** – namely, A320neos and ATR-72s. **This data is used with output from Frontier Intermediate and High Case modelling** to calculate the **projected total additional annual noise as a result of runway extension**. We have calculated a value for the current level of aircraft noise at Guernsey airport, to provide context to the additional noise that will occur due to runway extension.
Other environmental and social costs	These result form the extension process itself ▪ Environmental costs of the extension process: e.g. impact on landscape from clearing and filling ▪ Social impacts of changes to land use

The analysis of these effects is preliminary. It provides information that we incorporate into our assessment of net benefits.

At the same time, our research indicates the need for a more in-depth study of these effects.

Three methods were used to model the social cost of CO2 emissions for incremental flights.

The methods used are described below. There are two alternative approaches for the per passenger-km method, each with different underlying data.

Method A: Representative Aircraft approach

1. Take raw data for fuel burn (gallons) for a given aircraft (e.g. A320neo) on a 1100km flight
2. Convert fuel burn from gallons to kg. Divide by 1100km, to reach fuel burn (kg/km)
3. Revise the fuel burn (kg/km) number upwards to account for flights out of GCI being shorter than 1100km
4. Convert fuel burn (kg/km) to CO2 produced (kg/km) using an emissions factor
5. Multiply up by flight distance to reach a CO2 produced value for a GCI flight
6. Reach a social cost £ value per flight related to CO2 production, by multiplying by a monetary value computed by the UK government
7. Multiply the social cost related to CO2 emissions per flight by expected number of incremental annual rotations to calculate total annual social cost related to CO2 emissions on new flights.

Method B1: Per Passenger-km approach

1. Take raw data on average airline CO2 emissions per passenger-km from UK government sources. Use data for both domestic flights and short haul European flights
2. Scale up using data for number of passengers and distance to reach a figure for total CO2 emissions on a GCI-LGW flight
3. Calculate a social cost £ value per flight related to CO2 production, by multiplying by a monetary value computed by the UK government
4. Multiply the social cost related to CO2 emissions per flight by expected number of incremental annual rotations to calculate total annual social cost related to CO2 emissions on new flights.

Method B2: Per Passenger-km approach

1. Take raw data on average airline CO2 emissions per passenger-km for a low-cost airline's flights.
2. Revise the CO2 emissions per passenger-km number upwards to account for average Easyjet route distance being larger than GCI-LGW route
3. Scale up using data for number of passengers and distance to reach a figure for total CO2 emissions on a GCI-LGW flight
4. Calculate a social cost £ value per flight related to CO2 production, by multiplying by a monetary value computed by the UK government
5. Multiply the social cost related to CO2 emissions per flight by expected number of incremental annual rotations to calculate total annual social cost related to CO2 emissions on new flights.

The methods are used to estimate CO2 emissions for a given flight between airports. This information is then used to calculate additional CO2 and corresponding social cost for the set of Frontier Intermediate and High Case results on the incremental flights operated as a result of extension. Consolidation of pre-existing flights operated by smaller planes (e.g. ATR-72s) into bigger planes (e.g. A320neos) is not included in our analysis. On this basis, our results are conservative.

Intermediate results predict up to a 1% increase in Guernsey's annual CO2 emissions as a result of runway extension.

			Method A		Method B1		Method B2	
Destination	Annual Incremental Rotations	KM	CO2 produced (Kilotonnes)	Social Cost	CO2 produced (Kilotonnes)	Social Cost	CO2 produced (Kilotonnes)	Social Cost
[C.I.C]	[C.I.C]	[C.I.C]	0.6	£40,602	0.5	£36,124	0.6	£40,858
[C.I.C]	[C.I.C]	[C.I.C]	0.4	£25,017	0.5	£36,066	0.4	£25,175
[C.I.C]	[C.I.C]	[C.I.C]	0.1	£9,311	0.1	£8,284	0.1	£9,370
[C.I.C]	[C.I.C]	[C.I.C]	0.1	£9,325	0.2	£11,686	0.1	£9,384
[C.I.C]	[C.I.C]	[C.I.C]	0.1	£8,220	0.2	£11,218	0.1	£8,272
[C.I.C]	[C.I.C]	[C.I.C]	0.1	£9,769	0.1	£9,832	0.1	£9,831
[C.I.C]	[C.I.C]	[C.I.C]	0.1	£8,481	0.2	£10,628	0.1	£8,535
[C.I.C]	[C.I.C]	[C.I.C]	0.1	£6,217	0.1	£7,791	0.1	£6,256
Total			**1.7**	**£116,941**	**2.0**	**£131,269**	**1.8**	**£117,680**

Sources: can be provided upon request.

Note: only those routes with incremental flights operated due to extension are shown.

The table presents results for the social cost of increased emissions relative to a no-extension scenario according to the three methodologies described in this section. The social cost is derived by measuring the quantity of emissions from aircraft movements, multiplied by a monetary value that reflects an assessment of the damages resulting from the emissions of a unit of CO_2.In this case the monetary value is the official value used by the UK Government in its calculation of the social costs of carbon emissions.

Our analysis suggests that CO2 emissions in Guernsey will increase by up to 1% following extension. This is calculated using the CO2 emissions value for 2017 in Table 2.1.1. of Guernsey's Annual Greenhouse Gas Bulletin, 2017.

The table shows that in the Intermediate Case, the annual social cost from increased CO2 emissions is estimated to be £110,000 to £140,000. Measured over the life of the project, the total social cost is £2 million in NPV terms. These costs are included in our overall net benefit calculus and are set against the GVA impacts projected as a result of increased visitor spending and business facilitation/ expansion effects.

High Case results predict up to a 5% increase in Guernsey's annual CO2 emissions as a result of runway extension

			Method A		Method B1		Method B2	
Destination	Annual Incremental Rotations	KM	Total CO2 produced (Kilotonnes)	Total Social Cost	Total CO2 produced (Kilotonnes)	Total Social Cost	Total CO2 produced (Kilotonnes)	Total Social Cost
[C.I.C]	[C.I.C]	[C.I.C]	1.2	£78,344	2.0	£132,431	1.2	£77,791
[C.I.C]	[C.I.C]	[C.I.C]	0.4	£27,033	0.3	£19,854	0.2	£13,077
[C.I.C]	[C.I.C]	[C.I.C]	2.3	£154,254	3.3	£219,432	2.3	£153,167
[C.I.C]	[C.I.C]	[C.I.C]	2.5	£166,180	2.8	£189,969	2.5	£165,008
[C.I.C]	[C.I.C]	[C.I.C]	0.7	£45,872	1.0	£65,254	0.7	£45,549
[C.I.C]	[C.I.C]	[C.I.C]	1.4	£92,233	2.3	£155,910	1.4	£91,583
Total			**8.4**	**£563,916**	**11.7**	**£782,850**	**8.2**	**£546,175**

Sources: can be provided upon request.

Note: only those routes with incremental flights operated due to extension are shown.

The table presents results for the social cost of increased emissions relative to a no-extension scenario according to the three methodologies described in this section.

Our analysis suggests that CO2 emissions in Guernsey will increase by up to 5% following extension.

The table shows that in the High Case, the annual social cost from increased CO2 emissions is estimated to be £540,000 to £790,000. The total social costs of emissions is around £9million in NPV terms. These are costs are included in our overall net benefit calculus and are set against the GVA impacts projected as a result of increased visitor spending and business facilitation/ expansion effects.

The emissions impact analysis may in future need to be adapted to technological changes and to policy

Aircraft technology is changing in response to policy and consumer pressure

The analysis of these impacts is based on actual emissions data. It may be that over time carriers invest in lower emissions aircraft such as the Airbus Neo (see Annex 6). The runway extension may facilitate the deployment of such aircraft, given their take-off and landing requirements, which make them unsuited to the current runway length.

Over the economic life of the runway, it is likely that there will be further innovations in aircraft technology. These include alternative fuel technologies, and modification to aircraft structure and equipment (see Annex 7). The effects of these innovations remain at the level of conjecture, and are therefore not included in the formal analysis. There is evidence to suggest that some low emissions technologies – notably battery power – would require longer runway lengths. If this is the case, an extension may preserve the option that these aircraft deploying these technologies may be used to service Guernsey.

Flights into and out of the EU are currently subject to the requirements of the EU Emissions Trading Scheme, which stipulates that permits need to be surrendered corresponding to the quantity of emissions. These costs, and any further voluntary decision taken by carriers to offset emissions, are ones borne by the carriers themselves.

We have also assessed the impact of noise from additional aircraft landing on an extended runway.

There is an extensive body of work in the literature which covers how noise impacts on society. The UK Airports Commission (2013) considered that aviation noise in particular has an impact through the following channels:

- Annoyance
- Sleep disturbance
- Health impacts, including heart disease, stress and dementia

The impact of noise will also vary at different times of day. For instance, The Airports Commission state that there is difference in night-time compared to day-time aviation noise on the basis that night-time noise is more likely to impact on sleep. This means that a robust analysis of the impact of runway extension at Guernsey Airport should include an assessment of when additional flights are likely to take place.

The first in any assessment of noise impacts is to measure noise levels. The Airports Commission states how noise measurement is made a difficult task by the subjective nature of hearing varying by individual. There are also different ways to measure noise, for example, by focusing on the duration and frequency of a particular noise, or by focusing on the level and intensity of a noise.

The CAA (2003) state that aviation noise is measured at three different certification points:

- Lateral: following departure, 450m to the side of the initial climb after lift-off
- Flyover: following departure, under the departure climb path, 6500m from the start-of-roll
- Approach: prior to arrival, under a 3 degree descent path 2000m from runway threshold

At each of these certification points, noise is measured in terms of Effective Perceived Noise in decibels (EPNdB), which varies in terms of both intensity and frequency of noise. EPNdB only measures the annoyance impact of noise. A total noise level is calculated as the sum of noise across all of these certification points.

Our Approach

Our data source is EASA Europa data for February 2020 on noise levels measured in effective perceived noise in decibels (EPNdB) for different aircraft configurations. Noise is measured at each certification point: Lateral, Flyover, Approach.

Our approach was to calculate the sum of noise at each certification for a given aircraft. Output from the Intermediate and High Case modelling on number of incremental annual rotations on flights was used to estimate the total additional annual aviation noise due to runway extension.

As with our CO2 emissions modelling, consolidation of pre-existing flights operated by smaller planes (e.g. ATR-72s) into bigger planes (e.g. A320neos) is not included in our analysis. On this basis, our estimates for the impacts of extension on noise are conservative.

Intermediate Results predict up to a 5% increase in annual noise from flights at Guernsey airport.

Destination	Annual incremental rotations	Annual Noise (EPNdB)
[C.I.C]	[C.I.C]	29,311
[C.I.C]	[C.I.C]	12,769
[C.I.C]	[C.I.C]	5,905
[C.I.C]	[C.I.C]	5,342
[C.I.C]	[C.I.C]	4,467
[C.I.C]	[C.I.C]	5,577
[C.I.C]	[C.I.C]	4,815
[C.I.C]	[C.I.C]	3,616
Total		**71,802**

Sources: can be provided upon request.

Note: only those routes with incremental flights operated due to extension are shown.

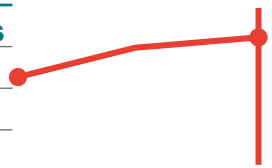
Interpreting our Results

Aviation noise is affected by many different factors, including the aircraft. Our view is that it is not possible for us to take all relevant factors affecting noise into account. On this basis, our results should be viewed as purely indicative and with caution.

Our analysis suggests that aircraft noise at Guernsey airport will increase by up to 5% following extension. There are three things to consider when interpreting this number:

- This increase in noise is entirely due to incremental flights being operated, and therefore should be viewed in the context of noise being more frequent at Guernsey airport, rather than noise from flights themselves becoming louder or more intense.
- Incremental flights will be served by A320neos, which are below the required noise thresholds and quieter than their predecessor, the A320.
- This percentage increase will likely only lead to a small change in noise levels, since Guernsey Airport has relatively few movements compared to other airports. The table below compares Guernsey Airports annual movements against those of Gatwick and Jersey.

Airport	2019 Flight Departures
GCI	10,436
JER	11,836
LGW	140,350



If the additional flights predicted by the modelling took place at LGW, it is likely that those additional flights would only lead to less than an additional 1% of noise at LGW.

Sources: OAG, https://www.gatwickairport.com/business-community/about-gatwick/company-information/gatwick-key-facts/

High Case Results predict up to a 15% increase in annual noise from flights at Guernsey airport.

Destination	Annual incremental rotations	Annual Noise (EPNdB)
[C.I.C]	[C.I.C]	32,862
[C.I.C]	[C.I.C]	12,398
[C.I.C]	[C.I.C]	79,183
[C.I.C]	[C.I.C]	94,775
[C.I.C]	[C.I.C]	23,413
[C.I.C]	[C.I.C]	38,989
Total		**281,620**

Sources: can be provided upon request.

Note: only those routes with incremental flights operated due to extension are shown.

Interpreting our Results

Aviation noise is affected by many different factors, including the aircraft. Our view is that it is not possible for us to take all relevant factors affecting noise into account. On this basis, our results for the additional noise generated as a result of runway extension should be viewed as purely indicative and with caution.

Our analysis of the High Case modelling outputs suggests that aircraft noise at Guernsey airport will increase by up to 15% following extension.

The caveats to interpreting our results, as stated for the Frontier Intermediate set of results on the previous slide, also apply to this set of High Case results.

Other impacts: the runway extension may cause localised community impacts that could be further examined.

The runway extension under a 1740 metre with traditional RESA would involve decisions over land use in the perimeter of the airport. Specifically:

- [REDACTED]
- [REDACTED]
- [REDACTED]

In considering the social costs, we assume that private costs (e.g. lost value of property) will be compensated. This is in line with past practice. We therefore consider the social benefits: ie those enjoyed by the community at large through these assets.

The main sources of loss are:

- Costs of congestion that may arise as a consequence of road closure and diversion (though this may be offset in the future if reconfigured roads are better suited to traffic conditions)
- The loss of amenity values associated with the valley and the roads. [REDACTED].

There will also be temporary social costs related to the construction phase of the extension. These include:

- Greenhouse gases emitted as a by-product of the construction process
- Increased traffic congestion for the transportation of raw materials.

The extent and value of these effects could be measured as part of further work.

Summing up: the economic benefits of extending the runway are likely to outweigh the costs over a 40 year period.

Our analysis projected the following annual increases in visitors by air relative to the no-extension base case:

- **High Scenario:** 61,000 additional visitors per year.
- **Intermediate scenario:** 20,000 additional visitors per year.
- **Break even scenario:** 7,700 additional visitors per year.

The table below summarises the results of our modelling of the net benefits of runway extension the across the three visitor number scenarios described above and on the previous pages.

The results are increases in Gross Value Added (GVA) to the Guernsey economy over-and-above the no-extension baseline scenario and reported in net present value (NPV) terms for the (standard) 40-year lifetime of the project, using a 3.5% discount rate.

Scenario (visitor impact)	High	Intermediate	Break-even
GVA impact: visitor spending effects (over 40 years)	£627m	£201m	£85m
GVA impact: business expansion effects (top down, over 40 years)	£153M	£86M	£21m
Resource costs of 1740m traditional RESA (total cost)	– £84m	– £84m	– £84m
Social cost of increased emissions (present value over 40 years)	– £9m	– £2m	– £1m
Net benefits (visitor spending effects only)	**£534m**	**£115m**	£0m
Net benefits (including business expansion effects)	**£687m**	**£201m**	£21m

The net benefits from the visitor spending alone are sufficient to cover the costs associated with runway extension

The net benefits from visitor spend for the "break even" scenario by definition: we have created a scenario to examine how many additional visitors would be needed to cover the runway costs. The answer: just over 8,000 per year.

Our overall conclusion on the benefits of runway extension would hold under a wide range of projections about visitor numbers and their effects

Our overall conclusion is that the runway extension is justified based on the benefits that arise from the economic impacts of visitor spending and business expansion. Indeed, the former effect on its own is sufficient to justify the costs incurred in investing in runway extension.

- We have adopted a cautious approach to assessing the potential benefits of runway extension. This has included developing sensitivities around projected visitor increases, and focusing on business expansion in one sector (financial services) only.
- The break-even scenario suggests that only a modest increase in annual visitor numbers is required for the runway extension to be justified on the basis of visitor spending impacts alone. Under that scenario, further benefits through some business expansion effects may be realised.
- There is some evidence to suggest that a no-extension case could lead to costs in terms of lost business opportunities. While we have not included these in our core calculus, they should be borne in mind in considering the outcomes under a no extension scenario. In that context, a break-even scenario could be presented as a safeguard against such losses.
- Other sources of benefits include increased tax revenues reflecting the economic impacts of increased spending and business expansion; access to healthcare services and facilities for residents; and positive effects on cultural and sports.

We have carefully considered social and environmental costs

- Given the importance of addressing climate change and the impact of additional greenhouse gas emissions on Guernsey's ability to support climate policies, we have paid particular attention to quantifying the social costs of emissions increases. We have documented our best current estimates of those increases and their social cost.
- Our estimates also point to increased noise effects, through these need to be understood in the context of the current relatively low level of air traffic to and from Guernsey and low levels of noise now compared to previous years when the island was served by louder aircraft. These findings are particularly sensitive to assumptions and should be treated with caution.
- There is some evidence of social costs relating to changes in land use.
- The analysis of social and environmental costs conducted in this study is at a relatively high level. Our findings indicate that further, more in-depth research should be considered.

Finally, many of the parties consulted agreed that the runway extension was not a panacea, notwithstanding the projected economic benefits. In particular, stakeholders pointed to the value of complementary interventions, ranging from initiatives to strengthen tourism to initiatives to attract and retain skills, that would be needed to support growth that a runway extension could create.

This analysis provides evidence in each of the areas highlighted as strategy objectives in the November 2018 Policy Letter.

Pursuant to the Policy Letter of November 2018, the States of Deliberation approved the Air and Sea Route Policy Development and Investment Objectives in December 2018.

We evaluate the findings of the analysis of the next benefits of an extension, relative to no extension, against these objectives. We take into account the view of the CfED that no one investment will address on its own the issues of connectivity, reliability and affordability of air links, or the wider economic and social objectives that may be promoted by addressing these issues.

Objective	Findings of this analysis
Meet future requirements of residents of Guernsey	The analysis presents evidence of economic and social benefits to residents
Enable economic growth	Quantified gains through visitor spending effects on GVA and through business expansion effects.
Increase visitor numbers	Projections of high and intermediate case visitor increases
Affordability: Incentivise airlines to help stimulate market growth through lower fares	The modelling projects fare reductions as a result of increased service provision
Affordability: Attract carriers with capability to sustainably offer market competitive fares	Projected increase in route offer and flights. The analysis assumes the provision of route development incentives over 10 years
Connectivity	The analysis demonstrates the potential for a wider range of routes and destinations.
Reliability	Extension increases the likelihood of attracting established carriers that optimise operations across networks, and who would be able to service Guernsey by deploying aircraft that are deployed on their network as a whole.

Annex 1: methodology for visitor estimate in the Intermediate scenario (1 of 2)

Data

OAG aviation traffic and scheduling data from OAG.

Modelling passenger volumes on existing routes

1. Estimated the reduction in fares that could be achieved by a low-cost carrier (LCC) operating on a route:
   a. We calculated the average fares for point-to-point passengers travelling from Guernsey.
   b. We calculated the average fare for point-to-point passengers travelling from Jersey to any of those destinations (i.e. destinations that can be accessed with direct flights from Guernsey).
   c. We found that fares from Jersey were 39% lower than fares from Guernsey.
2. We then estimated that, if a low-cost carrier (LCC) were operating on a particular route, then fares would be 39% lower than were observed in 2019. This was a conservative estimate; the average fare from Jersey to Gatwick was 58% lower than the average fare from Guernsey to Gatwick.
3. We assumed that passenger volumes would respond to a price decrease with an elasticity of -0.7 [DfT TAG Databook], i.e. a 39% reduction in fares would increase passenger volume by 29%.
4. We evaluated whether passenger volume at 129% of current levels would be high enough to sustain the operation of an LCC on that route. We estimated that a LCC could operate on the route if the annual passenger volume on the route exceeded the passenger volumes implied by the following schedule:
   a. 1 rotation per week
   b. Seat capacity of an A320 neo.
   c. An 85% load factor
   d. A route distance of greater than 173 ([REDACTED])
5. Routes that could sustain a LCC saw a passenger increase, and routes that could not had unchanged passenger volumes.
6. The scenario does not include any changes in passenger volumes on the Gatwick route.

Annex 1: methodology for visitor estimate in the Intermediate scenario (2 of 2)

Modelling passenger volumes on new routes

1. Using data on passenger volumes for indirect journeys from Guernsey, we estimated how much passenger volumes to the destination would be increased if a direct flight were introduced. To estimate this, we calculated the savings in cost and travel time of a direct route relative to an indirect route.
   a. We calculated flight times for new direct routes by calculating the great circle distance between airports, assuming a groundspeed of 850 km per hour, and 45 minutes for combined take-off and landing.
   b. We calculated the cost of travel time, assuming a cost of £21 per hour. (https://www.gov.uk/government/publications/tag-data-book)
   c. We estimated a fare for the new direct route by using the average fare per kilometre on existing Guernsey routes.
   d. We estimated a reduction in fare from the direct flight due to LCC operation (same methodology as previous slide)
   e. We calculated gross travel costs (cost of fare + cost of time) of the direct and indirect route.
2. We calculated the percent reduction in travel costs of the direct over the indirect route, and estimated passenger demand for the direct route using an elasticity of -0.7 (DfT TAG databook).
3. We estimated that a LCC could operate on the route if the annual passenger volume on the route exceeded the passenger volumes implied by the same criteria as before, but with on average 0.5 rotations per week.
4. We have assumed that no new services will be introduced on the Gatwick route.

Modelling visitor volumes

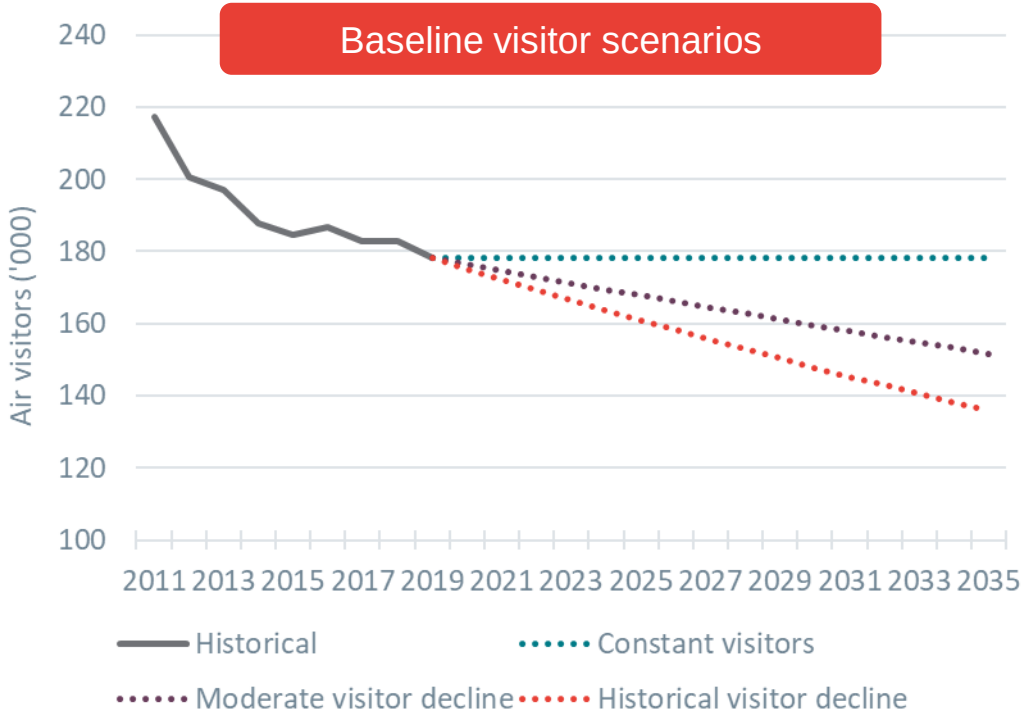
We have assumed that the proportional increase in passenger volumes from the runway extension would translate to the same proportional increase in visitor volumes.

Annex 2: We investigated how declining baseline visitor volumes could interact with the impact of the runway extension

In our main analyses, we have estimated the incremental impact of the runway extension against a no-extension case with constant visitor flows (180,000 visitors per year). However, visitor volumes have trended downward in recent years. Since 2012, annual visitors have decreased at an average rate of 1.7% per year. Therefore, as a sensitivity, we consider the effect of the runway extension under 3 no-extension **baseline scenarios**:

1. **Historical visitor decline**: the recent historical 1.7% annual decrease in visitors continues in every year
2. **Moderate visitor decline**: visitors volumes decrease 1% in every year
3. **Constant visitors**: visitor volumes stay constant (at 180,000 annual visitors)

We estimate the effect of the runway under each of these baseline scenarios. One issue to consider is how the baseline visitor trend may interact with the runway effect. There may be multiple types of simultaneous interactions. We illustrate some examples:

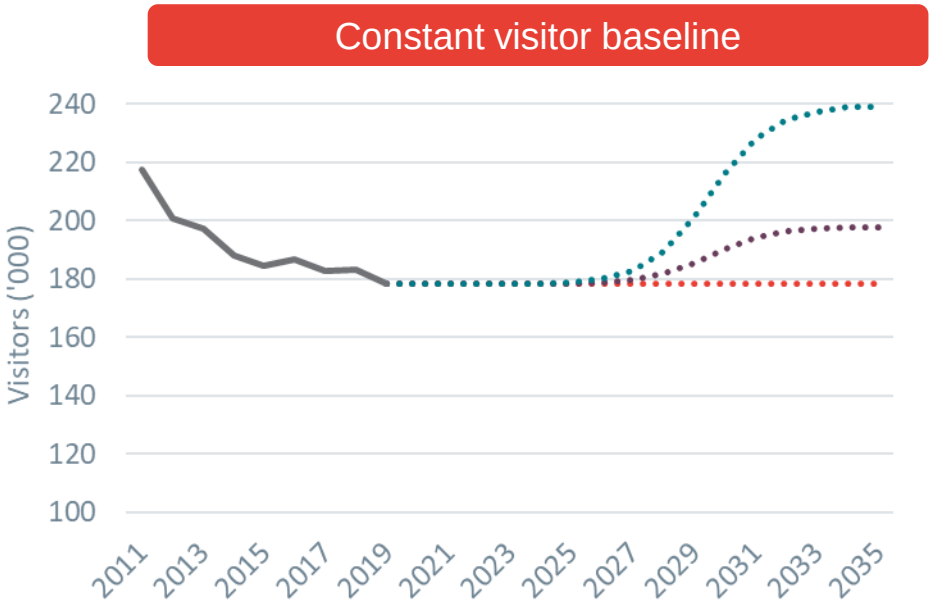


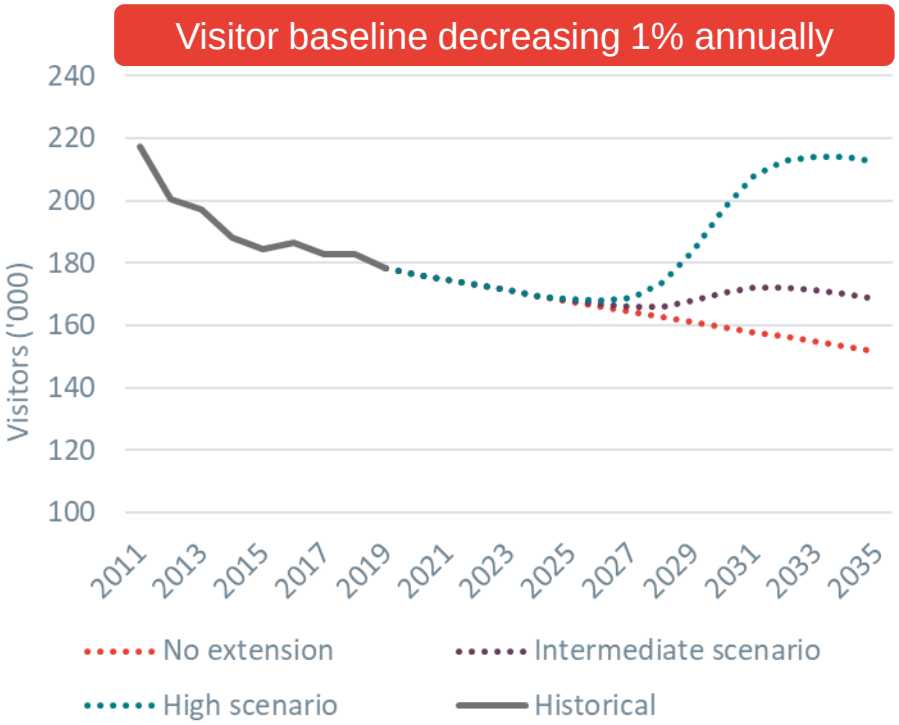
- The recent decline in visitors may be due to broad changes in preferences among potential visitors from the UK and elsewhere. In this case, a decline in baseline visitors may be associated with a decline in the incremental effect of the runway extension.
- The recent decline in visitors may be due to trends in demand that are not present among the populations served by new routes and services that result from the runway extension. In this case, the incremental effect of the runway extension may be invariant to any baseline decline in visitors.
- The recent decline in visitors may be due to Guernsey air links becoming increasingly comparatively expensive. In this case, a declining visitor baseline may indicate unserved or 'pent-up' demand for competitively priced Guernsey air links. A larger recent decline in the visitor baseline may correspond to a larger potential visitor increase from the runway extension.

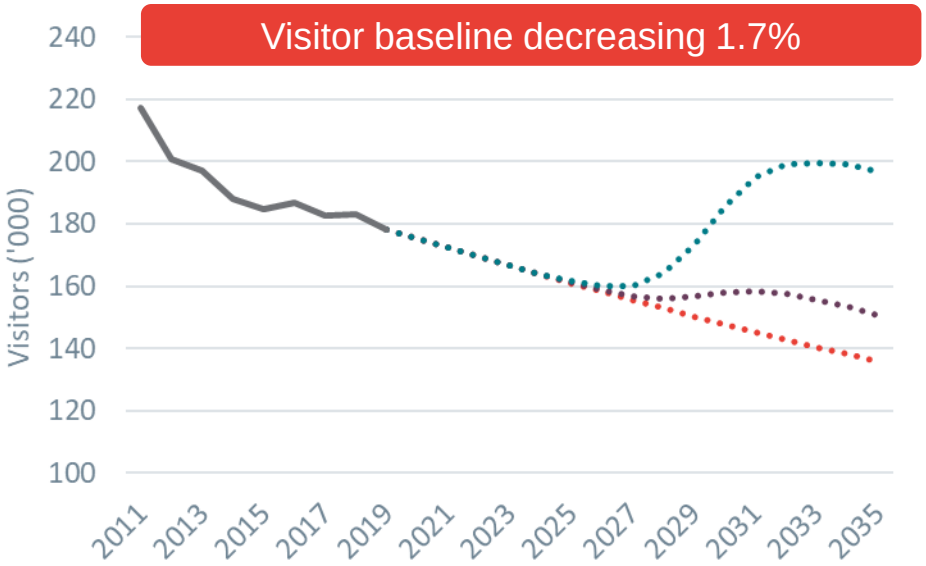
In order to capture this range of possible interactions between the baseline scenario and the runway effect, we estimate a lower and an upper bound for incremental visitors from the runway extension.

- **Upper bound**. We assume that our High runway scenario visitor impact is invariant to a baseline visitor decline
- **Lower bound**. We reduce our Intermediate runway scenario visitor impact in proportion with baseline visitor decline

Annex 2: We have modelled the impact of the runway extension under different baseline trend scenarios







- We have modelled the runway extension construction completing in 2024
- The visitor uplift required by the runway scenario to roughly recoup recent visitor losses depends on the baseline scenario.

Annex 2: The present value of visitor spend, by baseline trend scenario and runway extension scenario

We estimate the present value of benefits from visitor spend under the combinations of baseline visitor trend and runway scenario. Value is accrued beginning the year of runway completion (2024), with time discounting applied to every subsequent year.

Present value visitor spend	Constant visitors	Moderate visitor decline	Historical visitor decline
No extension	£2.4b	£2.0b	£1.8b
Extension - intermediate impact	£2.6b	£2.2b	£1.9b
Extension - high impact	£3.1b	£2.6b	£2.4b

Annex 3: Although we do not expect significant sea cannibalisation, we investigate the impact of hypothetical sea cannibalisation levels

As previously discussed, we find that there will likely be minimal sea cannibalisation from passenger increases resulting from the runway extension. However, for completeness we estimate the net benefits that would result from the runway extension under various sea cannibalisation scenarios.

Condor has informed us that their principal competitor airports are Bournemouth, Exeter, and Southampton. Therefore we focus our analysis on potential cannibalisation resulting from these routes. As in our previous analysis of Jersey route-level passenger data, we decompose Jersey sea and air passenger volumes by route into the following components:

Passenger volumes on a route = (seasonal effects on the route)

+ (trends common to all routes)

+ (trends specific to the route)

The relationship between route-specific trends on particular pairs of sea and air routes provides an estimate of the sea cannibalisation that would likely result by a passenger increase on particular air routes. Although there was no statistically evidence in support of significant cannibalisation, we have calculated an overestimate of route-level sea cannibalisation in the following way:

- We have regressed sea passenger route-specific trends (Poole and Portsmouth) on air passenger route-specific trends (Exeter and Southampton). This provides an estimate of the change in sea passengers that would be expected to result from a change in air passengers on particular routes.
- We have taken an overestimate of cannibalisation at the route level (the lower bound of a 75th percentile confidence interval for the regression coefficient). The overestimates of the change in sea passengers per increase in air passengers are:

Change in sea passengers for every increase in 1 air passenger	Portsmouth	Poole
Southampton	-0.06	-0.43
Exeter	-0.14	-0.76

As there is no direct flight between Jersey and Bournemouth, we have applied the Exeter estimates to Bournemouth passengers to be conservative, as the cannibalisation figures for Exeter are larger in magnitude than those for Southampton.

Annex 3: Given hypothetical sea cannibalisation scenarios, we have estimated net benefits from the runway extension

We have constructed two hypothetical scenarios that overestimate the effect of sea cannibalisation:

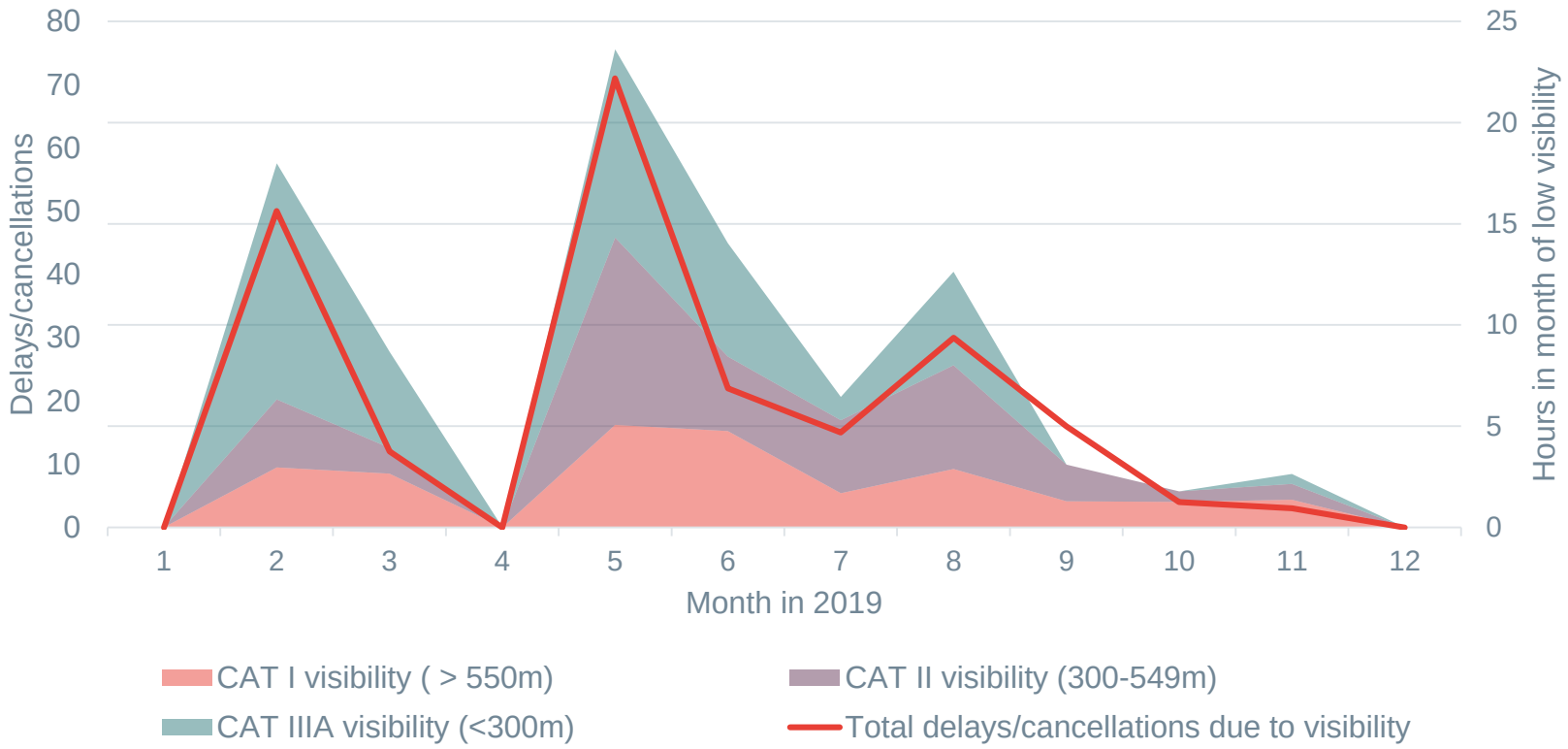
1. Medium cannibalisation: sea cannibalisation rates as described on the previous slide
2. High cannibalisation: every incremental passenger from Southampton, Bournemouth, or Exeter resulting from the runway extension is cannibalised from sea passengers

We calculate net benefits corresponding to these scenarios. For this analysis, we only show the intermediate runway scenario. The high runway scenario does not predict incremental passengers from Southampton, Bournemouth or Exeter and therefore its net benefits are unaffected by these hypothetical sea cannibalisation scenarios.

Intermediate scenario (differences against base case)	No sea cannibalisation	Medium sea cannibalisation	High sea cannibalisation
Long-run increase in annual visitors	*20,000*	*16,000*	*12,000*
Benefit from visitor spend	£201m	£161m	£119m
Resource Costs	-£78m	-£78m	-£78m
Environmental costs	-£2m	-£2m	-£2m
Net benefits (visitor spend impacts only)	£121m	£81m	£39m

In both cannibalisation scenarios, the benefits from the runway extension are likely to significantly outweigh the costs.

Annex 4: Upgrading the ILS would reduce flight delays and cancellations due to low visibility



We have received information from Guernsey Airport on visibility and also on flight delays/cancellations due to low visibility. We find that 1 hour in visibility below the CAT I requirement of 550m is associated with 3.4 delayed or cancelled flights (95% confidence interval of (2.9 to 3.9 delayed or cancelled flights)).

In 2019, the average month saw 2.0 hours of CAT I low visibility (>550m), 2.5 hours of CAT II visibility (300-549m), and 3.1 hours of CAT IIIA visibility (<300m). There were on average 18.6 delays/cancellations due to fog per month, or around 1% of total air traffic movements. The highest risk of fog delays/cancellations in 2019 occurred in February, at 4.3% of air traffic movements.*

*We note that the available data on delays/cancellation was at the monthly level. This monthly statistic may not capture higher rates of delays/cancellation occurring at particular times of day, for example in the early morning.

Annex 5 : References and sources for evidence on parameters for top-down modelling

Business connectivity and trade

- Frontier Economics estimated a gravity model of services trade, which it has used in a variety of policy modelling exercises. A brief description can be found in the report Frontier prepared in 2017 for the Royal Institute of British Architects (Frontier Economics, RIBA (2017) “Global Talent, Global Reach). The gravity model generates elasticities for bilateral trade flows in relation to various measures of trade costs. This includes distance. As the model also captures direct policy variables, notably the impacts of services trade restrictions and the existence of free trade agreements, the distance measure can be interpreted as a measure of costs associated with transport.
- In modelling the economic impacts of Toronto Pearson Airport, Frontier Economics conducted a review of the literature on the responsiveness of trade to connectivity. It noted in particular that the UK Airports Commission had in its 2015 report on airport expansion options used an elasticity of 0.3 for trade with respect to connectivity.

Trade and productivity

- The existing literature on trade and productivity is extensive, and the results vary widely. A seminal study by Cline (2004) reports that every 1 percentage point increase in trade openness, productivity increases between .14% and 0.96%. Campos and Coricelli (2014): estimates GDP benefits of EU membership for UK. The implied productivity increase is 0.34% for every percentage point increase in trade. Finally HMT in their 2016 analysis of the long term effects of the UK leaving the EU used a range of 0.2% to 0.3%. On the basis of these findings, we opt for 0.4% as an appropriate estimate for Guernsey. We then adapt these results to the financial services sector. For example, a study by Miroudot at all shows that services sector productivity changes in response to trade costs are significantly lower that other sectors 9around 12% of the overall effect). We use this as a proxy for productivity responses in Guernsey’s finance sector on the basis that some of the other channels that drive shar productivity growth (economies of scale, international value chains, large scale reallocation of productive workers from other sectors) are less applicable to Guernsey.
- References: William Cline (2004), Trade Policy and Global Poverty; Campos, Nauro F & Coricelli, Fabrizio & Moretti, Luigi, 2014. "Economic Growth and Political Integration: Estimating the Benefits from Membership in the European Union Using the Synthetic Counterfactuals Method," CEPR Discussion Papers 9968; and HMT (2016) The Long Term Economic Impact of EU membership and its Alternatives.; Sebastien Miroudot, Jehan Sauvage and Ben Shepherd (2011) “Trade Costs and Productivity in Services Sectors”, Economic Letters, 114(1): 36-38

Annex 6: Background on A320neo aircraft

Background

The A320neo is an example of a newer, more fuel efficient aircraft that might be used on any new routes operated by Low Cost Carriers out of Guernsey. Its environmentally friendly features include:

- **Improved fuel efficiency**: in total, the A320neo consumes around 20% less fuel per seat-km. This is due to the two new engine options which are able to carry more fuel and provide greater thrust. “Sharklet” wing tips which improve fuel efficiency by 7% have also been added.
- **Reduced noise**: the A320neo is quieter, based on its new engines and noise-reducing vortex generators which provides the A320neo with an up to 50% smaller “noise-carpet” than other comparable aircraft types.

Configuration

The main changes made to the configuration of the A320neo are:

- Capacity: the A320neo seats 165 passengers, compared to the A320 seating 150 passengers.
- Space: the cabin has a wider girth.
- New, larger engines: there is an option between the PurePower PW1100G-JM from Pratt & Whitney and the LEAP-1A from CFM International.
- Wing tips: these have been changed to new “Sharklet” wing tips.

Roll-out

The aircraft is still relatively new, but has already been introduced by airlines on their routes. The first airline to use an A320neo as part of their service was Lufthansa in 2016. Since then, other airlines have followed suit. Swiss Airlines are due to start operating A320neos on their Zurich to, among others, Brussels, Hamburg, Valencia and Heathrow routes later in March.

Annex 7: Possible future changes in technology

Background

There are several wider technological changes taking place in aviation that could impact a cost-benefit analysis of runway extension in the future. Our position is that currently it is too speculative to draw any firm conclusions on likely impacts, but that these could be covered in future research.

Landing Technology

This is potentially relevant on the basis that if future aircraft can land on smaller runways, then an extension to Guernsey airport's runway may not be required in order to deliver greater passenger numbers. However, it is our view that any attempt to estimate the potential scale and likelihood of this technology being transferred to mainstream aircraft in the future is highly speculative.

Biofuels and Electric Aircraft

This is potentially relevant to the cost-benefit analysis on the basis that aircraft using cleaner sources of fuel would emit a lower volume of greenhouse gases. This would in turn reduce the social costs of emissions due to increased flights from runway extension.

There have been improvements in fuel efficiency of aircraft over time, and biofuels and synfuels have very similar compositions to Kerosene, so may be compatible with existing aircraft. Batteries and hydrogen fuel cells on the other hand work differently to Kerosene. It is difficult to predict the likely take-up of biofuels and batteries/hydrogen by aircraft in the future.

Annex 8: Guernsey emissions policies and carbon offsetting

Guernsey Energy Policy

The States of Deliberation will discuss and potentially approve a new Guernsey Energy policy 2020-2050 next month. If approved in the form that is currently proposed, the Policy will adopt:

- A target of net zero emissions by 2050; and
- An interim target of reducing emissions by 57% on 1990 levels by 2030.

Given that the analysis presented suggests that runway extension will increase greenhouse gas emissions by up to 5%, it is likely that runway extension will make it harder for Guernsey to achieve its interim target. However, it is our view that determining the exact impact of runway extension on the ability of Guernsey to meet the interim target is beyond the scope of this study.

Carbon Offsets

One option to reduce the impact of greenhouse gas emissions on the environment is for the States of Guernsey to require airlines to take part in carbon offsetting schemes. Since the private sector would be responsible for obtaining EUAs, then any additional costs of purchasing carbon offsets will not flow into the cost-benefit analysis of runway extension.

Annex 9 Stakeholder consultations – list of parties

Organisation/ Person	Contact
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Digital Greenhouse	Lucy Kirby
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Committee for Economic development	Deputies Charles Parkinson Joe Mooney
[REDACTED]	[REDACTED]
Environment and Infrastructure Cttee	Deputy Barry Brehaut, Damon Hackley and Sarah McGreevy
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Guernsey Arts Commission	Russ Fossey
[REDACTED]	[REDACTED]

Annex 9: Stakeholder consultations – list of parties

Organisation/person	Contact
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
Guernsey Sports Commission	Dave Piesing and Graham Chester
Health and Social Care/Employment and Social Services Committees	Kate Loveridge and Claire Mahy/ Lee Savident
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED[]
REDACTED]	REDACTED]
Locate Guernsey	Paul Kilminster and Keith Wilen
REDACTED]	REDACTED]
REDACTED]	REDACTED]
REDACTED]	REDACTED]
States Trading Supervisory Board	Simon Elliott and Colin Le Ray
States Trading Supervisory Board (Board representatives)	Stuart Falla and John Hollis
Visit Guernsey	Mike Hopkins

Annex 10 – List of Documents Reviewed

Our research drew on documents supplied by the States and other parties

ASM (2019), GCI Airport Runway Extension, Market Assessment 2019.

BAE Infrastructure Solutions (2003), Guernsey Airport Runway Extension, Report 01

Blue Islands (2020), Guernsey Airport Runway Extension, Submission

Capt, Mervyn Dacey (2018), Guernsey Airport Low Visibility Landing Capability vs EVS ATR 72

Confederation of Guernsey Industry (2020), Guernsey Airport – Economic Case for Runway Extension

Ekosgen , Reference Economic Consulting (2018), Economic and Social Impact of Inverness Airport

Frontier Economics (2016) Toronto Pearson Airport, Economic Impact

Hollis, JC (2020), Guernsey Airport Runway Extension, Submission

Institute of Directors (2018 and 2019), Survey of Airlinks

PWC (2017), Tourism Product and Customer Experience Strategic Review

PWC (2018), Guernsey Air Links – Final Report: Strategic Options

RPS (2020), Guernsey Airport 1740m Traditional RESA Extension – Draft Costings

RPS (2020), Guernsey Airport 1740m EMAS Extension – Draft Costings

States of Guernsey, Guernsey Visitor Spend Survey Report, Various Years

States of Guernsey Air and Sea Route Policy Development and Investment Objectives, 12 November 2018.

States of Guernsey (2015), Security of Strategic Airlinks

States of Guernsey (2016), Island Development Plan

States of Guernsey (2015), Strategic Tourism Plan 2015-2025

Annex 10 – List of Documents Reviewed

States of Guernsey (2018), Committee for Economic Development, States of Guernsey Air and Sea Route Policy Development and Investment Objectives

York Aviation (2009), Airport Development – Economic Assessment of Options